Technological Higher Education Association – Response to DBEI Stakeholder Consultation on the Mid-term Review of Innovation 2020

THEA, representing the technological higher education sector, welcomes this opportunity to contribute to the stakeholder consultation on the mid-term review of Innovation 2020, Ireland's strategy for research and innovation, science and technology to 2020 ('the Strategy'. The review coincides with a major transformation in Irish higher education, namely the establishment of Technological Universities (TU). The TU legislation foresees a strengthened role for research, development, innovation and engagement (RDIE) activities in these new higher education institutions.[1] The Technological University Dublin will be established in January 2019 and during the remaining lifetime of I2020, at least three further TUs could be established.

More generally, the sector has built up its research, development, innovation and engagement capacity significantly since the early 2000's (see below). The National Development Plan 2018-2027 recognises this capability by proposing to establish "Technology and Innovation Poles" across the sector to support regional and rural development.[2] The Final Report of the Independent Expert Panel reviewing the Allocation Model for Funding Higher Education Institutions[3] stated "*the recognition of a research and innovation mission within the funding model can no longer be confined to universities and the panel has acknowledged the important role played by IoTs in undertaking research in key areas and driving regional innovation and enterprise growth*" and proposed reforms to the funding model to support research and innovation in the sector.

Accordingly, the implementation of the Strategy to end 2020 must include a consideration of how the technological higher education sector can be further supported to enhance their contribution to delivering on the Strategy's stated ambition to develop a coherent, joined-up innovation ecosystem and make Ireland a Global Innovation Leader.

1. The implementation of I2020 to date

Since the early 2000's there has been rapid expansion of RDIE activities and outputs across the entire technological higher education sector. There was a three-fold increase in expenditure on research and development (HERD) in the sector in the 10 years between 2004 and 2014.[4] During 2014 and 2015 approximately 60% of research expenditure was supported by Irish public funds, 27% from European Union funds and the remainder from industry, philanthropic and own funds. Enrolments on postgraduate research degree programmes have grown by 40% since 2012, during a period when

[1] http://www.irishstatutebook.ie/eli/2018/act/3/enacted/en/html

[2] http://www.per.gov.ie/wp-content/uploads/NDP-strategy-2018-2027_WEB.pdf

[3] Review of the Allocation Model for Funding Higher Education Institutions: Final Report by the Independent Expert Panel http://hea.ie/assets/uploads/2018/01/HEA-RFAM-Final-Report-for-Publication.pdf

[4] Survey of Research and Development in the Higher Education Sector 2014-2015, https://dbei.gov.ie/en/Publications/Survey-of-Research-and-Development-in-the-Higher-Education-Sector-2014-2015.html

national enrolment figures were declining. The sector is now recognised as making a substantial contribution to the national RDIE efforts, accounting for 12% of HERD nationally in 2014, although this figure has been static at between 10-11% in recent years. The challenge for the sector is how to continue to expand their activities in the area of research and innovation, and I2020 must be an enabler of this expansion. Below are some comments from THEA and its members on the actions most important to enabling growth in the sector.

1a. Ireland as a Global Innovation Leader

Ireland's stated ambition to be a Global Innovation Leader cannot be achieved without increased public investment in the research base. Despite the continuing constraints on the national budget, there must be a clear cross-departmental business case for increasing national investment towards the R&D intensity target of 2.5% GNP (**Action 1.2**), even if the timeline for achievement is pushed out beyond 2020. While focusing the national research investment on directly supporting the needs of enterprise was appropriate during a period of recession, now that the economy is in a period of growth there must be a renewed focus on providing balanced investment which supports the full continuum of research across the Technology Readiness Levels. Although the technological HE sector has a strong reputation for applied research (the 2017 HERD survey reported that 71% of our research is classified as "applied research"), there is a need for the sector to access funding for basic research to support their development as research-informed institutions, but also to build a strong base from which to deliver applied research outcomes. National funding programmes should be fully accessible to the sector. There is a particular challenge around securing funding from Science Foundation Ireland; just 6.6% of the sector's research expenditure in 2014 and 2015 was funded by SFI. The eligibility criteria employed often prevent or discourage researchers from the sector from applying. Similarly, while the sectors' researchers are now participating in 10 of the 17 SFI Centres, that participation does not automatically grant eligibility to apply for other SFI programmes.

