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ERC Enterprise Research Centre

Ulster University Economic Policy Centre

R&D and Innovation support in Northern Ireland:

Mapping the available support, developing international benchmarks, and identifying policy opportunities

ERC Research Report

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R&D and Innovation support in Northern Ireland

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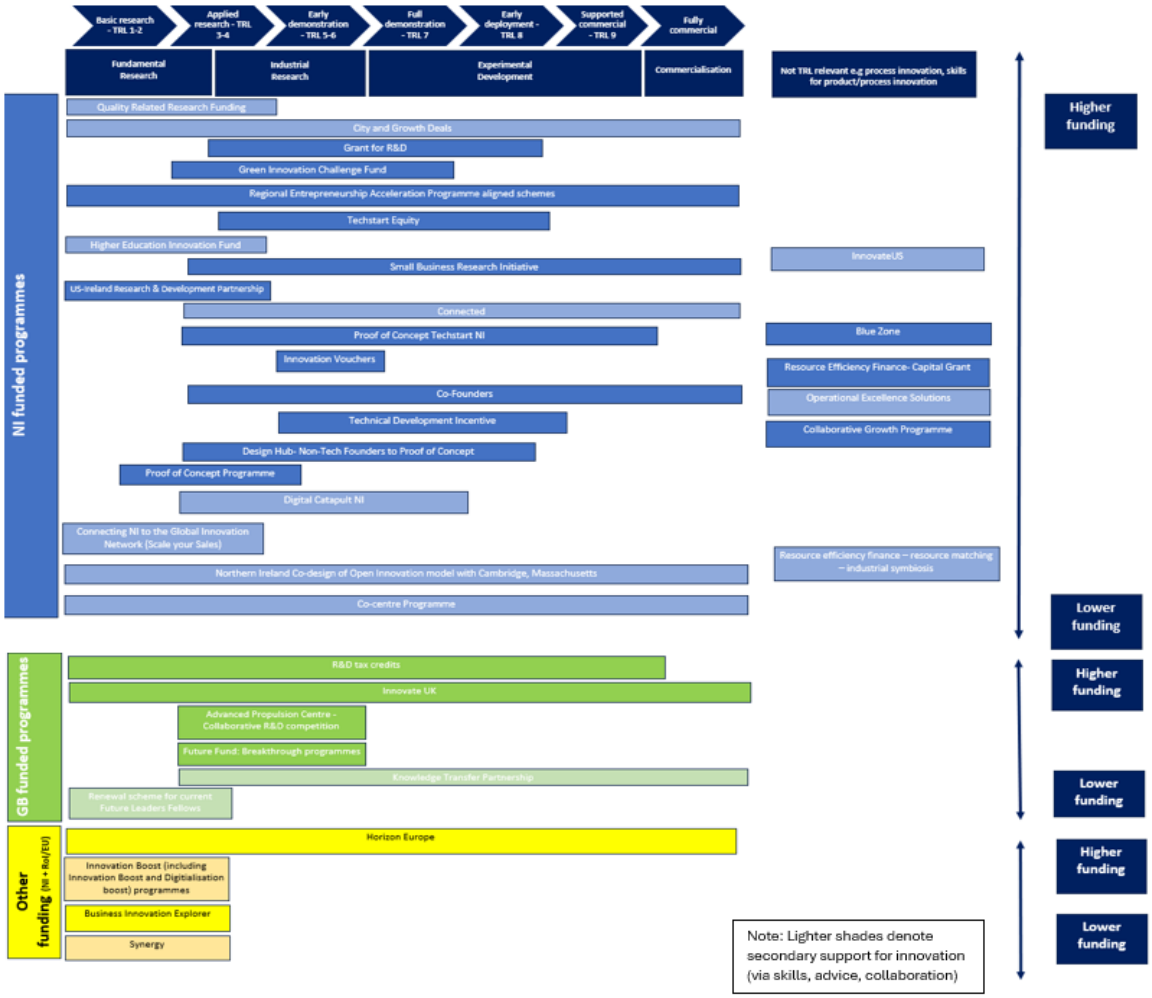
EXECUTIVE SUMMARY

This report focuses on providing a detailed overview of support measures for Research and Development (R&D) and innovation available to firms in Northern Ireland, and comparisons with selected benchmark countries. Changing policy priorities in Northern Ireland suggests the value of reviewing the adequacy and fit-for-purpose of existing support measures and considering potential lessons from other countries.

Mapping R&D and innovation support in Northern Ireland

Northern Ireland has a wide range of existing support measures for R&D and innovation provided by Invest NI and Innovate UK. Where firms are supported by these schemes the evidence suggests they significantly boost future business growth. Measures operated by both organisations as well as InterTrade Ireland, and measures such as the recently established North-South Co-Centres, also provide support to sectors in which they operate. These measures will be complemented in future years by the significant programme of investment in supporting R&D and innovation which is part of the City and Growth deals.

Figure1: Support measures for R&D and innovation in Northern Ireland



Our mapping suggests several observations on the Northern Ireland system:

- Direct grant support within Northern Ireland is provided largely by Invest NI with some support schemes restricted by eligibility conditions and/or sectoral focus.
- There is coverage at the lower TRL levels but the concentration of support measures is in the middle Technology Readiness Levels (TRLs) (3-8) with less comprehensive support available specifically for commercialisation of R&D (TRLs 9+).
- As in the broader UK support system, there is an emphasis on product/service innovation with less focus on process and organisational change.
- NI firms face a complex R&D and innovation support landscape given the availability of regional, national and cross-border support measures.
- Future expansion of R&D and innovation capacity in Northern Ireland – such as that envisaged in the City Deals – will depend critically on the availability of appropriate skills.

Benchmarking R&D and innovation support in other countries

Three main similarities emerge when examining R&D/innovation support across the five benchmark countries:

- Support systems have developed to provide support to firms at different points in their R&D and innovation 'journey', and recognise that firms' support needs will vary very significantly.
- There is a recognition that achieving objectives related to balanced growth will require targeted programmes.
- Support systems have evolved in all countries, often to focus direct support (grants) more directly on specific policy priorities and/or market failures.

Opportunities for policy development

The international landscape for R&D and innovation is changing rapidly leading to a re-orientation of policy rationales from addressing market failures to supporting policy missions. This more strategic approach to innovation policy making, and the advent of new policy priorities in Northern Ireland, suggests a range of policy development opportunities. Each of these opportunities can contribute to the Department's broad R&D objective, some are linked more strongly to supporting Comprehensive Innovation and others to objectives around Innovation Driven Enterprises.

Supporting balanced growth and Comprehensive Innovation

Supporting balanced growth and Comprehensive Innovation is likely to require broadening the base of innovating firms across Northern Ireland as well as encouraging higher levels of innovative activity among firms in economically weaker areas. Four opportunities to broaden the base of innovating firms are suggested by our analysis:

- ***Re-thinking eligibility criteria for existing support schemes*** - it may be worth reviewing the eligibility for those schemes that are restricted by either client or sector criteria to widen the pool of potential applicants.
- ***Single contact point for support*** – firms in Northern Ireland face a complex support landscape which may be off-putting to new innovators. The Innovation Fund for Denmark (IFD) operates a single point of entry for firms to the support system which could be emulated in NI, developing the existing single point of contact for NI support currently operated by Invest NI under the Innovate NI banner.
- ***Innovation lead or innovation 'pilot' programme*** – Another Danish programme provides firms new to innovation with support to recruit Innovation Pilots or Innovation Leads.
- ***Sub-regional support measures*** – consider developing support measures targeted at supporting R&D and innovation activity in less developed regions.

Supporting Innovation Driven Enterprises, good jobs and the net zero transition

Higher productivity creates the basis for paying higher wages and gives firms stronger revenue streams which can support future investments in productive capacity and lower carbon products/services. Our benchmark analysis suggests several areas where adopting more targeted support (or perhaps shifting the emphasis of current support schemes) may benefit productivity growth:

- ***Supporting commercialisation pathways*** **-** Other than academic spin-out interventions in Northern Ireland there is a lack of dedicated commercialisation-only schemes for the wider business population. The recent introduction of Founder Labs is welcome in this respect. There may however be a need for a broader intervention(s) which supports businesses to scale their demonstration or prototype models into full commercial production. This need will become increasingly important as the range of R&D-related initiatives linked to the City Deals reach maturity.
- ***Supporting process and organisational innovation*** – Evidence suggests that process and organisational innovation are most strongly linked to productivity growth. Specific measures have been introduced elsewhere to support productivity-enhancing process innovations such as Ireland's Digital Process Innovation scheme and a specific INNOVIRIS grant scheme in Belgium which supports organisational and process innovation.
- ***Extending innovation vouchers*** – Scotland has pioneered follow-on support to innovation vouchers relating to student placements and small-scale innovation projects which may be applicable in Northern Ireland.
- ***Extending R&D tax credits*** – Innovative use of tax credits in Belgium has introduced measures which augment their main tax credit scheme to support guest scientist or engineer placements with firms to support R&D and innovation projects. Although potentially difficult to implement, such measures may be helpful in both supporting individual innovation projects and cultivating closer collaboration between innovation partners.

SECTION 1: AIMS AND STUDY APPROACH

1.1 Aims and objectives

This report focuses on providing a detailed overview of support measures for R&D and innovation available to firms in Northern Ireland, and comparisons with selected benchmark countries. Changing policy priorities in Northern Ireland suggests the value of reviewing the adequacy and fit-for-purpose of existing support measures and considering potential lessons from other countries.

The project on which this report is based – and the accompanying database which provides detailed information on Northern Ireland support measures – has therefore addressed three main objectives:

- To update and extend a draft database of R&D/innovation (and related) support measures available to Northern Ireland firms;
- To profile the main R&D and innovation support available in benchmark countries including Ireland, Belgium, Denmark, Norway, and Scotland and identify potential lessons for Northern Ireland;
- To map support measures available in Northern Ireland and suggest opportunities to extend, develop and refine existing support measures to promote productivity, net zero, good jobs and balanced growth.

The project builds on a draft database of R&D and innovation support measures available to Northern Ireland firms originally developed within the Department for the Economy (DfE). The project is also aligned with the three areas of DfE innovation policy focus, namely Research and Development; Innovation Driven Enterprises; and Comprehensive Innovation.

The Research and Development policy aim is to increase R&D activity in NI and particularly to support areas of strength where NI could be a global leader. Investment in R&D is associated with productivity improvements and higher levels of growth. R&D activity can also attract higher levels of investment and contribute to business resilience. The policy aim is therefore to support increases in Government expenditure in R&D (GovERD), Business expenditure in R&D (BERD) and Higher Education expenditure in R&D (HERD).

The policy aim relating to Innovation Driven Enterprises (IDEs) is to increase the pipeline, in terms of the formation and development, of high-growth, technology-driven enterprises. IDEs can generate large-scale high-value job creation and tax revenues and contribute a significant proportion of R&D and export activity. Given their contribution to competitiveness, the policy aim is to increase their birth rate and support the growth and health of IDEs so that NI can position itself as a small advanced innovative economy where IDEs can prosper.

The Comprehensive Innovation policy aim seeks to expand innovation activity into those sectors not typically associated with innovation and/or that have lower productivity. Widening the scale and profile of businesses engaged in innovation should also increase the pipeline of those engaged in R&D and of IDEs. Therefore, Comprehensive Innovation should ensure that the benefits of innovation are felt across the NI economy.

1.2 Our approach

Northern Ireland government has set out challenging policy goals relating to productivity, net zero, good jobs and balanced growth. Achieving these goals will be difficult but success would transform the Northern Ireland economy, increase living standards and inclusivity and create better opportunities for future generations. Improved levels of innovation activity locally will play a critical role in making progress, requiring a combination of effective public support, strong collaboration between government, business and Higher Education Institution (HEI) partners, and strong commitment and sustained investment by the private sector.

The challenges are significant, but Northern Ireland is uniquely placed to shape collaborative local strategies which can boost innovation due to some key characteristics[1]:

- Local policy autonomy is significant, with a well-developed and widely understood range of delivery partners including Invest NI, InterTradeIreland and Catalyst.
- Collaboration and alignment between government, business and higher education in Northern Ireland is strong, as evident in the City and Growth Deals and related investment.
- Northern Ireland's position within the UK innovation support system (i.e., UKRI, Innovate UK, Catapults) combined with local support measures, as well as access to international support programmes from the Republic of Ireland (RoI), the EU and USA, provides a range of support options for Northern Ireland firms seeking to conduct R&D and innovation.

As the analysis outlined in later sections of this report suggests, public support measures for R&D and innovation targeted at firms can vary widely in their eligibility, application procedures, funding available, success rates for applicants, and their modes of delivery. These factors may influence the attractiveness of alternative grant measures for firms seeking to start innovating or fund continuing innovation activities:

- ***Eligibility*** – may vary between grant schemes with restrictions linked to legal status, and sector (e.g. non-agricultural businesses). The profile of eligible costs may also vary between schemes.
- ***Application procedures*** - peer review-based grant allocation processes such as those operated by Innovate UK generally rely on detailed proposals being completed by applicants. This can impose a high cost on applicants and, particularly where success rates are low, may reduce the attractiveness of particular sources of public funding.
- ***Alternative award processes*** – can differ significantly with UKRI (including Innovate UK) operating through targeted and competitive calls for proposals, peer evaluation and awards. As previous research has noted, however, peer review can be subject to biases by applicants' gender, ethnicity, prior success in attracting grant support and the conservatism of proposals. Other award processes such as that operated by Invest NI provide more bespoke support aimed to meet the specific needs of companies.
- ***Funding rates*** – may also vary both between schemes and between the funding offered to firm-size bands within specific funding schemes. Innovate UK funding rates have increased in recent years for micro-firms but have stayed relatively stable for small and larger firms[2].

[1] See https://media.nesta.org.uk/documents/stepping_forwards.pdf.
[2] Authors analysis of Innovate UK transparency data.

- ***Success rates*** – particularly where competitive funding is being offered on a national scale (i.e., UK-wide) success rates in grant applications can be low (c. 10-15 per cent) despite the significant costs involved in completing an application. This probability of success makes planning difficult on the part of the company and may deter smaller companies in particular from applying for competition-based funding. It is not clear what success rates are relevant to the more negotiated Invest NI funding but this is likely to be higher.
- ***Related support*** – firms may also consider the availability of related support which may enhance that for innovation. This might include support for digital investment, training, investments in physical capital etc., all of which have been shown to positively increase the performance benefits of R&D and innovation. Where R&D and innovation support is awarded through a competition, the availability of related support is generally uncommon, although the development of the Innovate UK Edge service to support broader business development is a recent move in this direction.

To capture this variation the first element of the project aimed to provide a comprehensive picture of public support available to Northern Ireland firms for R&D and innovation. This includes support available from public organisations in Northern Ireland, support available to Northern Ireland firms from organisations in Ireland and GB, and supra-national support measures such as those from the EU. Building on a draft database (excel spreadsheet) provided by the Department for the Economy (DfE), we extended and developed this 'R&D and Innovation Database' adding a range of extra fields relating to the size of each scheme, eligibility conditions etc. This involved a combination of desk research and direct contacts with support providers, particularly Invest NI.

In the database, interventions are classified into whether they are primary interventions, which should directly result in research and development (R&D), innovation or innovative start-ups, or secondary interventions that support wider innovation via skills, advice or collaboration. The final version of the database identifies around 60 varied initiatives and support mechanisms available to support R&D and innovation in NI. The number of initiatives identified makes it difficult to appreciate the overall landscape of support from the database itself. We also therefore undertook a mapping exercise intended to provide a more visual and intuitive understanding of the support landscape.

Based on initial discussion with DfE a selection of small open economies were then selected as benchmark comparisons. Here, the present report draws directly on a 2020 policy report, co-authored by Dr Kevin Mulligan along with other co-authors. This report – "A cross-country repository of details on the innovation and science policy instruments available to firms in eight countries (2007-2020)" – provides extensive information on the public innovation supports available to firms in the UK, RoI, and six other member-countries of the Small Advanced Economies Initiative. For this report, we updated the information contained in the 2020 report. This highlighted several major changes which have been implemented to key innovation policy supports since 2020. To provide two illustrative examples, since 2020 the RoI R&D tax credit programme has been amended to make it simpler for SMEs to access, and more generous for all firms in general. The rationale for this change includes a focus on how to incentivise more firms to begin R&D spending, as opposed to the previous version of the scheme which tended to favour already R&D-active firms. The introduction of the recently introduced 'Co-

Centres' programme in Northern Ireland is another recent initiative. This is based on the SFI Research Centres programme which has been credited with achieving a 'step change' in private R&D investment in the RoI.

1.3 Structure of the report

The remainder of the report is organised as follows:

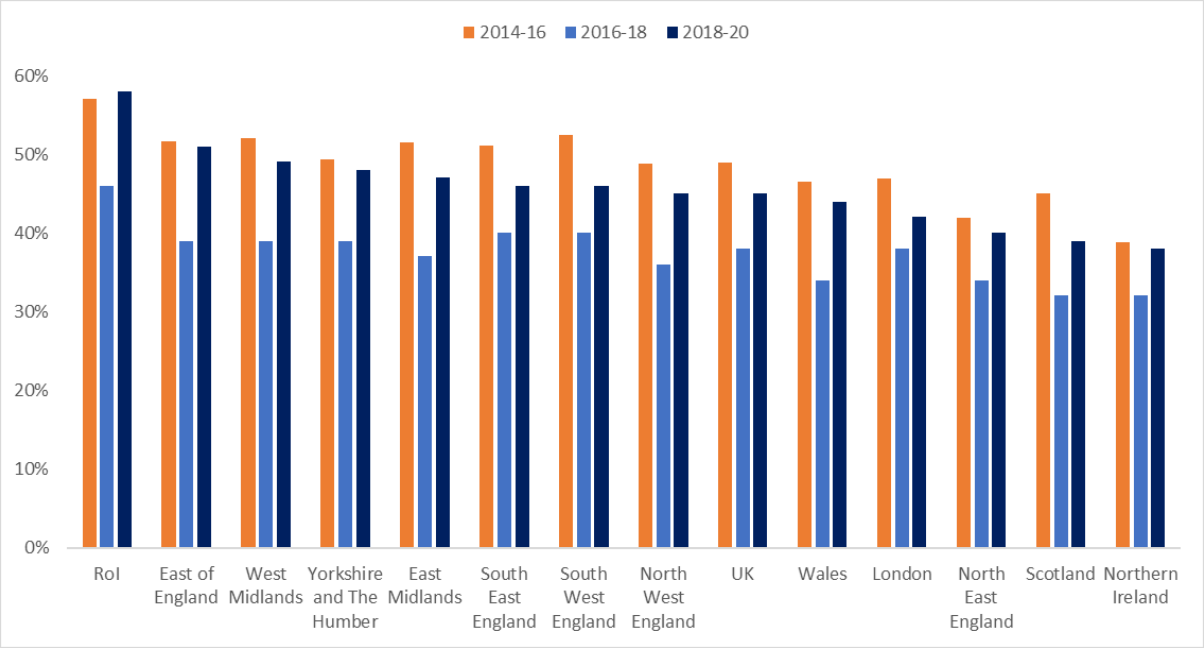
- Section 2 provides an overview of current support for R&D and innovation in Northern Ireland as well as the mapping of schemes by TRL level. This should be read alongside the Innovation Database which provides detailed information on each scheme.
- Section 3 focuses on the benchmark countries with a detailed discussion of the support landscape for R&D and innovation in Ireland, and more selective coverage of the other benchmark countries. Detailed information on each of the schemes discussed is included in Annex 1 for the Republic of Ireland (RoI) and Annex 2 for the other benchmark countries
- Section 4 summarises the key evidence points from the Northern Ireland and benchmark mapping exercises and scopes some potential areas for policy development in the light of recent policy changes in NI.

