



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Annual Review

2014— 2015

DR PATRICK PRENDERGAST
PROVOST & PRESIDENT



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Introduction from the Provost

The academic year began with the launch of our new Strategic Plan in October 2014, laying out our priorities to 2019. The nine goals cross all our commitments in research and education, innovation and entrepreneurship, creative arts and global relations, and public and community engagement.

The Plan is highly cohesive — from our vision flows our mission, and from our threefold mission flow our nine goals (Fig. 1).

This year has been about implementing the Plan and we've already achieved significant success across a number of actions. One of the central capital development projects envisaged in the Plan is for a new Trinity Business School co-located with an Innovation and Entrepreneurship Hub. Building is now underway to erect this flagship School on a site on the east end of the campus along Pearse Street — twenty individuals have donated significant funds to enable this.

In this Review we talk to Andrew Burke, new Professor of Business Studies and Dean of the Trinity Business School and we talk to the eight other professors appointed this academic year in Neurology, Music, Paediatrics, Computer Science, Clinical Medicine, Sociology, Law, and Orthopaedics & Sports Medicine. Collectively these appointments demonstrate the range and diversity of Trinity's Schools, and two of them — in

Neurology and Orthopaedics & Sports Medicine — are newly created full-time professorships, firsts for Trinity and for Ireland.

The Strategic Plan commits to building Trinity's research expertise in 19 interdisciplinary research themes. These include 'Creative Arts Practice', and this year we launched the Trinity Creative Challenge, inviting artists to propose interdisciplinary projects with a Trinity focus, with the aim of catalysing the arts in Dublin city and supporting the development of the creative and cultural industries sector. Five proposals were selected from over 140 applicants to share the award fund — collectively the projects showcase performance, visual art, music, film, design, new media, animation, and gaming and creative technologies.

The five winners will present their new works on campus in April 2016. This is part of delivering on our goal to 'Engage Wider Society', and to making the campus a vibrant social, cultural hub in the heart of Dublin city. In May, in the lead-up to Ireland's marriage referendum, Impac-winning author Colm Tóibín was invited to give a public lecture in the Trinity Long Room Hub entitled 'The Embrace of Love, Being Gay in Ireland Now'. It was part of the Hub's 'Behind the Headlines' discussion series, which aims to provide a forum for public discourse on current issues.

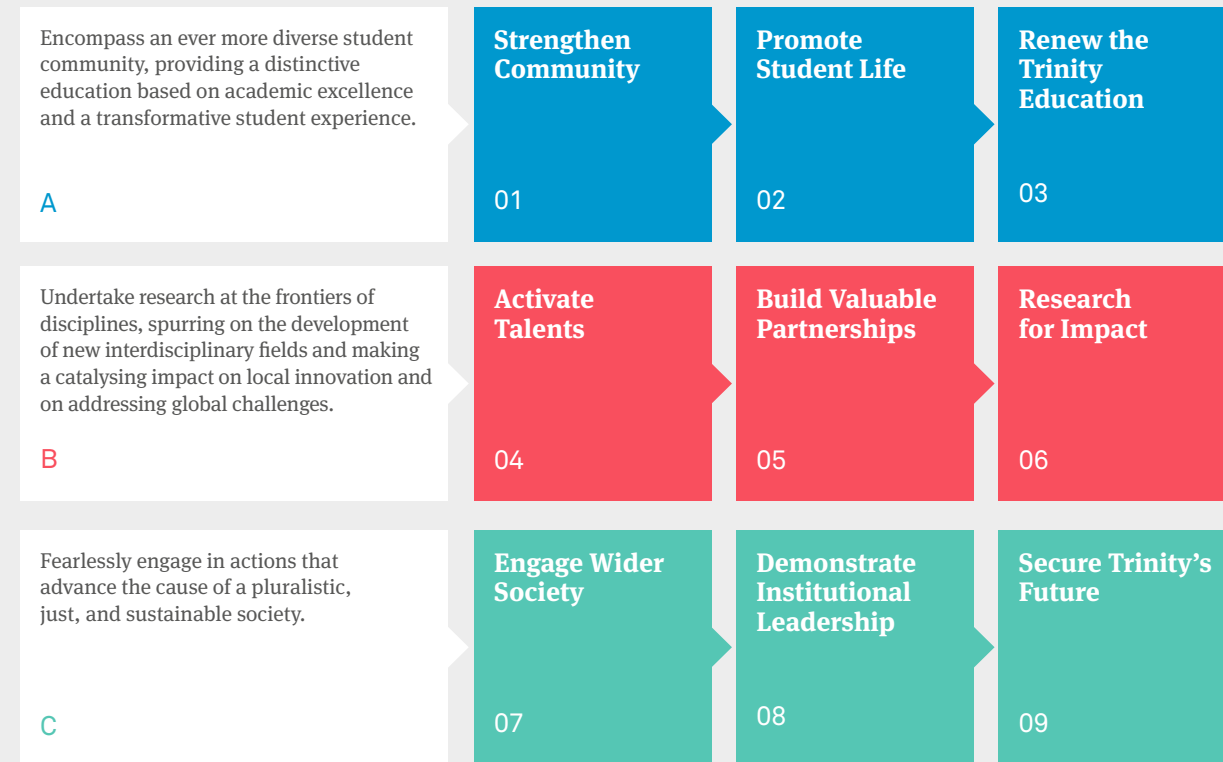
→ As a university of global consequence, we will be known for realizing student potential and for research and scholarship that benefits Ireland and the world.



01 Mission and Nine Goals

We provide a liberal environment where independence of thought is highly valued and where all are encouraged to achieve their full potential. We will:

Fig. 1



Another of Trinity's interdisciplinary research themes is 'Ageing', and this year Trinity emerged as a key partner in a major EU initiative for 'Healthy Living and Active Ageing' — 'InnoLIFE' is a multi-million euro consortium of industry, higher education, and research institutions funded by the European Institute of Innovation and Technology (EIT) to develop projects, products, training and services for healthy living and active ageing. Trinity also emerged as a partner in another EIT consortium, 'Raw Materials', which seeks to tackle sustainability and the efficient use of natural resources.

Success in the EIT was part of an excellent year for research for Ireland and for Trinity. At the European Research Council (ERC) awards — which reward frontier research — Ireland jumped from second-lowest performer to second-highest. Trinity now has six starting ERC grants, four consolidator, one proof of concept and one advanced grant currently active on campus; in June the *University World News* reported that Trinity is in the 50 top-performing universities in Horizon 2020.

Under the Goal 'Strengthen Community', we have begun to implement phase two of our Global Relations Strategy. This year saw over 30 new agreements signed with leading universities in the US, Latin America and Asia, including ten

new student exchange agreements. Between 2012/13 and 2014/15 Trinity's student body coming from outside the EU increased by over 30% and that rate of increase is continuing into 2015/16.

The Global Relations Strategy is about nurturing a multicultural, cosmopolitan campus, and enhancing research and the Trinity Education through internationalisation. Under our two goals — 'Promote Student Life' and 'Renew the Trinity Education' — we commit to delivering a world-class experience for our undergraduates and postgraduates, encouraging critical thinking, creative practice and innovation and entrepreneurship through curricular and extracurricular activities.

In October 2015, we learnt that Trinity has produced more entrepreneurs than any other university in Europe over the last five years. *The Universities Report*, published in October 2015 by private equity and venture capital-focused research firm, PitchBook, showed that Trinity produced 114 entrepreneurs and 106 companies, which raised €575.7 million in capital between 2010 and 2015.

We were gratified by this magnificent showing, but not surprised since in recent years we have initiated a number of key actions to drive student innovation and entrepreneurship.

BELOW LEFT Among the contributors and representatives of areas included in this Provost's Review, are, standing (L–R) Ian Mathews, Chief Financial Officer; Diarmuid O'Brien, Director, Trinity Research & Innovation; Prof Kevin O'Kelly, Dean of Students; Cathy Gallagher, Development Manager, Sport & Recreation; Nick Sparrow, Director, Trinity Development & Alumni; Prof Timothy Savage, Associate Dean for Online Education; Sally-Anne Fisher, Communications Officer; Seated (L–R) Prof Juliette Hussey, Vice-President for Global Relations; Prof Linda Hogan, Vice-Provost/Chief Academic Officer; Dr Patrick Prendergast, Provost; and Prof Shane Allwright, Registrar.



ABOVE Recipients of the 2015 Provost's Teaching Awards Dr Ciaran Simms, School of Engineering; Dr Ciaran O'Neill, School of Histories and Humanities (Early Career Award); Ms Sheila Ryder, School of Pharmacy and Pharmaceutical Sciences; Ms Cicely Roche, School of Pharmacy and Pharmaceutical Sciences (Early Career Award); Mr David Kenny, School of Law (Early Career Award); and Dr Daniel Geary, School of Histories and Humanities.

Our undergraduate accelerator, Launchbox, now in its third year, has progressed from a three-month accelerator to a 12 month programme which includes an 'idea workshop' series and a pre-accelerator element to develop ideas from early to prototype stage.

LaunchBox ideas incubated this year are as novel and ingenious as in previous years. They include: *SiteSpy*, a hardware device to help telco companies report live data information to engineers; *Blazer*, a new system to remove the dangerous varroa parasite from honey bees; *Unituition*, an online market place for third level students and tutors; and *Sensa FX*, a health tool to help people form healthier habits using scent associations.