1b. Innovation in enterprise

The investment by Enterprise Ireland in funding the 15 Technology Gateways for the period 2018-2022 (**Action 2.6.b**) is very welcome. The refunding was based on the positive effect of the Technology Gateway programme on the engagement of Irish industry in R&D activities, particularly SMEs. An independent review of the scale-up phase of the programme (2013 -2017) commissioned by Enterprise Ireland identified 251 new jobs and an additional €59.4m in company turnover attributed by participating companies to projects facilitated by the programme. Importantly, the review identified that 60% of Gateway clients in 2014 had no R&D spend prior to their engagement with a Gateway, indicating that the Gateways are playing an important role in driving initial R&D activity in companies. However, the funding model for the Gateways is based on supporting business development support staff to drive Gateway activity and does not cover the cost of the underlying infrastructure, including materials, research staff costs and capital equipment. There is a particular issue regarding the costs of suitable equipment. This, coupled with the lack of a successor to PRTLI and challenges with eligibility to apply to SFI's Research Infrastructure Calls, leaves the Gateways with very limited ability to purchase and maintain the cutting-edge equipment required to satisfy the needs of their industry clients. In addition, Gateways do not currently have the capital to replace, repair or upgrade existing equipment. Hence, there is an urgent need for a dedicated capital equipment fund for the Gateway programme so they can continue to offer a high-quality service to their industry clients.

An additional action related to the Technology Gateways is the forthcoming Directory of Innovation Supports (**Action 2.5**). Previous editions of this Directory focused heavily on showcasing the SFI Centres and EI/IDA Technology Centres, incorporating only a very brief section on the Gateways. Considering the substantial government investment in the programme and its proven track record in delivering on research solutions for industry (having completed over 2750 projects with over 1500

Irish companies since 2008), the forthcoming edition of the directory must include a detailed section showcasing the breath of industry-relevant expertise offered by the 15 Gateways and the three new clusters in Applied IOT, Food, and Engineering, Materials and Design.

More generally, in terms of innovation and enterprise opportunities, it would be hugely beneficial to increase access to academic-enterprise collaborative opportunities. Changing funding mechanisms to have payment upfront to participants would increase capacity to engage in innovative activities, particularly for young and/or small enterprises. Funding mechanisms that are more flexible in their design and remit would encourage increased engagement; for example, paperwork could be streamlined and an element of flexibility in scope or funding implemented.

1c. Education for innovation

Action 3.5 sets a target to "*Increase enrolment of postgraduate researchers to address demand in the economy: Increase research masters and Ph.D. enrolments from 1,750 in 2015 to 2,250 in disciplines aligned to enterprise and other national needs*", with the consultation document for the review explaining that progress on this action has been slow. THEA and its members would like to raise two issues in relation to this target:

a) While the consultation document refers to 500 new PhD places, the original goal refers to 500 research masters and PhD enrolments. In areas such as ICT, highly focused research training at masters level is more in line with the demand of the companies that the sector works with. Timelines are also an issue - it typically takes at least four years to graduate a PhD student, compared to 20 months for a masters student. If the goal is to address demand in the economy, a balanced mix of masters and PhD positions must be offered.

b) The technological higher education sector has been expanding its capability to deliver research postgraduate education in industry-relevant areas. As stated earlier, enrolments on postgraduate research degree programmes in the technological higher education sector have grown by 40% since 2012, during a period when national enrolment figures were declining. This increase has been driven more generally by the expansion of research and innovation activities in the sector, but also by the requirements for technological university designation which specify that "*of the students of the applicant institutes registered on a programme that leads to an award to at least honours bachelor degree level at least 4 per cent are research students registered on a programme which leads to an award to at least masters degree level*". The Act specifies a trajectory towards 7% research students within 10 years of designation. Without the ability to compete for national funding to support research degree programmes, the sector will find it extremely challenging to sustain the growth in postgraduate research activity, most notably specified by the TU legislation.