SECTION 2: SUPPORT FOR BUSINESS R&D AND INNOVATION IN NORTHERN IRELAND

2.1 Context

The latest UK Innovation Survey[3] shows that 38% of Northern Ireland (NI) businesses with 10+ employees were innovation-active in 2018-2020, an increase from 32% in 2016-2018 but just below the 39% experienced in 2014-2016 (Figure 2.1). Of the Northern Ireland businesses that were innovation-active in 2018-2020, 15% were product innovators and 14% were process innovators with just 8% carrying out both activities. As such, NI's rate of innovation activity in 2018-20 was below both the Republic of Ireland (RoI) average of 58%[4] and the UK average of 45%. NI's rate was the lowest of all the UK regions while the East of England had the highest rate of innovation-active businesses at 51% in 2018-2020 (Figure 2.1). Analysis by firm size shows that in 2018-20, 46% of large businesses in Northern Ireland were innovation-active compared to 38% of SMEs, the UK figures were 58% and 44% respectively. In the RoI in 2018-20, 83% of large businesses were innovation-active, 62% of medium-sized businesses and 51% of small businesses.

Figure 2.1: Innovation-active business, RoI and UK regions, 2014-2020



[3] UK results are available on Gov.uk available at https://www.gov.uk/government/statistics/uk-innovation-survey-2021-report and Northern Ireland results are available on NISRA available at https://www.nisra.gov.uk/statistics/other-surveys/innovation-survey .

[4] https://www.cso.ie/en/statistics/technologyandinnovation/innovationinirishenterprises/

Source: UK Innovation Survey, ONS and NISRA, Innovation in Irish Enterprises, CSO

At the industry level, 75% of Northern Ireland businesses in the manufacturing of electrical and optical equipment were innovation-active in 2018-2020, an increase from 47% in 2016-2018[5]. This was the highest rate across the sectors and above the UK rate of 70%. Meanwhile, the wholesale sector had the lowest rate of innovation-active businesses at 29%. This was down from 35% in 2016-18. In the UK, hotels and restaurants had the lowest rate at 32%, up from 23% in 2016-2018[6].

2.2 Mapping R&D and innovation support in Northern Ireland

2.2.1 Our approach – database and mapping

Our analysis aimed to provide a comprehensive picture of public support available to Northern Ireland firms for R&D and innovation. This includes support available from public organisations in Northern Ireland, support available to Northern Ireland firms from public organisations in Ireland and GB, and supra-national support measures such as those from the EU. In the database, interventions are classified into whether they are primary interventions, which should directly result in research and development (R&D), innovation or innovative start-ups, or secondary interventions that support wider innovation via skills, advice or collaboration. The final version of the database identifies around 54 varied initiatives and support mechanisms available to support R&D and innovation in NI.

The number of initiatives identified makes it difficult to appreciate the overall landscape of support from the database itself. We also therefore undertook a mapping exercise intended to provide a more visual and intuitive understanding of the support landscape. (We use a similar approach in the benchmark countries later in this report). In the mapping, Technology Readiness Levels (TRLs) (Figure 2.2) have been used to organise the innovation interventions available to Northern Ireland businesses (See Box 2.1). Interventions are categorised by funding arrangements (NI, GB or Other) and are ranked from highest to lowest in terms of overall funding available. Other measures, which can be considered part of the wider ecosystem of business supports but with a less direct R&D or innovation link, such as interventions for general start-ups, are not included within the TRL mapping but are listed within the R&D and Innovation Database.

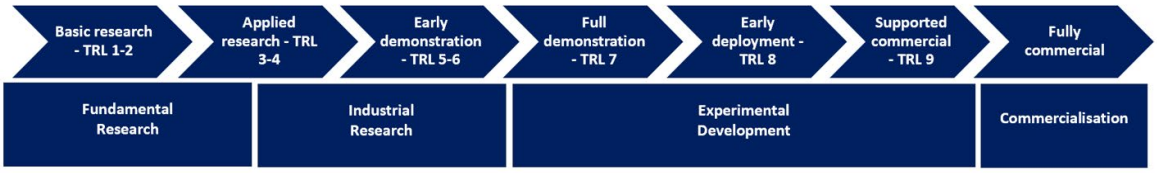
We also do not include any of the broader access to finance initiatives. Although they can and do support innovation and R&D activity, their remit is often broader to include funding growth and commercialisation activity more generally. Such initiatives are made available through several providers and are also listed within the Database.

Box 2.1: Introducing Technology Readiness Levels (TRLs)[7]

TRLs are a widely used measurement system which provides an indication of the maturity of a technology from TRL1 to TRL 9. The scale is used, for example, by the UK Science and Technology Facilities Council to decide whether a specific project or project proposal is eligible for support. The TRL levels and their definitions are as follows:

- TRL 1: basic principles observed and reported
- TRL 2: technology concept or application formulated
- TRL 3: analytical and experimental critical function or characteristic proof-of-concept
- TRL 4: technology basic validation in a laboratory environment
- TRL 5: technology basic validation in a relevant environment
- TRL 6: technology model or prototype demonstration in a relevant environment
- TRL 7: technology prototype demonstration in an operational environment
- TRL 8: actual technology completed and qualified through test and demonstration
- TRL 9: actual technology qualified through successful mission operations.

Figure 2.2: Technology Readiness Levels



2.2.2 Mapping Northern Ireland support

Mapping the Northern Ireland interventions to TRL levels shows that there is a concentration of support schemes in the middle TRLs both in terms of number of dedicated interventions and the amount of funding (Figures 2.3-2.5). Within the top ten NI-funded interventions there is an almost equal split between the number covering the lower TRLS (1-4), those covering TRL 3-4 to 7-8 and those which cover the majority of TRLS either through a dedicated programme (Connected) or which have a number of aligned schemes (City and Growth deals, Regional Entrepreneurship Acceleration Programme and the Small Business Research Initiative). SMEs are well represented within the eligibility criteria across the interventions. The number of businesses taking part within each individual scheme, however, appears to be typically in the hundreds or low thousands with limited coverage of the wider business population.

[7] See https://www.ukri.org/councils/stfc/guidance-for-applicants/check-if-youre-eligible-for-funding/eligibility-of-technology-readiness-levels-trl/.

Figure 2.3: Mapping NI-funded support schemes for R&D and innovation

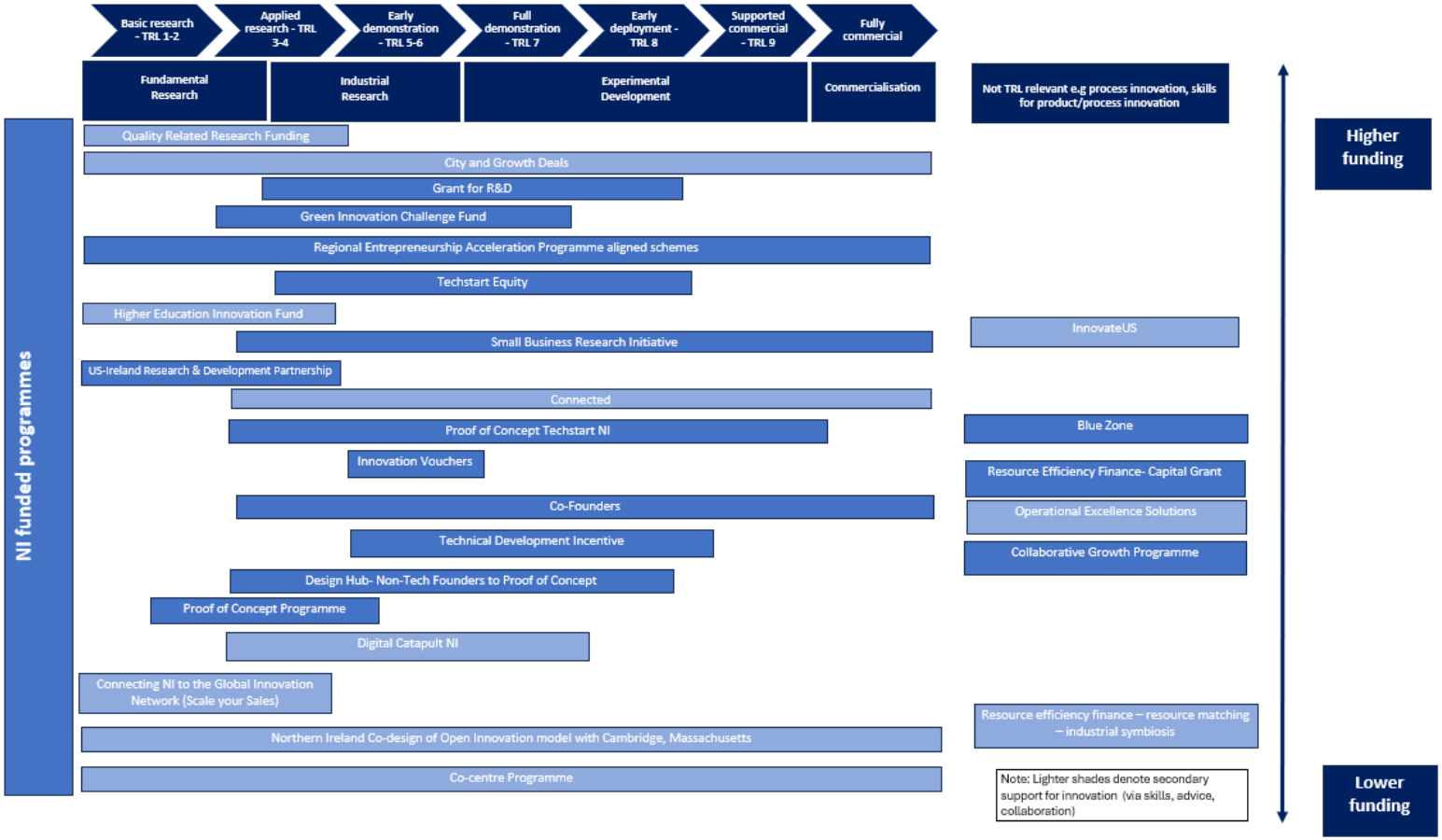


Figure 2.4: Mapping GB-funded support schemes for R&D and innovation

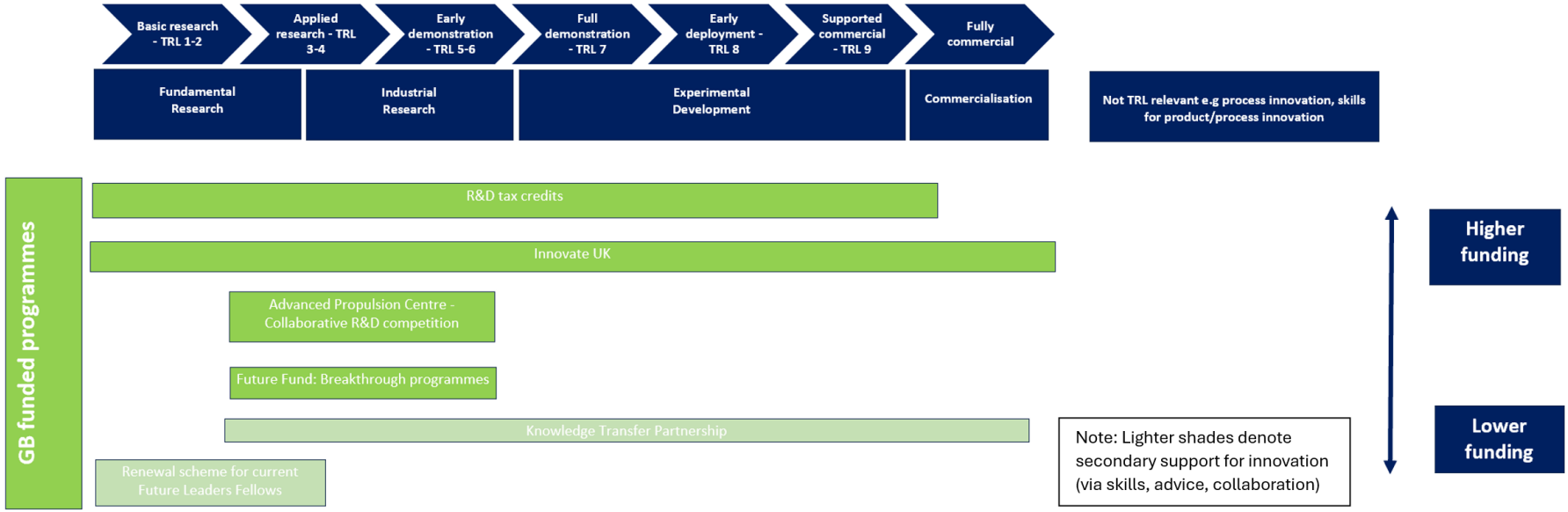
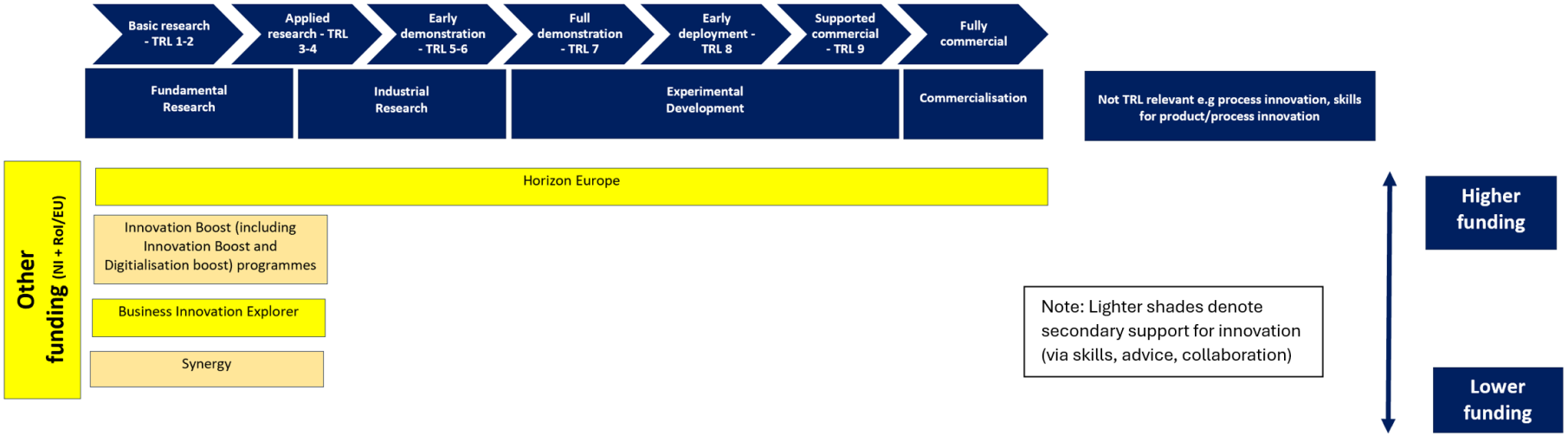


Figure 2.5: Mapping Other-funded support schemes for R&D and innovation



TRLs 1-4 support activities ranging from fundamental research through to early proof of concept, with the interventions available to Northern Ireland businesses accessible via NI, GB and Other (NI plus RoI and EU) funding arrangements. Northern Ireland also has several research facilities within TRLs 1-4 (not included within the map) including those which sit within the City Deals funding. The research facilities cover advanced technology in the manufacturing, computing, screen, health and medical sectors and some also offer specific innovation programmes or interventions: (see Box 2.1 for details and, for specific interventions funded through the City Deals, see Box 2.2). Although not necessarily duplicating activities a number of these research facilities focus on the health and life sciences sector (Centre for Digital Healthcare Technology, Momentum One Zero, Health Innovation Research Alliance, Institute for Research Excellence in Advanced Clinical Healthcare, and the Personalised Medicine Centre). The US-Ireland R&D partnership, funded through DfE, also focuses on health as one of its priority areas while Science Foundation Ireland's Co-Centres programme also aims to establish virtual centres of distributed excellence linking researchers across academia and industry to perform cutting-edge research in areas including health. To avoid duplication, it will therefore be vital to achieve coordination among these Centres and initiatives, potentially via DfE, while encouraging collaboration could also help support co-designed innovation outcomes.

Innovate UK, which is part of UK Research and Innovation (UKRI), provides the majority of interventions within the GB offering. As the UK's national innovation agency, Innovate UK, supports innovation across all sectors, regions and technologies. Northern Ireland businesses and academic institutions are eligible to access Innovate UK funding by application to their open competitions. The individual competitions are typically time-bound and collectively span the range of TRL levels, although individually they can be matched to specific TRLs. Box 4 provides further details of five of the competitions currently running (as of February 2024) to provide a sense of the scope of schemes available. Firms enter into a competitive process when applying with each application scored against criteria. The competitions typically have a funding limit so not all those scoring highly are funded. Notably, however, the Blue Zone funding scheme does provide further opportunity for some Northern Ireland firms that highly scored the chance to receive funding if they were unsuccessful in the original application[8]. Given that these competitions typically require a detailed application process, this intervention is particularly welcome.

[8] Blue Zone refers to those applicants that achieved the Innovate UK threshold (usually 70%) but failed to secure funding due to the budget being consumed by higher ranking applicants. This scheme provides funding to some NI companies which are in the Blue Zone.

Box 2.1: Research Facilities

Advanced Manufacturing Innovation Centre (funded through City Deals)

The Advanced Manufacturing Innovation Centre will operate at the interface between academia and industry, by creating new opportunities for innovative manufacturing in the Belfast City Region. Led by Queen's University Belfast (QUB) working with Ulster University (UU) will ensure that real-world industrial challenges based on market need are solved through cutting-edge research.

Artificial Intelligence Centre (AICC)

The Artificial Intelligence Collaboration Centre (AICC) has been developed to address market failures concerning low levels of AI and machine learning adoption across Northern Ireland. It will aim to position Northern Ireland as a leader on the global Artificial Intelligence stage.

Cyber AI Hub

The Cyber-AI Hub is hosted by CSIT at QUB as part of Momentum 1.0. It is a new initiative which aims to develop exceptional research, skills, and innovation across a range of cyber related themes and develop a talent pipeline of cyber security professionals with strong industry links.

Centre for Digital Healthcare Technology (funded through City Deals)

The Centre hosted at UU will provide a world-class space for academia, industry, and clinicians to come together to innovate and boost the productivity of the Life and Health Sciences sector, as well as medical device and related sector activity in Northern Ireland. The Centre aims to build on the capabilities of the HSC Data Institute in partnership with HSCNI.

Momentum One Zero (Global Innovation Institute) (funded through City Deals)

Hosted at QUB Momentum One Zero will support the creation of a Global Innovation Ecosystem in Belfast, comprising a community of businesses linked by a common digital innovation thread. High performance computing capability, spanning edge to cloud, will catalyse and accelerate an innovation agenda based on research strengths in priority growth sectors for the region: Health and Life Sciences, and Agri-food.

Health Innovation Research Alliance - Northern Ireland (HIRANI)

HIRANI was established to strengthen the Life & Health Sciences ecosystem in NI. It aims to drive collaboration and connectivity across business, academia and health organisations in the life and health sciences sector.

i4C Innovation Centre (innovation lab) (funded through City Deals)

The Innovation Lab forms a key part of the i4C proposal allowing for an engineering staff led and well-equipped workshop that focuses on developing products, services, training, and solutions for the cleantech sector across Northern Ireland i.e. in the emerging hydrogen economy.

Institute for Research Excellence in Advanced Clinical Healthcare (iREACH) (funded through City deals)

The Institute, led by QUB, aims to Integrate the activities of clinicians, life scientists and data scientists with industry partners to identify and develop new diagnostic tests, treatments, and health related technologies.