While there is not enough space to describe all the new initiatives, an important one for the future will be the Trinity Education Project. The ambitious aim is to agree a set of graduate attributes for all our courses and ensure that the Trinity curriculum is designed to deliver these. Also this year we drew on generous philanthropic support to establish Teaching Innovation Grants to endow teaching projects which expose students to new ways of thinking and learning. There were 18 applicants and six grants were awarded across the three university faculties.

The whole Trinity community was immensely proud in October 2015 when alumnus William C. Campbell won the Nobel Prize for Medicine for his part in combating the parasitic worms which cause river blindness. In interviews, Professor Campbell has spoken movingly of his mentor in Trinity, Desmond Smyth, who, he said, "changed my life by developing my interest in parasitic worms" (*Irish Times*, 9 October 2015).

We want to continue educating such alumni and mentors — people who contribute to making this world a better, more equal, more sustainable, and more illuminating place.

In conclusion, it remains for me to thank the staff, students, and alumni who have helped make this year such a success. Your hard work, creativity and dedication are an inspiration, and the reason why Trinity, now entering its 425th year, remains fresh, resilient, and fully delivering on the Vision enshrined in our Strategic Plan: "As a university of global consequence, we will be known for realizing student potential and for research and scholarship that benefits Ireland and the world."

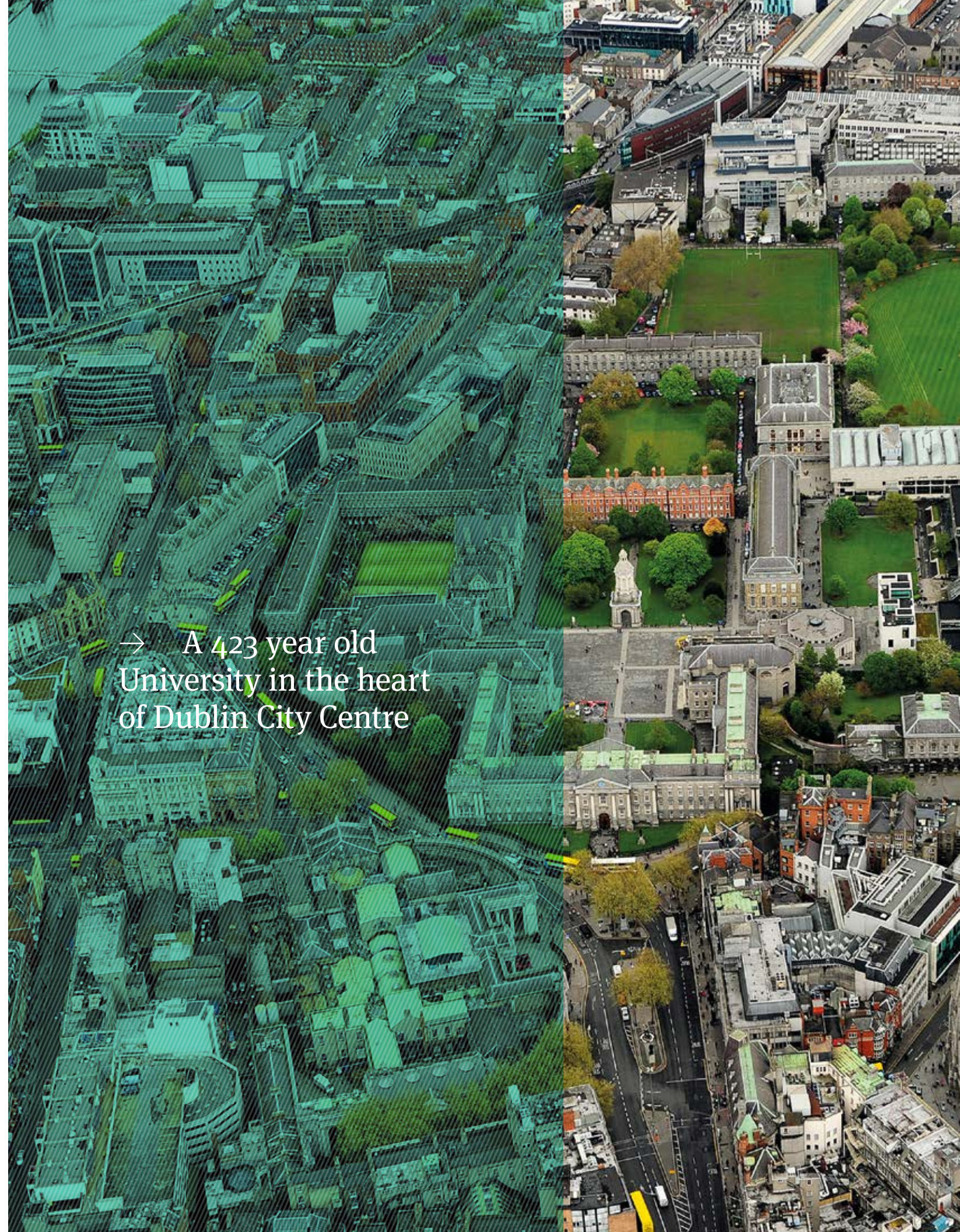
Dr Patrick Prendergast
Provost & President

Trinity at a Glance

Trinity is Ireland's
No. 1 University

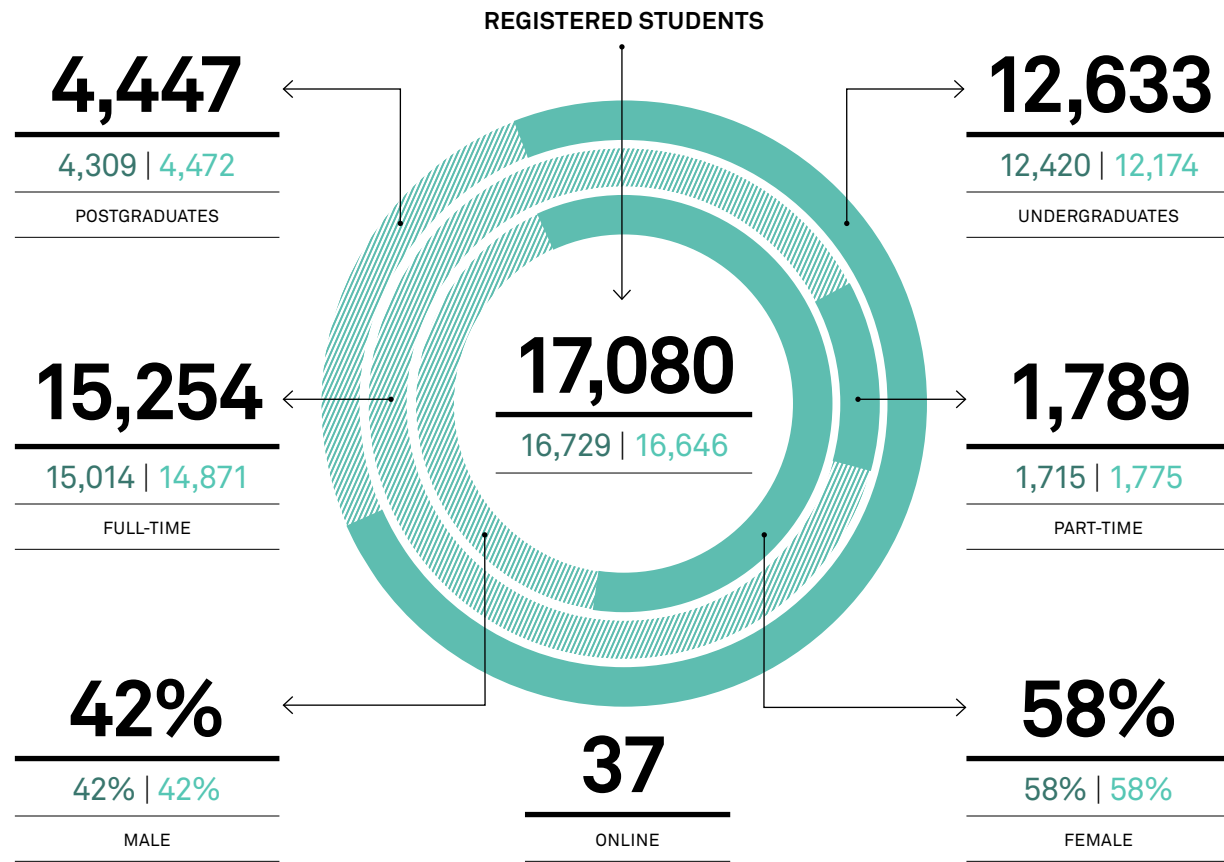
QS World University Ranking, THE World University Ranking, Academic Ranking of World Universities (Shanghai)