Action 3.7 refers to ensuring "*continued opportunities for researcher career development in areas of strategic importance"*. The reported progress towards delivering **Action 3.7.b** "*Develop metrics for scoring applicants who have successful industry linkages but lower numbers of publications/ citations than candidates with a purely academic track record*" is welcome. The outcome should be merged into relevant calls such as the SFI Starting Investigator Research Grant and Career Development Award to enable support for early career researchers with a track record of excellent applied and oriented basic research in addition to those with a track record of excellent frontier/basic research.

THEA has been liaising closely with the IUA in the development of a proposal for a National Researcher Careers Framework (**Action 3.10**), and is pleased that this is close to finalisation. It is important now that all stakeholder Departments and Agencies unite behind the proposal, which will realise the ambition of Innovation 2020 to "*Identify and tackle impediments to career progression and mobility of trained researchers and innovators in the publicly funded research system by developing a coherent national policy on structured progression for researchers"*.

THEA strongly supports the introduction of the EU RESAVER Pension Scheme (**Action 3.14**), which would support researcher mobility and improve their working conditions. However, it is essential that plans to open the State Single Pension Scheme to researchers working in IOTs are taken forward as a matter of urgency.

Action 3.16 describes the scoping out and development of a successor to PRTLI. The aforementioned growth in research and innovation capacity in the sector could not have been achieved without the successive cycles of investment provided by the PRTLI. A successor programme is long overdue. Any such programme must cover the full breath of research areas, and avoid limiting AHSS participation to STEAM initiatives.

1d. Innovation for social progress and the economy

The progress towards a grand challenges approach (**Action 4.3**) evidenced by the refresh of the national research priority areas and the new SFI Future Innovators Prize is very welcome. Any forthcoming grand challenges funding must align with the Horizon Europe missions-oriented approach to innovation to address societal challenges, thereby increasing Irish researchers' chance of successfully competing for Horizon Europe Missions funding.

THEA welcomes the work led by the HEA regarding electronic journal access and bibliometric tools (ref. **Action 4.7**). Currently, provision of access to e-journals, databases and bibliometric tools is a matter for each institute of technology to handle individually. This leads to non-uniform access to these vital resources which support the sector's research and innovation activities and assist with monitoring of their impact. It also leads to poor value-for-money, as individual institutes do not have a strong negotiating position with the publishers. At present, the sector is spending approximately €5 million per annum on e-journal access alone, with substantially less coverage of journal collections than that provided by the IReL consortium. Regarding bibliometric tools, the sector would strongly value access to these to assist with validating the impact of their RDIE activities.

1e. The role of intellectual property in innovation

THEA welcomes the investment in the national technology transfer infrastructure provided by TTSI 3 (**Action 5.5**). Analysis of the figures provided in KTI's Annual Knowledge Transfer Survey and normalising them by the amount of annual research expenditure illustrate that the sector is extremely efficient in delivering on knowledge transfer metrics, despite having a relatively small base of research activity from which to generate KT outcomes. Consider this, THEA recommends that a more nuanced appraisal of performance, where metrics are normalised by the quantum of research expenditure should be added to the funding allocation model in any future Calls for TTSI funding.

1f. Innovating with the EU and the wider world

While Ireland is on track to reach or exceed its H2020 target (**Action 6.1**), nonetheless the number of new entrants remains a challenge. While the existing system of financial and advisory supports is valuable, there is a need to make more funding available at a national level for training for potential coordinators. Training is key to ensuring high quality proposals. This could be delivered by previously successful coordinators, NCPs, recent evaluators drawing on for example, proposals that scored full marks. Also the level of financial support should be reviewed as the amount of time and resources required to prepare high quality bids has increased in line with the requirement for larger consortia targeting larger proposals.

