RESEARCH STRATEGY

2017 – 2019

DUNDALK INSTITUTE OF TECHNOLOGY

FOREWORD

The period from 2014 up to 2016 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.

This Research Strategy document:

- Sets out the recent developments in both National policy which has informed the strategic positioning of research within the Institute
- Details the Institute's past performance in terms of its research agenda over the lifespan of the last research strategy (2014-2016)
- Details the suite of strategic imperatives, specific actions and associated key performance indicators which will enable the institute to deliver upon its research 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 Strategy from across the Institute. I would like to sincerely thank all those who have contributed to the development of this strategy.

I am confident that through the realisation of this strategy the Institute can continue its upward trajectory in its research performance.

Kind regards

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Dr Tim McCormac
Head of Research

1. Internal Environment

The mission of Dundalk Institute of Technology, as set out in its most recent strategic plan 2017-2019 "Connect to your future", is to provide learner-centred higher education, dedicated to serving the needs of its learners and empower its staff to deliver high quality learning and teaching, research and engagement. The Strategic Goals and Objectives for the Institute are aligned with the broader national higher education agenda as published in a number of key policy documents and reports to include, but not restricted to: the National Strategy for Higher Education 2030, National Skills Strategy to 2025 and the National Plan for Equity for Access to Higher Education 2015-2019 and also papers published by the HEA on the future landscape of higher education in Ireland. The Strategic Goals are aligned to the strategic areas identified in the HEA's Mission-based Performance Compacts and reflect the ambitions of the Institute across eight key areas as determined by the needs of the learners, staff and the region. Research by its nature within the institute underpins several of the 8 stated strategic objectives of the institute, namely, regional clusters, excellent learning and teaching, high quality internationally competitive research and innovation and enhanced engagement with enterprise and community.

DkIT continues to be recognised as one of the leading research intensive institutes of technology across the sector. Since the last research strategic plan (2014-2016) 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 within our prioritised research clusters
- Diversified our research funding base to ensure our sustainability through increased participation in European research programmes
- Increased our dissemination and impact of our research
- Established spin out companies from our research base

The Institute has secured over €15M in external funding from both national and international sources culminating in €52M secured research income since 2007. Over the past 2 years national research funding awards, such as, Science Foundation Ireland (SFI) (36%) and the Marine Institute (31%), have accounted for 20% of all research awards, with European programmes (i.e. Horizon 2020, Interreg VA, AAL) accounting for 78% of all research awards. By comparison, National awards accounted for 60% of all funding awarded between 2007-2013, with 60% of these stemming from Enterprise Ireland. A primary aim of the DkIT Research Strategy 2014-2016 was to diversify the research funding base towards more European schemes which, as shown in Figure 1, has been achieved. This has resulted in the Institute securing a 10.7% success rate in securing Horizon 2020 funding, just above the IOT sector average at 10.3%.[1]
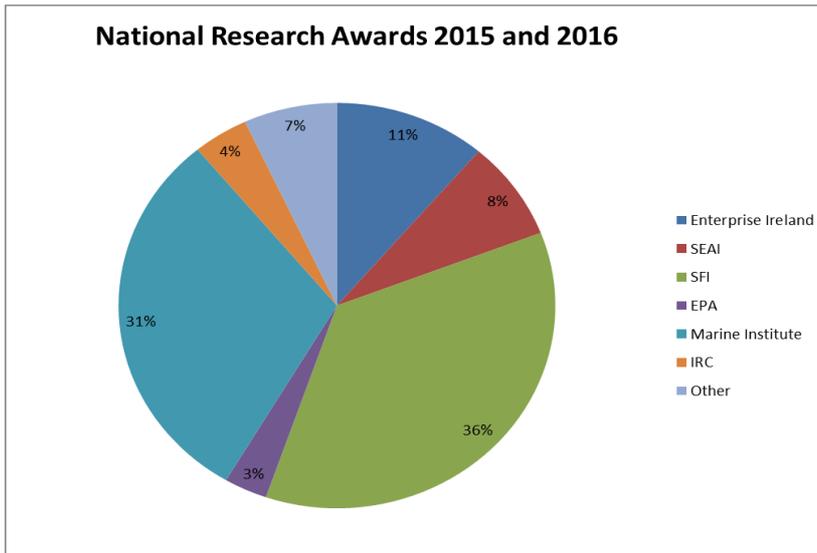
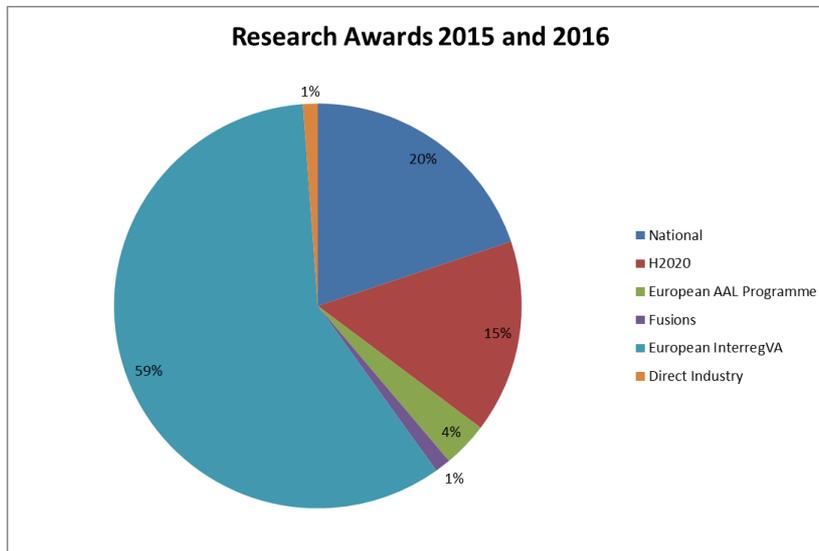**Figure 1: Research Awards by National Source 2015-2016**