Personalised Medicine Centre

The Personalised Medicine Centre at UU aims to develop treatments and clinical tools that consider a person's individual genetic and molecular signatures. At the forefront of innovation in personalised and precision medicine, the Centre has secured 14 patent applications in novel therapeutic and diagnostic advances.

Box 2.2: City and Growth Deals Interventions

- **Complementary Fund – Digital Transformation Flexible Fund**
  Aims to support micro and SME businesses to be active in digital transformation, such as Smart technologies/ smart environments, process automation and immersive technologies, whilst supporting inclusive growth by addressing financial barriers businesses face when seeking to digitally transform. The Fund provides a grant between £5,000 and £20,000 which can cover up to 70% of the cost of a project with 30% match funding from the applicant.

- **Complementary Fund – HyTech Northern Ireland Hydrogen Accelerator and Demonstrator**
  This project will link the research capabilities of QUB and UU delivering a range of H2 technology innovations with deployment via the ECOS located Demonstrator facility, i4C and local manufacturers partnering with HyTech NI. The Accelerator will incorporate Generation, Storage and Powertrain technologies.

- **Complementary Fund – Industrial Investment Challenge Fund**
  The intervention, which sits under the Boosting Innovation & Digital Capacity pillar of the MSW RES, seeks to address the productivity gap that exists in the region which is almost 10% lower than the rest of Northern Ireland and 15% lower than the UK average.

The interventions listed under the 'Other' category are those funded primarily through InterTradeIreland (via Northern Ireland and ROI funding) although EU Horizon funding is also included. In some cases, these interventions cover the island of Ireland rather than being NI-specific. These interventions are also primarily focused on the lower TRLs. For example, at TRL 1-4 and directly supporting innovation, Intertrade Ireland's new Business Innovation Explorer is a two-stage (explore and plan) programme providing SMEs across the island of Ireland with early-stage guidance and support using innovation to tackle business challenges or develop new products or ideas in Science, Engineering and Technology. At the explore stage business can receive up to £5,000 for 5 days of academic/specialist support, and at the plan stage funding up to £18,000 is available for 18 days of support.

On completion of the above businesses can seek further specialist support through the Innovation Boost programme. This intervention provides funding to SMEs of up to £56,000 to fund academic expertise (100% costs) and support the salary of a project manager (50% costs) to help tackle a business problem or develop an idea. As of June 2023, there were more than 800 participants, with Intertrade Ireland reporting that on average, each company taking part in Innovation Boost benefits from over £1 million worth of sales or efficiency savings in the three years following the project[9]. It should be noted however that there are a range of sectors ineligible for this support including: wholesale/retail, distribution, tourism, hospitality,

[9] https://intertradeireland.com/innovation/innovation-boost/why-choose-innovation-boost

primary agriculture and personal services while organisations in professional business services must develop a product or service that will be traded internationally.

Within the mid TRLS, one of the largest individual Northern Ireland interventions is the Grant for Research and Development, with a budget of £20m in 2023/24. The scheme is administered by Invest NI and offers advice and financial support to help Invest NI customers globally develop new products, services and processes. Overall, 1,240 awards were made between 2013-2020 resulting in £232m in funding from Invest NI. Due to the matched funding nature of the intervention, this was matched to the £622m planned investment from beneficiaries. SQW's[10] evaluation concluded that the Grant had positive value for money with the return-on-investment estimates reaching £4 of GVA for every £1 invested.

If there is a limitation with this particular grant, it is that only Invest NI clients are eligible to apply. This is also the case for nearly 20% of interventions within the Northern Ireland funded schemes. Therefore, while the interventions in total appear to cover the breadth of TRL levels it is worth noting that not all firms are eligible for all schemes which impact the 'Comprehensive Innovation' aim in particular.

There are also several specific interventions spanning TRLs 5-8 although again the number of firms involved in each is relatively small in relation to the wider business population. For instance, at TRLs 5-7, Innovation Vouchers offer SMEs, early-stage entrepreneurs and third-sector organisations up to £5,000 to purchase specialist knowledge from universities colleges and research organisations on the Island of Ireland. Reporting in 2019, SQW stated overall from 2012-2019[11] 1,250 projects had been completed with variation in the form of output businesses received. Two-thirds of supported businesses received a technical report or written form of output and over a third were provided with a prototype while 14% had a product ready for market.

Similarly, Knowledge Transfer Partnerships (KTPs) enable a partnership to be formed between a company and an academic or researcher within a Knowledge Base to form and deliver a collaborative project that will address a company's need. The 2016 evaluation[12] indicated that Northern Ireland outperformed other UK regions with QUB being the most active Knowledge Base in the UK and UU ranking 8th. In terms of project numbers, QUB ranked first in the UK with 322 completed projects between 1982-2014 and UU ranked sixth (with 192 completed projects).

[10] Published in 2021, available here https://www.investni.com/sites/default/files/2022-03/grant-for-r-and-d-interim-evaluation-december-2021.pdf

[11] The evaluation of the Innovation Vouchers covered Phase II which was 2012-2015 and Phase III which was 2015-2019. Evaluation available at: https://www.sqw.co.uk/application/files/4016/2081/4083/evaluation_of_innovation_vouchers-final-_November-2019.pdf

[12] https://www.investni.com/sites/default/files/documents/static/library/invest-ni/documents/knowledge-transfer-partnership-interim-evaluation-report.pdf

The 2023 evaluation[13] further indicates that between 2010-20 QUB had the greatest number of projects completed of all Knowledge Base organisations while 135 businesses in Northern Ireland benefitted from the programme.

Although successful interventions, this type of knowledge partnership is one area where there is a degree of duplication across the available interventions. Within this space, schemes are offering or supporting academic and industry partnerships via InterTradeIreland (Business Explorer and Innovation Boost), DfE (the Higher Education Innovation Fund and the Digital Catapult), FE colleges (InnovateUs), DfE (Connected) and Invest NI (Innovation Vouchers and KTPs). Although some businesses make use of these sequentially (for example a number of the case studies from the Connected programme also subsequently accessed Innovation vouchers[14] it may be beneficial to combine, streamline, or differentiate the academic-industry offering to clarify the route for the business population.

At the commercialisation end of the TRLs, the mapping identifies several relevant interventions. Of note, however, is that these typically form part of interventions which span several TRLS rather than there being a dedicated commercialisation scheme on its own[15]. In some cases, the commercialisation also occurs after the intervention rather than it being an in-built part of the scheme. The Small Business Research Initiative (SBRI) is one such example which is open to businesses of all sizes and supports the research and development of solutions to solve public sector challenges (see Box 2.3 for a NI case study). The NI programme specifically aims to provide the public sector with innovative solutions to problems aimed at driving improvement, where there is no available solution/product or service currently in the market; and, to allow businesses to develop products and services working collaboratively with the public sector enabling them to develop new skills, expertise and market opportunities. The recent evaluation[16] of the UK-wide scheme refers to it as a Pre-Commercial Procurement (PCP) initiative. It suggests that "SBRI competitions are often followed by a commercialisation and adoption process to diffuse and implement the new products and service. This commercialisation …is distinct to the pre-commercial activity" (pg. 18). Furthermore, it is recognised that it can be difficult to scale up solutions from a prototype to full commercial production. This would also be applicable in NI where one of the aims is to enable businesses to develop new products and services for the public sector. The commercialisation gap may therefore help justify the need for a specific Northern Ireland intervention at TRL 9 and beyond to fund and support these, and other prototypes more generally in NI, through to commercialisation.

[13] https://www.ukri.org/wp-content/uploads/2023/10/IUK-23102023-KTP-Evaluation-Final-Report-FINAL-Aug-23.pdf

[14] https://www.connected.ni.org/case-studies/

[15] Both universities have commercialisation programmes (via QUBIS and Innovation Ulster) although these are targeted towards academic spin-outs.

[16] https://www.ukri.org/wp-content/uploads/2022/05/UKRI-130522-AnEvaluationoftheSBRIJanuary2022-WEB-FINAL.pdf

Beyond the TRLs, the mapping in Figure 2.3 also identifies interventions which are not specific to new product or service innovation but relate to process or organisational innovation. These are important as both types of innovation have been shown to have a positive effect on productivity (efficiency) growth, and more so than product innovation (Turner and Roper, 2020). There are just three interventions identified as such within the mapping, two of which are open to Invest NI clients only. Within the Resource Efficiency Finance interventions, the Capital Grant scheme is available to Invest NI customers whereby grants of up to £50,000 are available to help with the purchasing of new equipment which will reduce the consumption of water, raw materials and waste production, resulting in cost savings and greater operational efficiencies.

Similarly, the Resource Matching-Industrial Symbiosis scheme, which is open to all Northern Ireland firms, provides an opportunity to transfer business waste, unwanted materials and bi-products from one business or organisation to be reused, recycled, reprocessed and repackaged by another. Operational Excellence Solutions is again only available to Invest NI clients, and provides assistance to help companies improve their competitive advantage by increasing their productivity and profitability through support, workshops and tutorials.

Box 2.3: NI Small Business Research Initiative Case Study

Rates Max - Belfast Business Rates Maximisation- Belfast City Council wanted to cut the level of uncollected business rates. The objective was to use intelligent data analytics to bolster the rates collection system and to ensure that errors, omissions, and mistakes in property listing were spotted quickly and remedied efficiently. This was to be achieved by developing and adopting a more sophisticated data analytics approach based around collating more accurate and up to data and intelligence on the occupation status of business premises and the eligibility for rates payments across the local business base.

BCC contributed £50k of its own resources, alongside an SBRI pot of £100k. This provided a total funding envelope of £150k for Phases 1 and 2 of the competition. Six companies applied and four were awarded phase one awards of £5,000 each for proofs of concept. Two companies that proceeded to phase two were awarded £55,000 for prototypes, including two weeks of field testing which immediately identified significant additional revenue opportunities.

The SBRI competition was regarded as an excellent opportunity to stimulate private sector creativity, agility, and expertise in developing an innovative solution to this long-standing public-sector problem.

2.3 Summary

Overall, given the extent of innovation interventions available to Northern Ireland businesses, it would appear that the region is well served with all TRLs covered, and separate interventions targeted towards process and organisational innovation. Particular strengths are noted in TRLs 3-8 in relation to the number of schemes available while TRLS 1-4 also have substantial funding made available for them. In addition, there are several existing and emerging research facilities with a focus on advanced technologies across several sectors. There have also been recent developments in the support landscape, with several new initiatives aiming to address gaps in current provision. This includes those developed through the Regional Entrepreneurship Acceleration Programme (REAP) such as Founder Labs, a business accelerator for IDEs and the Business Innovation grant. The Blue Zone initiative also helps to fund viable innovation projects which have met the standard for Innovate UK schemes but which they have not been able to fund due to budget.

Despite the complement of initiatives, there is little duplication across the innovation support landscape except in the knowledge partnership space, with several separate interventions supporting academic-industry partnerships. These could be streamlined or sufficiently differentiated so that there is clarity in the offering to the business population. Likewise, within the current and emerging research facilities, there are a number with a particular focus on health and life sciences. Their activities should be coordinated to avoid duplication and to support collaboration for additional innovation outcomes. Overall, the broad aims of increasing R&D and the number of Innovation Driven Enterprises therefore appear achievable given the existing interventions.

Where there is perhaps more scope for developing the available support is:

- Within the Comprehensive Innovation aim, i.e., to increase the number of innovating firms;
- Within the higher TRLs to support effective translation and commercialisation of R&D results; and,
- With regard to process and organisational innovation.
- Developing a single point of entry for information on all innovation interventions

The Comprehensive Innovation aim seeks to increase innovation activity within the broader business population (given that just 38% are innovation-active). There is scope to make a difference here although not necessarily through the need for any additional interventions. SMEs, which form the bulk of the Northern Ireland business population, are eligible for most schemes although there are a number which are open to Invest NI clients only or are targeted sectorally. Where these are not bound by state-aid restrictions, it may be worth reviewing the eligibility for those schemes that are restricted by either client or sector criteria to widen the pool of potential applicants. Generally, the number of firms assisted through the various interventions is relatively small in relation to the wider business population. Without a central database recording the activities, it is difficult to know how many businesses in total are

beneficiaries as there may be repeat recipients of either the same or multiple interventions. Widening eligibility in conjunction with the wider promotion of the interventions may help to expand the numbers. Separately, there could be a dedicated mentoring or support service provided to help businesses apply for open funding competitions, such as those offered by Innovate UK, which require detailed funding applications. Such a scheme is currently offered via Innovate UK Edge, hosted by Invest NI, but only to high-potential IDEs. Innovate NI and Invest NI also provide a similar advisory service to firms registering/enquiring with them. This service could potentially be streamlined to one provider and promoted more widely to support any businesses seeking to apply to competition-based initiatives.

As a means of co-ordinating these activities and achieving the desired Comprehensive Innovation outcome the development of a single point of entry for knowledge on all innovation interventions would be desirable. Although the duplication of interventions was not found to any significant degree, there are currently several scheme administrators including Catalyst, DfE, Further Education Colleges, InterTrade Ireland, Invest NI, NI Councils and Innovate UK.

To clarify the innovation-specific interventions for the NI business base the development of a single dedicated website would support the promotion and accessibility of these interventions[17]. The Innovate NI website may offer a solution to this whereby its diagnostic tool could operate as the initial portal entry with a dedicated area that details the various interventions. Completing the diagnostic tool as a means of accessing the support would help develop the knowledge base on the baseline position of the business population interested in innovation support. This is partly already in operation, with access to a number of innovation programmes requiring completion of the Innovate NI diagnostic tool prior to accessing the support. Broadening this to the range of all available innovation interventions would therefore not require any new arrangements. Promotion of this single website would also provide clarity for the business population on the range of innovation interventions. The other elements of the initiative (the Innovation Framework, Innovation Recognition and Management Standards) are already developed and, with promotion to the wider business base, will continue to help develop the Comprehensive Innovation strand.

With regards to the TRLs, the area which perhaps needs more specific focus is that relating to commercialisation. As previously identified, other than the academic spin-out interventions there is a lack of dedicated commercialisation-only schemes for the wider business population. Given the heavier emphasis at the low to mid TRLs relating to research and the development of prototypes, there may be a need for an intervention(s) which supports businesses to market test and scale their demonstration or prototype models into full commercial production. This will become increasingly important as the range of R&D-related initiatives linked to the City Deal reach maturity. Having strong commercialisation pathways in Northern Ireland will help the region capture the full benefits of these foundational investments.

[17] The nibusinessinfo.co.uk website does provide information on a range of business support interventions including innovation. This could be linked up to feed into a single innovation-specific website.

Finally, among the interventions, there were a small number dedicated specifically to process or organisational innovation. Given that this type of innovation is associated more directly with productivity improvements it may be worth either expanding the eligibility criteria of the schemes to enable wider participation and/or creating other interventions along the same vein which would support businesses to improve operational efficiency. We return to this latter point in the next section of the report which focuses on benchmark countries.

Box 2.4: Innovate UK Competitions

Innovate UK Smart grants: January 2024

The Innovate UK Smart grant supports SMEs and their partners in developing genuinely new innovations with significant potential for rapid economic return to the UK. It offers funding where other opportunities are not available or appropriate, and where timing is key to ensure swift and successful commercialisation post-project completion. Applications can come from any area of technology and be applied to any part of the economy with a total funding pot up to £25m. Projects of 6 to 18 months must have total eligible project costs between £100,000 and £500,000 and can be single or collaborative. Projects of 19 to 24 months must have total eligible project costs between £100,000 and £1 million and be collaborative. Projects must start by 1 October 2024 and end by 30 September 2026.

Innovate UK Edge

This programme is hosted in Northern Ireland by Invest NI and is targeted at high potential SMEs. It provides support for businesses wanting to scale and grow with innovation and growth specialists acting as mentors, critical friends, or champions to help identify strategies to grow and maximise potential. Advisors can support connections with new collaborators and business partners in over 65 countries through their involvement in the Enterprise Europe Network. The programme may provide financial and non-financial business development support to enterprises at 100% funding up to £315,000.

Unlocking nature positive private investment:

The aim of this competition is to mobilise significant private investment to scale nature positive solutions. The project must enable biodiversity-related risks and opportunities to be incorporated into planning, reporting and investment decisions for the finance and business sectors. The scheme is grant funded; UK registered businesses can apply for a share of up to £2m and each project's total funding request must be between £250,000 and £500,000. The project must last up to 9 months and start on 1 September 2024. All of the project work must be carried out in the UK.

Eureka Quantum collaborative R&D Multilateral 2024:

The aim of this competition is to support international collaboration on R&D projects that create innovative products, processes, or services for commercialisation in Quantum technology. The scheme is grant funded; UK applicants can apply for a share of up to £2m with a total grant of up to £500,000 for each project. The project can last up to 36 months and the earliest start date is 1 April 2025. Projects must be collaborative and as part of the eligibility criteria the project must include at least two independent legal entities from a minimum of two Eureka countries participating in the competition.

Cyber security academic startup accelerator programme 2024-25: phase 1

The Cyber Security Academic Startup Accelerator Programme (CyberASAP) is a one-year programme designed to support innovative cyber security projects coming from an academic research base. Phase 1 will determine the value of the idea and, if appropriate, identify the best commercial route to progress. The project is grant funded, with a funding pot of £800,000. The project's total costs must be up to £32,000 with £16,000 allocated to phase 1 and £16,000 to phase 2. This competition offers two funding strands, an Industry Challenge-led strand, and an Open strand. The Industry Challenge – led strand is open for eligible individuals from any UK academic institution who address one of three key industry challenge areas from AI model security, software supply chain security and Industrial Internet of Things (IIOT) or Operation Technology (OT) security. The Open strand is open for any eligible individual. The project must start on 1 April 2024 and end on 31 July 2024.

SECTION 3: BENCHMARKING INNOVATION SUPPORT PROVISION IN OTHER SMALL OPEN ECONOMIES

3.1 Introduction

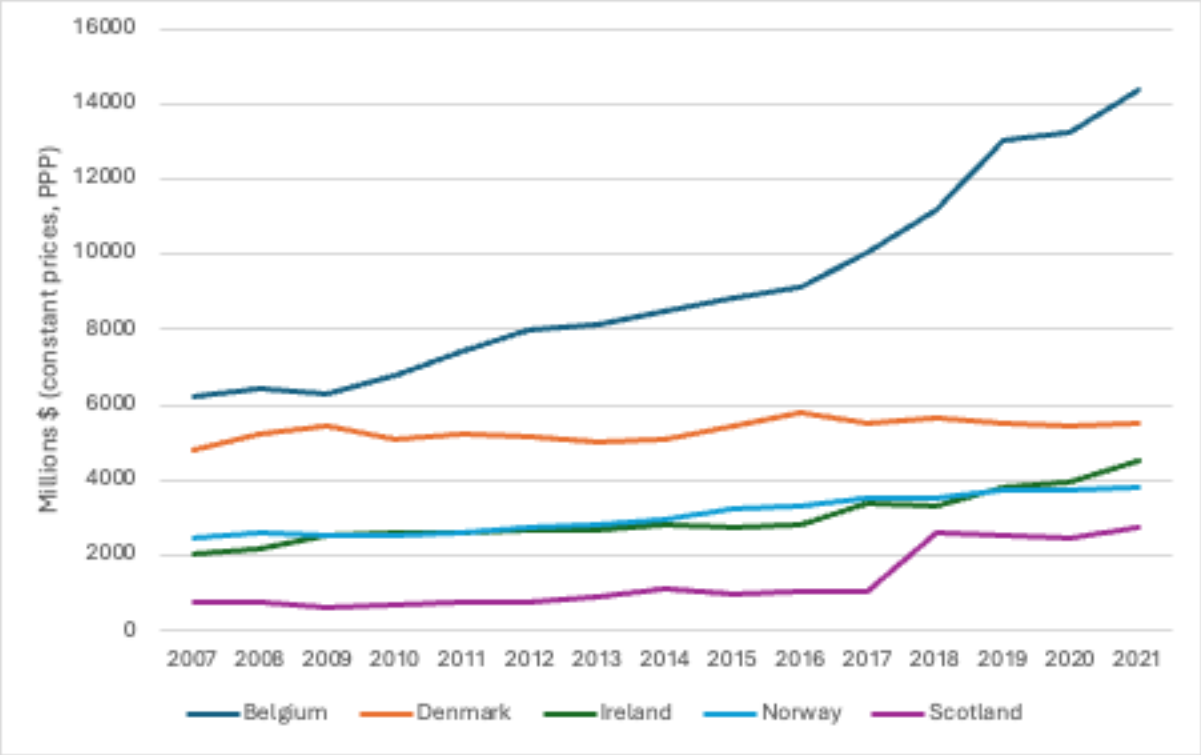
This section provides a review of innovation support provision in the RoI, Belgium, Denmark, Norway, and Scotland. These five countries were identified by DfE as useful comparators for Northern Ireland. The section is structured as follows:

- Section 3.2 provides an introductory overview of the five economies including levels of public support and innovation activity.
- Section 3.3 focuses on the RoI in detail, to provide a comprehensive and exhaustive list of the R&D/innovation supports available to firms in RoI.
- Section 3.4 applies a more selective approach to Belgium, Denmark, Norway, and Scotland. This focuses only on the supports which are deemed to align most significantly with the core Northern Ireland policy priorities of innovation to promote productivity, good jobs, and regional balance. The information in this section will be used and cross-referenced in other sections of the report, for issues such as identifying gaps in support provision in NI.
- Section 3.5 summarises the key findings and implications for Northern Ireland.