Action 6.5 seeks to ensure the full benefit to Ireland from European Structural and Investment funding for research and innovation by participating fully in ERDF and ETC (European Territorial Cooperation). Regarding ETC (INTERREG) THEA's members have been highly successful in securing INTERREG projects to support their research and innovation activities. Examples include:

- Letterkenny: Bryden Centre for Advanced Marine and Bio-Energy Research. Funded by INTERREG VA (Northern Ireland, Ireland, Scotland). €2.7 million to LYIT.
- Dundalk: Border and Regions Airways Training Hub. Funded by INTERREG VA (Northern Ireland, Ireland, Scotland). Combined funding to consortium of three partners: €7.7 million.
- Sligo: Northwest Centre for Advanced Manufacturing. A consortium looking at advanced manufacturing technology, principally in the medical device sector. Combined funding to six partners: €8.5m.

BREXIT will impact on the future of INTERREG post-2020, and it is essential that a strategic approach is taken to identifying which regions should replace Wales, Scotland and NI as potential INTERREG cooperation partners for Ireland.

In terms of ERDF, the Commission's proposal for Horizon Europe includes the continuation of the potential for cumulative funding ("synergies") between Framework R&I funding and other EU funds. This concept was introduced at the start of Horizon 2020, but the European Commission acknowledges that implementation of it has been patchy. Ireland has to-date been unable to take advantage of synergies between Horizon 2020 and ERDF such as the 'Seal of Excellence' initiative for the SME Instrument and Marie Sklodowska-Curie actions Individual Fellowships. It is essential that Ireland's approach to the Operational Programmes for Structural Funds for the next programming period and any revised Smart Specialisation Strategy are designed to enable synergies with Horizon Europe so we can take full benefit of the opportunity to use EU funding to support national research and innovation activities.

It appears that there has been little progress made on **Action 6.11** "*Develop follow up initiatives to the ISCA programme*". In particular, THEA members are keen to develop research relationships with Brazil to build on those developed during the Science without Borders programme. Many THEA members attended the April 2018 Research Brazil Ireland day organised by the HEA, THEA, IUA and IRC in Rio de Janeiro as part of their strategic cooperation agenda with Brazil. A recent Brazilian funding call (CAPES) contains significant funding for international research cooperation, with the opportunity for Irish HEIs to collaborate with Brazilian partners. It will be essential to provide funding from the Irish side to support this collaboration.

With reference to **Action 6.16** (Benchmarking our innovation system against comparator countries), the existing benchmarking such as the European Innovation Scoreboard and Regional Innovation Scoreboard as an extension of that, should be included as comparator references in the international benchmarking exercise.

2. How changes in the broader policy environment (e.g. economic, social, enterprise and education policy) as well as the changes in European Research, Development and Innovation (RDI) policy will impact on the implementation of I2020

In the opinion of THEA's members, the most ground-breaking changes in the Irish research ecosystem that will affect I2020 are A) the establishment of Technological Universities (TU) and B) the growth in research and innovation capacity across the entire technological higher education sector. There is a real opportunity to harness these changes to assist in developing a coherent, joined-up innovation ecosystem and in making Ireland a Global Innovation Leader.