→ A 423 year old
University in the heart
of Dublin City Centre

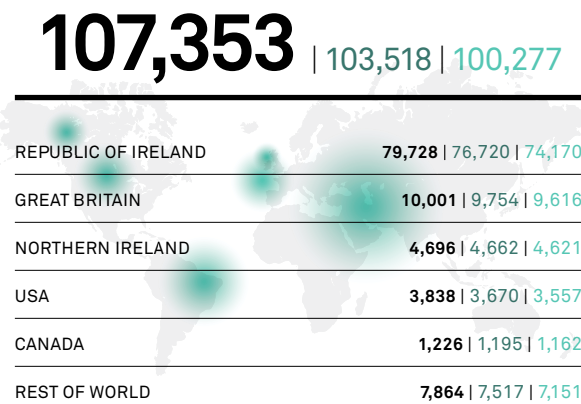


02 Student Statistics

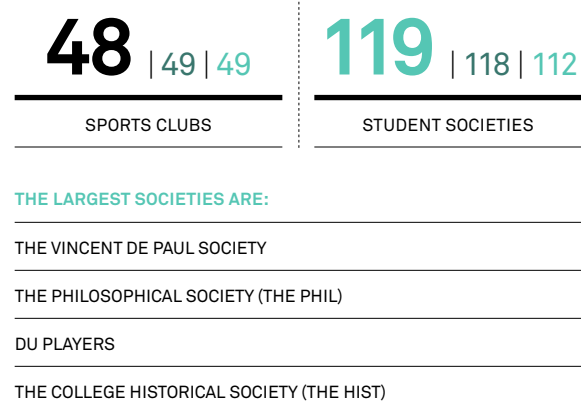
2015 | 2014 | 2013
(3 year comparisons)



ALUMNI



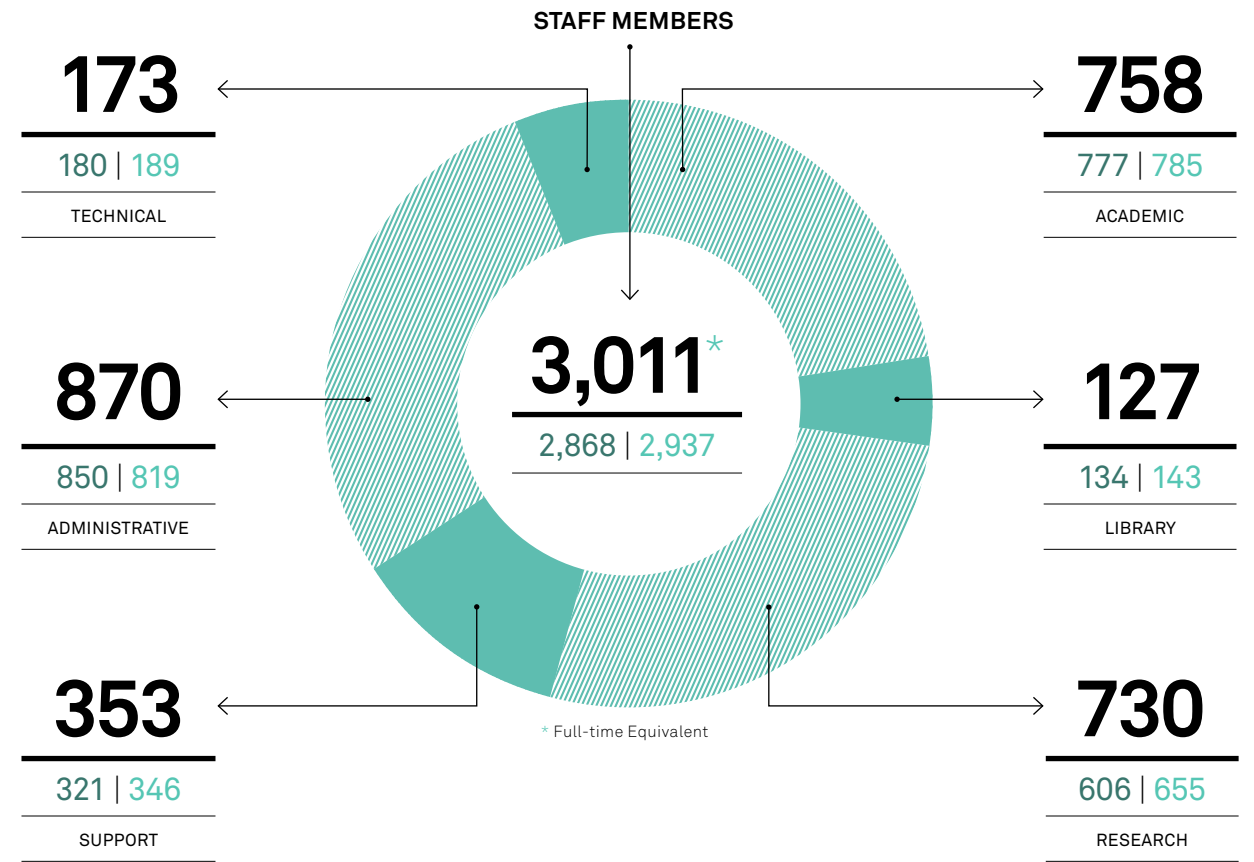
CLUBS AND SOCIETIES



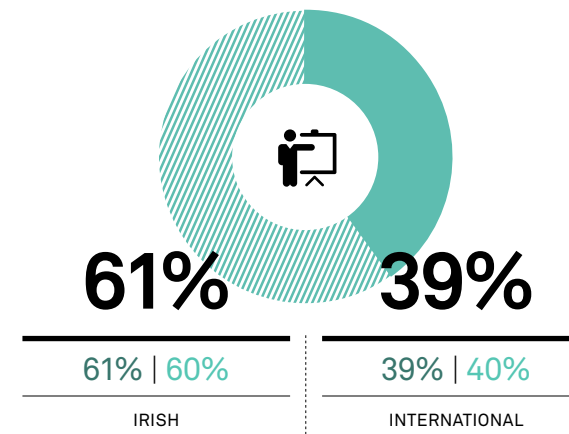
— The college historical society (the hist) is the oldest student society in the world, founded in 1770

Staff Statistics

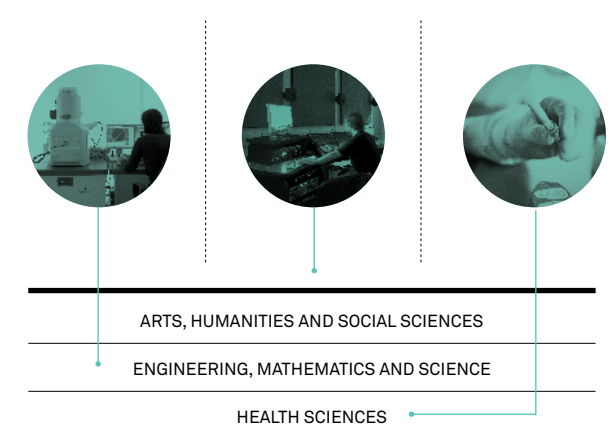
2015 | 2014 | 2013
(3 year comparisons)



ACADEMIC STAFF



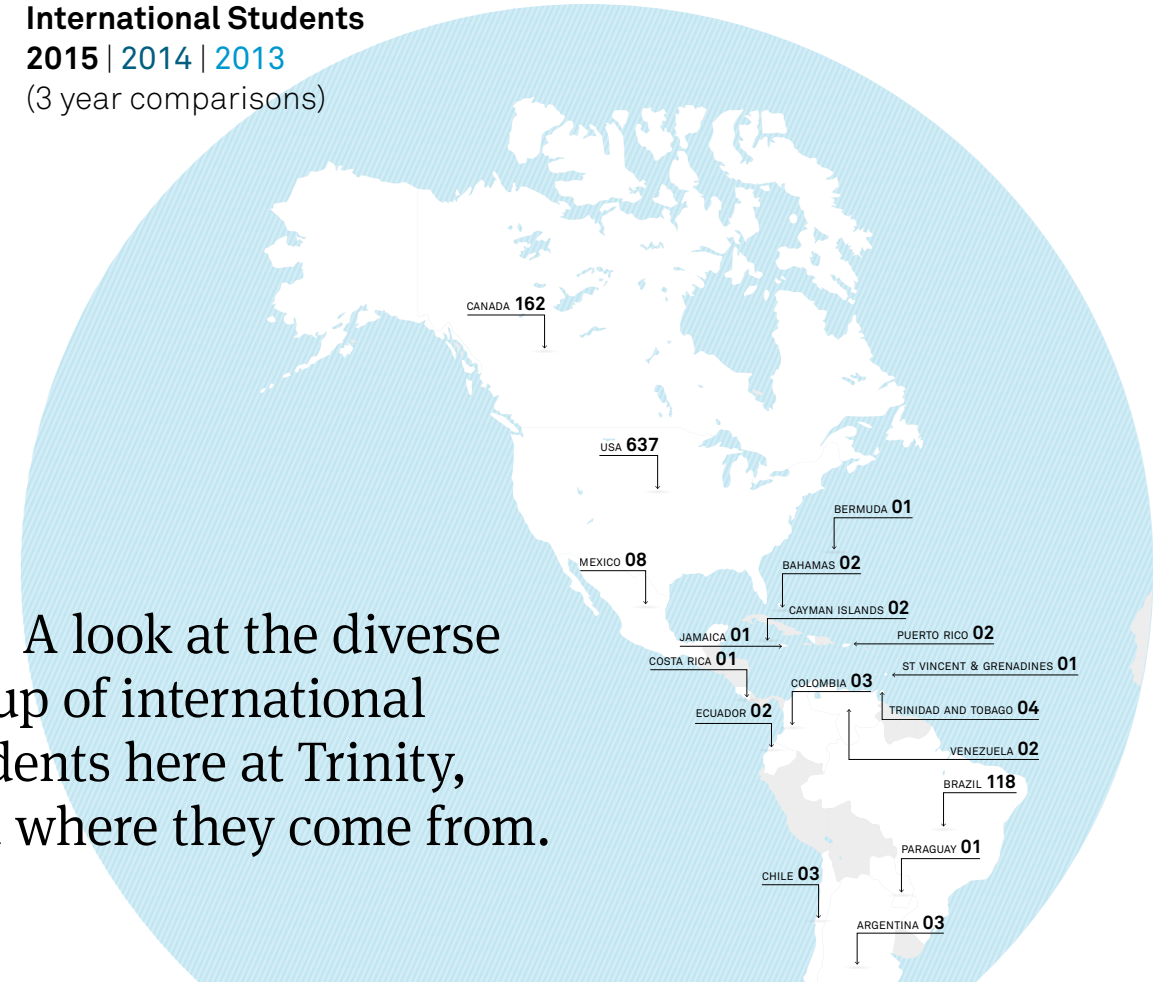
FACULTIES



02 International Students

2015 | 2014 | 2013
(3 year comparisons)

→ A look at the diverse group of international students here at Trinity, and where they come from.