3.2 Overview of the five benchmark economies

Before examining the R&D/innovation policy instruments available in each benchmark country, it is important to examine the overall Business Expenditure on Research and Development (BERD) landscape, as well as the more comprehensive aspects of innovation beyond R&D. Figure 3.1 shows the level of BERD in each country between 2007-2020, expressed adjusted for Purchasing Power Parity (PPP) for comparability. As the DfE (2022) 'Measuring Success: 10X metrics to achieve a 10X economy baseline report' makes clear, each of the countries considered in Figure 3.1 are reasonable comparators. As such, providing the BERD figures in absolute monetary terms is appropriate to give an overall sense of scale in each country. Using a ratio, such as BERD to GDP, would be more appropriate when making a comparison between countries that were not close comparators (e.g. Norway and the UK as a whole).

Figure 3.1: Business Expenditure on R&D



Notes: Data for Belgium, Denmark, Ireland, and Norway come from the OECD Tax incentives for R&D and innovation database, see: https://www.oecd.org/innovation/tax-incentives-RD-innovation/. Data for Scotland comes from the UK Office for National Statistics (for 2018-2021, data release titled: "Business enterprise research and development (R&D), UK: 2021"; for 2007-2017, data release titled: "Research and Development in UK Businesses, 2017 – Datasets"). For comparability, all data is shown in US Dollars, at constant prices, and adjusted for Purchasing Power Parity (PPP).

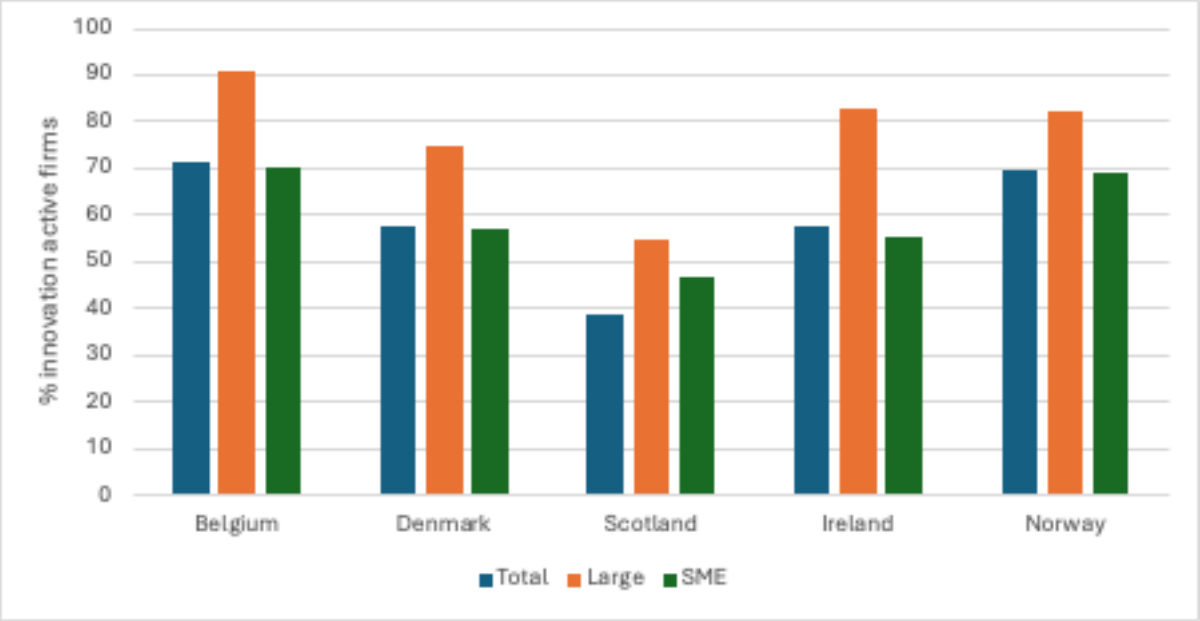
In terms of achieving Northern Ireland's innovation policy goals, Figure 3.1 suggests that Belgium provides the most compelling example, followed by Norway and RoI. Since 2007, Belgium has increased its BERD almost threefold by 2021. Although lower in scale than Belgium, Norway and RoI both doubled their BERD over the same period. All three countries show that substantial year-on-year BERD growth is achievable. This can play a major role for Northern Ireland in growing total R&D expenditure from the current baseline of £1.02 billion. However, as noted by the OECD (2020), an important caveat for the RoI case is that all BERD figures are heavily skewed towards FDI.[18]

Building on the R&D data presented in Figure 3.1, it is also important to the more comprehensive parts of innovation, when viewed in a holistic sense.

[18] OECD (2020), FDI Qualities Assessment of Ireland (see: www.oecd.org/investment/FDI-Qualities-Assessmentof-Ireland.pdf).

Comprehensive Innovation involves the expansion of innovation to more businesses beyond innovative and knowledge-intensive sectors and into those sectors that typically innovate less or have lower productivity. Therefore, Figure 3.2 takes a broad definition of innovation, capturing the percentage of firms that have any innovation activities. This includes both R&D-based and non-R&D-based innovation, as well as innovation activities that did not necessarily result in the successful introduction of an innovative product, service, process, etc. As such, Figure 3.2 provides a more holistic picture of innovation activity in the five benchmark economies. This is perhaps particularly useful for an economy such as NI, which has a very high proportion of firms that are not innovation-active (circa 62% in 2020, based on the most recent NISRA innovation survey data).

Figure 3.2: Innovation-active firms, 2020



Sources: OECD 'Business innovation statistics and indicators' database (https://www.oecd.org/sti/inno-stats.htm), and Scottish Government's 'UK innovation survey 2021: results for Scotland' database (https://www.gov.scot/publications/uk-innovation-survey-2021-results-for-scotland/documents/).

It is clear from Figure 3.2 that there are far fewer innovation-active firms in Scotland. In addition, while there is a greater proportion of innovation-active large firms in all countries, large firms dominate the innovation-active landscape in RoI. In contrast, Norway has a similar level of innovation-active large firms to RoI, but a much higher level of SMEs engaged in innovation. Overall, this leads Norway to have a much higher total percentage of innovation-active firms.

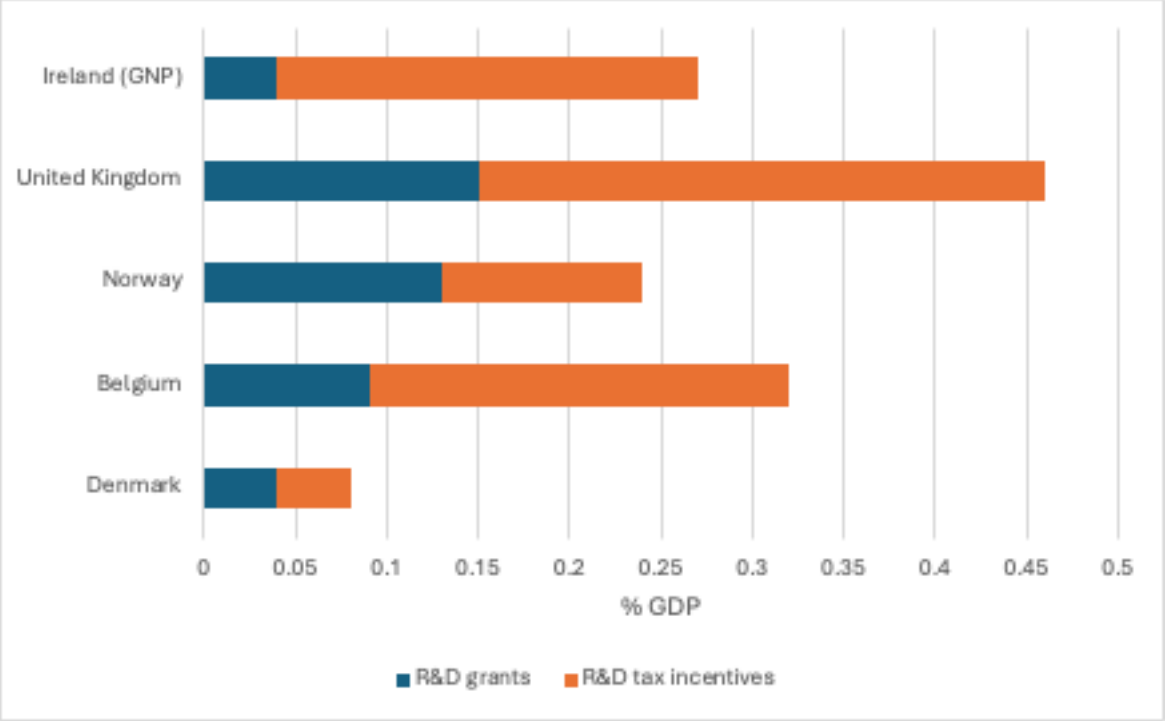
Turning to the overall levels of government support for R&D and innovation in the five benchmark countries, Figure 3.3 presents a snapshot of the relative levels of R&D tax incentive support versus direct support through R&D grants for firms in 2020. Figure 3.3 uses UK data in place of Scotland, as consistent data for Scotland was unavailable. This figure

makes it clear how dominant R&D tax credit support is in RoI and Belgium, while showing the more balanced breakdown of support in Norway and Denmark. This difference between countries is most likely reflective of the prominent role the subsidiaries of multinational firms play in both the Belgian and RoI economies, where location decisions about R&D are taken in the home country, and can be influenced by the local policy environment. This is a potentially important point for NI, as increasing the baseline level of BERD in a small economy can be rapidly achieved through multinational firms establishing or enhancing R&D in subsidiaries based in the host country. Moreover, a large MNE footprint in a host country can leave the economy well-placed to benefit from R&D diffusion, through the positive effects of R&D performed elsewhere in the world. This is especially the case in more recent years, as R&D has become more globalised.[19]

Looking at Figures 3.1, 3.2 and 3.3 together, Denmark provides an interesting example of a benchmark country which maintained a high overall level of BERD but did not allocate significant public R&D support for firms. In addition, Belgium and Denmark started at a very similar level of BERD in 2007, but Denmark did not experience rapid BERD growth comparable to Belgium. This perhaps reflects the fact that the scale of the R&D tax credit in Belgium grew significantly from 2013, while the Danish R&D tax credit level was relatively static (see also Figure 3.4). In summary, the Figures presented up to this point may suggest a role for an expanded R&D tax credit programme in NI, adding one lever in achieving R&D growth. However, countries such as Norway suggest that achieving more Comprehensive Innovation is also possible, with a more balanced use of direct and tax support.

[19] See e.g. the 2022 EU Industrial R&D Investment Scoreboard (https://data.europa.eu/doi/10.2760/08410)

Figure 3.3: Government support for firm-level R&D (2020)

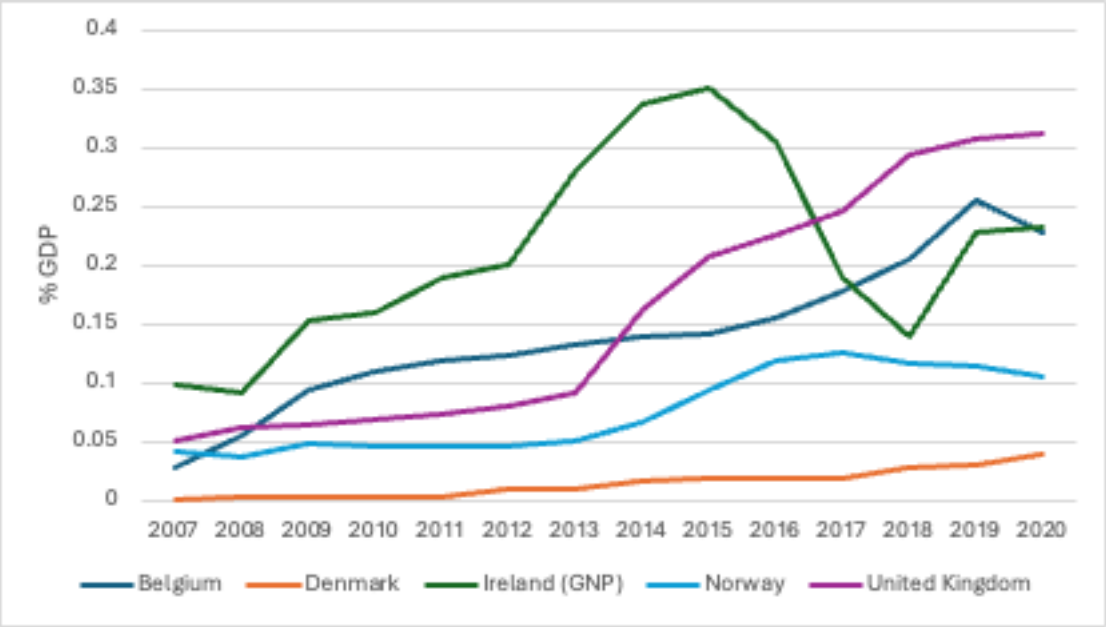


Source: OECD Tax incentives for R&D and innovation database, see: https://www.oecd.org/innovation/tax-incentives-RD-innovation/

Building on the snapshot presented in Figure 3.3, Figures 3.4 and 3.5 provide a detailed breakdown of the mix of R&D tax incentive support versus direct support through R&D grants for firms over time. As alluded to above, it is clear from Figure 3.4 that as BERD has increased rapidly in Belgium, so has R&D tax credit support. While this descriptive statistic does not prove a causal relationship, it is indicative of the role R&D tax credits may play in driving BERD. It should be noted that this report does not examine the 'standard' R&D tax credit offering in Belgium, or any of the other benchmark countries (except for the RoI, where we have sought to provide comprehensive coverage). This is to avoid repetition, as the standard R&D tax credit offering in each country does not vary fundamentally across the benchmark countries, leading to little opportunity for policy learning. The exception to this rule is in the case of Belgium, which, in addition to its standard R&D tax credit offering, also has differentiated wage-based R&D tax incentives, which are potentially of interest to NI. Indeed, the recent launch of the Investment Zones programme across the UK may provide the opportunity for Northern Ireland to offer additional R&D tax credit supports, which are targeted at areas of policy interest (e.g. SMEs, firms in specific regions, etc).

Looking again at Figure 3.4, it is clear that R&D tax credit support in Norway has grown significantly, while it has been somewhat volatile in RoI. This latter result perhaps reflects the nature of the RoI economy, where BERD is dominated by a small number of multinational firms. To alleviate this volatility to the greatest extent possible, the figures for RoI are in proportion to Gross National Product (GNP), as opposed to Gross Domestic Product (GDP). It has been argued that Ireland's GDP is not an accurate measure of economic activity due to the number of multinational firms present in the country, who repatriate profits outside of Ireland. To overcome this issue, it is typically recommended that Ireland's support for BERD should be measured as a percentage of GNP.[20]

Figure 3.4: Tax incentives for firm-level R&D as a % of GDP



Source: OECD Tax incentives for R&D and innovation database, see: https://www.oecd.org/innovation/tax-incentives-RD-innovation/

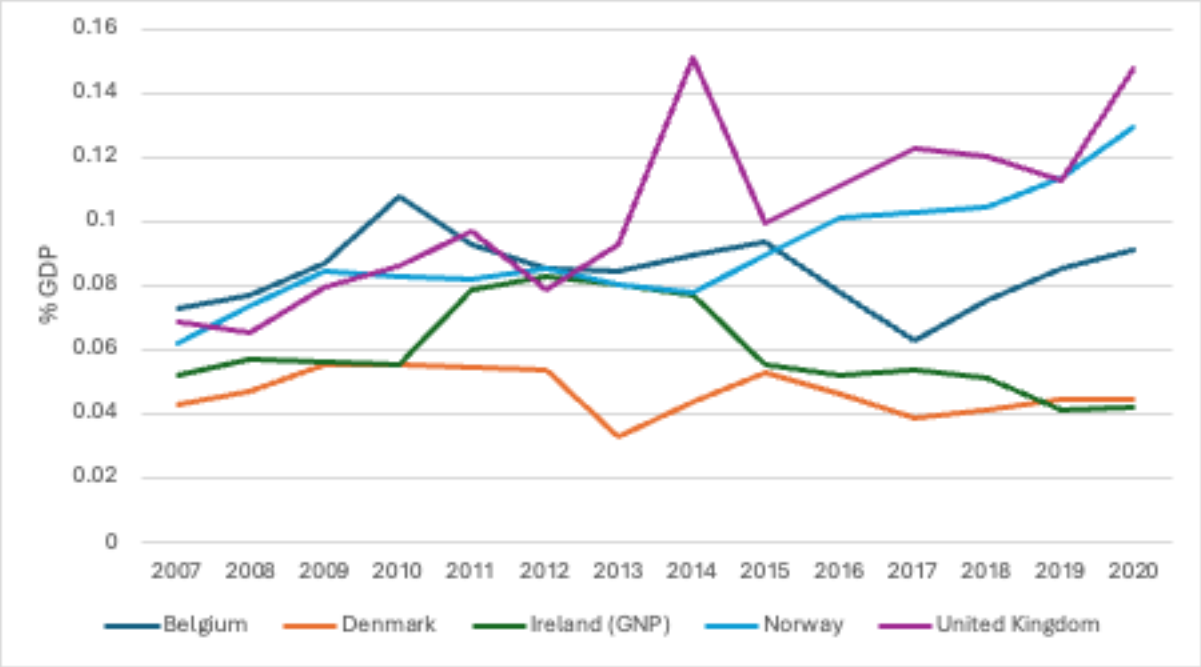
Turning to direct support, Figure 3.5 highlights that R&D grants have played a significant role in Norway over the period. This is relevant for NI's innovation policy objectives, given that Norway has achieved a balance between high BERD and innovation-active firms. The example of Norway may suggest that a balanced approach between R&D tax incentives, and direct grant support which can be more targeted at activities across the innovation spectrum, could be a fruitful policy approach (however, detailed data on support for R&D and non-R&D based innovation would be required to substantiate this supposition).

[20] See data from the RoI Central Statistics Office: https://www.cso.ie/en/interactivezone/statisticsexplained/nationalaccountsexplained/grossnationalproductgnpandgrossnationalincomegni/

Picking and choosing examples of successful policy interventions among the benchmark countries may also be useful for achieving the breadth of Northern Ireland's innovation policy objectives, from innovation-driven enterprises to comprehensive innovation (e.g. the tax credit programme in Belgium, and the variety of grant programmes in Norway).

