RESEARCH AND INNOVATION STRATEGY

2020 – 2024

DUNDALK INSTITUTE OF TECHNOLOGY

FOREWORD

The period from 2017 up to 2019 for the last research strategy saw continued growth of the research agenda in the Institute. During this period the Institute has strengthened its position as one of the leading Institutes of Technology with international reputation in terms of its research performance within its prioritised research domains.

This five-year Research and Innovation Strategy (2020-2024):

- Sets out the recent developments in both National and European policy which has informed the strategic positioning of research and innovation within the Institute:
- Details the Institute's past performance in terms of its research and innovation agenda over the lifespan of the last strategy:
- Details the suite of strategic goals, specific objectives and associated key performance indicators which will enable the institute to deliver upon its research and innovation vision:
- Underpins the Institute's current Strategic Plan and builds upon previous research strategies

There is no doubt that the Institute's strong track record to date has been built upon the commitment and enthusiasm of our researchers and support staff. Over the past several months there has been widespread consultation and input into the Research and Innovation Strategy from across the Institute. I would like to sincerely thank all those who have contributed to the development of this strategy.

We are confident that through the realisation of this strategy the Institute can continue its upward trajectory in its research and innovation performance.

Kind regards

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Dr Tim McCormac
Head of Research and Graduate Studies

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Aidan Browne
Head of Business Development and Innovation

1. Institutional Context

The mission of Dundalk Institute of Technology (DKIT), as set out in its most recent strategic plan 2020-2022, is underpinned by five Strategic Priorities. Research and Innovation will play a pivotal role in ensuring the mission and vision of the Institute are attained, in particular;

- Ensuring the institute attains Technological University status over the lifetime of the current strategic plan;
- Cementing current and developing new national, cross border and international strategic alliances;
- Addressing national needs as outlined in government policy;
- Maintaining the Institute's international reputation in its key research domains whilst taking advantage of emerging areas of national interest

The institute continues to be recognised as one of the leading research-intensive institutes of technology across the sector. Since the last research strategic plan (2017-2019) the research performance of the Institute has grown substantially, during this time we have

- Enhanced our strong research base and reputation in selected prioritised research areas which are in line with national and European policy
- Concentrated and consolidated our research strengths within Institute designated research centres and groups
- Continued to concentrate on research excellence as a primary driver for conducting research
- Increased the critical mass of our talented pool of researchers
- Increased our dissemination and impact of our research
- Maintained our track record in securing external income

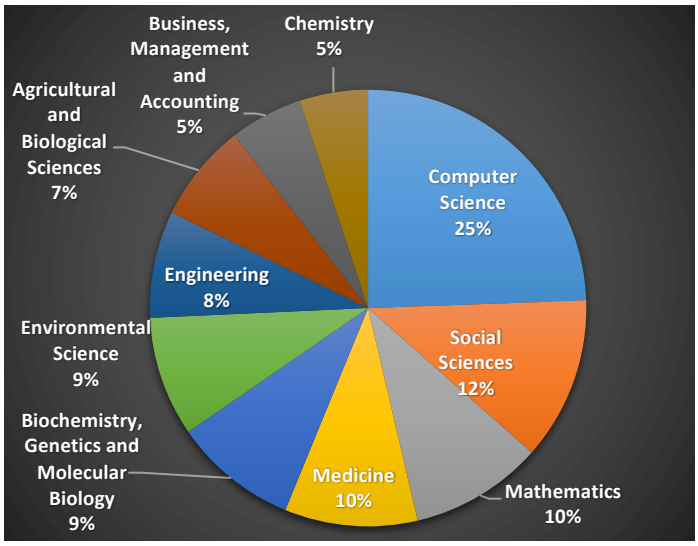
2. Recent R&I Performance (2017-2109)

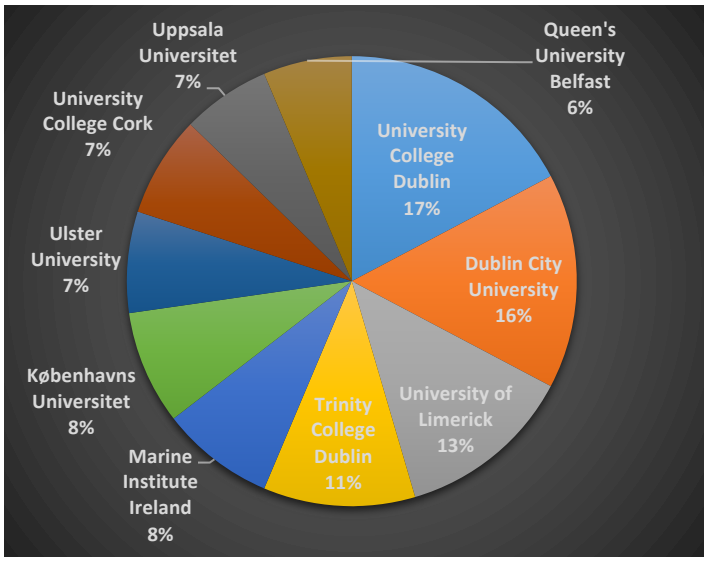
In the last strategy a suite of key performance indicators were set against three strategic imperatives and centred upon the traditional research and innovation metrics employed to track an institute's performance. These included:

2.1 Number of Postgraduate Research Students and Supervisors: It was envisaged that by the end of 2019 there would be 60 registered postgraduate research students at both levels 9 and 10. The actual number was 80 which was primarily due to the awarding of several key external large-scale grants through the Higher Education Authority and European cross border sources. In addition, a target of 55 was set as the number of both academic and non-academic research supervisors that would be actively supervising either at research levels 9 and/or 10, with 57 representing the number attained. Of this number 44 are located within two of the four academic schools hence representing future opportunities to expand upon the supervisory capacity across the other two schools.