95 | 97 | 109

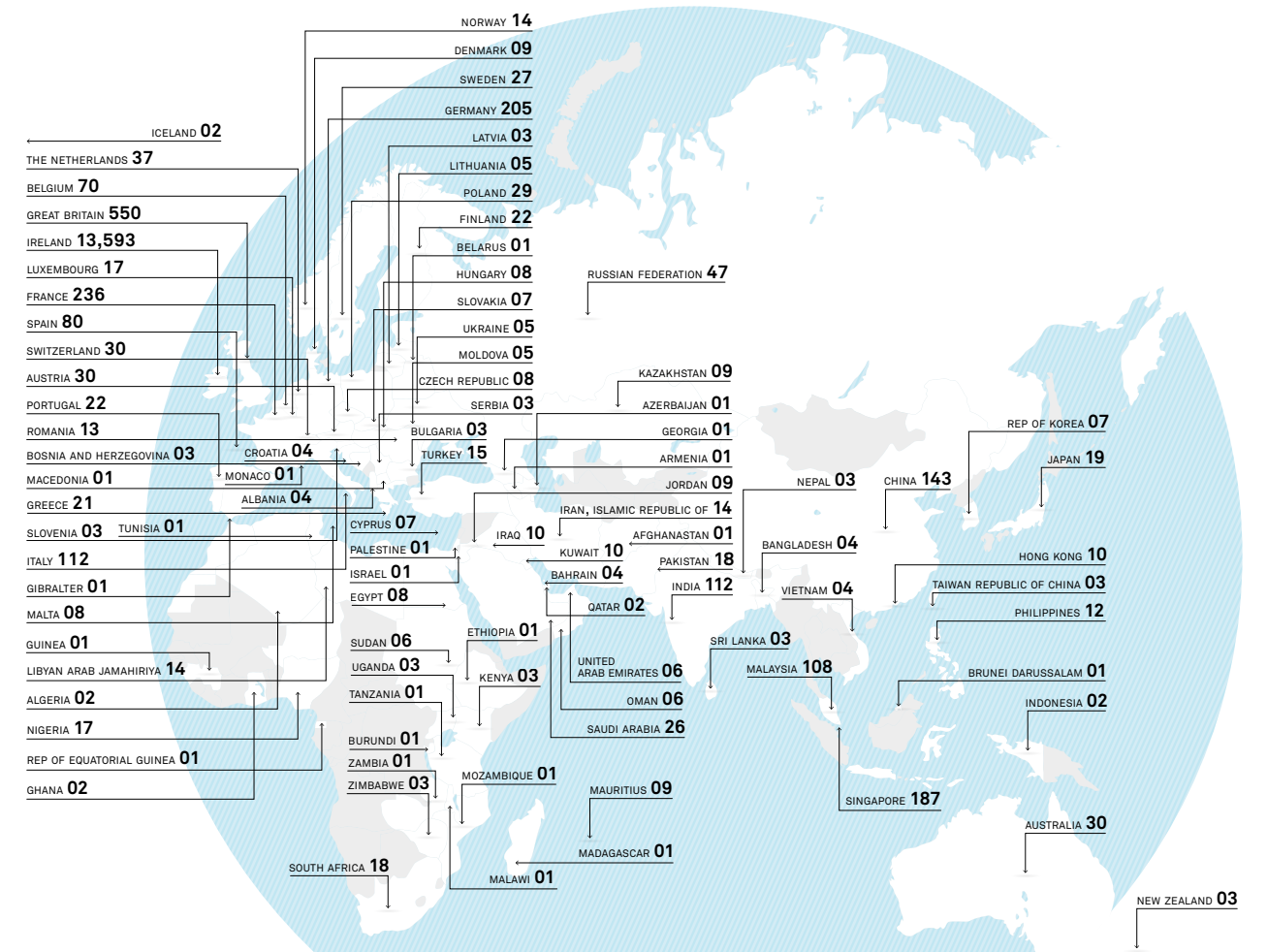
728 | 615 | 567

33 | 37 | 33

AFRICA	
ALGERIA	2 1 1
BOTSWANA	1 5
BURUNDI	1 1
CAMEROON	1 1
EGYPT	8 4 3
ETHIOPIA	1 2 3
GHANA	2 3
GUINEA	1
KENYA	3 5 4
LESOTHO	1 1
LIBYAN ARAB JAMAHIRIYA	14 5 6
MADAGASCAR	1
MALAWI	1 5 4
MAURITIUS	9 9 7
TOTAL	95 97 109

ASIA	
AFGHANISTAN	1
ARMENIA	1 1 1
AZERBAIJAN	1 1 2
BAHRAIN	4 3 2
BANGLADESH	4 5 7
BRUNEI DARUSSALAM	1 1 1
CHINA	143 122 99
HONG KONG	10 4 1
INDIA	112 91 90
INDONESIA	2 2 1
IRAN ISLAMIC REPUBLIC OF	14 14 12
IRAQ	10 7 7
ISRAEL	1 2 1
JAPAN	19 22 16
JORDAN	9 3 6
KUWAIT	10 8 8
LEBANON	2 1
MACAO	2
MALAYSIA	108 108 107
NEPAL	3 3
OMAN	6 5 3
PAKISTAN	18 16 17
PALESTINE	1 1
PHILIPPINES	12 10 10
QATAR	2 1
REP OF KOREA	7 13 14
SAUDI ARABIA	26 28 24
SINGAPORE	187 131 120
SRI LANKA	3 4 2
SYRIAN ARAB REPUBLIC	1 1
TAIWAN REPUBLIC OF CHINA	3 1 1
THAILAND	1
UNITED ARAB EMIRATES	6 5 6
VIETNAM	4 1 3
TOTAL	728 615 567

AUSTRALASIA	
AUSTRALIA	30 31 26
NEW ZEALAND	3 6 7
TOTAL	33 37 33



15,125 | 14,954 | 15,062

146 | 112 | 106

821 | 836 | 718

132 | 78 | 19

EUROPE	
AUSTRIA	30 24 20
BELGIUM	70 71 61
BULGARIA	3 4 3
CYPRUS	7 8 8
CZECH REPUBLIC	8 8 7
DENMARK	9 10 11
ESTONIA	1
FINLAND	22 15 18
FRANCE	236 238 205
GERMANY	205 211 190
GREAT BRITAIN	550 572 637
GREECE	21 19 22
HUNGARY	8 5 5
IRELAND	13,593 13,434 13,600
TOTAL	15,125 14,954 15,062

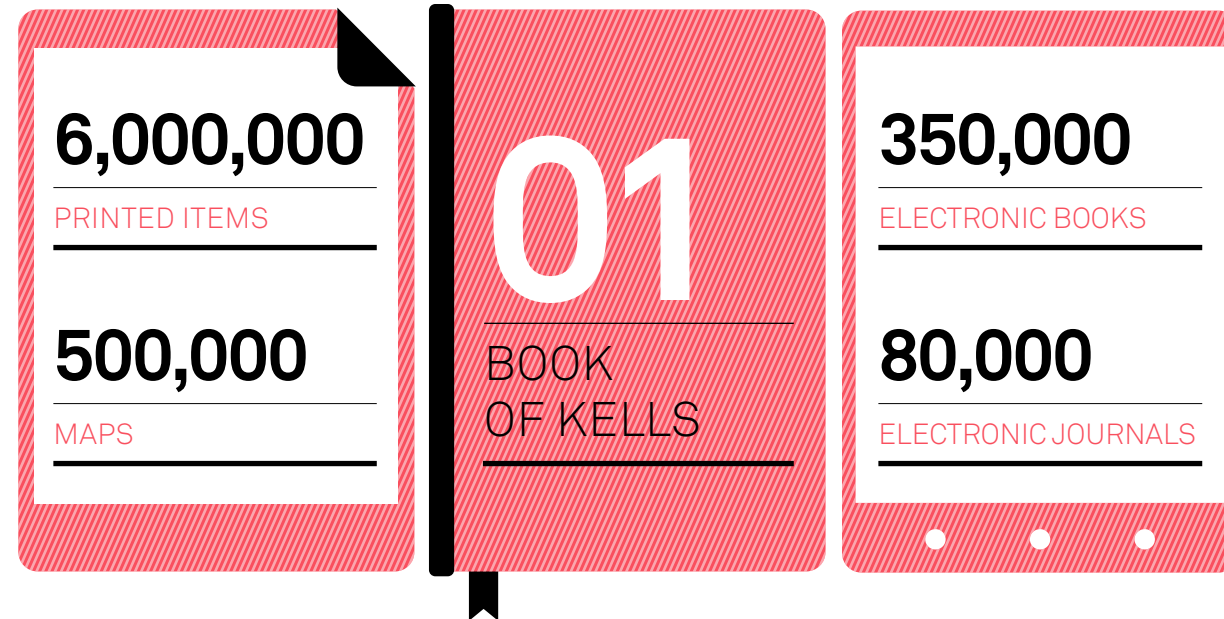
EUROPE NON EU	
ALBANIA	4 1 2
BELARUS	1 2 1
BOSNIA & HERZEGOVINA	3 2 1
CANARY ISLANDS	2
CROATIA	4 2
GEORGIA	1
GIBRALTER	1 1 1
ICELAND	2 2 1
KAZAKHSTAN	9 12 16
MACEDONIA	1
MOLDOVA	5 4 3
MONACO	1
NORWAY	14 9 14
REPUBLIC OF KOSOVO	1
SAN MARINO	1
SERBIA	3 2 1
SWITZERLAND	30 22 19
TURKEY	15 8 8
UKRAINE	5 2 1
TOTAL	146 112 106