Figure 2: Research Awards by Source (%) 2015-2016

There are currently 55 postgraduate research students, 80% of which are registered through the DCU-DkIT Graduate School, with 57 formally trained research supervisors across the four academic schools. There have been 29 Postgraduate research degree graduations since 2014 with the number of PhD graduations now exceeding that of MSc research degrees.
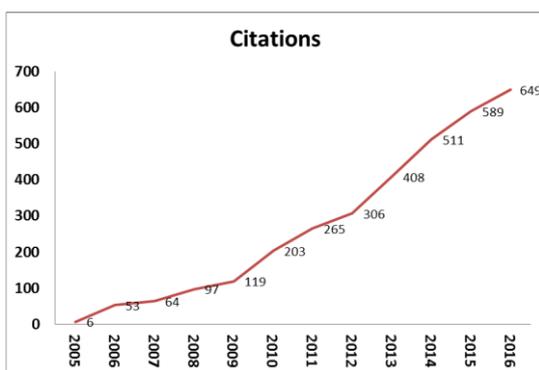
An enhancement in the impact of the Institute's research through growth in both the number and breadth of our research publications and associated citations has led to an additional 101 peer reviewed research articles, 31 conference presentations and 1539 citations from 2014 – 2016. The citation rate increased by 78% over this period compared to the previous three years (2012-2014), raising the institutes ranking to 4th in its sector.

Figure 3: No. of citations from DkIT publications by year

This data, captured through the Scopus database, excludes the research dissemination output of the Creative Arts domain from within the institute. Over the past 3 years researchers within this area have produced over 250 research outputs including exhibitions, recordings, performances, books and book chapters, conference presentations and proceedings, journal articles and guest lectures.

A new high impact Creative Arts Research Centre has been established through the consolidation of the Music Research Centre *Ionad Taighde Ceoil* and the Creative Media Research Group within the School of Informatics and Creative Arts. In addition one new research groups have been formed within our emerging research area of Entrepreneurship. This has led to in excess of 55 academic lecturers (17.2%), of the 320 academic staff, now formally aligned as members of the institute's research centres and groups.

Establishment of 2 High Potential Spin out companies from the ICT research base through initial seed funding from Enterprise Ireland's Commercialisation Fund. Tapa Healthcare are a medical software company developing clinical support tools that are used across multiple mobile and computer based platforms. The products drive patient centric proactive care using industry standard and proprietary clinical models to predict the deteriorating patient and recommend next actions to prevent avoidable incidents, serious illness and death. Nova Leah specialise in cybersecurity risk management software solutions for the medical device and healthcare industry. Nova Leah is the first company to develop an intelligent security risk management solution for use by manufacturers, vendors and healthcare providers.

Attainment by DkIT of the European Union HR Excellence in Research Award in 2014

2. External Environment

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 has moved up two places in the EC Innovation Union Scorecard[1] from 10th place in 2013 to 8th in 2015and is now 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, moving up to 16th place in 2014[2]. One of the principle objectives of the Irish government's recent Innovation 2020 strategy[3] is 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. Innovation 2020 sets out a roadmap for Ireland to achieve its stated goal of becoming a global innovation leader. The vision is underpinned by several key principles, namely,

- Excellent research in strategically important areas
- A strong innovative and internally competitive enterprise base
- A renowned pool of talent across the public and private sectors
- A coherent joined-up innovation ecosystem
- An internationally competitive research system

Innovation 2020 is composed of 93 strategic actions with some of these directly underpinning the institute's strategic approach to its research over the next 3 years. A flavour of some of the more important actions from Innovation 2020 for the institute includes:

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[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

- *Ensure that world class standards apply to postgraduate education*
- *Increase enrolment of postgraduate researchers*
- *Address funding system gaps for postdoctoral researchers*
- *Ensure opportunities for researcher career development*
- *Institute a new programme of funding for frontier research*
- *Attract world class researchers*
- *Ensure a strategic approach to the development of research infrastructure programmes*
- *Ensure mobility of researchers*
- *Enhance innovation and entrepreneurship training*
- *Develop a coherent approach on researcher career progression*
- *Encourage commercialisation of research*
- *Secure €1.25bn from Horizon 2020*

In light of Innovation 2020's stated actions and objectives, it is clear that if the Institute is to consolidate and enhance its position as one of the leading Institutes of Technology in terms of its research performance, it must take cognisance of National and European research and innovation policies. The Institute's Research Vision, Strategic Goals, associated Actions and Key Performance Indicators for the period 2017-2019 have therefore been developed in this context.

OUR RESEARCH CLUSTERS

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. Through the National Research Prioritisation Exercise, Horizon 2020, Innovation 2020 and a recent Institute self-assessment exercise, DkIT identified both its current research strengths and emerging research areas. The Institute's research agenda within both these established and emerging areas is driven by various research teams, which are embedded across the Institute's four academic schools.