2.2 Research income: €12M was the amount of external research income to be secured over the three-year period 2017-2019, the actual income secured exceeded this and was €12.7M. Of particular note was the Institutes increasing success in capturing European based funding with DkIT being ranked 10th out of 22 Public Research Organisations in Ireland in March 2019 translating it being the third highest ranked Institute of Technology with only CIT and Sligo IT ahead. There has been a significant growth in the ability of the Institute to compete at European level across the various European frameworks, for example in FP6 - €517,945 funding was won by DKIT, FP7 it was €1,051,417 and through Horizon 2020 it amounts to €1.861,989. Some key funding successes include:

- Two Disruptive Technology awards from Enterprise Ireland amounting to €980K with the national success rate sitting at only 6%;
- Science Foundation Ireland (SFI) awards totalling €1.45M through the SFI Research Centre Scheme;
- Two Higher Education Authority Landscape awards in 2018 and 2019 amounting to €810K allowing the recruitment of 23 PhD research students and the support of 12 academic staff to complete their PhD programmes of study;





2.3 Number of Peer reviewed publications and citations: The target for peer reviewed publications for 2017-2019 was 125 however over 140 peer-reviewed research articles, including books and book chapters, but excluding the outputs from the Creative Arts domain were successfully published. Our citation count for 2017 to 2019 totalled 2,295, representing a 19% increase on the previous strategic period (2014 to 2016) with the target for 2017-2019 being 1650. For the period 2015-2019 our peer reviewed research output, captured through Scopus, was primarily funded by Science Foundation Ireland (SFI) and European sources. Figure 1 details the discipline areas from 2015 to 2019 in which we have primarily published our research findings, with computer science representing a quarter of all our research output with the majority of this output being though peer reviewed conference proceedings. Interestingly when comparing the years 2010-2014, the discipline areas of growth in terms of peer reviewed output include, but limited to, nursing, energy, environmental science and biochemistry.

Strategic alliances through peer reviewed output are shown in figure 2, with the top 10 all being in the university sector, with UCD, DCU, UL and TCD accounting for 57% of our peer reviewed collaborative output.

2.4 Postgraduate Research Graduations: The number of level 9 and 10 research degree graduations for 2017 to 2019 were 25 comprising 19 PhD awards whereas the target was 28. The increasing numbers of research students witnessed in the past few years will see a significant increase in our research graduations with an emphasis on PhD graduates. 51% of the Institutes research degree graduations have occurred since 2013 and has surpassed 100 with PhDs now outstripping both MA and MSc research degree graduations. The strategic partnership with Dublin City University through the establishment of the joint DCU DkIT Graduate School in 2014 has been pivotal in ensuring both our postgraduate base and our ability to output PhD graduates has developed significantly in recent years. Specifically, the establishment of the Graduate School has afforded DkIT the ability to recruit PhD students across all disciplines and academic schools and departments.

2.5 Commercialisation Outputs: Spearheaded through the Regional Development Centre (RDC), in collaboration with the institute's research community, the institute's track record of enterprise, innovation and commercialisation support over the past three years witnessed some significant achievements, including:

- The support of over 1660 entrepreneurs on various support and intervention initiatives;
- Management in excess of 326 collaborative research projects;
- Incubation in excess of 211 companies in the RDC;
- DkIT were awarded National Winner of European Enterprise Promotion Awards 2017 for its development of the BSc. (Hons) in Engineering Entrepreneurship programme;
- In 2019 the RDC were awarded Enterprise Centre of the Year and the Institute's Technology Transfer Office won a Knowledge Transfer Ireland Impact Awards in the Spinout Category for the success with spin-out company Nova Leah.

2019 saw the launch of DkITs Corporate Partnership Programme (CPP) that is a key strategic initiative designed to build on our track record offering an organised framework for DkIT and high-profile organisations across industry, community and professions to develop sustainable and mutually beneficial relationships within the region with the capacity to evolve and grow in a planned manner. Within this period DkIT have signed MoUs with Cargotech Ireland, STATSports and ABP Food Group and Creative Spark, Walls Construction, The Fintech Corridor Initiative (formerly M1PC) and The FUTURUM Group with areas for exploration around workforce training, education and bespoke programme development, initiatives to better access DkIT Students and Graduates, access Research and Innovation collaboration and corporate sponsorship opportunities. A significant pipeline of progressive organisations are engaged and developing MoU as part of the initiative. DkIT have also been awarded €200,000 from the HEA Performance Funding to grow and leverage the DkIT CPP with particular focus on industry clusters in the region.

2.6 Creative Arts Outputs: In the period 2017-2019 there were 261 documented research outputs across the arts and humanities and technology involving members creative Arts research centre. These include 7 Book chapters, 5 Journal articles, 4 Review articles, 115 conference presentations, 22 Guest/Public lectures, 8 workshops, and 38 podcasts/radio broadcasts. Researchers in the centre have also engaged in a number of high profile performances nationally and internationally, as well as releasing an album and a collection of compositions. Researchers in CARC have completed four commissions and three innovation vouchers in addition to Installations, Games Development, and Films. CARC researchers have featured on television (RTÉ1, TG4) and radio (RTÉ LyricFM, RnaG, 2FM). The have contributed significantly to major national events including Fleadh Cheoil na hÉireann, which was staged in Co. Louth in 2018 and 2019. They continue to foster community engagement through initiatives including the Oriel Traditional Orchestra. Researchers have made presentations at a range of international conferences in ethnomusicology, musicology, games design, theatre studies, film studies, Irish studies, gender studies, and education. Publications have included contributions to the *Journal of the Society of Musicology in Ireland, Journal of Music, Technology and Education, Popular Music, Yearbook for Traditional Music, Éire/Ireland Journal of Irish Studies*. Significant conferences include the International Council for Traditional Music, British Forum for Ethnomusicology, EUGEO, Conference of Irish Geographers, IEEE Games, Entertainment and Media Conference (GEM), DiGRA / Digital Games Research Association Conference, Irish Screen Studies and more. Researchers in the centre have made regular and sustained contributions to the conferences of ICTM Ireland, Society for Musicology in Ireland, Society for Music Education in Ireland and EdTech. In addition to the Éistigí/Picteilín conferences that focus on research at DkIT, CARC also supported the hosting of a symposium entitled 'Sounding the Feminists' and the Irish Sound, Science and Technology Association International Conference and Festival at DkIT.