NORTH/CENTRAL AMERICA	
BAHAMAS	2 1 1
BARBADOS	1 1
BERMUDA	1 2 1
CANADA	162 164 158
CAYMAN ISLANDS	2 1 1
COSTA RICA	1
CUBA	1
HAITI	1
JAMAICA	1
MEXICO	8 10 10
PUERTO RICO	2 1
ST VINCENT & GRENADINES	1
TRINIDAD & TOBAGO	4 7 5
USA	637 648 540
TOTAL	821 836 718

SOUTH AMERICA	
ARGENTINA	3 2
BRAZIL	118 70 12
CHILE	3 1 4
COLOMBIA	3 2 2
ECUADOR	2 1
PARAGUAY	1 1
PERU	1 1
VENEZUELA	2
TOTAL	132 78 19

02 Library

LIBRARY COLLECTION HAS



TRINITY'S RESEARCH THEMES

— AGEING	— IMMUNOLOGY, INFLAMMATION & INFECTION	— MANUSCRIPTS, BOOK & PRINT CULTURES
— CANCER	— INCLUSIVE SOCIETY	— NANOSCIENCE
— CREATIVE ARTS PRACTICE	— INTELLIGENT CONTENT & COMMUNICATIONS	— NEUROSCIENCE
— CREATIVE TECHNOLOGIES	— INTERNATIONAL DEVELOPMENT	— NEXT GENERATION MEDICAL DEVICES
— DIGITAL HUMANITIES	— INTERNATIONAL INTEGRATION	— THE SMART AND SUSTAINABLE PLANET
— GENES AND SOCIETY	— MAKING IRELAND	— TELECOMMUNICATIONS
— IDENTITIES IN TRANSFORMATION		

LEADING FLAGSHIP RESEARCH INSTITUTES

04

- TRINITY BIOMEDICAL SCIENCES INSTITUTE
- CENTRE FOR RESEARCH ON ADAPTIVE NANOSTRUCTURES AND NANODEVICES (CRANN)
- TRINITY COLLEGE INSTITUTE OF NEUROSCIENCE (NATIONAL NEUROSCIENCE NETWORK)
- TRINITY LONG ROOM HUB, ARTS AND HUMANITIES RESEARCH INSTITUTE

Commercialisation of Research

2015 | 2014 | 2013
(3 year comparisons)

IN THE PERIOD 2010–2015 (2009–2014)

314

 | 308

DISCLOSURES OF NOVEL INVENTIONS RECEIVED

102

 | 81

LICENCES TO INDUSTRY GRANTED

36

 | 37

TRINITY CAMPUS COMPANIES APPROVED

IN THE YEAR ENDED SEPTEMBER 2015

03

 | 04 | 05

TRINITY CAMPUS COMPANIES

53

 | 58 | 46

DISCLOSURES OF NOVEL INTELLECTUAL PROPERTY RECEIVED

23

 | 28 | 09

COMMERCIALISATION LICENCES WERE ISSUED

18

 | 23 | 15

NEW PATENT APPLICATIONS FILED

55

 | 51

COLLABORATIVE RESEARCH AGREEMENTS WERE CONCLUDED

€25k

 | €25k

CONTRIBUTED BY INDUSTRY PARTNERS TO EACH COLLABORATIVE RESEARCH AGREEMENT

CONSOLIDATED ACCOUNTS

€326.1M

TOTAL INCOME FOR YEAR ENDED 2014

€318.4M

TOTAL INCOME FOR YEAR ENDED 2013

€323.4M

TOTAL INCOME FOR YEAR ENDED 2012

FINANCIAL YEAR	€'000 2013/14	€'000 2012/13	€'000 2011/12
STATE GRANT	€47,279	€54,469	€58,650
STUDENT FEES (ACADEMIC FEES)	€122,169	€116,138	€113,833
RESEARCH INCOME	€78,004	€74,670	€75,950
OTHER INCOME *	€78,611	€73,120	€75,005
TOTAL INCOME PER CONSOLIDATED ACCOUNTS	€326,063	€318,397	€323,438
* OTHER INCOME			
AMORISATION OF DEFERRED CAPITAL GRANTS	€11,599	€13,245	€14,465
OTHER OPERATING INCOME	€51,243	€50,535	€49,478
INTEREST INCOME	€866	€2,811	€4,449
ENDOWMENT INCOME	€7,022	€6,529	€6,613
GAIN ON REVALUATION OF INVESTMENT PROPERTIES	€7,881		
TOTAL OTHER INCOME	€78,611	€73,120	€75,005

Research Case Studies

01 Yuri Volkov

02 Poul Holm

03 Roja Fazaeli

04 Anne-Marie Healy

05 Darryl Jones

06 Samson Shatashvili

07 Luke O'Neill

08 Linda Hogan

09 Brian O'Connell

10 Paul Delaney

11 Valeria Nicolosi

12 Linda Doyle



BACK (L-R) – Prof Yuri Volkov, Dr Roja Fazaeli, Prof Darryl Jones, Dr Paul Delaney, Prof Anne-Marie Healy, Prof Brian O'Connell

FRONT (L-R) – Prof Luke O'Neill, Provost Dr Patrick Prendergast, Prof Linda Hogan

03 Targeting Cancer at Nanoscale Yuri Volkov

Over 3.2 million new cases of cancer and over 1.7 million cancer-related deaths are recorded every year in Europe alone. For survivors, the toll is high in terms of recovery from invasive treatments, which also carry a heavy financial burden for individuals and the state. Early diagnosis is key to better patient outcomes.

Nanotechnology — the manipulation of matter on an atomic, molecular and supramolecular scale — has increasingly important applications in a range of areas and disciplines. One of its most exciting recent applications is in early diagnosis of cancer.

Nanotechnological toolkits — My team in Trinity College Dublin is a key coordinating partner in NAMDIATREAM, an interdisciplinary and pan-European consortium of academic institutions and industry. We are developing nanotechnological toolkits to enable early detection and imaging of molecular biomarkers of the most common cancer types (breast, lung and prostate) and of cancer metastases, as well as identifying cells indicative of early-stage disease onset.

The toolkits are based on four different technological platforms, each with a unique nanotechnology feature which detects biomarkers of cancer and cancer cells in micro-litre volumes of blood and urine.

The first platform involves the exploitation of fluorescent nanomaterials (quantum dots) which enables the creation of ultra-small diagnostic probes covered with single-domain antibodies against tumour biomarkers. This tool offers superior sensitivity and photostability compared to alternatives, as well as the capability for multiplexed detection of tumour molecular signatures.

The second platform relies on antibody-functionalised magnetic core/noble metal shell nanorods that bind tumour biomarkers. The changes in their optical properties in response to an externally applied magnetic field enables the detection and quantification of target molecules in a straightforward biological sample.

Nanocrystals with non-linear optical properties use the advantage of the infrared spectrum for unique deep tissue imaging with enhanced sharp contrast against the surrounding background. Selectively targeted to tumour cells, they provide a

stable long lasting signal leading to efficient cancer detection and monitoring. Three products based on this technology have already been licensed and commercialised.

Finally, segmented magnetic nanowires acting as barcode-type labels for disease marker detection are paired with a unique optical-magnetic sensor detection platform for selective multiplexed detection of cancer biomarkers.

Improved patient treatment outcomes

The NAMDIATREAM consortium committed, from the outset, to delivering high quality, safety-assured and scalable products matching in vitro models for pre-clinical testing, and benchmarked against both clinical and industrial gold standards. Our outstanding work has resulted in NAMDIATREAM's selection as the best of over 1,000 projects in the field of nanotechnologies and advanced materials launched under the EU funding instruments.

By fostering early detection of cancer with reduced invasiveness, cost effectiveness, and ease of use, these tools will simplify routine population screening for prompt intervention with dramatically improved patient treatment outcomes, and reduced health care costs.

Yuri Volkov holds an MD from the 1st Moscow Medical University and a PhD from the Institute of Immunology, Moscow. He joined Trinity College Dublin in 1995 as a post-doctoral Research Fellow and now is Professor and Chair of Molecular and Translational Medicine at the School of Medicine. His research interests include nanomedicine and biomedical applications of nanotechnologies, molecular mechanisms of immune system functioning in health and disease, cancer diagnostics, advanced cell and molecular imaging. He is also a PI at the Trinity's CRANN and AMBER Centres, where his group is pursuing the applications of nanomaterials for advanced research and medical diagnostics.