A) Technological Universities: w.r.t research, the TU legislation specifies that they will "*support a body of research that includes research relevant at regional, national and international levels and pursue excellence in the conduct of that research*" and "*support entrepreneurship, enterprise development and innovation in business, enterprise and the professions through teaching and the conduct of*

*research and through effective transfer to those and other sectors of knowledge arising from that researc*h". In order to apply for TU designation, institutes must show recent substantial growth in research and innovation capacity, including a large increase in research postgraduate enrolments and in the percentage of staff qualified to PhD level, which must continue to grow during the years after the TU is established. During the remaining lifetime of I2020, the sector is preparing to transform to encompass four Technological Universities (located in the South-East, South-West, North-West, and in Dublin) and four Institutes of Technology, all with an increased capacity to perform research and innovation. The first Technological University will be established in January 2019; the Technological University Dublin, formed from the merger of the Institutes of Technology in Blanchardstown, Dublin and Tallaght.

B) Growth in sectoral research and innovation capacity: the entire technological higher education sector is on an upward trajectory in terms of enhancing their capacity to engage in and deliver on research and innovation with a strong focus on problem-solving - as well as social and technological development and innovation - intended to advance human knowledge, address societal challenges and make a real impact on people's life experience. This will build on the growth over the past 10 years as described in section 1 above. This enhancement of capacity is mirrored in the National Planning Framework 2018-2017, which plans for a scaling of the capability of the technological higher education sector via the establishment of 'Technology and Innovation Poles'.

Brexit could also have a significant impact on the national research and innovation system, and can be seen as a challenge (e.g. potential loss of key partners for EU funding applications) or an opportunity (e.g. a chance to attract excellent researchers to relocate from the UK to Ireland). As stated above, INTERREG is an important source of funding for THEA's members and it is essential that a strategic approach is taken to identifying which regions should replace Wales, Scotland and NI as potential INTERREG cooperation partners for Ireland. In addition, support should be provided for the continuation and scaling of the research cooperation between NI and ROI catalysed by EU and national funding programmes.

Looking further afield, the transition from Horizon 2020 to Horizon Europe should be a factor in the future implementation of I2020, particularly around supporting a transition to a challenges/missions-based approach and in harnessing the opportunities offered by the European Innovation Council.

Finally, the open science/open research agenda is increasing in importance at a global level. The transition to full open access envisaged by Plan S and the forthcoming requirements regarding open data will be a significant challenge for research performers, and will not be achieved without appropriate investment at system level.

3. The key areas of focus for the remainder of the Strategy (until the end of 2020) to ensure successful delivery of the Strategy.

Building on the comments above, the following are some brief suggestions for focus areas for the remainder of I2020:

- Consider how the new technological universities and the institutes of technology can be supported to more fully contribute to the national innovation ecosystem;
- Develop a cross-departmental business case for increased investment in research and innovation, working towards the longer-term goal of investing 2.5% of GNP annually;
- Move to a challenge/missions approach for some research funding streams, to prepare Irish research teams to successfully compete in Horizon Europe;
- Develop new methods to support industry-academic collaborations, particularly with SMEs;

- Expand the number of masters and PhD research positions, particularly for applied, close-to-the-user research areas;
- Support the development of research collaboration with Brazilian institutes, capitalising on links built through the Science Without Borders programme;
- Ensure that the National Researcher Careers Framework is put in place and that the ability of the TUs/IOTs to offer pension benefits to their researchers is enabled;
- Scope out and launch a successor to PRTLI which covers the full range of TRLs and supports the full breath of research areas, including AHSS;
- Consider and plan for the impact of Brexit on INTERREG, and more generally on research cooperation with NI;
- Support the innovation ecosystem in adopting the Open Science/Open Research agenda;
- Facilitate greater cohesion between the national research funders in terms of programme development and implementation.

4. Other issues that pertain to I2020.

The final issue that THEA wishes to raise is the re-establishment of the post of independent Chief Scientific Adviser. If Ireland wishes to achieve the goal of becoming a Global Innovation Leader and sustaining that position, it is essential that we have an individual who can devote themselves full-time to the role of advising the government on research/innovation policy and being a global ambassador for Irish research and innovation across the full breath of research activity including the arts, humanities and social sciences. The post should be established under the auspices of the Department of the Taoiseach and supported by an independent research advisory council of academic, industry and community experts.