Prioritised Established Research Clusters

- ICT, Health and Ageing
- Energy and the Environment
- Creative Arts

Emerging Research Clusters

- Humanities and Social Sciences
- Teaching and Learning
- Entrepreneurship

DkIT has always recognised the need to have a diversity of research centres and groups, including academic, industry facing and mission-orientated centres. Our established research centres have created acritical mass of the Institutes world class researchers:

- who have established international track records in their own right
- whose research outputs are internationally benchmarked
- whose work is interdisciplinary in nature cutting across traditional academic schools
- who possess state of the art infrastructure and facilities.

In view of the relatively small 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 past 3 year period. There is however, further scope to build upon this with further possible consolidation and development of collaborative synergies between existing teams of researchers. This would allow a focus on building higher critical mass centred on a select number of high performing research centres embedded within our prioritised research clusters. At present, the institute has six research centres and two research groups. Over the life course of this research strategic plan, a review of the research governance structures of centres 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. The Institute will continue to prioritise its three main research clusters and their associated top performing research teams for support.

Figure 4 illustrates the embedded nature of the 6 research centres across the three primary research clusters. What is apparent is the existing interdisciplinary collaborations between some research centres and that some centres cut across research clusters due to the interdisciplinary nature of their research programmes. One key objective for the next strategic period will be to encourage and support, where appropriate, the development of such linkages between research centres. In tandem with this a key action will be to revise and develop new governance structures around the strategic development of each of the research clusters involving the research leaders, research office, academic schools and the technology transfer office.
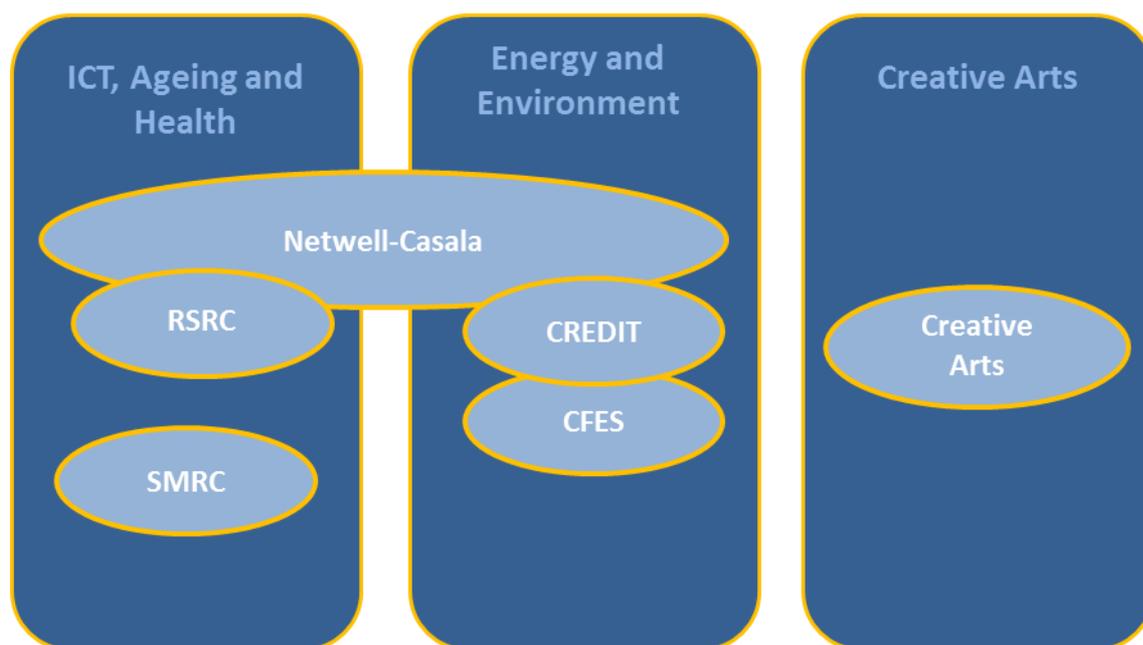
Figure 4: DkIT Research Centres and their affiliated thematic areas

Social Networks, Environments and Technologies for Wellness and Ageing-in-place (NETWELL): Centre for Affective Software for Ambient Living Awareness (CASALA)

Regulated Software Research Centre (RSRC):
The Regulated Software Research Centre (RSRC) at Dundalk Institute of Technology (DkIT) is internationally recognised for medical device software engineering research. They perform research in

relation to medical device software processes, medical device software traceability, medical IT Networks and medical device cybersecurity. The RSRC was setup by Dr Fergal Mc Caffery in 2008 and now consists of 30 researchers and during this period the RSRC has secured over €12 million in competitive research funding. The RSRC at DkIT has a strong commitment to the development and evolution of international standards, in relation to both generic software engineering and medical device software development. Over the past 3 years, this commitment has led to the development of a number of new international standards and technical reports, including IEC/TR − 80002-3, IEC/TR 80001-2-7, IEC/TR 80001-2-8 and IEC/TR 80001 2-9.

Smooth Muscle Research Centre (SMRC):
The Smooth Muscle Research Centre focuses on the cellular mechanisms underlying physiological function of smooth muscle relevant to disease states including chronic obstructive pulmonary disease (COPD), urinary incontinence and erectile dysfunction. Our researchers utilize a vast array of experimental techniques in several scientific disciplines including electrophysiological, molecular biological and medicinal chemistry techniques. We have recently led a successful €7.7M EU-funded Interreg project (BREATH) with Partners in QUB and UWS to study the causes, treatment and prevention of COPD. Specific projects include: evaluating the role of different ion channels in bronchoconstriction and bronchodilation in health and disease; use of novel potassium channel openers as bronchodilators; determination of the identity of pacemaker cells in urethra smooth muscle; elucidation of the mechanism of action of beta3 adrenoceptor agonists in the treatment of overactive bladder; unlocking the binding site of novel BK channel openers and examination of interactions between BK alpha subunits and novel accessory proteins (beta and gamma subunits); studying the molecular mechanisms involved in the function of the TMEM16A calcium-activated chloride channel.