Contact: yvolkov@tcd.ie

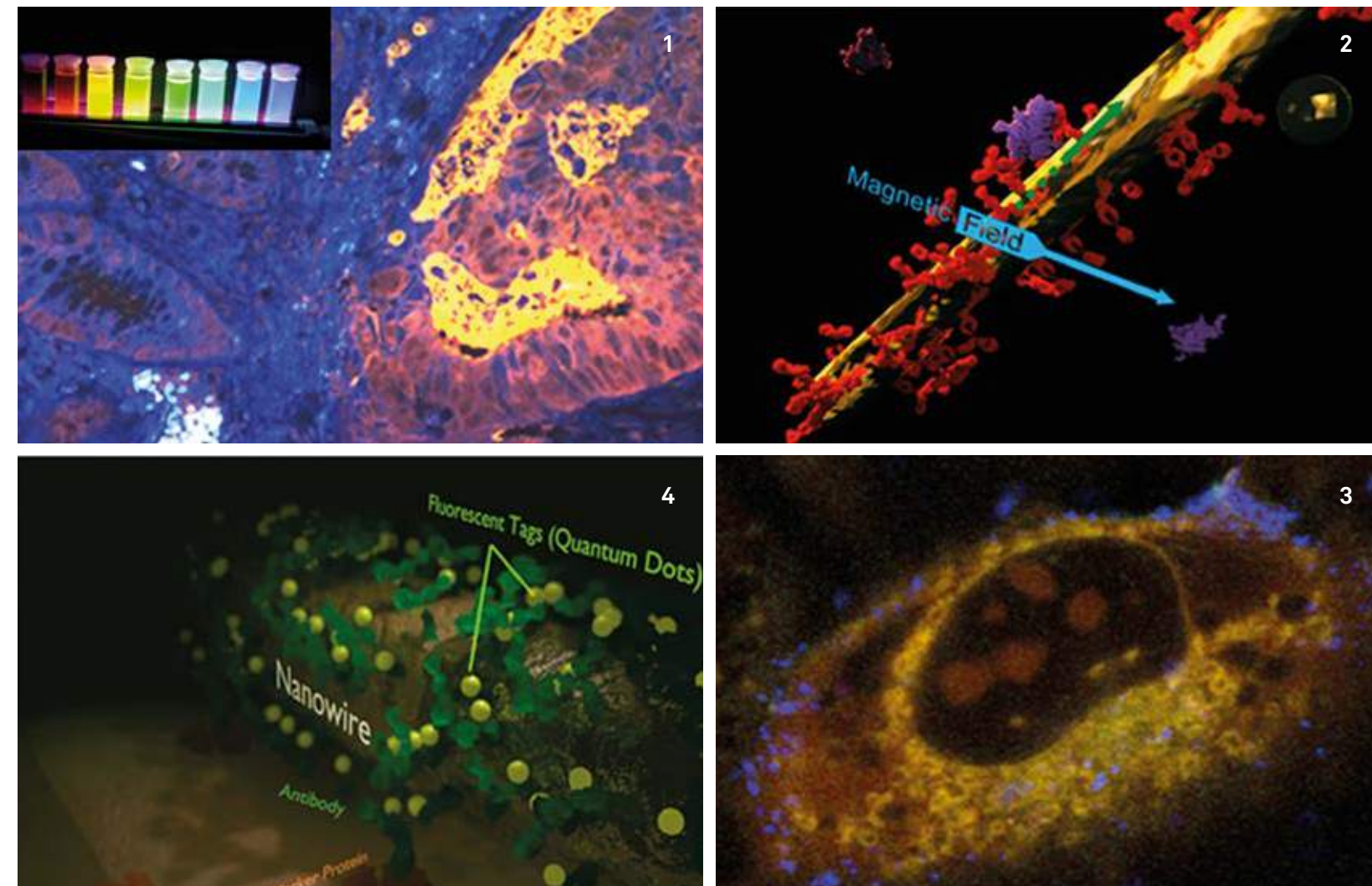
Technology Platform 1:
Photoluminescent
nanoparticles

Technology Platform 2:
Nanorods for plasmon-
optical detection

Technology Platform 3:
Second harmonic generating
nanocrystals

Technology Platform 4:
Magnetically barcoded
nanowires

→ We are developing nanotechnological toolkits to enable early detection and imaging of molecular biomarkers of the most common cancer types (breast, lung and prostate) and of cancer metastases, as well as identifying cells indicative of early-stage disease onset.



03 The North Atlantic Fish Revolution, 1400–1700

Poul Holm

In 1497, John Cabot returned to Bristol from a voyage across the North Atlantic. He had set sail to find a northerly way to China but like Columbus a few years earlier he found the passage blocked by what came to be known as New Found Land. Cabot did not bring back silk and gold but a tale of waters so thick with fish that they could be lifted straight on board in baskets. Within a few years of this journey fishermen from all over western Europe made the journey across. This was the beginning of the fish revolution of the early-modern world.

Fish was of enormous economic, social and cultural significance in the medieval world, and the fish revolution was one of the first examples of the disrupting effects of globalization. Fish was a high-priced, limited resource in the late Middle Ages. The Grand Banks fishery offered abundant high-quality low-priced catches to the European market.

The consequences were dire for fishermen along the stretch from the Irish Sea right up to northern Norway. When local products could not compete with the North Atlantic cod, the fishermen had the choice of joining the thousands across the dangerous ocean or giving up fishing. Many fishing settlements were deserted as inhabitants took to the road to seek casual work in agriculture or towns.

Kings and high politics were similarly affected by the fish revolution. The new resource held strategic importance for all major western European powers,

including Spain, Britain and France. Queen Elizabeth of England saw acutely the need to encourage the fisheries as a means to ensure the recruitment of able-bodied seamen for her fleet.

The consequences of Cabot's discovery are still with us in our food culture. Countries like Spain and Portugal developed a strong preference for the 'bacalao' or dried and salted cod from North America which is still evident today. Northern Europe on the other hand came to see fish as cheap pauper's food and developed a preference for beef.

Researching the consequences of the fish revolution — While we know the broad outline of the fish revolution, many questions remain and will be the focus of my research team for the next five years. In short, the core questions are: What were the natural and economic causes of the fish revolution? How did marginal societies adapt to changing international trade and consumption patterns around the North Atlantic? How did economic and political actors respond? The answers will help explain the historical role of environment and climate change, how markets impacted marginal communities, and how humans perceived long-term change.

More broadly, my research project, entitled 'North Atlantic Fisheries, an Environmental History 1400–1700', may help put perspective on today. In recent years we have all been affected

by the impact of globalization, climate change, and threats of unemployment and social upheaval. I want to know how people in the past responded to the same forces. Everything that seemed certain was questioned and emigration became the response by many when local livelihoods were challenged.

Applications of my research — My research will probably have both tangible and intangible impact. Knowing more about past fish populations, fishing power, and climate variability will help fisheries modellers to understand long-term variability of stocks and the effects of both climate and human extractions. The more intangible effect will be better historical understanding of the creation of the North Atlantic world.

Outcomes will be published in both scholarly papers and a book. In addition all data will be freely available to all by means of a digital atlas of the historical North Atlantic fisheries.