3. The External Environment

3.1 National Research and Innovation Spend: Prior to 2017 National public spending on research fell by 22% between 2008 and 2013, from €930M to the stabilising figure of approximately €735M in 2015. Despite this decrease in available exchequer funding, Ireland had moved up two places in the EC Innovation Union Scorecard[1] from 10th place in 2013 to 8th in 2015 and was considered one of the strongest global innovators. Since 2009 Ireland has been listed among the top 20 countries in global rankings for quality of its scientific research in terms of its citations, moved up to 16th place in 2014[2]. One of the primary objectives of the Irish government's Innovation 2020 strategy[3] was to increase public investment in R&D up to 2.5% of GNP by 2020, with the Europe 2020[4] strategy setting a 3% objective for R&D intensity. In 2017 the Irish Government invested €739 million "*to stimulate research and development, the majority of which (51.5%) was funded through the Department and its agencies. The aim of this investment in research and innovation was to foster and embed a world class innovation system that underpins enterprise development and builds national competitive advantage across the economy".* Through the establishment of Knowledge Transfer Ireland, the launch of the National IP Protocol 2019 and the increasing levels of commercial orientated targeted national funding schemes have aimed to increase the ability of private industrial partners, either SMEs or multinational to engage with research performing organisations.

More recently from a global ranking perspective, Ireland is ranked 1st in attracting high foreign direct investment projects (IBM Global location trends 2018), 9th European Innovation Scorecard (June 2018) and 11th for scientific research quality (InCites from Clarivates Analytics, April 2018). Despite these rankings the Irish Government's target, set out in Innovation 2020 launched in 2015, was to ensure total research spending represented 2.5% of GNP by 2020. Spending on research and development fell with Ireland slipping down the table of developed nations with respect to Research and development spending. In 2018, of the €3.7bn spend on R&D only €766M came from the state. Research within the third level can only hope to play its part in addressing the targets set out in Innovation 2020 if the Irish government significantly increases its spend on R&D.

3.2 National Research Prioritisation Exercise: In 2018 the national research priority areas were refined detailing the strategic areas of priority for government investment for the period 2018-2023 after "*conducting a horizon scan of global markets, a technology futures exercise and an audit of progress under the original priority areas".* The primary areas of focus for investment shall be ICT, Health and Wellbeing, Food, Energy, Climate Action and Sustainability, manufacturing and Materials, Services and Business processes. Appendix 2 details how are current research teams align with these priority areas. The Institute must continually review its research themes and ensure that they align with not only existing national needs but also with global challenges as set out in Horizon Europe, so are research and innovation remain relevant and ultimately fundable.

3.3 Shared Island Initiative: Recently the Irish Governments "Shared Island" initiative was launched whose primary aim is build a shared island, foster constructive and inclusive dialogue and commission research so as to strengthen the social, economic and political links on the island. Through the Institute's geographical position and it's established network of strategic partnerships cross border with Queens University Belfast and University of Ulster, primarily within the research and innovation domain, the "Shared island" initiative represents a unique opportunity for our institute which must be leveraged.

[1] Innovation Union Scorecard - an instrument employed by the European Commission for the analysis of innovation performance across EU member states

[2] Thomas Reuters: Essential Science Indicators

[3] Innovation 2020 – Ireland's strategy for research and development, science and technology

[4] Europe 2020 – A strategy for smart, sustainable and inclusive growth

3.4 Technological University Development: More specific to our sector the establishment of "Technological Universities (TU)" through the amalgamation of Institute's of Technology (IOT) along with the launch of the "Technology University Research Network (TURN)" report in 2019 has ensured that research and innovation will represent a key pillar requiring significant institutional commitment for any IOT expressing a strategic desire to form part of a TU. Aligned with this has been the Higher Education Landscape funding scheme from the Higher Education Authority (HEA) which since its establishment has allowed IOTs and other selected HEIs to avail of funding to drive strategic agendas which align with landscape reform. The Institute was successful in securing €770K in 2018 and 2019 which enabled the the recruitment of 23 additional PhD research students and allowed 12 academic members of staff to complete their own PhDs. Further tranches of competitive funding will occur over a three-year period 2020-2022 through the Technological University Transformation Fund (TUTF) totalling €90M for the development of existing TUs, TU consortium and IOTs not formally aligned to either a TU or consortium. It is anticipated that the institute shall leverage this funding platform to further develop its research and innovation agenda and build capacity towards reaching the TU targets over the life-course of the institute's current strategic plan.

3.5 National Research Centres: Over the past number of years significant levels of national research investment has occurred which has led to the creation of inter-institutional national research centres funded through Science Foundation Ireland (SFI), an approach which is set to continue with inclusion of a potential All Island focus. The institute to date has been a long-standing strategic member of the LERO SFI centre through the Regulated Software Research centre within the area of software engineering and more recently formal membership of the SFI Maerai research centre within the renewable energy domain. There are opportunities to form linkages with existing SFI centres and to forge new strategic partnerships, in particular cross border inter-institutional partnerships, so as to avail of future All island research centre opportunities which may arise in the short to medium term. In the short term a key

In conclusion, from national spending on research and development to Higher education landscape reform, the institute must align its future research and innovation vision and objectives to take account of a changing landscape and remain agile in responding to the changing environment.