Centre for Renewable Energy (CREDIT):
Research at the Centre for Renewables & Energy (CREDIT) focuses primarily on wind energy and energy storage, owing to the Institute's impressive infrastructure, which includes an 850 kW rated wind turbine, Campus ice bank, wave tank and associated data monitoring equipment. The Centre has enjoyed continued success with the funding of the EU INTERREG VA SPIRE 2 project which focuses on Distributed Energy Storage of renewable energy and is led by Ulster University. This EU funding in complemented by national funding supporting energy storage and wind research through SEAI RD&D with two projects in 2017. Centre staff are involved with international standards development activities through the IEC and International Energy Agency.

Centre for Freshwater and Environmental Studies (CFES):
The Centre for Freshwater and Environmental Studies (CFES) is a vibrant, multidisciplinary research facility, established in 2005 and is structured to facilitate research and educational activities which provide strong basic science training and experience while addressing cross-disciplinary research investigating environmental issues and evaluating effective solutions which have a regional, national, and international focus. The CFES is currently involved in a range of both large-scale and smaller scale projects, which in addition to contributing internationally relevant environmental research, provides relevant scientific information for government agencies, policymakers, communities and other interested parties. Expertise in the centre includes lake and river monitoring, palaeolimnology, soil science and agriculture, organic resources management, wetland ecology, safe and sustainable drinking water provision, microbial ecology, molecular biology, and environmental modelling. Research within the centre is organised under three themes: Lake and Catchment Management, Organic Resources Research, and Water and Development. The CFES has enjoyed significant success in recent years, most notably the awarding of a H2020 Marie Sklodowska Curie Joint Doctorate International Training Network (DkIT as Coordinator) for the MANTEL Project.

Creative Arts Research Centre:

Creative Arts Research has developed as an area of strength at Dundalk Institute of Technology with innovations contributing to Teaching and Learning, the cultural life of the community in the region, and the academic disciplines. The centre represents the merging of the Music Research Centre *Ionad Taighde Ceoil* and the Creative Media Research Group, which includes academic membership of 16 staff members from within DkIT's School of Informatics and Creative Arts. The Centre for Creative Arts Research was designated by an external panel of research active academics who visited the Institute in November 2016 to assess research outputs by DkIT academic staff members to date. The panel was impressed to learn that over a three year period, DkIT researchers in the area of Creative Arts produced 244 single research outputs including, conference presentations, secured research funding, workshops, guest lectures, performances, journal articles and monographs. The centre is currently involved in a number of projects, many of which involve external collaborations with regional industry, community groups and other Higher Education institutions in Ireland and internationally. The centre is committed to attracting more funding and researchers to DkIT in the future and making the research outputs accessible to the local community in the first instance.

Entrepreneurship & Marketing Research Group (EMeRGe):
"*EMeRGe*" is a new Research Group in the area of Entrepreneurship & Marketing. It will conduct research activities across three interconnected thematic areas; Entrepreneurship Education, Entrepreneurial Marketing and Practice Social Enterprise. The overarching aim of EMeRGe is to develop scholarly activity in the area of Entrepreneurship & Marketing and, in so doing, make a valuable and measurable contribution to the field.

Project Highlight – Smooth Muscle Research Centre

Border Area Regional Airways Training Hub (Breath)
(Keith Thornberry, Coordinator)

Funder: Interreg VA

Duration: 60 months
Start Date: 09/01/2017
Total Funding:

Aim: This project will establish a world-class cluster of researchers that will seek to address the clinical, societal and economic burdens associated with chronic obstructive pulmonary disease (COPD).

Beneficiaries (3): Dundalk Institute of Technology (IE)(Coorindator), Queens University Belfast (NI/UK), University of the West of Scotland (SCOT/ UK)

Partner organisations (5):
ProAxsis Ltd (NI/UK), Raptor Photonics (NI/UK), Norbrook Laboratories (NI/UK), Axis Biosciences (NI/UK), Prior PLM Medical (IE).

Project Overview
BREATH brings together Partners from DkIT, QUB & UWS to develop innovative approaches to target new treatments for respiratory disorders, create a step change in PhD training and increase industry relevant research capacity. Ireland, (N&S) together with Scotland are world leaders in prevalence rates for chronic respiratory disease; in the EU, Ireland ranks second in death rates from respiratory disease (excluding lung cancer), and chronic obstructive pulmonary disease (COPD) is a major contributor to these. COPD is expected to be the 3rd leading cause of death in Ireland by 2020 (INHALE report). The estimated annual economic burden of COPD in the EU in 2011 was €141.4 billion. BREATH will focus on industry relevant research in airways disease to address the causes, treatment and prevention of airway disease, we need to focus scientific research and training specifically in this area. BREATH will ensure that each of its researchers will receive excellent training through projects that are focused, feasible, intellectually challenging, clinically and commercially relevant and above all, innovative. We will train a total 21 new young researchers and will significantly impact upon the overall capacity for research and innovation in Health and Life sciences within the Region by increasing