Fig 1

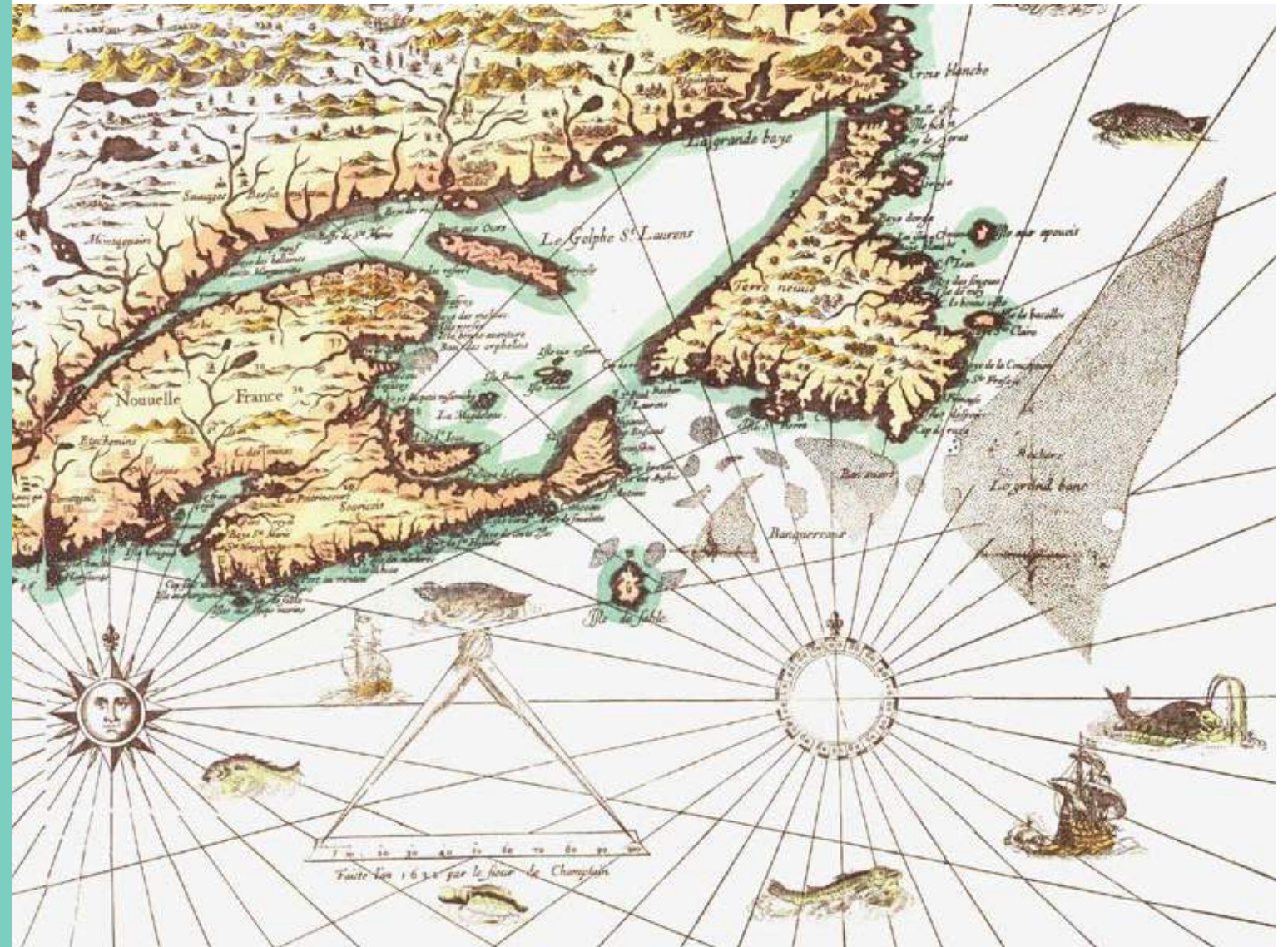
Poul Holm is Professor of Environmental History at the School of Histories and Humanities. He was the founding director of the Trinity Long Room Hub — the research institute for the arts and humanities at TCD, and he directs the Irish structured PhD in digital arts and humanities. In 2015 he was awarded a prestigious Advanced Grant of 2.5 million euro by the European Research Council. In the next five years he and his team will explore the North Atlantic fish revolution, c.1400–1700 AD. **Contact:** holmp@tcd.ie

Fig 1. Carte De La Nouvelle France, (excerpt of Newfoundland Grand Banks) Samuel de Champlain, 1632

Fig 2. Carta Marina, (Norwegian coast excerpt) by Olaus Magnus first version published in 1539

→ Knowing more about past fish populations, fishing power, and climate variability will help fisheries modellers to understand long-term variability of stocks and the effects of both climate and human extractions.

Fig 2



03 Women's Rights in Iran: State Change and Islamic Feminism

Roja Fazaeli

The twentieth century was a century of great advances for women's suffrage and women's rights all over the world, including in the Middle East and Muslim-majority countries. However, in some states, these hard gained rights have also been subject to loss over time. In Iran, for instance, women were able to claim the right to vote in 1963, but then saw their freedom significantly curtailed following the Islamic revolution of 1979. In Iran, as in other countries, a loss of rights led to the adoption and creation of different forms of feminism, as well as different strategies for activism and advocacy along social, political and legal lines.

Women's rights in Iran: narrative forms — My primary research, for Trinity's School of Languages, Literature and Cultural Studies, explores women's rights in Muslim-majority countries, with a specific focus on Iran and the Iranian women's movement from 1906 to the present. Through in-depth study of the Iranian constitution, civil and criminal codes, I provide new understandings and critical perspectives on national articulations of Islamic law.

A secondary strand of my research looks at the narrative forms around which women's rights in Iran are organized. For instance, while recognizing that women's reformist print magazines such as *Zanan*, *Farzaneh* and *Payam-iHajar* were traditionally the platforms where women's issues were discussed and religious texts were reinterpreted, I am building new arguments about how the transition to online publications is linked to censorship, the closure of many media outlets, and the harassment and arrest of journalists and human rights activists, in particular women's rights activists. This leads me to consider contemporary prison narratives of women's rights activists in Iran as a discreet narrative form, one that simultaneously challenges narrative convention as well as criminal stereotypes.

Women's rights in Iran: legislative context — My research marks the first time many of the national laws in Iran regarding women have been the subject of an extended programme of academic research conducted in English. For instance, by comparing Iran's Family Protection Act of 1964 and Iran's Family Protection Bill of

2007 I am able to track the ways in which the form and understanding of women's rights in Iran have changed over time. By engaging these laws systematically, in a comprehensive and comparative way alongside existing Persian language studies, I help contribute to greater international understandings of the women's movement in Iran, especially as it relates to forms of political and religious dissent.

The results of this research have led me to new insights about Iran's recalcitrance relative to international standards, such as the UN Convention on the Elimination of all forms of Discriminations against Women (CEDAW), as well as greater understanding of the political and legal dynamics that ratification of CEDAW would entail in Iran. As modes of engagement with Islamic law remain a key contemporary challenge for international human rights law, my research also highlights areas of law where gender discrimination is apparent in the Shi'a tradition and shows how international human rights law, while a powerful tool, may remain insufficient to meet the various cultural needs and demands of many Muslim women.

Roja Fazaeli received her BA (Mod) and MPhil from Trinity and her PhD from the Irish Centre for Human Rights in NUI Galway. She returned to Trinity as a lecturer in 2008 and helped form a new department of Near and Middle Eastern Studies. She now serves as assistant professor in the School of Languages, Literature and Cultural Studies. The recipient of grants from Johns Hopkins University Protection Project, British Institute for Middle Eastern Studies, and Irish Research Council, she has published widely on Islamic feminisms, female religious authorities and women's rights in Iran, and is on the editorial board of the *Journal of Religion and Human Rights*. She has previously served on the executive boards for UN Women Ireland, Amnesty International Ireland and the Irish Refugee Council. She is currently the Scholars at Risk representative for Trinity and a member of the Immigrant Council of Ireland's research and policy steering group.

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Islamic Feminism — A distinguishing feature of my research is the way in which I conceptualise the term "Islamic feminism." I do this by revisiting a variety of scholarly arguments and pairing them with new analysis gained through interviews with Iranian women's rights activists. In distinction to feminist writers such as Mehrangiz Kar, Azadeh Kian, Shirin Ebadi, Ziba Mir-Hosseini and Nayereh Tohidi, whose feminist consciousness is linked to a time before the Iranian Islamic Revolution of 1979, I offer a post-revolutionary form of analysis. My work demonstrates how feminist movements can and should play a critical role in Islamic law reform, as

well as forming a bridge of engagement with international human rights law in Muslim-majority countries, such as Iran.

This research has a broad reach. Beyond the general advancement of knowledge about the history of the Iranian legal system, particularly pertaining to women's rights, the research also has the capacity to resource and influence policy and governmental actors, as well public understanding. For instance, in addition to publishing widely, I have contributed to news outlets such as BBC Persian and also organised panels with the UN Special Rapporteur on Human Rights in Iran.

Photo: Shahab Mirzaei

→ My primary research explores women's rights in Muslim-majority countries, with a specific focus on Iran and the Iranian women's movement from 1906 to the present.

03 Delivering Safe, Effective Medication: Reducing Doses, Minimising Side Effects, and Maximising Therapies

Anne-Marie Healy

When a drug is taken by a patient, the pharmacological effect — lowering of blood pressure, pain reduction, relief from attack etc. — is usually achieved as a result of the drug interacting with receptors at its site of action. However drugs are rarely given to patients in the form of the pharmacologically active pharmaceutical ingredient (API) alone. Instead, the API is incorporated into a formulation designed to provide stability to the drug compound, but also to optimise delivery to the patient, maximising therapeutic action, while minimising unwanted side effects.

'Pharmaceutics' is the science of dosage form design and deals with the process of turning a new chemical entity or old drug into a medication that can be taken safely and effectively. 'Pharmaceutical Technology' focuses on the processes and instrumentation employed in the manufacture, dispensing, packaging, and storage of drugs and medicinal products. These two areas are the focus of my research group in the School of Pharmacy and Pharmaceutical Sciences.

Ireland is a key location for the pharmaceutical industry in Europe. Given the importance of the sector to the country, much of the research that is conducted in my group is industry informed and/or undertaken in collaboration with industrial partners. I am a Principal Investigator of two Science Foundation Ireland (SFI) funded research centres that are focused on such academia-industry collaborative

research: the Synthesis and Solid State Pharmaceutical Centre (SSPC) and the Advanced Materials and Bioengineering Research Centre (AMBER).

Some of the projects that we are undertaking in the group include:

Improving the solubility and dissolution rate of poorly soluble drugs — If a drug has poor solubility, its bioavailability (absorption into the bloodstream) and therapeutic effect will be compromised. We can improve the solubility and dissolution rate of drugs by means of *cocrystals* — where the drug is complexed with a soluble co-former (Figure 1) and *amorphous solid dispersions* — where the drug is presented in a higher energy, more soluble form. Our work is focused on optimising the manufacturing process and formulation performance for such alternative solid-state forms.