It is important to highlight that Figure 3.5 shows the role of direct R&D support seems to have shrunk in RoI over the period 2007-2020. This may reflect a shift to R&D tax credit support, as detailed in Figure 3.4. In addition, Ireland experienced extremely rapid GNP growth from 2015-2022 (increase from €164 billion to €282 billion). This makes the grant support appear small in proportion. However, it also highlights that the high proportion of R&D tax credit support in Figure 3.4 was particularly impressive, as it stayed very high, even as GNP was growing so rapidly. Although consistent information on R&D tax credit claims is unavailable for Scotland for the time-period, partial data does provide an indicative example. In the period 2014-2015, £170 million was claimed in R&D tax support in Scotland, and this has increased to £310 million in 2021-2022.[21] As such, the growth rate in Scotland appears to reflect the overall UK growth trend highlighted in Figure 3.4.

Figure 3.5: Grants for firm-level R&D as % of GDP



Source: OECD Tax incentives for R&D and innovation database, see: https://www.oecd.org/innovation/tax-incentives-RD-innovation/

[21] The 2014-2015 figure comes from the National Archives (file name: "Research and Development Tax Credits: Revised Tables RD5 and RD6 2014-15"), while the 2020-2021 data can be found here: https://www.gov.uk/government/statistics/corporate-tax-research-and-development-tax-credit

Having surveyed the landscape of R&D and innovation in the five benchmark countries, this section of the report now turns to a detailed examination of each of the policy instruments available in each country. As noted at the beginning of this section, we first focus on the RoI, to provide a comprehensive level of coverage given the relevance for the Northern Ireland economy. We then provide a more selective review of the four other benchmark economies, focusing on the R&D/innovation policy instruments which are most relevant for achieving Northern Ireland's innovation policy goals, of innovation to promote productivity, good jobs, and regional balance.

As noted above, the 'selective' part of this report entails that we will not examine the R&D tax credit offering in each of the five benchmark countries (apart from RoI, which serves as an indicative example for all countries). The R&D tax credit offering does not vary substantially from country to country, and Northern Ireland has little opportunity to fundamentally alter its main offering (e.g. change from the UK-wide volume-based system split between SMEs and larger firms, to an incremental system focused on specific sectors). As such, including an analysis of the R&D tax credit for all countries would offer little opportunity for policy learning in NI. However, Belgium offers a somewhat differentiated R&D tax credit programme (in addition to its 'standard' offering), which offers wage-based support at different points of the innovation process (e.g. 'R' vs 'D'). Therefore, these R&D tax incentive sub-schemes in Belgium are included in the analysis, as they may be of policy relevance for NI.

Before the detailed description of the policy instruments is presented, we first provide key information on each economy. In this description, we highlight selected policy instruments which are particularly relevant for achieving NI's innovation policy goals, in a series of 'In focus' boxes. Finally, before the detailed description of the policy instruments, we present graphs which map the TRLs of each policy instrument. These TRL graphs serve to highlight where key policy instruments are targeted in each economy and potentially relevant instruments for addressing any gaps in the Northern Ireland case. As such, the TRL graphs present an 'at a glance' overview of R&D/innovation policy support targeted at firms in each of the five benchmark economies.

3.3 R&D and innovation support in the Republic of Ireland

Ireland has four main funding agencies/government bodies responsible for implementing R&D/innovation policy instruments at the firm level: Enterprise Ireland (EI), Industrial Development Agency (IDA) Ireland, Science Foundation Ireland (SFI), and the Irish Revenue Commissioners. EI and IDA are the main agencies responsible for R&D/innovation grants and other types of direct support. EI focus on indigenous/domestic Irish firms, and implements many different small- and mid-scale R&D/innovation supports. This reflects the broad range of firms EI serve (e.g. from large R&D-intensive firms, to SMEs who are not yet R&D active). IDA focuses on attracting Foreign Direct Investment (FDI) to Ireland, and embedding it within the Irish economy after they have made their location decision. Relative to EI, IDA implements a small number of R&D/innovation policy instruments, which target a smaller pool of firms with much larger-scale grant support. It is interesting to note that of the five benchmark countries,

Ireland is the only one to have a dedicated agency responsible for attracting FDI, and providing large-scale R&D incentives specifically to multinationals.

In contrast to these direct grant-awarding agencies, SFI does not directly support firm-level R&D. Rather, its overall mission is to invest in academic researchers most likely to generate new knowledge, leading-edge technologies and competitive enterprises in STEM areas. When it comes to supporting BERD, SFI funds research centres in Ireland which are mandated to collaborate with firms on oriented basic research[22] and applied research projects. In practice, this may entail that large firms who operate across several sectors can gain the most from these SFI research centre collaborations, and are thus better placed to extract value from R&D with a high uncertainty of outcome. These centres have been shown to be effective at increasing firms' research capacity[23] (i.e. the 'R' in R&D), which is potentially crucial for breakthrough innovations.

Finally, Irish Revenue Commissioners implement Ireland's R&D tax credit programme. Since its launch in 2004, the R&D tax credit has undergone many significant changes. These include the rate increasing significantly, from 20% on expenditure above a baseline in 2004, to 30% on the total volume of R&D in 2024. Recent research[24] has shown that the level of R&D tax credit claims by multinational firms are over double that of domestically-owned firms, despite the number of multinational claimants being one quarter that of the domestic claimants.

Figure 3.6 provides an overview of support measures for R&D and innovation in the RoI with a detailed overview of each measure provided in Annex 2. Three ROI support measures seem particularly interesting in the context of policy development in Northern Ireland: the scheme to support Innovative High Potential Start-ups (HPSUs), the Smart Regions Enterprise Innovation Scheme, and the scheme which supports Digital Process Innovation (Box 3.1)

[22] As opposed to pure basic research which does not have a specific use in view or direction, the OECD's (2015) 'Frascati Manual' defines oriented basic research as work that is carried out with the expectation that it will produce a broad base of knowledge that is likely to form the background to the solution of recognised, or expected, current or future problems or possibilities (see; https://doi.org/10.1787/9789264239012-en).
[23] See Mulligan et al. (2022): https://doi.org/10.1016/j.respol.2021.104468.
[24] See Lenihan et al. (2023): https://doi.org/10.1007/s10961-023-09995-9.

Box 3.1: In focus: Ireland

Innovative High Potential Start Up (HPSU)

This programme provides a highly comprehensive range of supports, with large and smaller levels of associated funding, to help high-potential start-up firms through every stage of the growth process. It is a venture capital-style funding model, where investment goes to an innovative business plan, as opposed to specific R&D projects.

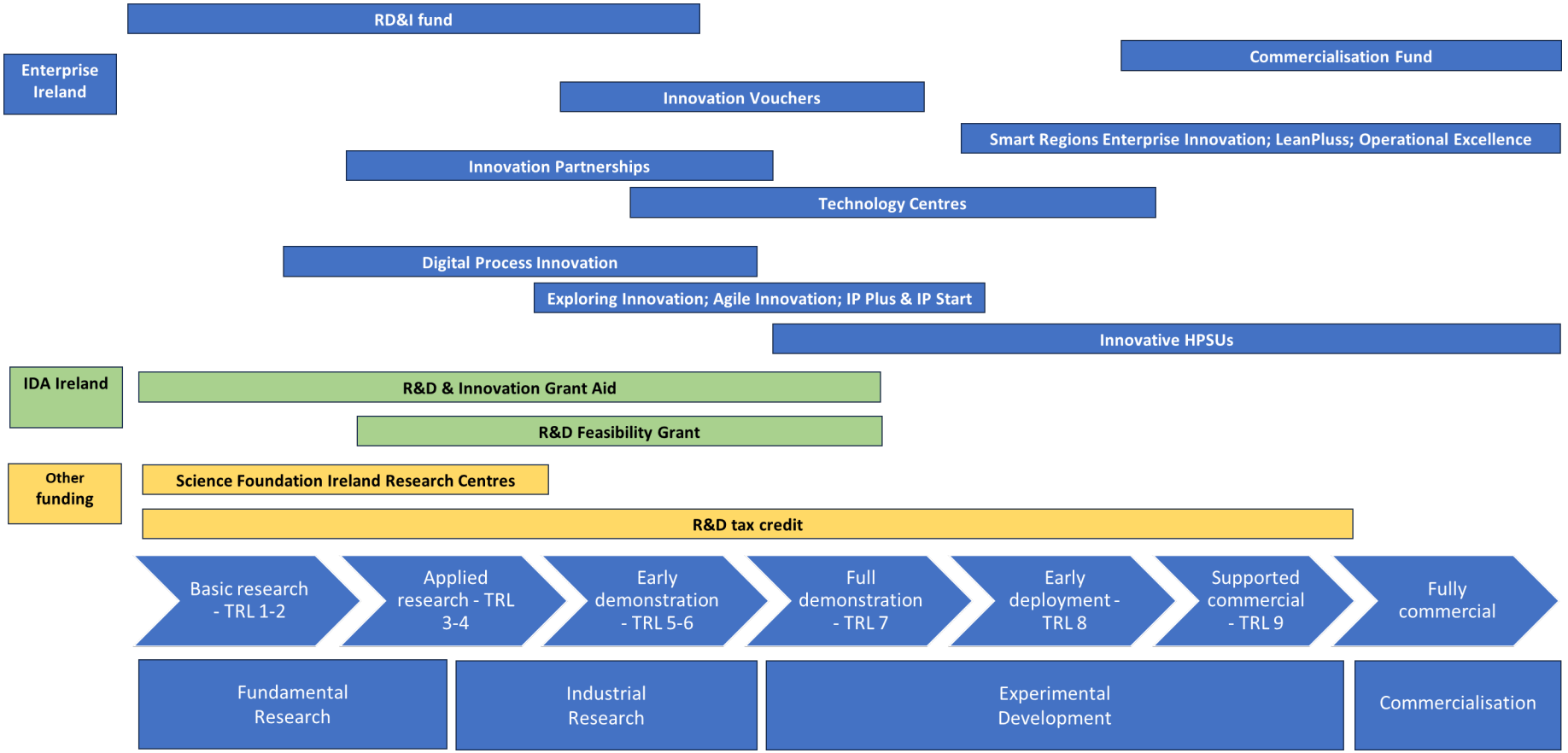
Smart Regions Enterprise Innovation Scheme

This scheme is implemented by Enterprise Ireland on behalf of two Regional Assemblies from less-developed regions, under the auspices of the European Regional Development Fund. As such, it provides an interesting example of region-specific innovation policy, involving multiple partners. This may be relevant for achieving regional balance, beyond traditionally strong innovation areas in NI. It also highlights that potential role EU funding and support could play in NI, which is unique within the UK.

Digital Process Innovation

Enterprise Ireland provides grants of up to €150,000, for projects that have the potential to deliver a 'step-change' in firms' capabilities.

Figure 3.6: Technology Readinesss Levels (TRLs) for R&D/innovation policy instruments in the Republic of Ireland



3.4 Benchmarking R&D and innovation policy in other countries

3.4.1 Belgium

There are a number of funding agencies/government bodies responsible for R&D/innovation policy instruments at the firm level in Belgium, some of which function solely at the regional level in Flanders, the Brussels-Capital Region, and Wallonia. The Agency for Innovation and Entrepreneurship (VLAIO) is a governmental organisation of the Flemish regional government. VALIO implements a large range of supports, focused on both SMEs and larger firms. The Brussels Institute for Research and Innovation (INNOVIRIS) answers directly to the minister in the Brussels-Capital Region with responsibility for scientific research. INNOVIRIS manages various funding measures targeting universities and firms located in the region, including support for technology transfer. Flanders Make is a strategic research centre for the manufacturing industry, who also engages with VLAIO to conduct feasibility studies for firms' potential innovative projects.

Federal Public Service (FPS) Finance is responsible for Belgium's highly differentiated R&D tax credit schemes. Belgium's R&D tax credit system is very different the other Benchmark countries (and the UK) in how it is calculated. Firms in Belgium are eligible to deduct circa €3.38 from every €100 spend on R&D. This initially may seem significantly smaller than the other benchmark countries, as well as the UK. However, when examining Belgium's R&D tax credit in a more detailed manner, the analysis undertaken for the purpose of this report highlights that Belgium offers a series of tax deductions which augment this initial offering and allow firms to reduce their corporation tax further. The specific Belgian R&D tax credits include patenting intellectual property, investing in R&D, and employees who introduced new ideas to the firm. In this report, we focus on two specific branches of the differentiated Belgian R&D tax credit, which are highlighted in the 'In focus' box.

Finally, the Institute of Microelectronics and Components (IMEC) performs world-leading research in the field of nano-electronics and nano-technology, and collaborates on R&D projects with (typically smaller) firms. This scheme may be particularly interesting in the context of NI, given recent investments in establishing the Smart Nanotechnology consortium. In the context of the recent launch of the Co-Centres programme in NI, IMEC may provide an example with a proven track record to follow.

Figure 3.7 provides an overview of key support measures in Belgium (see also Annex 2). Two measures seem of particular interest in terms of policy development in Northern Ireland (Box 3.2).

Box 3.2: In focus: Belgium

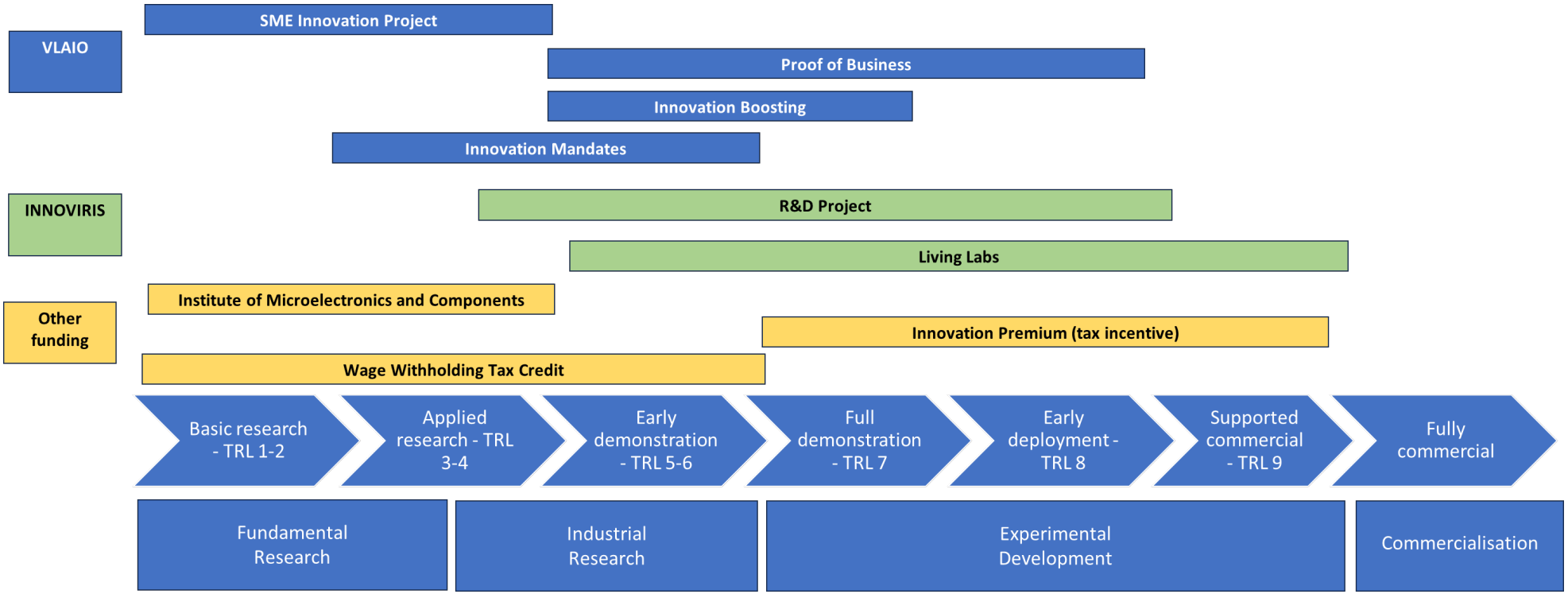
INNOVIRIS R&D project support

In addition to traditional 'research' and 'development' aspects of an R&D project, this intervention has a specific focus on supporting projects that are wholly based on organisational innovation and process innovation. The funding can cover up to 70% of project costs, making it generous and potentially large-scale if the firm needs this level of support.

Innovation Premium tax incentive, and Wage Withholding Tax Credit

These two supports augment the traditional/main R&D tax credit in Belgium. They both apply specifically to employees, who either bring a unique innovative idea to the firm, or are exceptional research employee (e.g. scientist, engineer) and can bring these skills to the firm. The first scheme applies at a relatively low level, covering one month of an employee's salary, while the second scheme covers 80% of the tax an employee would pay on their salary. This can enable the firm to re-invest the money (which would be forgone in tax) in R&D projects, or pay higher wages to R&D workers.

Figure 3.7: Technology Readinesss Levels (TRLs) for R&D/innovation policy instruments in Belgium



3.4.2 Denmark

Of the many funding agencies/government bodies responsible for R&D/innovation policy instruments at the firm level in Denmark, this report mainly focuses on supports covered by Innovation Fund Denmark (IFD), and highlights one additional support from The Danish Agency for Science, Technology and Innovation (DASTI). As noted in the introduction to this section of the report, Denmark is notable among the five benchmark countries for maintaining a relatively high level of BERD, while also investing a relatively low amount through R&D tax credits and direct support for firm-level R&D and innovation. Indeed, the Danish R&D tax credit scheme (Skattekreditordningen) was only introduced relatively recently in 2012. This is just as countries such as the UK, Ireland and Belgium were enhancing their offering and the take-up of the scheme was growing at pace (see Figure 4 above). R&D tax credit rates are strictly controlled in Denmark, and have varied substantially since its introduction. The rates were always below the headline UK level, and only applied to loss-making firms, and only to the part of the losses that can be attributed to R&D activities. In some years have been capped at a certain level (relatively low compared to other benchmark countries, at circa €671,000). Given that it is unlikely Northern Ireland would be in a position to adopt such a substantial change from the standard UK-wide R&D tax credit offering, this scheme is not considered below. However, Denmark does have some policy instruments which are particularly interesting for the Northern Ireland case, in terms of achieving key Northern Ireland policy aims, such as innovation to promote productivity, good jobs, regional balance and net zero.

IFD have the objective of creating a single-entry point to innovation funding for Danish firms, universities, and talented individuals. IFD offers a variety of programmes to enable firm-level innovation, designed for different target groups, and to support different firm needs. Of particular interest in the Northern Ireland context, and specifically in relation to the goal of achieving regional balance, is IFD's Innovation Pilot in Rural Districts programme (see the 'In focus' box). In addition to IFD, DASTI performs tasks relating to research and innovation policy, and runs the Innovation Incubator Programme, which helps early-stage, innovative firms. Essentially, DASTI works with firms at the lowest point of the firm's value chain, where venture capitalists and other private investors are usually reluctant to engage. This support is also highlighted in the 'In focus' box (Box 3.3). See also Figure 3.8 and Annex 2.