4. OUR RESEARCH

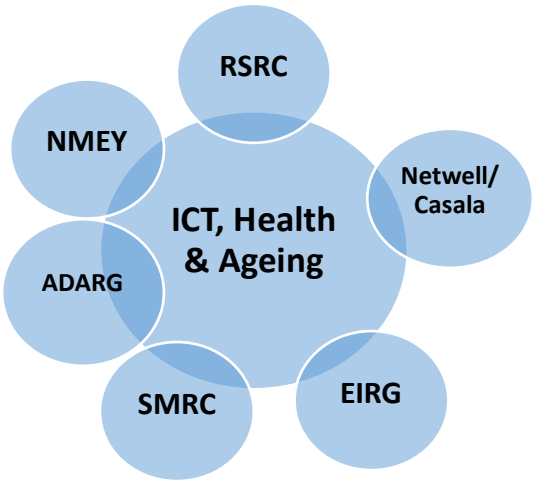
The principle aim of research is both to answer key questions and to generate new knowledge in specific domains. The Institute prides itself on supporting and engaging in a broad range of research enquiry across a range of disciplines which are aligned to the research and innovation core principles. The Institute's approach to research has always been to invest in growth areas of strategic importance, which are aligned with our research strengths and which are informed by the external environment. Our research is founded upon excellence led by global needs with real-world societal and economic impacts.

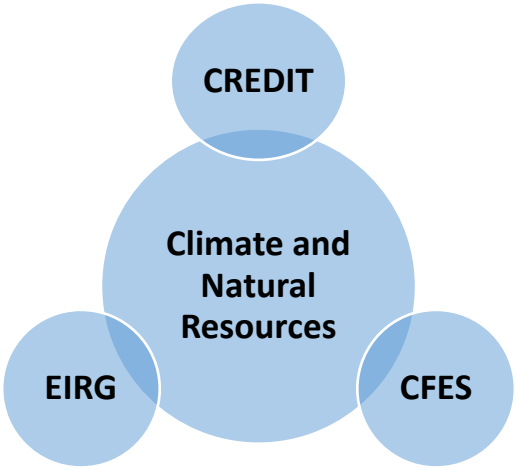
4.2 Our Research Clusters and Teams: The consolidation and concentration of our research into thematic areas of strength which are underpinned by internationally recognised research teams has been at the heart of our strategic development for the past decade. The Institute has always recognised the need to have a diversity of research centres and groups, including academic, industry facing and mission-orientated which underpin our thematic areas. In view of the size of the Institute in terms of its research community, collaboration between existing research centres and groups and consolidation of existing groups and centres has been encouraged and achieved over the lifecycle of the preceding research strategy (2017-2019). However, there is further scope to build upon this with further possible consolidation and development of collaborative synergies between existing teams of researchers. This allows a focus on building higher critical mass within our prioritised research themes. Since the previous research strategy (2017-2019) there have been significant developments in terms of the number of research groups and the alignment of all centres and groups within one of the three research themes. At

present, the institute has six research centres and seven research groups. Outside of our established research centres and groups there are individual researchers across the four academic schools who are not formally aligned within existing research centres and groups but bring their own research expertise and outputs to the Institute's research vision in their individual fields of enquiry.

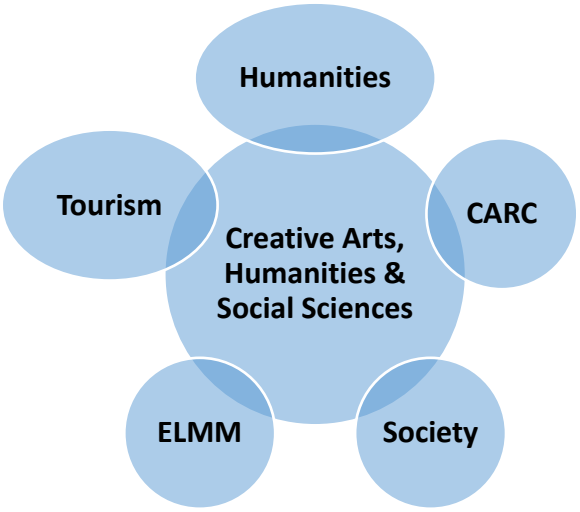
Through the National Research Prioritisation Exercise, the recent Horizon Europe programme, Innovation 2020 and a recent Institute self-assessment exercise, DkIT identified its current research strengths and has consolidated them into three defined research clusters of scale and impact. Over the life course of this research strategic plan, a review of the research governance structures of centres and groups operating across the Institute will be undertaken in order to ensure that the Institute continues to be well positioned to take advantage of national and international opportunities in the research and innovation space. A key action will be to revise and develop new governance structures around the strategic development of each of the research themes involving the research leaders, research office, academic schools and the technology transfer office.

ICT, Health and Ageing Cluster: This theme represents the highest number of associated research centres and groups spanning two academic schools, namely, Health & Science and Informatics & Creative Arts, with a critical mass of researchers comprising 39 academics, 4 Postdoctoral Fellows, 5 Research Fellows, 3 Support Staff and 32 postgraduate research students. There are three research centres, namely, Smooth Muscle, Regulated Software and Netwell/Casala, and three research groups, Interfaces & Electrochemistry (EIRG) and the newly established Nursing, Midwifery & Early Years (NMEY) and Applied Data Analytics groups (ADARG) , aligned to this Institute. This theme accounts for over €40M of the institute's research income form sources such as the SFI Centre programme, EU FP7, Horizon 2020, Interreg IVA, Irish Research Council and direct industry funding. Several of the teams are involved in European wide networks of scale and have established strong linkages with university researchers both nationally and internationally





Climate and Natural Resources Cluster: This cluster spans two academic schools, Health & Science and Engineering and is composed of two research centres, Centre for Renewable Energy (CREDIT) and its associated Technology gateway, Centre for Freshwater & Environmental Studies (CFES), and one research group, Electrochemistry and Interfaces (EIRG), with the latter also conducting research underpinning the health domain. It is comprised of 15 academics, 2 Postdoctoral Fellows, 2 Senior Research Fellows, 1 Support Staff and 25 postgraduate researchers.