Project Highlight – Centre for Freshwater and Environmental Studies

Management of Climatic Extreme Events in Lakes & Reservoirs for the Protection of Ecosystem Services (MANTEL)
(Consortium lead: Eleanor Jennings DKIT (IE)

Funder: Horizon 2020 Marie Sklodowska Curie Innovative Training Network (European Joint Doctorate)

Duration: 48 months
Start Date: 1/1/2017
Total Funding:

Aim: To train 12 PhD early Stage Researchers in the management of the effects of climatic extreme events in lakes and reservoirs

Beneficiaries (8): Dundalk Institute of Technology (IE) (coordinator); Estonian University of Life Sciences (EE), University of Barcelona (ES), University Geneva (CH), Leibnitz Institute of Freshwater Biology and Inland Fisheries (DE), Netherlands Institute of Ecology Netherlands Institute of Ecology (NL), Catalan Institute for Water Research (ES), Uppsala University (SE).

Partner organisations (10): Centre for Ecology and Hydrology (UK), ETH Zurich (CH); Marine Institute (IE); Aigües Ter-Llobregat (water supply, Girona, ES); Barcelona Supercomputing Centre (ES); Catalan Water Authority (ES); Waterboard BrabantseDelta (NL); Witteveen + Bos (NL); Wageningen University (NL); NIVA (NO);,Wageningen University (WU – NL).

Project Overview
Environmental perturbations to freshwater bodies occur largely in the form of episodic climatic events. These range from relatively short mixing events to storms and heat waves. A common characteristic is that their effect is generally longer lasting than the duration of the event itself. Understanding the impact of these events in lakes and reservoirs requires monitoring that captures the event (hours–days) as well as the ensuing impact that can last for months or even years. Only recently have such automated high frequency monitoring (HFM) systems been widely adopted on lakes and reservoirs throughout Europe (www.netlake.org). Extreme weather events are also becoming more frequent, a trend that has been linked to directional climate change and is projected to continue in the coming decades (IPCC 2012). As near real time monitoring of the freshwater environment has become more common, the true importance of such episodic events is becoming clear. Taken together, it is often the sum of multiple events that shape a given freshwater environment within the constraints imposed by regional climate and impact the resilience of the system to respond to change. These new insights require new theoretical frameworks and approaches to managing lakes and reservoirs. This proposed European Joint Doctoral Innovative Training Network brings together eight beneficiaries, supported by ten partners and five awarding universities. This consortium will use their monitoring resources and data archives to train a cohort of 12 Early Stage Researchers to investigate the effects on water quality of the climatic extreme events, while at the same time giving training in state-of-the art technology, data analysis and modelling, and linking to the water management sector. The aim of the proposed programme is, therefore, to ensure that future scientists gain expertise in the effects of episodic and extreme events in lakes and reservoirs, so that future water management strategies in Europe can explicitly account for their occurrence.

Project Highlight - CREDIT

Storage Platform for the Integration of Renewable Energy (SPIRE2)
(Paul McArtain and Raymond Byrne-Project Partners)

Funder: Interreg VA – Research andInnovation in Health & Life Sciences and Renewable Energy

Duration: 58 months
Start Date: 1/3/2017
Total Funding:

Aim: This project will increase the region's Research and Innovation (R&I) capacity by creating a cross border Virtual Research Graduate School in the area of Mass Energy Storage (MES). It will boost collaboration between Research Institutes and SMEs and intensify technological innovation and commercialisation in the region.

Beneficiaries (4): Ulster University (NI/UK) (Coordinator), Dundalk Institute of Technology (IE), Queens University Belfast (NI/UK), Strathclyde University (Scot/UK).

Partner organisations (14): Arbarr Group (NI/UK), Sunamp (Scot/UK), Causeway Coast and Glens Borough Council (NI/UK), Community Energy Scotland (Scot/UK), B9 (NI/UK), Glen Dimplex (NI/UK), Climote (IE), AES (IE), SSE (NI/IE/Scot), Energia (IE/NI), ESB (IE), Paypal (IE), Ulster Farmers Union (NI), The Authentic Food Company (IE).

Project Overview The project will focus on how the wide-scale deployment of MES can allow very high levels of renewable energy to be integrated into power grids globally. Variable renewable energy (VRE) resources (e.g. wind and wave) cannot be controlled, and require measures such as energy storage to integrate them into existing power grids. Energy can be stored in bulk using large-scale storage, or at smaller scales using MES devices, owned and operated by domestic and business consumers. Ireland, NI and Scotland have among the best wind, wave and tidal resources in the world and are regarded globally as a test bed for the deployment of services and technologies to manage very high levels of VRE. MES is crucial to achieving a global transition to clean energy. It allows for optimal use of existing infrastructure, has a less burdensome planning process than large-scale storage, and can be installed rapidly. While progress has been made with large-scale storage, there has been limited development of MES. This project will assess the ability of MES to operate profitably in the UK and Irish electricity markets, and how MES can be used to maximise the whole-life performance of VRE systems operating in harsh environments.

Project Highlight - Netwell/Casala

ProACT

Funder: H2020 – Personalising Health and Care Research and Innovation

Duration: 42 months
Start Date: 1/1/2016
Total Funding:

Aim: The overall aim of ProACT will be to implement a novel ICT-AT system to advance and improve integrated care for multimorbidity (including associated comorbidities) management by connecting 4 key care and support models central to understanding and implementing effective, continued and coordinated patient centric care (including selfcare). These models are: 1) homecare 2) hospital care 3) community and social care and 4) social support networks.