Box 3.3: In focus: Denmark

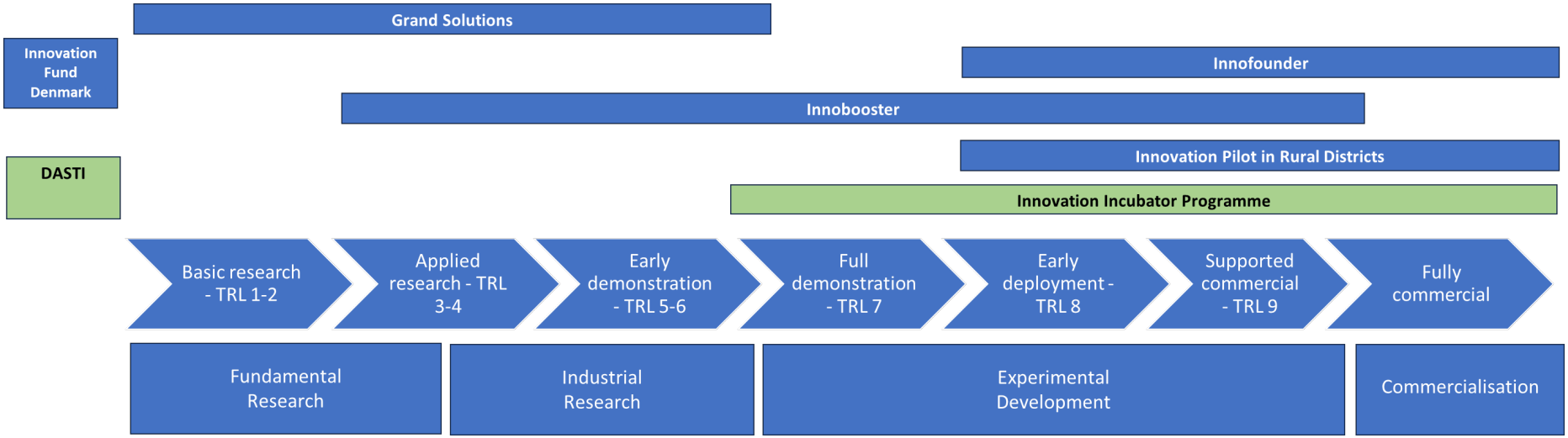
Innovation Incubator Programme

Similar to the HPSU scheme available in RoI, this programme offers a comprehensive level of support to start-ups, covering relatively low amounts of funding for early-stage idea generation (which are nevertheless essential at that stage), to later-stage securing of seed funding which can be in the millions of Pounds (equivalent to Danish Krone). The 'one stop shop' nature of this support may be particularly relevant for NI, in terms of developing and seeing through a pipeline of new, innovative firms.

Innovation Pilot in Rural Districts

This is not a 'pilot programme' as usually understood (i.e. initial small-scale implementation that is used to prove the viability of a project idea). Rather, the scheme provides support to a firm to hire an individual to 'pilot' (or lead) an innovation project in a firm based in a rural area. While the level of funding support is relatively low (circa €17,000 per year for 2 years), this type of support may be particularly relevant for firms who are just starting on their innovation journey, and do not have established innovation and R&D capacity.

Figure 3.8: Technology Readinesss Levels (TRLs) for R&D/innovation policy instruments in Denmark



3.4.3 Norway

There are many funding agencies/government bodies responsible for innovation policy instruments at the firm level in Norway. This report focuses on three key bodies: Innovation Norway, the Ministry of Education and Research, and the Research Council of Norway (RCN). Innovation Norway contributes to the following areas: Promoting Norwegian firms; securing development in rural areas; enhancing innovation in Norwegian firms and industry; building competitive Norwegian firms at both domestic and international markets; transforming ideas into successful business cases; promote interaction between firms, knowledge communities and R&D institutions. The Ministry of Education and Research supports firms conducting R&D through the Regional Research Fund programme. RCN is responsible for promoting basic and applied research, and innovation. RCN offers firms a series of supports, which can involve funding projects directly, or supporting collaborations with research institutions. The 'In focus' boxes highlight two schemes which target innovation in rural areas, which may be particularly relevant to NI.

Norway also offers an R&D tax credit programme (Skattefunn), which operate at circa 20% of R&D expenditure, capped at a total claim amount of approximately €2.3 million per firm. As highlighted in Figure 3.3 above, in contrast to Belgium, RoI and the UK, Norway has a balanced distribution of R&D tax credit support and direct (i.e. grant) support for R&D and innovation. This contextual point is potentially of interest to NI, in terms of where benchmark countries place emphasis in how they implement public support for firm-level R&D/innovation. However, the Norwegian R&D tax credit scheme is relatively similar to that offered in RoI and the UK as a whole. As such, it is not considered below as a close examination offers little opportunity for policy learning in the context of NI.

Figure 3.9 provides an overview of selected schemes in Norway with Regional Research Funds and FORREGION – the Programme on Research-Based Regional Innovation – suggested as potential examples for Northern Ireland (Box 3.4). See also Annex 2 for details on selected support measures.

Box 3.4: In focus: Norway

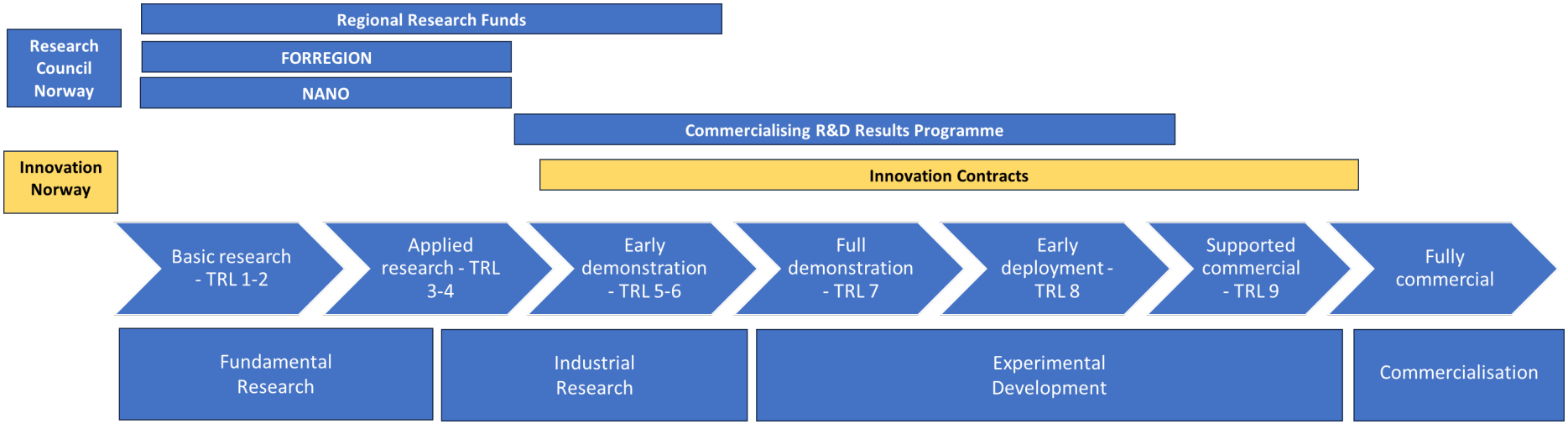
Regional Research Funds

Implemented jointly between the Norwegian Ministry of Education and Research, and Research Council Norway, this scheme targets the 'R' in R&D, with a specific focus on building up research capacity in firms located in rural regions. The scheme is at a relatively large scale, and can fund projects over £200,000 for 3 years. Funding is typically awarded on the basis of whether it aligns with government strategic objectives, meaning that it is flexible. Thus, it could be particularly relevant for Northern Ireland achieving the goal of regional balance, and as priorities may change over time.

FORREGION – Programme on Research-Based Regional Innovation

This support applies to a smaller number of firms than the Regional Research Funds, because it is targeted specifically at research-driven innovation. Key aspects of the scheme are its focus on firms in specific regions, and its novel incentivisation of collaboration and technology transfer. Under the scheme, a researcher working at a University can be 'loaned' to a firm to work on a research project, and vice versa so employees at a firm can get experience in University labs.

Figure 3.9: Technology Readinesss Levels (TRLs) for R&D/innovation policy instruments in Norway



3.4.4 Scotland

While firms in Scotland can benefit from UK-wide support provided by agencies such as UKRI, Innovate UK, the UK Research Councils, and the R&D tax credit scheme implemented by His Majesty's Revenue and Customs (HMRC), this section focuses specifically on Scotland-specific support. Scottish Enterprise (SE) is a sponsored non-departmental public body of the Scottish Government which encourages economic development, enterprise, innovation, and investment in firms. A separate agency of the Scottish Government, Highlands and Islands Enterprise operates in north-western Scotland and works closely with SE. It is important to note that in relation to Highlands and Islands Enterprise, which is one of the schemes detailed below, no firms successfully applied for funding during 2016-2019. This highlights the difficulty and implementation challenge for R&D/innovation support, outside of traditional innovation-intensive regions. In addition, as Scotland is part of the UK-wide R&D tax credit scheme, this policy instrument is not considered in the below analysis, as the scheme is already available in NI.

Following on from the above, Interface is a hub connecting a wide variety of firms and industries to Scotland's higher education and research institutes. They implement two unique types of Innovation Voucher scheme, which are highlighted in the 'In focus' box. At a different point in the TRL scale, the Scottish Funding Council implements a series of schemes designed to support technology transfer and university spin-outs. Finally, the Investment Zones scheme has recently been launched in collaboration between the Scottish Government, the UK Department for Levelling Up, Housing and Communities, and HM Treasury. As of 2024, this broad and large-scale support is currently being rolled out in several regions throughout the UK, and is designed to be context-specific. It will support innovation in firms through specific R&D/innovation interventions (e.g. grants), and by creating a more enabling environment in general. The implementation of this scheme in Scotland is potentially interesting from a Northern Ireland perspective, as two specific regions have been chosen for Investment Zones in Scotland. In contrast, the whole of Northern Ireland is currently being considered for Investment Zone categorisation, but there is the potential to have more than one Investment Zone which could be regionally located.[25]

Figure 3.10 provides an overview of key Scottish support measures (see also Annex 2). Box 3.5 provides an overview of Scotland's innovation voucher scheme which may provide learning points for Northern Ireland.

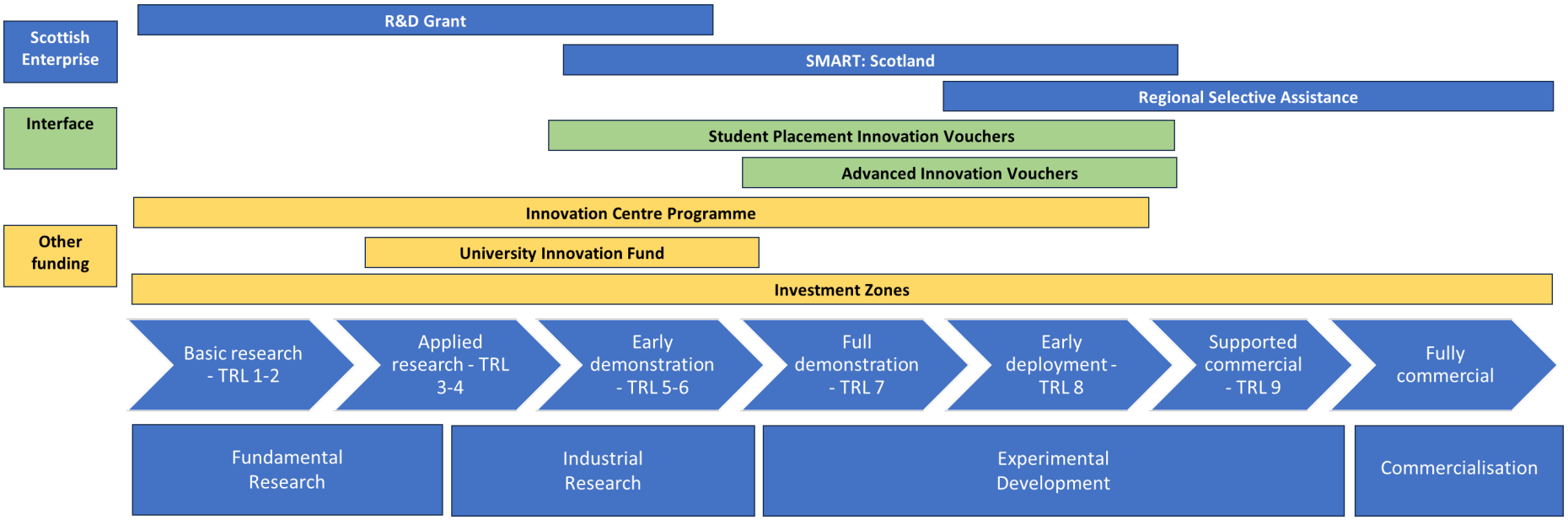
[25] See the Department for Levelling Up, Housing & Communities/HM Treasury 'Investment Zones policy prospectus': https://www.gov.uk/government/publications/investment-zones/investment-zones-policy-prospectus

Box 3.5: In focus: Scotland

'Student Placement' Innovation Vouchers, and 'Advanced' Innovation Vouchers

The funding agency Interface offers these two 'follow on' supports, which build on the traditional Innovation Voucher scheme. Respectively, they over firms the opportunity to engage with a PhD or master's student on an innovation project, and provide additional funding up to £40,000. The latter of these can be used to continue a relationship started with a traditional Innovation Voucher. These augmenting schemes (or similar) are not currently available in NI, and demonstrate how a devolved country within the UK can implement bespoke firm supports, depending on the needs of the industrial base. These schemes may be of particular relevance for achieving the policy objective of innovation to promote productivity, good jobs, and regional balance.

Figure 3.10: Technology Readinesss Levels (TRLs) for R&D/innovation policy instruments in Scotland



3.5 Summary

Three key similarities emerge when examining R&D/innovation support across the five benchmark countries:

1. All countries have at least one major R&D grant programme (e.g. potential support over circa £1 million) which targets firms with a major existing R&D capacity, and at least one SME grant programme which is often targeted at early stages in the innovation process and provides a lower level of funding (e.g. £100,000).
2. All countries have at least one region-specific R&D/innovation support programme, targeted firms located in lagging regions.
3. In all countries, the R&D/innovation support measures on offer to firms have evolved significantly over the years, often with major changes in the proportion of eligible costs firms can claim, and/or the overall monetary level of support available.

NI already has significant offerings in terms of point 1 above. However, the scope for learning from comparator countries still remains, as many countries implement their main grants in different ways. In particular, the case of Belgium may be relevant for Northern Ireland if considering the implementation of a differentiated R&D tax credit. Under the new Investment Zone programme, Northern Ireland may have the facility to make additional R&D tax incentive offerings, on top of or alongside the standard UK-wide scheme.

Given the focus on balanced growth in Northern Ireland, point 2 above may also be of particular interest to NI, as the five benchmark countries offer many suggestions for driving R&D/innovation in lagging regions. The recently introduced Smart Regions Enterprise Innovation Scheme in the RoI may provide specific advice for achieving Northern Ireland's innovation policy goals, as it is large-scale, holistic, and implemented under the auspices of the European Regional Development Fund. The latter point may be of particular interest in NI, as EU funding should in theory represent a unique source of finance and support available, within the UK context. However, the applicability of this point may be dependent on several complex bureaucratic steps, with necessary coordination not guaranteed.

In relation to point 3 above, in many countries, instruments which provided major funding in previous years have been phased out, and replaced or assimilated with other supports. For example, in the RoI up to 2020, the Technical Feasibility Fund was an important and widely used small-scale support (55 firms used it in 2014 alone, claiming €12.55 million). As of 2023, this support no longer exists, and has been replaced by the Exploring Innovation Grant. This new support is more comprehensive than the previous version, involving the option for collaboration and increasing the potential funding amount. In addition, parts of larger R&D/innovation grants that were available in previous years, have been separated into distinct, smaller-scale grants targeted at specific policy priorities (e.g. IP protection, digital process innovation) to make them more accessible to SMEs and non-R&D/innovation-active firms.

SECTION 4: KEY FINDINGS AND POLICY DEVELOPMENT OPPORTUNITIES

4.1 Key findings

Northern Ireland has a wide range of existing support measures for R&D and innovation covering all TRLs reinforced by support provided by UK-wide support measures operated by Innovate UK and other parts of UKRI. Where firms are supported by these schemes the evidence suggests they significantly boost future business growth[26]. Measures operated by InterTradeIreland, and measures such as the recently established North-South Co-Centres also provide support to sectors in which they operate. These measures will be complemented in future years by the significant programme of investment in supporting R&D and innovation which is part of the City and Growth Deals (see Box 2.1). Our mapping suggests a number of observations on the Northern Ireland system:

- Direct grant support within Northern Ireland is provided largely by Invest NI with some support schemes restricted by eligibility conditions and/or sectoral focus. This may be limiting access by some local firms to relevant support measures deterring them from starting to innovate or conduct R&D.
- There is a concentration of support measures in the lower TRLs (1-4) with less comprehensive support available for the translation and commercialisation of R&D (TRLs 5-9). Addressing this limitation in the support framework will become increasingly important if Northern Ireland is to maximise the innovation and productivity benefits of City Deal investments in R&D.
- As in the broader UK support system, there is an emphasis on product/service innovation with less focus on process and organisational change. Productivity improvements often require this type of business model innovation, a factor recognised by targeted initiatives in some of the benchmark countries (e.g. Belgium).
- NI firms face a complex R&D and innovation support landscape given the availability of regional, national and cross-border support measures. Enabling firms to navigate this effectively, particularly where firms are new innovators seems potentially important.
- Future expansion of R&D and innovation capacity in Northern Ireland – such as that envisaged in the City Deals – will depend critically on the availability of appropriate skills. This may be particularly important where balanced growth is a priority, and requires a system-wide approach to planning R&D and innovation support.

Comparing the benchmark countries suggests the diversity of approaches to supporting R&D and innovation. In Denmark, both grant support and levels of tax credit are relatively low although business R&D investment remains substantial. In Belgium, as in the UK, R&D tax credit support has increased sharply in recent years accompanied by the introduction of a range of targeted grant support measures. A similar picture is evident in the RoI, although here tax credit support is strongly concentrated in externally-owned companies.

[26] https://www.enterpriseresearch.ac.uk/wp-content/uploads/2022/08/QUB-NI-Grant-Report-09.08.22.pdf.

Three main similarities emerge when examining R&D/innovation support across the five benchmark countries:

- Support systems have developed to provide support to firms at different points in their R&D and innovation 'journey', and recognise that firms' support needs will vary very significantly. All of the countries considered have at least one major R&D grant programme (e.g. potential support over circa £1 million) which targets firms with a major existing R&D capacity, and at least one SME grant programme which is often targeted at early stages in the innovation process and provides a lower level of funding (e.g. amounts up to £100,000).
- There is a recognition that achieving objectives related to balanced growth will require targeted programmes. Hence, all countries have at least one region-specific R&D/innovation support programme, targeted at firms located in lagging regions.
- Support systems have evolved in all countries, often with the aim of focusing direct support (grants) more directly on specific policy priorities and/or market failures. These changes have included new or revised scheme objectives, major changes in the proportion of eligible costs firms can claim, and/or the overall monetary level of support available.

In terms of how each benchmark country help firms to assess the most appropriate public R&D/innovation support for them, the case of RoI is perhaps indicative. In the case of RoI, domestic Irish-owned firms must first approach Enterprise Ireland with an application for R&D/innovation support. That is, in the vast majority of cases, the initial move is from the firm, as opposed to the support agency. The initial move from the firm is typically initiated by financial need, and tacit awareness of the potential for available support (although likely not a complete understanding of the various funding measures available). Support agencies typically keep up-to-date information on support available on their webpages, with easy-to-use links to online application portals which show eligibility requirements. In addition, support agencies advertise available funding in traditional and social media. Firms can also request to meet with Enterprise Ireland officials before making a formal application. After this initial move, firms become 'clients' of the support agency, and are allocated an enterprise development officer, who works with them on their application for support. In practice, this enterprise development officer can help the firm to navigate to the most appropriate type of support for them, and potentially direct them to further support measures at later stages of their R&D/innovation journey. However, this process is not wholly structured or targeted, and at all stages is dependent on the firm.