Creative Arts, Humanities & Social Sciences Cluster: Comprised of one research centre, Creative Arts (CARC) and five research groups, Humanities, Society, Tourism, Gender & Inclusion Academy (GIA) and Entrepreneurship, Leadership, Marketing and Management (ELMM), this cluster spans two academic schools, Business & Humanities and Informatics & Creative Arts. It is composed of 68 academics and 30 Postgraduate research students.

Research Theme	Academic Members	Postgraduate Researchers	Career Researchers
ICT, Health & Ageing	33	32	12
Climate & Natural Resources	15	25	5
Creative Arts, Humanities & Social Sciences	68	30	0

Outside of these priority research themes and their associated centres and groups, the institute aims to establish a teaching and learning research group which will span the four academic schools and includes members from existing research centres and groups. The Teaching and Learning Research group will be strategically linked to the Institute's Centre of Excellence in Learning and Teaching (CELT). It is a growing area of research interest for the Institute and is composed of leading academics from each of the four academic schools.

4.3 Nature of our Research: The Institute recognises the importance of all types of research, from fundamental "blue skies" to industry orientated "close to market" research. Concentrating on embedding research excellence across all research areas whilst ensuring its impact, whether that be economic or societal, is the primary driver for our research endeavours. Analysis across our research clusters and research teams has shown that the our research operates across the broad "Technology Readiness Levels (TRLs)", an approach which will continue to be prioritised. Such an approach ensures the institute remains agile in responding to the various national and international funding streams which target the broad spectrum of research activity, which in turn underpins the concept of funding diversification.

5. SUSTAINABILITY OF OUR RESEARCH AND INNOVATION

The Institute has successfully developed internationally recognised research capacity in key thematic areas which are underpinned by research centres and institutes of critical mass and expertise. Over the past decade and more recently the challenges the research community and their associated Higher Education Institutions have faced have increased. For our research to continue to strategically grow and

be positioned so as to react quickly and effectively to future research funding calls it is essential that the foundations of research and innovation within the Institute are strengthened and in turn ensuring the future sustainability of our research. The three sustainability pillars of personnel, infrastructure and funding diversification are key in ensuring the agility and strength of our research endeavours.

- Personnel
- Infrastructure – Facilities and Equipment
- Funding Research – Diversification of Income

5.1 Research and Innovation Personnel: It is the quality and expertise of our research and innovation community that drives research excellence across our institute. The community is comprised of postgraduate students, career researchers, like postdoctoral and research fellows, academic staff and members of the various research and innovation support teams. A key focus of the next five years shall be to:

- Increase the number of dedicated research and innovation support staff so the required upward trajectory can be supported and maintained.
- Ensure recruitment across the four academic schools increases the number of research active academics that possess a track record of securing external research funding and undertaking research of international quality and that will align with our existing prioritised research themes. This shall involve a review of recruitment policies across the campus and involve close partnership between the research community, academic schools and senior management.
- Address the imbalance between teaching loads at undergraduate levels and ensure equal recognition of research active academic and non-academic staff
- Leverage and expand the existing research supervisory capacity across the institute so the current overreliance on the same cohort of research supervisors is alleviated. Currently there are between 50-70% of academic staff that possess a level 10 qualification not involved in postgraduate research supervision thereby representing a significant pool of future research supervisors. The Institute must commit to supporting and involving these staff, where applicable, to become active supervisors if the Institute is to grow its postgraduate research student numbers.
- Supporting Career Researchers through the Institutes Researchers Career Framework, providing the tools and training required to facilitate their development to independent researcher
- Recruitment of promising new research talent through leveraging of funding from national and international sources

5.2 Research Infrastructure: The Institute has attempted to invest in the provision of dedicated research infrastructure and facilities through the academic schools, library, research office and regional development centre. At present the Institute has approximately 2750m^2 of dedicated research space through the provision of laboratories and dedicated research offices. These primarily serve the needs of the Institute's Research Centres across its four academic schools. The Institute recognises it needs to do more and to expand these facilities so as to allow the future growth of the Institutes Research teams, so that they can remain competitive. The primary objective is therefore to increase its research space over the next 5 years to reach a target of 5000m^2 by the end of 2024. This will need to be achieved through an internal space prioritisation exercise and securing external infrastructure awards, which at present are both lacking.

5.3 Funding Research – Diversification of Income: As detailed prior to the previous Institute's Research Strategy 2017-2019 the institute had secured various levels of both national and European from a wide range of sources. Despite some notable successes during 2017-2019 the Institute faces a challenging period to not only increase and diversify its income from external sources but to target national schemes which have been an untapped resource to date. Currently close to 70% of our

postgraduate base are internally funded, a situation which will need to addressed by the Institute so as to avoid the approaching funding cliff.

6. CORE PRINCIPLES, STRATEGIC GOALS, OBJECTIVES AND KEY PERFORMANCE INDICATORS (2020 – 2024)

6.1 Context: Society is currently facing real global challenges which affect people's quality of life, including finding renewable forms of alternative energy, finding cures for fatal diseases and addressing the societal issues around ageing populations. Within our cross disciplinary research teams, through both basic and translational research programmes, we are attempting to address these global issues and find solutions for industry and society. Ensuring our research has impact, whether it is contributing to the knowledge gap, aiding economic development, solving societal challenges, informing national and international policy and informing the teaching remit of the institute, has always been at the heart of our research endeavours. It is vitally important that the Institute increases the visibility of its research to external stakeholders, including research funders, private and public bodies, potential collaborators and society at large. This will, in itself, demonstrate the unique contribution the Institute's research outputs are making to the knowledge economy. Greater visibility will not only lead to strengthening the Institute's ability to secure external research income but it will also enable the development of strategic partnerships with public and private bodies. We recognise that it is the quality and expertise of our researchers which underpins our research success to date. The Institute must strive to actively support its research community in their endeavours, both established and early career researchers. It is only through this that the Institute can attain its research vision to be a leader in its research themes. Research, is a critical and integral part of the overall learning environment of the Institute for its staff and student body.