Beneficiaries (4): Trinity College Dublin (Co-ordinator) (IE), IBM Research (Global), DkIT (IE), University College Cork (IE)

Partner organisations (8): AIA Bologna Onlus (IT), iMINDS (BE), Treelogic (SP), Phillips (Global), Home Instead (global), European Association of Service providers for Persons with Disabilities (EU), Agenzia Servizi Alla Personna, Cittia di Bologna (IT).

Project Overview:
An estimated 50 million people in the European Union (EU) live with multiple chronic diseases, which deeply impact quality of life. Health systems across the EU and worldwide need to evolve rapidly to address the emerging challenges of long-term care faced by an ageing population, widening social inequalities and financial health budget constraints. Presently health systems are primarily focused on supporting a single disease framework of care. The primary challenge is to create a patient centric integrated care ecosystem in order to understand and manage multimorbidity. To enable effective integrated healthcare delivery, ProACT will focus on the technical infrastructure, but will also indicate how the programme will influence and support the other key areas to effective integrated healthcare by: (i) Addressing vertical and horizontal aspects of integration, combining both patient and service needs into a consolidated approach that provides coordinated and continuous coverage along the continuum of care (e.g. ability to combine patient needs and workflow management to improve clinical and domain knowledge outputs), (ii) Ensuring key benefits to relevant stakeholders in the system are maximized such as increasing patient engagement, reducing healthcare costs, improving workflow organization, coverage of care and efficiency of service provision, (iii) Developing an open data aggregation system to allow for future adoption of health information systems (HIS) and new technologies and (iv) Advancing knowledge to address clinical and non-clinical (e.g. human factors, cultural differences) barriers to integration. ProACT aims to fuse Information Communication Technology and Assistive Technology (ICT-AT) system design with a strong patient centric, social and human factor behaviour change approaches to create a user friendly system that goes beyond the traditional telehealth/telemedicine model.

Project Highlight – Regulated Software Research Centre - RSC

Funder: Science Foundation Ireland – Research Centres

Duration: 64 months
Start Date: 01/08/2015
Total Funding:

Beneficiaries (5):
University of Limerick (Coordinator), University College Dublin, National University of Ireland, Galway, National University of Ireland Maynooth, Dundalk Institute of Technology

Industry Partners: (35):
ACI Payment Systems, Aerogen, Allstate Northern Ireland, Almir Business Ltd, Analog Devices, B5, Bluebridge Technology, Dabl, Data Direct Networks, SMI Systems, DELL, Entellexi, Fidelity, Ericsson, Fijuwave, IBM, Information Mosaic, Intel, JBA Consulting, Kuglar Maag Lie, QAD, Lumension, Microsoft, Ocuco, Portable Medical Technolgy Ltd, S3 Group, SQS, Systeam, Statsport, Storm Technology, Toyota, Tullow Oil, United Technologies, Vitalograph

Project Overview:
SFI Research Centres link scientists and engineers in partnerships across academia and industry to address crucial research questions; foster the development of new and existing Irish-based technology companies; attract industry that could make an important contribution to Ireland and its economy; and expand educational and career opportunities in Ireland in science and engineering. Lero, an SFI Centre funded in 2015 is the Irish software Research Centre.

SFI Research Centre's are comprised of a Hub and Spoke model, with the Hub represented Core Platform Research and the Spokes, comprising Academic-industry targeted projects. DkIT's Regulated Software Research Centre (RSRC) is a partner in Hub A: Methods and Standards for High Intregity Systems. The objective if this Hub is to further develop and tailor Software Development Methods to facilitate the increasing demands of contemporary software development environments, such as regulated and global software development. The RSRC are also partners in two separate Spokes Projects. The first of which is concerned with satisfying regulatory compliances for medical devices. Its objective is to develop techniques and frameworks to help medical device manufacturers satisfy regulations. Software applications are increasingly classified as medical devices, and their development must also be regulated The second targeted project involves Software for Financial Services and its objective is to integrate accumulated best practice knowledge from 3 software development domains into a hybrid process assessment and improvement model

Project Highlight – Centre for Creative Arts

Strategic Partnership: Agents of Change in Education

Funder: ERASMUS+

Duration: 36 months
Start Date: 01/10/2016
Total Funding:

Beneficiaries (6):
Artesis Plantijn Hogeschool, Stord Haugesund University College in Norway, CMSM - Curso de Musica Silva Monteiro in Portugal, Speel je wijs in the Netherlands and RESEO- European Network for Opera and Dan in Belgium, Dundalk Institute of Technology

Industry Partners: (3):
Speel je wijs in the Netherlands, RESEO- European Network for Opera and Dance in Belgium, European Space Agency

Project Overview:
Our project will be realized in the transversal domain, using innovative methods in which science, art, ICT and education are explored within a common entrepreneurial framework. Quality and relevance will be improved by enhancing creative elements of in-training teachers' learning processes, and by allowing them to experience entrepreneurship as both a goal and a method. SPACE will thereby create a framework within which both entrepreneurship and creative learning processes may occur as part of the science curriculum. The reasoning behind this is that Science, Arts, ICT and Education, even though different in their domains and objects, share some basic problems and a creative approach to knowledge. By creating a common entrepreneurial framework, as well as multidisciplinary teams, participants are encouraged to collaborate with others using their own expertise but also creativity as a shared language, a means of communication. The specific methodological approach which we plan to use is Write a Science Opera (WASO), a cross-disciplinary approach to science and art teaching in which an inquiry-based science teaching structure is extended to include the arts in each step of the pupil´s inquiry process. The project will involve realizing innovative didactical models for the teaching of science and technology during practicum activities in Norwegian, Belgian, Irish, Portugese and Dutch pre-primary, primary and secondary schools (age 3 to 14 years). Our project aims to allow creative arts students to be inspired by technological innovation, and to contribute to it. Engaging in a dialogue with a leading entrepreneurial European organization (ESTEC) will allow them to understand the necessary mindsets and ways of thinking behind today's foremost innovations.