Alongside these systemic changes the benchmarking analysis highlighted a number of more specific policy innovations which may be interesting in the future development of the Northern Ireland support system. Specifically:

- ***Commercialisation pathways*** – measures such as Ireland's Innovative High Potential Start-up (HPSU) scheme which aims to provide venture-capital style funding to support an innovative business plan rather than a specific R&D project. Another model is the Danish Innovation Incubator programme.
- ***Process and organisational innovation*** – specific measures have been introduced to support productivity-enhancing process innovations such as Ireland's Digital Process Innovation scheme and a specific INNOVIRIS grant in Belgium which supports organisational and process innovation.

- ***Sub-regional support measures*** – in very different contexts, both Ireland (Smart Regions Enterprise Innovation Scheme), Norway (Regional Research Funds, FORREGION) have developed support measures targeted at supporting R&D and innovation activity in less developed regions.
- ***Innovation leads*** – the Danish 'Innovation Pilot' programme supports staff hired to lead or 'pilot' innovation in firms new to R&D and innovation.
- ***Extending R&D tax credits*** – Belgium in particular has introduced measures which augment their main tax credit scheme to support guest scientist or engineer placements with firms to support R&D and innovation projects.
- ***Extending innovation vouchers*** – Scotland has pioneered follow-on support to innovation vouchers relating to student placements and small-scale innovation projects.

4.2 Opportunities for policy development

The international landscape for R&D and innovation is changing rapidly as countries sharply increase their investment in intangibles such as R&D and skills. Global challenges such as the climate crisis, bio-diversity and the ageing workforce are also changing innovation priorities which, in addition, are also being rapidly reshaped by technological changes such as AI. Internationally this has led to a need for agility in innovation policy making, and a re-orientation of policy rationales from addressing market failures to supporting policy missions. This more strategic approach to innovation policy making, and the advent of new policy priorities in Northern Ireland, suggests a range of policy development opportunities. Each of these opportunities can contribute to the Department's broad R&D objective, some are linked more strongly to supporting Comprehensive Innovation and others to objectives around Innovation Driven Enterprises.

Supporting balanced growth and Comprehensive innovation

Supporting balanced growth and Comprehensive Innovation is likely to require broadening the base of innovating firms across Northern Ireland as well as encouraging higher levels of innovative activity among firms in economically weaker areas. Four opportunities to broaden the base of innovating firms are suggested by our analysis:

- ***Re-thinking eligibility criteria for existing support schemes*** - Generally, the numbers of firms assisted through current interventions are relatively small in relation to the wider business population. SMEs, which form the bulk of the Northern Ireland business population, are eligible for most schemes although there are a number which are open to Invest NI clients only or are targeted sectorally. It may be worth reviewing the eligibility for those schemes that are restricted by either client or sector criteria to widen the pool of potential applicants. Widening eligibility in conjunction with the wider promotion of the interventions may help to expand the numbers.
- ***Single contact point for support*** – Firms in Northern Ireland face a complex support landscape which may be off-putting to new innovators. The Innovation Fund for Denmark (IFD) operate a single point of entry for firms to the support system which could be emulated in NI, developing the existing single point of contact for NI support currently operated by Innovate NI. Scotland also operates 'Interface' which provides a similar service to SMEs to link them with appropriate academic support.

- ***Mentoring/support service to help firms seek extra-NI grant support*** – NI firms are under-represented in Innovate UK awards, and new cross-border opportunities may open up in future years. Related to a single contact point, there could be a dedicated mentoring or support service provided to help businesses apply for extra-NI funding competitions, such as those offered by Innovate UK, which require detailed funding applications. Such a scheme is currently offered via Innovate UK Edge, hosted by Invest NI, but only to high potential IDEs. This could be extended more widely to any businesses seeking to apply to competition-based initiatives.
- ***Innovation lead or innovation 'pilot' programme*** – Another Danish programme provides firms new to innovation with support to recruit Innovation Pilots or Innovation Leads. This helps firms to develop an innovation plan and acquire matching resources. In some ways, this is similar to the Business Explorer scheme operated by InterTradeIreland which might provide the basis for developing a similar scheme at a larger scale across other rural areas.
- ***Sub-regional support measures*** – in very different contexts, both Ireland (Smart Regions Enterprise Innovation Scheme), and Norway (Regional Research Funds, FORREGION) have developed support measures targeted at supporting R&D and innovation activity in less developed regions. Both may provide a model for developing sub-regional support strategies in Northern Ireland.

Supporting Innovation Driven Enterprises, good jobs and the net zero transition

Higher productivity creates the basis for paying higher wages and gives firms stronger revenue streams which can support future investments in productive capacity and lower carbon products/services. Northern Ireland firms already have access to support measures through Invest NI and Innovate UK which the evidence suggests are effective in promoting medium-term growth[27]. Our benchmark analysis suggests a number of areas where adopting more targeted support (or perhaps shifting the emphasis of current support schemes) may strengthen the environment for Innovation Driven Enterprises (IDEs), benefit productivity growth and facilitate the transition to net zero:

- ***Supporting commercialisation pathways for IDEs -*** Other than academic spin-out interventions in Northern Ireland there is a lack of dedicated commercialisation-only schemes for the wider business population. The recent introduction of Founder Labs is welcome in this respect. There may however be a need for a broader intervention(s) which supports businesses to scale their demonstration or prototype models into full commercial production. Potential models are Ireland's Innovative High Potential Start-up (HPSU) or the Danish Innovation Incubator programme. This need is likely to become increasingly important as the range of R&D-related initiatives linked to the City Deal reach maturity. Having strong commercialisation pathways in Northern Ireland will help the region capture the full benefits of these foundational investments through the development of IDEs.
- ***Supporting process and organisational innovation*** – Evidence suggests that process and organisational innovation are most strongly linked to productivity growth. Specific measures have been introduced elsewhere to support productivity-enhancing process innovations such as Ireland's Digital Process Innovation scheme and a specific INNOVIRIS grant in Belgium which supports organisational and process innovation.

[27] https://www.enterpriseresearch.ac.uk/wp-content/uploads/2022/08/QUB-NI-Grant-Report-09.08.22.pdf.

- ***Extending innovation vouchers*** – Scotland has pioneered follow-on support to innovation vouchers relating to student placements and small-scale innovation projects which may be applicable in Northern Ireland. This type of (relatively) low-value, easily accessible support may be particularly applicable to IDEs in the early stages of their development.
- ***Extending tax credits*** – Tax credits play an important role in supporting innovation in all sizes of firms. Innovative use of tax credits in Belgium has introduced measures which augment their main tax credit scheme to support guest scientist or engineer placements with firms to support R&D and innovation projects. Although potentially difficult to implement, such measures may be helpful in both supporting individual innovation projects and developing closer collaboration between innovation partners.

ANNEX 1: SUPPORT SCHEMES FOR R&D AND INNOVATION IN THE REPUBLIC OF IRELAND

Intervention	**Enterprise Ireland RD&I Fund**
Eligibility	Available to all registered Irish-based firms with positive earnings. Supports ***R&D projects*** with total costs greater than €300,000 (there is no set upper limit to support). Proportion of total cost firms can claim is dependent on company size (small firms 45%, medium firms 35%, large firms 25%). Bonus of up to 15% if two firms collaborate.
Purpose	Aimed at **larger R&D projects**. Supports new or substantially improved products, processes, services, and organisational changes which will increase a firm's competitiveness in their target market. Project must represent a 'step-up' for a firm's RD&I capability.
Scale	€59.6 million, 251 firms (2013 – 2016)

Intervention	**Enterprise Ireland Commercialisation Fund**
Eligibility	Available to academics in research institutions in Ireland. Firms cannot apply. Project costs are typically **between €80,000 and €350,000**. Commercial Case Feasibility Grant also offered, which allows firms to scope and develop the case for an innovation project (**€10,000-€15,000**).
Purpose	Supports non-industry researchers in **science and engineering** to develop technology that leads to the creation of start-up firms and/or the generation or licensing of technologies to firms to bring products/services to market.
Scale	€144.2 million, 895 projects (2003 – 2009)

Intervention	**Innovation Voucher (Enterprise Ireland and IDA Ireland)**
Eligibility	Available to all **SMEs** in Ireland. Some specific sectors excluded, such as agriculture and not-for-profit.
Purpose	€5,000 voucher to **incentivise collaboration** and build links between Ireland's HEIs and SMEs. SMEs can match the €5,000 voucher with up to €5,000 of their own funding to avail of a **50-50 co-funded fast-track** application process.
Scale	€9.9 million, 1,638 SMEs (2007 – 2012)

Intervention	**Innovation Partnership Programme (Enterprise Ireland)**
Eligibility	Available to all manufacturing/internationally traded services firms based in Ireland, who wish to collaborate with Irish HEIs. Innovation Partnerships provide grants from 40% to 80% of a research project. ***Grant paid directly to the HEI on verified*** expenses. Funding typically does not exceed €200,000. Different supports are available depending on the firm size and project type. Firms can use the Innovation Partnership funding to join a Technology Gateway, which facilitates collaboration between firms and academics in specific research fields on near-to-market innovation projects.

Purpose	Facilitates **collaboration between firms and academics** in specific research fields. Provides **up to 80%** of the cost of research project between a firm and HEI. Aim is to develop new and improved products, processes, or services, or generate new knowledge and know-how.
Scale	€22.6 million, 145 partnerships funded (2004 – 2006)

Intervention	**Technology Centre (Enterprise Ireland and IDA Ireland)**
Eligibility	Available to all firms based in Ireland. ***Technology Centres*** have a specific mandate to pursue an industry-led research agenda. Focus on short-to-medium term, problem-oriented research. Participating firms must already be R&D-active.
Purpose	Facilitates **collaboration between firms and academics** on market focused strategic R&D projects. Technology Centres are collaborative bodies, led by industry, to generate economic value from publicly funded research.
Scale	Exact scale unavailable (aim is to enable collaboration, not directly fund R&D in firms)

Intervention	**Innovative High Potential Start Up (Enterprise Ireland)**
Eligibility	Available to all start-up firms (usually with less than ten employees) and small enterprises that have been in existence for less than five years. Based on a venture capital-style funding model with several investment rounds, with specific requirements on the proportion of operating costs that relate to R&D. Firms must have an innovative business plan for development of products, services, or processes. Support up to 50% of investment required per investment round. Average funding approved is **€200,000 in Seed phase**. Additional sums based on achieving agreed milestones. The maximum equity funding by EI is **€1.2 million over three years** (higher rates may apply for regions outside Dublin). Before applying for the main support, **HPSU feasibility study grant funding** is available (70% of eligible expenditures or €30,000). Firms can also avail of the **HPSU Founder Forum**, to help founders overcome challenges.
Purpose	Encourages the establishment and development of **innovation-led HPSUs**. Investment goes to achieving an overall business plan, not funding discrete elements of a business plan, such as R&D or employment creation.
Scale	€12.55 million, 55 firms (2014)

Intervention	**Exploring Innovation Grants (Enterprise Ireland)**
Eligibility	Available to all manufacturing or services firms based in Ireland, employing ten or more people. Maximum grants are 50% of eligible expenditure, up to a **maximum grant** of **€35,000**.
Purpose	Support improved planning of **R&D, innovation, or international collaboration projects**. This includes: Encouraging firms to engage in strategic thinking about disruptive technologies; encouraging firms to look for external inspiration and guidance; investigating if solutions are available from HEIs; carrying out prototype development to assist in the evaluation of project options; and analysing project commercial feasibility.

Scale	Exact scale unavailable. Offers support worth up to €35,000 to firms.

Intervention	**Agile Innovation Fund (Enterprise Ireland)**
Eligibility	Available to all firms in Ireland, with positive earnings, who are new to R&D, operating in short product life cycles, and/or undertaking small/short projects. Grant support is provided for projects **up to €150,000**. Grant rates are from 25% to 50%, dependent on a firm size, project type, and collaboration.
Purpose	Supports development of new or substantially improved products, services or processes, where total project cost is less than €300,000.
Scale	Exact Scale unavailable. Offers support worth up to €150,000 to firms.

Intervention	**Smart Regions Enterprise Innovation Scheme (Enterprise Ireland)**
Eligibility	Competitive open call with strict evaluation criteria. Key part of Ireland's Smart Specialisation Strategy. The scheme has four streams: 1) Local infrastructure (€1m-€10m); 2) Innovation clusters/consortia (€50k-€2m); 3) Services to SMEs for innovative solutions (€200k-€1m); 4) Feasibility/priming research (€25k-€200k). Applicants must be Not-for-Profit Designated Activity Companies or Not-for-Profit Companies Limited by Guarantee (applicants for Stream 4 can also be public bodies). Successful projects must be collaborative in nature, innovative, financially viable, sustainable, and support existing regional infrastructure.
Purpose	Support the development of innovative services to drive regional job creation/retention and enterprise development. Targeted at strategic locations where an identifiable deficit exists in key infrastructure for micro firms and SMEs. Enterprise Ireland implement this scheme under the auspices of the European Regional Development Fund's regional programmes for the Southern, Eastern and Midland Regional Assembly and the Northern and Western Regional Assembly.
Scale	€145.3m total (first open call for €35m launched in October 2023, open until March 2024; further open calls follow)

Intervention	**IP Plus and IP Start (Enterprise Ireland)**
Eligibility	Available to all R&D-active Irish-owned businesses operating in the manufacturing/internationally traded services sectors. **Maximum grant of €35,000**.
Purpose	This grant supports companies to obtain **external expert IP advisory support** services and **build the in-company IP capability** necessary to implement a detailed IP Strategy. It can be used for both consultancy and salary costs.
Scale	New support, scale not available. Funding up to €35,000.

Intervention	**LeanPlus (Enterprise Ireland)**

Eligibility	Available to all firms located in Ireland. 50% of the eligible project costs up to a maximum of €100,000 (**€50,000 grant**). Projects are typically 6-9 months in duration.
Purpose	Support **Lean process innovation**. Eligible uses include hiring an approved external Lean service provider to facilitate the project, and partial salary cost for up to 10 staff members working on the Lean project team.
Scale	New support, scale not available. Funding up to €50,000.

Intervention	**Operational Excellence Offer (Enterprise Ireland)**
Eligibility	Available to all SMEs and large firms trying to ***redesign their business model***, for projects with a minimum expenditure level of €100,000.
Purpose	Support for new investment in transformation RD&I projects. Different grant rates dependent on nature of the project and firm size.
Scale	New support, scale not available. Funding up to €100,000.

Intervention	**Digital Process Innovation (Enterprise Ireland)**
Eligibility	Available to all SMEs and large firms, 50% for project costs to up a **maximum of €150,000**.
Purpose	Competitive funding for projects that will deliver a ***step-change*** in the company capability and operational effectiveness, introducing new digital technology systems, implementing new production methods for enhanced sustainability. Can also cover the cost of hiring an **external consultant**.
Scale	New support, scale not available. Funding up to €150,000.

Intervention	**IDA Ireland R&D & Innovation Grant Aid**
Eligibility	Available to foreign-owned firms based in Ireland, to perform R&D and introduce innovative products, processes and services. Support available for: 30% personnel costs, 10% consultancy costs (no travel/subsistence), 20% materials. **Maximum grant** amounts can vary depending on the project. Divided into three categories: 1) up to €500,000, 2) €500,000 to €7.5 million, and 3) greater than €7.5 million.
Purpose	Aims to increase the number of foreign-owned firms **performing R&D in Ireland**, the scale of investment in R&D in Irish operations, and number of foreign-owned firms in Ireland performing R&D for the first time.
Scale	€852 million, 566 firms (2006 – 2016)

Intervention	**IDA Ireland R&D Feasibility Grant**
Eligibility	Available to foreign-owned firms based in Ireland. Provides grant support up to a **maximum** of €250,000 or 50% of eligible expenditure.

Purpose	Investigate the feasibility of developing a new product, process, technology or service offering. Designed to **support exploratory work** required to develop and justify longer term and more sustainable Research, Development and Innovation (RD&I) programme within IDA client firms.
Scale	€17.7 million, 131 firms (2006 – 2016)

Intervention	**Science Foundation Ireland (SFI) Research Centres**
Eligibility	Available to all firms (based in Ireland and outside of Ireland). Funding from SFI used to establish Research Centres on the campuses of HEIs. Research Centre then collaborates with firms on research projects (SFI does not directly fund firms). Firms must make a minimum 30% 'in cash' **financial contribution** and a **verifiable intellectual contribution** to all research collaborations.
Purpose	Supports research that delivers significant economic and societal impact in areas of strategic opportunity for Ireland. Research Centres link **scientists and engineers** in partnerships across academia and industry to address key research questions. Centres aim to: foster development of new and existing Irish-based technology firms; attract industry that makes potentially important contributions to Ireland and the Irish economy; and expand science and engineering educational and career opportunities in Ireland.
Scale	€483million (2012 - 2018), 16 centres (as of January 2024)

Intervention	**R&D Tax Credit (Irish Revenue Commissioners)**
Eligibility	Available to all firms in Ireland. Firms can claim a **30% tax credit** (increase in 2024 from previous rate of 25%) on R&D-related expenditure once it meets strict criteria (referred to as a 'science test'). Several steps are in place to remove administrative burden on firms, there is a reduced criteria for passing the 'science test' if: 1) Any R&D carried out under an Enterprise Ireland, Horizon 2020, Horizon Europe or IDA R&D grant; 2) The firm is micro, small or medium-sized; or 3) Total claim is €50,000 or less. Direct R&D grant aid is deducted from the total R&D firms can claim, so firms cannot claim tax relief on other R&D support received.
Purpose	Reduces the cost of performing R&D, thus providing **indirect support** for any R&D activities.
Scale	€3.6 billion, 11,272 firms (2007 – 2016)

ANNEX 2: R&D AND INNOVATION SUPPORT MEASURES IN OTHER BENCHMARK COUNTRIES (SELECTED)

A2.1 Belgium

Intervention	SME Innovation Project (Agency for Innovation & Entrepreneurship-VLAIO)
Eligibility	Available to SMEs in the Flemish region. Maximum project duration of 24 months. A series of selection criteria are considered, including: sufficient substantive challenges; novelty of the idea; contribution to firm knowledge; feasibility of the project within the set time frame and resources deployed; and expertise of the project partners and subcontractors. **The minimum budget required for the project is €50,000. Maximum support of €250,000**. Innovation projects must be aimed at research (and not development).
Purpose	Supports Flemish SMEs with their innovation projects.
Scale	In the 5 years up to 2020, 594 projects supported, across 657 firms, with a total funding level of €105.9 million.

Intervention	Innovation Boosting (Flanders Make and Agency for Innovation & Entrepreneurship-VLAIO)
Eligibility	Available to existing firms and start-ups who seek advice in the development of an innovative idea. Both innovative products and production processes are eligible. Offers extensive feasibility studies. Flanders Make carries out the feasibility study before an assessment is made on whether the project qualifies for VLAIO funding. **The maximum budget of an Innovation Boosting project is €60,000**. Depending on the size of the firm, 25-45% of this is subsidised.
Purpose	Helps firms to lower innovation barriers, through offering detailed feasibility studies.
Scale	Exact funding and scale unavailable. The maximum amount granted is €60,000.

Intervention	Innovation Mandates (Agency for Innovation & Entrepreneurship-VLAIO)
Eligibility	Available to all firms located in the Flemish region. Must be part of a consortium between a Flemish firm, Flemish knowledge institution and postgraduate researcher. The eligible projects focus on the elaboration of basic research to make the results applicable within firms and on the economic valorisation of research. The accepted budget forms the basis for the calculation of the subsidy. The aid depends on the type of mandate and the phase. **Spin-off firms:** receive a 100% subsidy, paid to the knowledge institution. **Existing firm:** Phase 1: research phase (maximum duration 12 months): 100% subsidy paid to the knowledge institution. Phase 2: follow-up phase, if Phase 1 successful, with firm co-financing, the funding percentage depends on the size of the firm.
Purpose	Allows for postdoctoral researchers to carry out a project in close collaboration with firms, either with an existing firm or with a view to setting up a new firm. The main aim of the research project is the economic valorisation of research. **Focus on projects with a risk level that is too high to be carried out as an ordinary R&D project.**
Scale	In the 5 years up to 2020, 49 projects supported, across 84 firms, with a total funding level of €5.79 million.