6.2 Core Principles: The Research and Innovation Strategy (2020-2024) is founded upon five core principles (CPs) from which the stated strategic goals and associated objectives flow. These core principles include:

6.2.1 Institutional Research Culture: Dundalk Institute of Technology was originally established as a Regional Technology College with a primary focus on education at levels 6 and 7. For the past decade the research and innovation agenda has significantly matured allowing the Institute to become an internationally recognised research -intensive institution in its key research areas. However, the careful balancing act required, and tension between the teaching and learning and research worlds to attain this has been beset with significant challenges and obstacles, both internally and externally. With the Institute approaching its 50-year anniversary it seems opportune to ensure that research and innovation is at the core of all its activities. An integral part of this will be to ensure that research and innovation is viewed by all internal stakeholders as of strategic importance and as mainstream activity of the Institute. The latter shall involve ensuring all functional areas and academic schools are equally supportive of research and innovation and that improved internal communication exists across the Institute so all can better understand research and innovation. To achieve this a detailed review of all governance structures in tandem with the development of policies that are fit for purpose will be required.

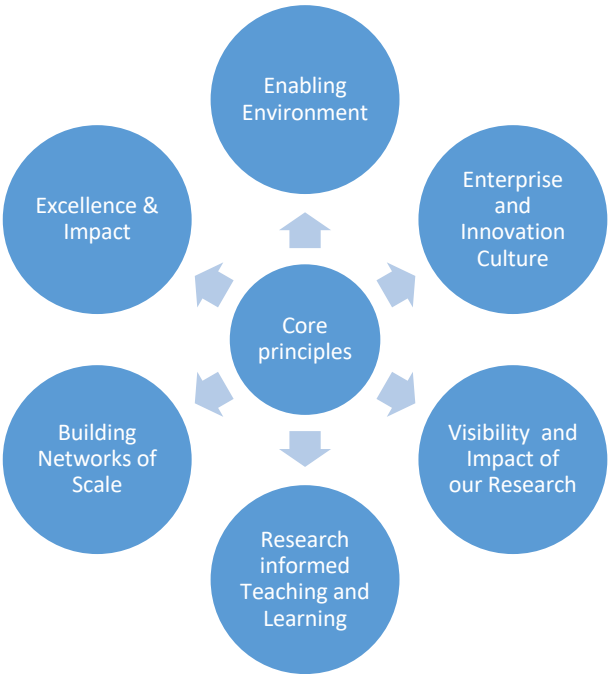
Academic freedom: The cornerstone of any research intensive higher educational body should be the recognition of the principle of academic freedom for research endeavour irrespective of the research discipline. Dundalk Institute of Technology has encouraged this approach through its support of research across a wide spectrum of discipline areas and recognition of how the outputs of scholarly research differ across such disciplines. This approach should continue and be bolstered through greater recognition and reward for different forms of research output.

Culture of inclusivity and gender equality: The Institute will continue to be committed, through the Athena Swan process and recent institutional strategic planning process to align with National and

European best practice with respect to the principles enshrining gender equality and inclusivity within the Higher Education Sector. The European funding instrument, Horizon 2020, states three objectives which underpin its strategy on gender equality which the Institute has taken cognisance of and has become the implementation where necessary. These objectives include "fostering gender balance in research teams so as to close the gaps in female participations", "ensuring gender balance in decision making groups" and integrating a gender dimension in research and innovation content". Specific measures at an institutional level which can be implemented include ensuring any perceived barriers for participation of females in research are highlighted and removed, a review of all governance structures around research and innovation and encouragement of underrepresented genders in certain research disciplines and research teams to proactively become research active.

Public outreach: Dundalk Institute of Technology carries out translational research which has had significant societal and economic impact, whether that has been through addressing issues around ageing, the climate or health. This has cemented the institute's research reputation with external stakeholders from funders to governmental bodies. The awareness however of what we do in research to private enterprise and what problems our research community may be able to solve for such enterprises needs improving. This can be achieved in ensuring the research community within the Institute engages proactively with the Regional Development Centre. In addition, the need to communicate what we do in research and innovation to the general public has never been as important due to the current challenges in the public finances and how research and innovation are funded. Efficient public outreach and awareness will form an important aspect of what we do in research moving forward. Engaging with our region across all sectors can be achieved through ensuring the communications office, the research office and research community work in unison and develop specific measures and policies around public outreach and engagement.

Positioning DKIT as a research leader in its sector: Dundalk Institute of Technology has cemented its position as one of the leading research-intensive Institutes of Technology over the past five years with some notable successes both on the National and European scene. The performance of the Institutes research community is one important facet through which reputational enhancement is achieved, however another is that the Institute's management, through leadership from the Research Office, influences national research and innovation policy so the needs of the research community in the Institute are better served. This takes the form of ensuring the Institute plays key roles in national fora and communicates with external stakeholders of influence. As the national Higher Education Landscape goes through dramatic changes through the creation of the Technology Universities and the short to long terms challenges posed by Covid 19 it is vital the Institute is seen to be at the forefront of those challenges from within its own sector.