SUSTAINABILITY OF OUR RESEARCH

Key to the ongoing growth and success of the Institute's research activities, in terms of its regional, national and international impact, is to ensure that sustainable research foundations are secured. The Institute views this as being structured around three key areas, these are;

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

4.1   Research Personnel: The underpinning of the Institute's Research Strategy and the activities of the Institute's Research Clusters through the recruitment of relevant top calibre research personnel cannot be understated. Our research endeavours are underpinned by the quality of our researchers and their level of expertise. The Institute is committed to:

- Recruitment of research active academics across the four academic schools who possess a track record of securing external research funding and undertaking research of international quality and whose research underpins our research clusters
- Maintain the number of postgraduate researchers, at both level 9 and 10, through internal and external funding
- Increasing the research supervisory capacity of the Institute through
    - Recruitment of suitably qualified academics
    - the continued roll out of supervisory training and support programme
    - increasing the percentage of staff with level 9 and 10 qualifications
- Recruitment of both established internationally recognised research leaders and postdoctoral researchers through leveraging of funding from national and international sources, such as Science Foundation Ireland (SFI), Irish Research Council (IRC) and Horizon 2020
- Supporting Early-Stage Researcher through the Institutes Researchers Career Framework, providing the tools and training required to facilitate their development from Post-Graduate to independent researcher

4.2   Research Infrastructure: The Institute has invested 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 2580m^2 of dedicated research space through the provision of state of the art laboratories, performance spaces, practice facilities, recording studio space, editing suites and dedicated research offices. These primarily serve the needs of the Institutes' Research Centres across its' four academic schools. The Institute recognises the need 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 3 years. This will be primarily achieved by the targeting of appropriate external research funding sources such as the successor to the PRTLI programme as highlighted in Innovation 2020.

4.3   Funding Research – Diversification of Income: As detailed in the Institute's Research Strategy 2014-2016 the institute had secured €34M since 2007 up to 2013 from external funders with 60% of this originating from national sources. During this time period the level of funding originating from European sources such as the Framework 6 and 7 programmes had been approximately €3M representing a 9% share of the Institute's total funding for the period 2007 to 2013. Over the past 3 years the research awards secured were €15.6M with the institute's success rate for securing H2020 awards being 10.7% this being 0.4% higher than the sector average with the national success rate across the third level sector being 15%. The key challenge for the period 2017-2019 will be to ensure the Institute continues to diversify its research funding base with greater participation and success from both European Funding Programmes, such as, Horizon 2020, and national funding schemes, such

as Irish Research Council, SFI and HRB. Measures aligned with the external environment to be driven by the Research Office in partnership with the research community include:

- ➢ Target both international public and private funding sources
- ➢ Foster and support external partnerships
- ➢ Increase visibility of DKIT's research agenda with global funders
- ➢ Leverage funding from national programmes with an international focus (i.e. SFI's US-Ireland)

In addition to securing further external awards with an emphasis on diversification the Institute recognises its requirement to invest internally in its research agenda. To date this has entailed:
- ➢ Investment in the establishment of the management and governance structures, such as, the Research Office and its associated staff
- ➢ Provision of research infrastructure and dedicated facilities
- ➢ Targeted internal funding support schemes
- ➢ Investment in the recruitment and retention of leading Principle Investigators in our key research areas

1. RESEARCH STRATEGIC PLANNING PROCESS

During 2016 the Institute established a Research Strategic Planning Committee, chaired by the Head of Research, whose principal role was to develop a roadmap detailing the strategic direction for research within the institute for the period 2017 to 2019. This committee was comprised of

- One representative from each of the Institutes research centres
- Head of Teaching and Learning
- Representative from the Registrar's Office
- Head of School Representative
- External Services Manager
- Representation from the Research Sub Committee

This committee undertook the following

- On-going review of national and international strategic documents which inform policy in relation to research, development, innovation and graduate education
- Identification of the Institutes Strengths, Weaknesses, Opportunities and Threats in relation to its research activity

The committee drafted the Institute's research strategy and then submitted it to the Institute's research subcommittee for further discussion and finalisation.

2. VISION, STRATEGIC GOALS, ACTIONS AND KEY PERFORMANCE INDICATORS (2017 – 2019)

Our research vision is

"To enhance our international reputation as one of the leading research intensive Institutes of Technology"

To achieve this vision the Institute's Research Strategy (2017-2019) is founded upon several strategic imperatives with associated actions and key performance indicators (KPIs). These imperatives include:

Imperative 1: Focus and drive research excellence in our prioritised research areas which is internationally competitive and that has societal and economic impact

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 fundamental and applied research programmes, we are attempting to address these global issues and find solutions for industry. Ensuring our research has impact, whether it is contributing to the knowledge gap, aiding economic development, solving societal challenges, informing national and international policy or informing the teaching remit of the institute, has always been at the heart of our research endeavours. It is vitally important that the Institute also 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 Institutes' research endeavours 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.