Intervention	Proof of Business (The Brussels Institute for Research and Innovation-INNOVIRIS)
Eligibility	Available to firms that will develop all or part of their business activities in the Brussels-Capital Region. Funded projects must have the following characteristics: Project is designed to develop a **technologically innovative prototype or service**, which may have a favourable impact on the economy, employment and/or sustainable development in the Brussels-Capital Region. Eligible firms receive a grant that covers **50% to 70% of the costs** to obtain a proof of business or proof of concept. Firms can have a maximum budget of €100,000. The proposed work programme must last at least three months, but not more than nine months.
Purpose	Demonstrate that the business component is in line with the development of an innovative product/service, that is well integrated into the overall business strategy, with a view to growth and long-term sustainability.
Scale	Exact funding and scale unavailable.

Intervention	Institute of Microelectronics and Components (IMEC)
Eligibility	Available to all firms. IMEC is an independent non-profit research centre. IMEC's revenue is mainly realised by collaborative R&D with firms, universities, and research centres worldwide. IMEC receive an annual research grant from the local government (approx. 15% of IMEC revenue) which support IMEC in conducting longer-term research. Firms can collaborate with IMEC on research projects. IMEC does not fund firms.
Purpose	Supports research in the field of nano-electronics and nano-technology. This research includes digital components, organic electronics, or scaling-driven nano-electronics and is applied in healthcare, smart electronics, sustainable energy, and transport.
Scale	Exact funding scale unavailable. Estimated annual budget of over €500 million.

Intervention	R&D Project (The Brussels Institute for Research and Innovation-INNOVIRIS)
Eligibility	Available to all firms. Finance 15% to 70% of the cost for three funding categories: **1) Industrial research:** acquiring scientific knowledge to achieve a predetermined industrial or commercial goal. The result of this project leads to the development of a proof of business or a prototype; **2) Experimental development:** developing an innovative product, process or service, where the firm has already taken some steps to analyse the feasibility of the idea. There are still uncertainties and risks regarding the concrete use of the technology. This project results in a prototype tested in a real environment; **3) Organisation and process innovation:** Implement a new organisational structure, process or a new method of production or delivery in firm. Have defined the issues with the current and estimated the benefits of proposed innovation. Have tested the innovation on a small scale.

Purpose	Offers financial support to develop, complete or implement an innovative product, process, or service.
Scale	Exact funding and scale unavailable.

Intervention	**Experimental Platform – Living Labs (The Brussels Institute for Research and Innovation-INNOVIRIS)**
Eligibility	Available to SMEs with an operating office located in the Brussels-Capital Region. Offers a subsidy to cover the costs involved in preparing a Living Labs (LL) project. LLs operate as intermediaries among cities, regions, firms, third sector and research organisations, as well as citizens, for **joint value co-creation, rapid prototyping, or validation to scale up and speed up innovation and firms**. Costs covered include: staff costs; operating costs for the organisation of meetings and preparatory workshops with a view to preparing and setting up the project; the cost of legal services carried out in the framework of a service contract; the costs of consultancy services, including the costs of involving a research body and other similar charges involved in preparing a project. The Brussels-Capital Region has a financial intervention rate of 100% and a maximum budget of **€25,000 per platform project**. Grant rates for projects as part of the LLs vary depending on what size of firm applies for the grant.
Purpose	Allows participants to experiment together with other stakeholders and test solutions in a real environment.
Scale	Exact funding and scale unavailable.

Intervention	**Innovation Premium (Federal Public Service Finance)**
Eligibility	Available to all firms in Belgium. For a **creative employee who contributes to a new idea (with added value)** that is implemented within the firm. The recipient is exempt from personal income tax and social security contributions for the employee and employer. The maximum amount available is **one month's gross salary** per worker and per calendar year. The definition of an 'innovative idea' is wide, which makes the programme flexible.
Purpose	The support rewards employees for contributing creative and innovation ideas which add value to a firm.
Scale	€160.624 million in 2017.

Intervention	**Wage Withholding Tax Credit (Federal Public Service Finance)**
Eligibility	Available to all firms based in Belgium. The employer is entitled to an **80% exemption of payment of the wage withholding tax of highly qualified researchers**. The part of the withholding tax that is deducted (but not paid to the tax administration), stays at the disposal of the employer. This works as a wage subsidy to the employer.
Purpose	Supports firms by diminishing the wage cost of highly qualified researchers, thus reducing the cost of R&D.

Scale	€722.745 million, 6,024 firms in 2017.

A2.2 Denmark

Intervention	**Innobooster (Innovation Fund Denmark-IFD)**
Eligibility	Available to SMEs, entrepreneurs and start-ups. Firms can apply for between DKK 50,000 – DKK 5 million (circa £5,750 - £575,000). Projects can last for up to two years. Requirements for firms include: **Novelty value** – The firm must initiate new development activities, and the result of the project must be distinctly different from what is currently on the market; **Value creation and business potential** – The firm must render it probable that it can gain a significant competitive advantage, and in the long term a profit from the solution; **Implementation** – It must be clear which specific activities will be carried out in the project, which concrete results the firm will have after the project, and how they will be used; **Financial efficiency** – The project must be budgeted realistically and the desired grant must measure up to the expected business gain and the project risk.
Purpose	Innobooster is a grant to develop and make a new product or service ready for the market or to improve a process that increases the firm's competitiveness and creates growth
Scale	DKK 580 million (circa £66.7 million) (2014 – 2017)

Intervention	**Grand Solutions (Innovation Fund Denmark-IFD)**
Eligibility	Available to any legal entity (firms, research institutions or public institutions), directly involved in the project activities. The purpose of Grand Solutions (GS) is to invest in high quality research and innovation projects with the potential to create knowledge, growth, and employment in Denmark. Typically grants range from between DKK 5 million and DKK 30 million (circa £575,000 – £3.45 million). Applications based on: **Excellence** – Quality of research and innovation; **Value creation**; **Efficiency** of project execution; **Implementation** of results. Covers maximum of 75% of total project costs. The level of support depends on the organisation type, research type, and costs.
Purpose	The GS support is aimed at collaborative projects based on excellent research, focused on solutions of considerable societal value, and cross-disciplinary investments in research institutions and firms.
Scale	DKK 1.344 billion (circa £154 million) given to 67 projects in 2015.

Intervention	**Innofounder (Innovation Fund Denmark-IFD)**
Eligibility	Available to any field of expertise as long as the idea is innovative, and the funding recipient has potential to develop a sustainable firm. Innofounder has two tracks: **Innofounder Graduate** for recent higher education graduates. **Innofounder Experienced** for individuals with significant research/work experience. Projects last approximately 12 months. Applicants can apply individually or as a team of up to three founders. Innofounder finances the establishment and development of the firm, with extensive development remaining before

	the offering is complete and business model in place. No major external funding should have been obtained. Both supports provide monthly funding to individual founders, ranging from DKK 15,000 - DKK 100,000 (£1,725 - £11,503).
Purpose	Accelerate development of innovative business ideas from early stages to the stage where firms are ready to go to market or gain investment.
Scale	During the last 5 years this support has been allocated to 114 firms, total DKK 95.77 million (£11m).

Intervention	**Innovation Pilot in Rural Districts (Innovation Fund Denmark-IFD)**
Eligibility	Available to rural-based SMEs. **Projects can address the development of new products, new markets, services, or new production methods**. It is essential that the project can demonstrate considerable business potential. Funding available for 1- and 2-year projects, up to DKK 150,000 (circa £17,000) per year.
Purpose	Firms in rural districts, who have a good idea for a development or innovation project, can apply for funds to **hire an 'Innovation Pilot'**, who is a higher education graduate that will run the innovation project.
Scale	In the past 5 years, 245 projects have been funded, with a total amount approved of DKK 53.25 million (circa €7 million). Not all approved funding was paid out as of 2020.

Intervention	**Innovation Incubator Programme (Danish Agency for Science, Technology, and Innovation-DASTI)**
Eligibility	Available to all **early-stage innovative firms** in Denmark. The incubators can engage financially with firms in three successive stages. **1) Pre-investigation**: A preliminary analysis and evaluation of the technological perspectives and commercial potential of the project. Approx. DKK 80,000 (circa £9,000) allocated for this stage. **2) Primary project funding**: Pre-seed funding for the initial capital injection and early-stage development activities in the start-up. Maximum of DKK 3.5 million (circa £400,000) invested at this stage in the form of loans or equity, provided that a supplementary private investment is raised. **3) Secondary project funding**: Seed funding for further development activities. Maximum of DKK 2.5 million (circa £287,500) invested at this stage in the form of loans or equity, provided that an additional supplementary private investment is raised equalling.
Purpose	Provides professional support for early stage, highly innovative start-ups. Operates at the earliest stage of the investment chain, where venture capitalists and other private investors are reluctant to engage.
Scale	Approximately DKK1.75 billion (circa £200 million), 1,000 firms (1998 – 2014).

A2.3 Norway

Intervention	**Innovation Contracts (Innovation Norway)**
Eligibility	Available to **Norwegian-owned SMEs**, who demonstrate they have the skills and knowledge necessary to develop **products or services needed by large firms** (foreign-owned or domestic), which are not available in the market. Covers up to 45% of development costs. The large firm makes contributions (workload and funding) up to at least 20% of project costs.
Purpose	Stimulate innovation and value creation by reducing risk for SMEs.
Scale	Circa NOK 300 million (circa £22.5 million) per year.

Intervention	**Regional Research Funds (Ministry of Education and Research, and Research Council Norway)**
Eligibility	Available to firms and public sector research institutions in Norway, depending on the type of project. There are three types of project: **public sector, research, and business projects**. Selection criteria for business projects include: Track record of applicant; Feasibility of project; Anticipated return on investment; Societal impact anticipated; **geographical location**; alignment with national strategic priorities. The exact amount of funding is dependent on the project length and the **regional location**, ranging between NOK 100,000 – NOK 3 million (circa £7,500-£225,000), for up to 36 months.
Purpose	Increase research capacity through regional research and innovation.
Scale	NOK 1.9 billion (circa £143 million), 4,828 applications (2010 – 2018)

Intervention	**FORREGION – Programme on Research-Based Regional Innovation (Research Council of Norway)**
Eligibility	Available to all Norwegian firms. Three pillars: 1) Broadly-based instruments to encourage **wider use of research-based innovation** (competence brokering, feasibility studies); 2) Knowledge-building projects, known as **capacity enhancement projects**, for targeted industries; and 3) Knowledge and dialogue about **regional efforts related to research-based innovation**. Different support under each pillar includes: feasibility studies where firms work with a R&D group on their project; and the 'loan' of a researcher, where they work in a firm, or a firm's employee works in a research/educational institution. Aims to enhance value creation, based on the unique opportunities and challenges of each region. Funding ranges between NOK 100,000 - 3 million (circa £7.5k - £225k).
Purpose	Strengthen the connection between regional, national and international efforts to promote research-based innovation.
Scale	In 2018, NOK 50 million (circa £3.7 million) was allocated, across 208 projects.

Intervention	**NANO (Research Council of Norway)**

Eligibility	Available to firms and research institutions. Firm-level supports: **Innovation Project for the Industrial Sector (IPN)**: An R&D project designed to lead to innovation. The Project Owner and any partners will generally fund at least 50% of the project costs. **Knowledge-Building Project for Industry (KPN)**: Projects contribute to industry-oriented researcher training and long-term competence development in the Norwegian research community and are designed around **identified needs for new knowledge in Norwegian firms**. The firms play an active role in the management of the project. The support provided by the Research Council of Norway may not exceed a maximum of four times the total cash contribution from the firms. Funding calls vary.
Purpose	Provides funding for research and innovation on microtechnology, nanotechnology and advanced materials.
Scale	NOK 716 million (circa £53.8 million), 95 projects (2012 – 2016)

Intervention	**Commercialising R&D Results Programme (Research Council of Norway)**
Eligibility	Available to all **newly established firms** whose activities are based partially or entirely on **intellectual property from publicly funded research**. The programme does not provide support for research activities themselves. The programme allocates funding for activities to verify and document the application of R&D results and **confirm whether the results can lead to substantial commercial returns** or be of some other major benefit to society. In 2018, projects were 80% funded with at least 20% contribution from the institution and/or industry partner. Duration is between one to three years.
Purpose	Facilitates the commercialisation of results from projects conducted at publicly funded research institutions and helps to bring the products and services to the market.
Scale	In the 5 years to 2020, 138 firms supported, with total funding of NOK 260 million (circa £19.6m).

A2.4 Scotland

Intervention	**Scottish Enterprise R&D Grant**
Eligibility	Available to all firms based in **or planning to locate** in Scotland. The firm must show that the project cannot go ahead without the R&D grant or would proceed in slower timescale or significantly reduced scope. **SMEs may be awarded between 35%-50%** of eligible projects costs. For SMEs carrying out R&D which will result in a product for a commercial partner(s), commercial partner(s) must contribute a minimum 20% to the project costs. Grant support up to 45% of the remaining eligible project costs. **Large firms may be awarded between 25%-40%** of eligible projects costs. Consortiums (2-6 firms) also eligible. Similar support is also offered by **Highlands and Islands Enterprise**, which is regionally-focused.
Purpose	Supports R&D and the introduction of new or significantly improved product, process, or services.
Scale	£177.5 million, 341 firms (Financial years 2014 – 2019)

Intervention	**SMART: Scotland (Scottish Enterprise)**
Eligibility	Available to SMEs based in Scotland, for **feasibility tests and developing prototypes** that have a commercial endpoint. Feasibility: Supports up to 70% of the eligible costs for small firms and up to 60% of the eligible costs for medium firms (6-18 months), and the **maximum grant is £100,000**. Feasibility is paid with a third of the grant in an upfront instalment, and the rest is paid quarterly in arrears. Prototype development: Up to 35% of the eligible project costs. Supports projects with a minimum cost of £75,000, with a **maximum grant of £600,000** (6-36 months), paid quarterly in arrears. Projects can be co-funded through the European Commission's European Structural and Investment Funds (ESIF).
Purpose	Aims to support high-risk, highly ambitious projects. Supports feasibility studies that help to show how an idea could work in the real world, and the development of prototypes to test an idea before it goes into production.
Scale	£38.5 million, 303 firms (Financial years 2014 – 2019)

Intervention	**Student Placement Innovation Vouchers (Interface)**
Eligibility	Available only to SMEs that have had a successful Standard Innovation Voucher. Worth between £1,000 and £7,500. The firm should identify **an opportunity that will benefit from PhD/Masters student interaction**, and match the funding in-kind.
Purpose	Aims to building on existing relationships between SMEs and HEIs in Scotland to continue the development of a Standard Innovation Voucher award.
Scale	£79,282, 17 firms (2014 – 2020)

Intervention	**Advanced Innovation Vouchers (Interface)**
Eligibility	Available to SMEs in Scotland. Project costs should be **between £10,000 and £40,000**. SMEs can receive grants of 50% of total costs. For projects costing between £10,000 and £20,000, SMEs are expected to contribute 25% in-kind and 25% in-cash. For projects costing between £20,001 and £40,000, SMEs are expected to contribute 15% in-kind and 35% in-cash. Projects must require the expertise of an academic partner and cannot be delivered commercially. Can be used to **continue a previous collaboration or develop a new one**.
Purpose	Building sustained relationships between SMEs and HEIs, and drive innovation.
Scale	£1.2 million, 90 firms (2011 – 2020)

Intervention	**Regional Selective Assistance (RSA) funding (Scottish Enterprise)**

Eligibility	Available to all firms with a presence in Scotland. **Minimum grant £100,000**. The funding is allocated to new projects that would not go ahead without public support, and take place in Scotland. Firms can be funded for a variety of projects including the development of new laboratory facilities. The maximum rate a firm can receive is dependent on the size and location of the firm. Tiers are determined by firm location. Tier 1: Applies to firms located in the Highlands and Islands. **Highlands and Islands Enterprise** is responsible for this tier. **No firm has successfully applied for the funding during 2016-2019**. Tier 2: Large firms 10% of project costs; Medium-sized firms 20% of project costs; Small firms 30% of project costs. Tier 3: Only SMEs can receive RSA grants (Medium-sized firms 10% of project costs; Small firms 20% of the costs).
Purpose	A discretionary grant aimed at helping projects that create or protect jobs in Scotland. Gives Scottish firms another potential source of funding for investment, alongside other UK funding mechanisms.
Scale	£337 million, 960 projects (2009 – 2019)

Intervention	**Investment Zones (Scottish Government; UK Department for Levelling Up, Housing and Communities; HM Treasury)**
Eligibility	Eligibility for firm-level R&D/innovation supports not yet specified, as the zone selection was only announced in **August 2023**. However, clear focus on improving multifaceted aspects of firm-level R&D/innovation, through **specific R&D/innovation interventions** (e.g. grants), and creating a more **enabling environment** in general. Grant support should be on the basis on matched funding, except in justified cases. Focus on attracting Foreign Direct Investment (FDI).
Purpose	Two Investment zones: 1) **Glasgow City Region** Regional Economic Partnership; and 2) **North East of Scotland** Regional Economic Partnership. Goal is to support the development and growth of clusters in order to increase regional innovation capacity, attract investment and strengthen the private sector. Holistic approach to ensure benefits of growth and investment are felt by local communities. For firm-level R&D/innovation, overarching mission to **increase public investment in R&D by 40%** in Scotland by 2030, and **leverage at least twice as much private sector** investment over the long term. Firm-level innovation-related outcomes include improvement in Intangible Capital, for example increased time to market for R&D product, and increased R&D activity undertaken by businesses. Firms to be supported through R&D grants, with a wide variety of targets (specifics as yet unspecified). New support will be sector-specific, tailored for start-ups and businesses that leverage regional research strengths and facilities, and will be **additional to supports offered at national/UK-leve**l.
Scale	£80 million over 5 years (not all firm-specific R&D/innovation support, large supports focused on infrastructure, etc.)

Intervention	**Innovation Centre Programme (Scottish Funding Council-SFC)**

Eligibility	Available to all firms in Scotland. International collaboration is also permitted, but **supporting the academic-industry ecosystem in Scotland** is more heavily encouraged. 75% of firms supported under this programme were SMEs, who typically undertake smaller projects (circa £94,000) with shorter time scales (circa 9 months). **Major longer-term projects were led by large firms, which led to more significant economic gains**.
Purpose	Enable collaboration between research organisations and firms in Scotland. Research focus is led by industry demand. Seven centres focused on sector specific research (e.g. Precision Medicine, Sustainable Aquaculture). Firms often go on to receive further public R&D/innovation support after the project to continue the work. Through collaborative projects, this programme has supported firms' p**rogression through basic research and proof of concept, to prototyping, demonstration and commercial readiness**.
Scale	£137 million to fund the centres (2012-2023), circa 1,169 collaborative projects supported, £93 million industry finance (2012-2023).

Intervention	**University Innovation Fund (Scottish Funding Council-SFC)**
Eligibility	Available to already-existing firms/entrepreneurs, new entrepreneurs, start-ups, and **academics wishing to found spin-outs**.
Purpose	Provides incentives to universities to commercially exploit their research, by **supporting knowledge transfer and exchange** with already-existing firms/entrepreneurs and encouraging university spin-outs. 19 participating University receive £250,000 per year, with additional 'uplift' funding distributed as available.
Scale	£13.5 million (2019/2020).

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