Goal 1: Focus on and drive research and innovation excellence that has societal and economic impact

Objectives	Timeline	Responsibility
Ensure our research priorities are aligned with the areas articulated in the National Research Prioritisation Exercise and Horizon Europe	Ongoing	Head of Research
Continue to consolidate and concentrate our research through the establishment of Institutes of Excellence of scale	End 2023	Head of Research Heads of School Research Centres and Groups Regional Development Centre
Ensure all research teams work in partnership with the Research Office to optimise their ability to attract research funding	Ongoing	Research Centres and Groups Research Office
Embed a culture of research funding diversification whilst increasing the level of Consultancy and Contract Research	Ongoing	Head of Research Research Centres and Groups Regional Development Centre
Develop and implement a research and innovation space master plan which will increase the level of dedicated research space through internal prioritisation and targeted external capital funding submissions	Q2 2022 - ongoing	Head of Research Regional Development Centre Leadership
Conduct biannual Intellectual Property (IP) audits of all research centres and groups	Ongoing	Research Centres and Groups Regional Development Centre
Review the DKIT commercialisation process map	Q3 2021	Regional Development Centre IP Committee Research Office

Prioritise leading research institutes for major strategic external programmes and internal investment	Ongoing	Head of Research Leadership
Recruit and retain high calibre academic researchers which align with our research institutes in partnership with the academic schools	Ongoing	Head of Research Heads of School Human Resource Manager
Expand the cohort of staff who can apply for external funding through staff development and external hires.	Ongoing	Head of Research Heads of School Research Office
Identify suitable external partners to engage with the Institute's research community through the Institute's Corporate Partnership Programme	Ongoing	Regional Development Centre Leadership Research Office

Goal 2: Create an enabling environment for all researchers to reach their full potential

We recognise that it is the quality and expertise of our researchers which underpins our research success to date. The Institute must strive to actively support its research community in their endeavours, both established and early career researchers. It is only through this that the Institute can attain its research vision to be a leader in its research themes.

Roadmap – Actions, Timelines and Responsibility

Objectives	**Timeline**	**Responsibility**
Overhaul and revise all current research and innovation policies to ensure they are fit for purpose	Q4 2021 – ongoing	HR Manager Heads of School Head of Research Regional Development Centre Leadership
Improve and streamline internal structures that support research and innovation and ensure they operate in partnership	Q1 2022	HR Manager Heads of School Head of Research Regional Development Centre Research Centre Directors
Devise new policies and initiatives which align with the external environment and its drivers	Q3 2021	Research Office, RDC Heads of School HR Manager
Implement a peer-to-peer researcher mentoring system to develop early career researchers	Q3 2021	Research Office
Revise the current workload model across the Institute to ensure proper recognition is given to staff's research endeavours	Q3 2021	HR Manager Head of Research Heads of School
Review of the Institute's Master Development plan and develop 5-year research and innovation space plan	Q3 2021	Head of Research Heads of School Research Centre Directors
Roll out dedicated training programmes for all researchers targeted to address skills gaps with an emphasis of developing the next generation of research leaders	Q1 2021 - ongoing	Research Office
Reconfigure the "Research Career Framework" to ensure retention of leading researchers and recruit and develop all career researchers through the framework and ensure alignment with national career framework	Q4 2021	HR Manager Head of Research Heads of Schools
Design and implement specific internal funding support programmes to increase the level and quality of targeted external funding submissions	Q1 2021	Research Office
Increase the support staff in the Research Office concentrating on post award support for researchers	January 2022	Head of Research Leadership HR Manager

Recognise and reward research excellence and impact	Ongoing	Research Office Heads of School
Recognise the issue of gender disparity in research and put in place initiatives that will tackle the issues around same	Ongoing	Head of Research EDI Committee Leadership
Platform the role female research and innovation role models to encourage more women to engage in research and innovation	Ongoing	Head of Research EDI Committee Leadership
Target the SALI initiative to recruit internationally recognised female researchers	2022	HR Manager
Streamline and simplify the processes around research administration	September 2021 – ongoing	Research Office Manager
Create an annual internal awards and recognition initiative to demonstrate that technology transfer and commercialisation is valued and supported.	Annual	Regional Development Centre Research Office

Goal 3: Build new national and international collaborative networks of scale and impact

Action	Timeline	Responsibility
Employ our collaborative networks to recruit and retain high calibre academics	On-going	Heads of School HR Manager Head of Research
Proactively review existing collaborative networks	Annually	Research Office
Develop international Institutional led research and innovation strategic partnerships with selected Higher Education Institutes in key areas which will maximise our research impact	2020-2024	Head of Research Leadership
Ensure our leading research teams formally join large scale national and European research and innovation platforms	Annually	Head of Research

Goal 4: Increase the visibility and impact of our research

Action	Timeline	Responsibility
Develop a detailed communications strategy with respect to our research and innovation activities	**Q1 2022**	Research Office Regional Development Centre Communications & Marketing Team
Harness internal talent to better communicate our research externally and internally	**Ongoing**	Research Office Research Centres and Groups Communications & Marketing
Train researchers in relation to communicating their research	**Q1 2022**	Research Office
Harness alternative methods of communicating our research	**Ongoing**	Research Office
Understand and implement an open access culture	**Q2 2022**	Library, Research Office
Revise and increase our research digital presence	**Ongoing**	Research Office
Run annual research and innovation strategic showcases events	**Ongoing**	Research Office Regional Development Centre
Develop annual Research & Innovation case studies	**Ongoing**	Research Office Regional Development Centre Research Centres and Groups

Goal 5: Embed research and innovation into our teaching and learning agenda

Research, rather than being considered as a distinct and separate activity, has now become a critical and integral part of the overall learning environment of the Institute for its staff and student body. The guiding principle must be to embed the Institute's research activities within its' academic schools through the implementation of a suite of strategic actions.