Roadmap – Actions and Timelines

Action	Timeline	Responsibility
Ensure our research priorities are aligned with the areas in Innovation 2020	Ongoing	Head of Research
Strengthening connections with national and European funders and research policy makers	Ongoing	Head of Research
Ongoing review and internal dissemination of national and European research policy papers	Ongoing	Head of Research
Continue to support frontier research that underpins the translational research agenda	Ongoing	Head of Research
Development of a comprehensive researcher database for external dissemination	December 2017	Research Office
Development of a comprehensive directory of all national research funding programmes for enterprise – HEI partnerships for dissemination to potential industrial partners	December 2017	Research Office Regional Development Centre
Promote Great Northern Haven as a national test bed for trialling of innovative technologies in conjunction with relevant stakeholders	January 2018	Head of Research Netwell/Casala Director
Liaise with funders on future strategic research programmes	Ongoing	
Horizon scan for major strategic research opportunities	Ongoing	Head of Research
An institutional policy to facilitate enterprise access to institute's research infrastructure	Ongoing	Research Office
Prioritise leading research teams for major strategic external programmes and internal Investment	Ongoing	Research Office Head of Research
Biannually benchmark each research centres performance though standardised key performance indicators	Ongoing	Research Office
Review existing research governance structures	December 2017	President Head of Research Heads of School
Implement research cluster governance structure	December 2017	Head of Research
Recruit and retain high calibre academic researchers in selected research areas	Ongoing	Heads of School
Annually analyse potential available academic positions for recruitment aligned with research clusters	Ongoing	Head of Research Heads of School

Action	Timeline	Responsibility
Review the current recruitment policy around academic posts	Ongoing	Head of Research Heads of School
Develop and roll out new training tools and aids to support researchers at all career stages in the submission of quality, competitive research funding applications	March 2018	Research Office
Annually assess research dissemination and impact	December 2017, 2018 & 2018	Research Office Academic Schools Research Teams
Formally join large scale national research platforms and European platforms	Ongoing	Head of Research Research Centre Directors
Capture all current relevant external memberships by institute staff	March 2018	Research Office Heads of School
Explore possible consolidation of research teams and develop collaborative synergies across teams	Ongoing	Head of Research
Review internal support measures for existing centres and link to performance	Ongoing	Head of Research
Incentivise collaboration and possible consolidation of research centres	Ongoing	Research Office
Horizon scan both internally and externally possible research opportunities in emerging research areas	Ongoing	Research Office
Ensure Institute is prepared for Brexit and its impact upon the research agenda	Ongoing	Head of Research

Imperative 2: Engage and support all researchers in an enabling environment

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 and Timelines

Action	Timeline	Responsibility
Mentor and support early career researchers	Ongoing	Research Office
Construct an early career researcher database	February 2018	Research Office Heads of School
Establish a research buddy " mentor" system for all early career researchers	February 2018	Research Office Research Centres
Establish an annual specific training programme for early career researchers	September 2017	Research Office
Roll out national career framework programme	September 2018	Head of Research HR Manger Heads of School
Develop a structured training programme for all researchers	September 2017	Research Office
Foster a culture of responsible conduct of research amongst the research community	Ongoing	Research Office

Imperative 3: Ensure teaching and learning agenda remains research informed

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.

Roadmap – Actions, Supports and Timelines

Action	Timeline	Responsibility
Ensure all academic and career researchers deliver on undergraduate and postgraduate programmes where possible	On-going	Heads of School HR Manager
Foster and develop a research culture amongst undergraduate students	On-going	Heads of School
Support 3 research summer schools	June 2017 June 2018 June 2019	Research Office
Run Irish Research Council workshops for all 3rd and 4th year undergraduate students	Semester 1 2017 Semester 1 2018 Semester 1 2019	Research Office

IMPLEMENTATION AND OVERSIGHT

The implementation of the Research Strategy will be overseen primarily by Academic Council's Research Sub-Committee (RSC). A review committee from the RSC will be established involving the following membership:

- Head of Research (Chair)
- Research Projects Officer
- Technology Transfer Manager
- 2 Head of School Representatives
- 2 RSC Representatives
- 3 Research Centre Representatives
- 2 Research Group Representative

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. 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 some Key Performance Indicators

Key Performance Indicator	End 2017	End 2018	End 2019
Focus and drive research excellence in our prioritised research areas which is, internationally competitive and that has societal and economic impact			
Exchequer and non-exchequer research income leveraged by researchers	€3.75M	€4M	€4.25M
Level of participation in EU wide networks and H2020 proposals	6	8	10
Peer reviewed research publications in journals	30	35	40
Total citations (>1600)	500	550	600
Research dedicated space and facilities	2800m^2	2950m^2	>3000m^2
Number of outputs in the creative arts	>10% increase		
Level 9 and 10 researchers all registered through DCU- DkIT Graduate School	55	60	65
Level 9 and 10 research graduations	8	10	15
Engage and support all researchers in an enabling environment			
% Academic Staff with PhD	30%	30%	32%
Presidents Research Excellence Awards (early career and established researchers)	4	4	4
Staff supported through structured research training programmes	30	40	50
Number of Research Fellows researchers	5	7	9
Number of Postdoctoral Fellows	7	10	12
Staff supported through research career development programme	0	4	8
Ensure teaching and learning agenda remains research informed			
Postgraduate research supervisors	50	55	60
Institutional postgraduate scholarships	8	10	12
Summer Undergraduate Research Schools	1	1	1
School based research seminar series	4	4	4
Increase in IRC PhD applications from DkIT undergraduates	10	15	20