Action	Timeline	Responsibility
Devise novel methods for undergraduates to become more involved in research	**Ongoing**	Research Office
Ensure all career researchers have opportunities to teach at third level	**Q3 2022 – ongoing**	Human Resources Heads of School Head of Research
Reinvent the summer research internship programme	**Q3 2021**	Research Office

Goal 6: Foster a progressive culture of enterprise and innovation

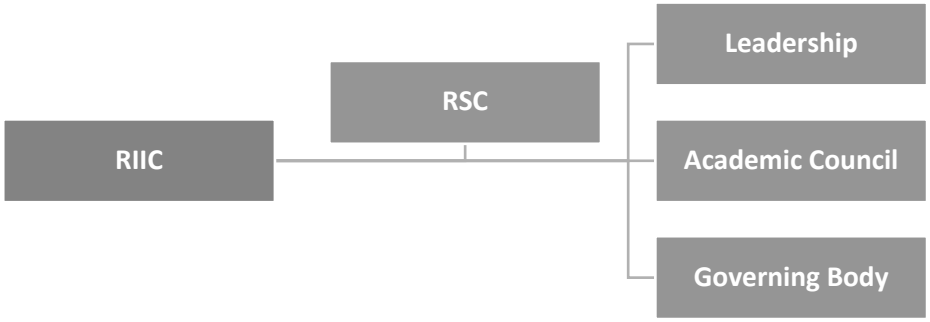
Action	Timeline	Responsibility
Provide annual training sessions on commercialisation, intellectual property and entrepreneurship	Annually	Regional Development Centre
Market technology transfer and commercialisation to students in post-graduate curricula and facilitate post graduate research students to engage on applied research opportunities such as Innovation Vouchers	Annually	Regional Development Centre Research Office
Facilitate external organisation engagement with DkIT research community in opportunity and collaboration project development through targeted workshops	Annually	Research Office Regional Development Centre
Ensure the positioning of the RDC as the "one-stop-shop" for commercial activity by providing support to academic/research staff on commercial matters, IP management; contracts management; marketing and market assessment.	Annually	Regional Development Centre

IMPLEMENTATION AND OVERSIGHT

The implementation of the Research and Innovation Strategy will be led by the Head of Research and Graduate Studies in partnership with the overseen primarily by Academic Council's Research Sub-Committee (RSC) and the Institute's Leadership Team. A Research and Innovation Implementation Committee (RIIC) will be established involving the following membership:

- Head of Research and Graduate Studies (Chair)
- Research Office Manager
- VP Academic Affairs and Registrar
- VP Strategy, Communications and Development
- Head of Innovation and Business Development Manager
- Heads of School Representatives (4)
- 1 Head of Department Representative from each School (4)
- 3 RSC Representatives
- 6 Research Centre Representatives
- 2 Research Group Representatives
- Head of Teaching and Learning
- Human Resource Manager

This group will review the Institute's progress towards the implementation of its stated strategic objectives on a quarterly basis and report back into the RSC and the Leadership Team. Annually a report will be released which will detail the institute's progress and highlight any key strategic actions required in the changing external environment. It will be imperative that the strategy remains flexible, in that with the changing external environment a revision of the required actions may be required so as the Institute can realise its stated vision. The review process, therefore, ensures that the Institute's Research Strategy is developed as a result of a dynamic and widely consultative process. It is a process which fully takes account of internal and external factors and influences, with the aim of ensuring that DKIT continues to develop quality research and scholarly capabilities in areas of Strategic importance and relevance and that embraces new discipline areas and research capabilities.



Appendix 1 – Overview of Key Performance Indicators

Key Performance Indicator	End 2020	End 2021	End 2022	End 2023	End 2024
Exchequer and non-exchequer research income leveraged by researchers	€3.75M	€4.5M	€5.5M	€6.5M	€7.5M
Level of participation in EU wide networks and H2020 and Horizon Europe proposals	6	8	10	15	20
Peer reviewed research publications in journals	45	60	75	90	100
Total citations (>1600)	500	550	600	700	850
Research dedicated space and facilities	2750m^2	3000m^2	3500m^2	4000	5000
Level 9 and 10 researchers	85	105	120	130	135
Level 9 and 10 research graduations	6	10	20	25	30
Number of invention/software disclosures filed	3	3	5	7	9
Number of licenses, options and assignments executed	2	2	4	6	8
Number of invention/software disclosures filed	3	3	5	7	9
Number of licenses, options and assignments executed	2	2	4	6	8
Number of innovation voucher project agreements with industry	17	17	27	30	32
Number of research collaborative agreements wholly funded by industry (<€25K)	1	1	2	3	5
Number of research collaborative agreements part funded by industry (€25K-€500K)	2	2	3	4	6
Number of contract researcher (Research Fellows, Postdoctoral Fellows)	10	10	15	20	25
Staff supported through research career development programme	0	4	12	16	20
Postgraduate research supervisors	50	60	65	75	85
Summer Undergraduate Research Schools	1	1	1	1	1
Research Seminar Series	4	4	4	6	10
Involvement in All Island SFI centres	0	0	0	1	2
Research and innovation MOUs with university partners	1	2	3	4	5

APPENDIX 2 – MAPPING INSTITUTE RESEARCH THEMES TO NATIONAL PRIORITY AREAS

The national research priority areas for 2018-2023 are listed below and synergies between the Institute's existing research themes, centres and groups

National Priority – Main Theme	National Priority – Sub Theme	Research Centres/Groups
ICT	Future Networks, Communications and Internet of Things	RSRC, Netwell/Casala,
	Data Analytics, Management, Security, Privacy, Robotics and Artificial Intelligence (including Machine Learning)	CARC, ADARG
	Digital Platforms, Content and Applications, and Augmented Reality and Virtual Reality	CARC
Health and Well-Being	Connected Health and Independent Living, Medical Devices, Diagnostics, Therapeutics	Netwell/Casala, SMRC, RSRC, EIRG, ADARG
Energy, Climate Action and Sustainability	Decarbonising the Energy System, Sustainable Living	CREDIT, CFES, EIRG