Iron microencapsulation for improved treatment of iron deficiency — In collaboration with Solvotrin Therapeutics, a spin-out of Trinity College Dublin, we are optimising a novel drug delivery system for iron, which sees the iron embedded in a protective matrix through a microencapsulation process that optimises the iron release characteristics and therapeutic effect. Solvotrin Therapeutics plan to launch its microencapsulated iron product in early 2016.

Pulmonary drug delivery of new and 'old' drugs — We employ sophisticated particle engineering techniques to improve drug delivery to the lungs, enabling an increased therapeutic effect with reduced dose. In a current collaboration with University College Dublin and the University of California, San Francisco we are working to develop an inhaler product of a novel mucolytic agent to treat cystic fibrosis patients.

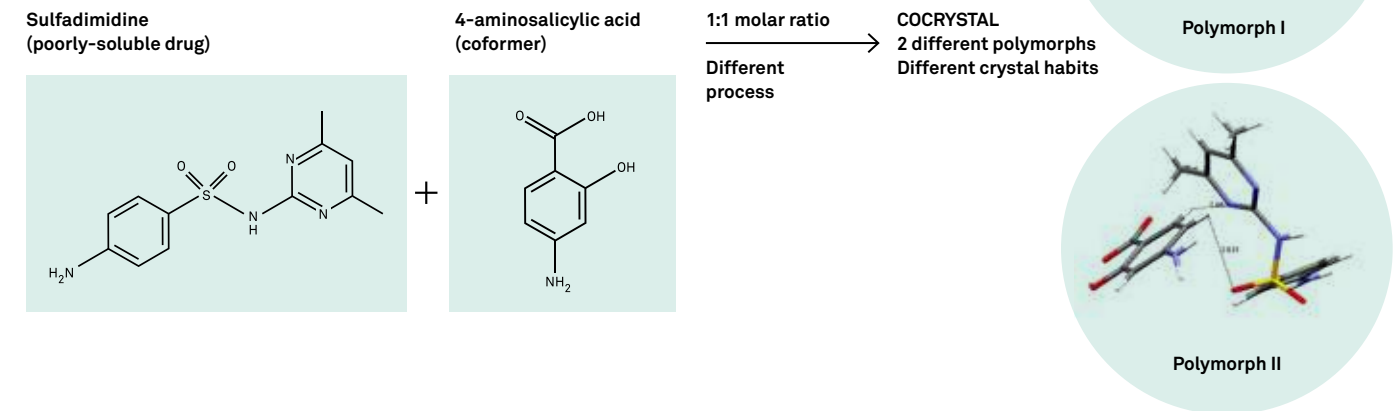
Fixed dose combination therapies — The goal of this project, which was recently awarded funding under the SFI Investigators programme, is to reduce the pill burden for patients who are on long term and multiple dosage regimes. The project will focus on the use of advanced processing technologies to develop fixed dose combination drug delivery systems that will permit reduced dosing frequency, thus improving patient compliance and clinical outcomes.

“The goal of this project, which was recently awarded funding under the SFI Investigators programme, is to reduce the pill burden for patients who are on long term and multiple dosage regimes.”

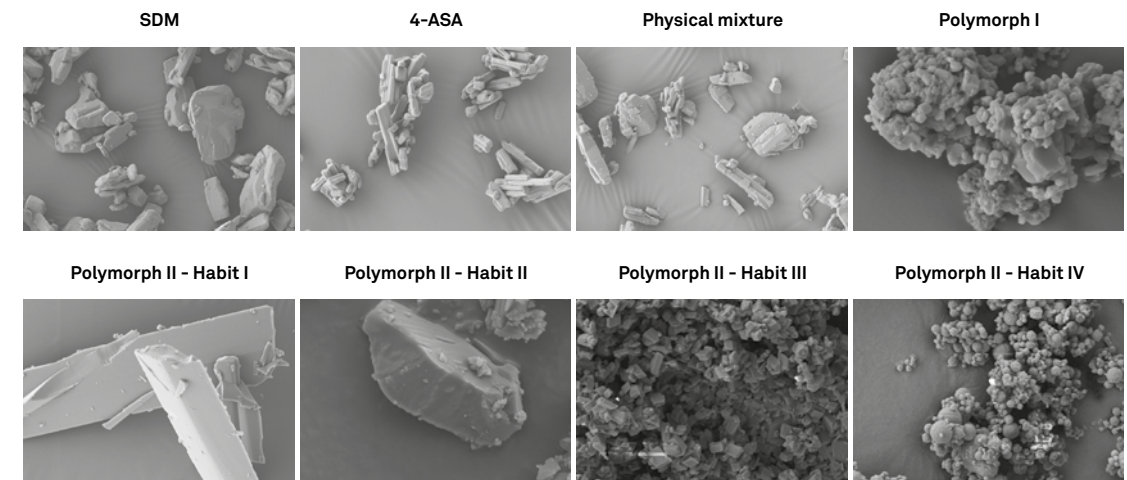
Anne-Marie Healy received a BSc (Pharm.) and PhD from Trinity, and joined the School of Pharmacy as a Lecturer in 1992. She is now Professor in Pharmaceutics and Pharmaceutical Technology and Head of School. In 2010 she was elected Fellow of Trinity College Dublin and in 2014 was awarded a Special Visiting Research Fellowship by CNPq (Brazil). She is a principal investigator of two SFI Research Centres and a holder of a SFI Investigator Award (2015). Her research focuses on pharmaceutical material science, formulation and advanced pharmaceutical processing.

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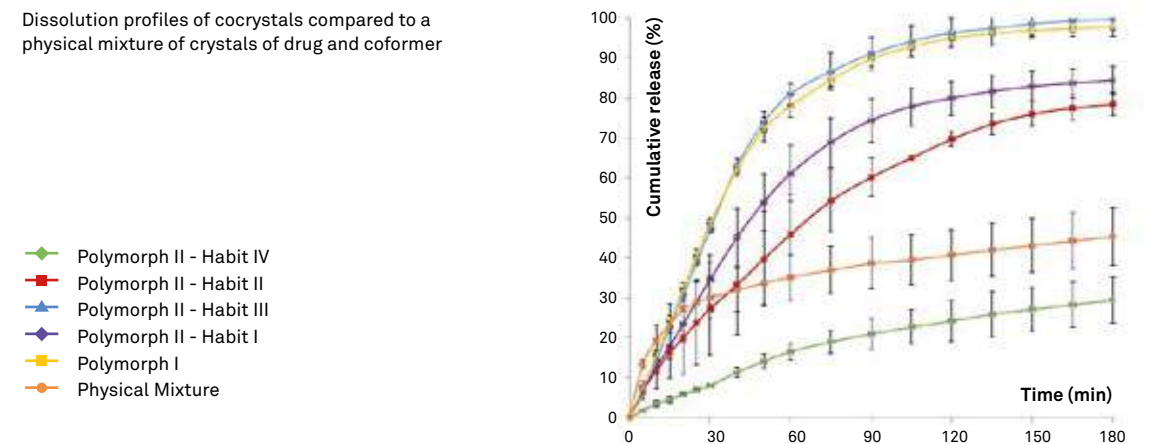
Fig 1. Designing cocrystals for improved drug dissolution



Scanning Electron Microscopy (SEM) images of drug, coformer and cocrystals



Dissolution profiles of cocrystals compared to a physical mixture of crystals of drug and coformer



03 Horror Stories: Classic Tales from Hoffmann to Hodgson

Darryl Jones

A case could be made that the Western literary tradition is a tradition of horror. Take a foundational text of the canon: Euripides's *The Bacchae*, first performed around 400 BC. In describing graphically the actions of Agave and her Maenads, dismembering King Pentheus and putting his head on a pole, it sets the bar very high for artistic representations of violence and gore.

Horror is an extreme art form, and like all avant-garde art, its real purpose, I would suggest, is to force audiences to confront the limits of their tolerance — including their tolerance for what is or is not art. Commonly, when hitting such limits, we respond with fear, frustration, and even rage. So we shouldn't be surprised that audiences respond to horror with — well, with horror. But we need to recognize that the reasons they do this are complex, and are deeply bound up with the meaning and function of art, and of civilization.

I'm a scholar of nineteenth-century fiction, with a particular interest in genre fiction. I'm also primarily a textual editor and scholar. The second half of the nineteenth century is the great age of periodical fiction, when writers from Charles

Dickens to Arthur Conan Doyle to H. G. Wells published in a variety of literary magazines, from *Blackwell's Edinburgh Magazine* to *Household Words* to *The Strand*. This is the age when literary genres began to appear in their modern forms: crime fiction, spy fiction, the thriller, war stories, adventure fiction — and the horror story.

Anthologising Horror — With *Horror Stories: Classic Tales from Hoffmann to Hodgson* (Oxford University Press 2014) I have produced the first-ever scholarly anthology of the horror fiction of the long nineteenth century, including stories from the British, Irish, American, and European traditions. Its publication on Halloween 2014 was the culmination of three years' work, sourcing, selecting, and editing the 29 best and most representative horror stories from among the thousands published across the long nineteenth century.

Horror Stories is the second book in a six-book contract with Oxford University Press (OUP). The first, an edition of M. R. James's *Collected Ghost Stories*, was published to international acclaim in 2011. I am currently working on the first ever anthology of Arthur Conan Doyle's *Gothic Tales*, for publication in 2016,

with scholarly editions of H. G. Wells's *The War of the Worlds* and *The Island of Doctor Moreau* to follow, as well as the volume on 'Horror' in OUP's *Very Short Introductions* series.

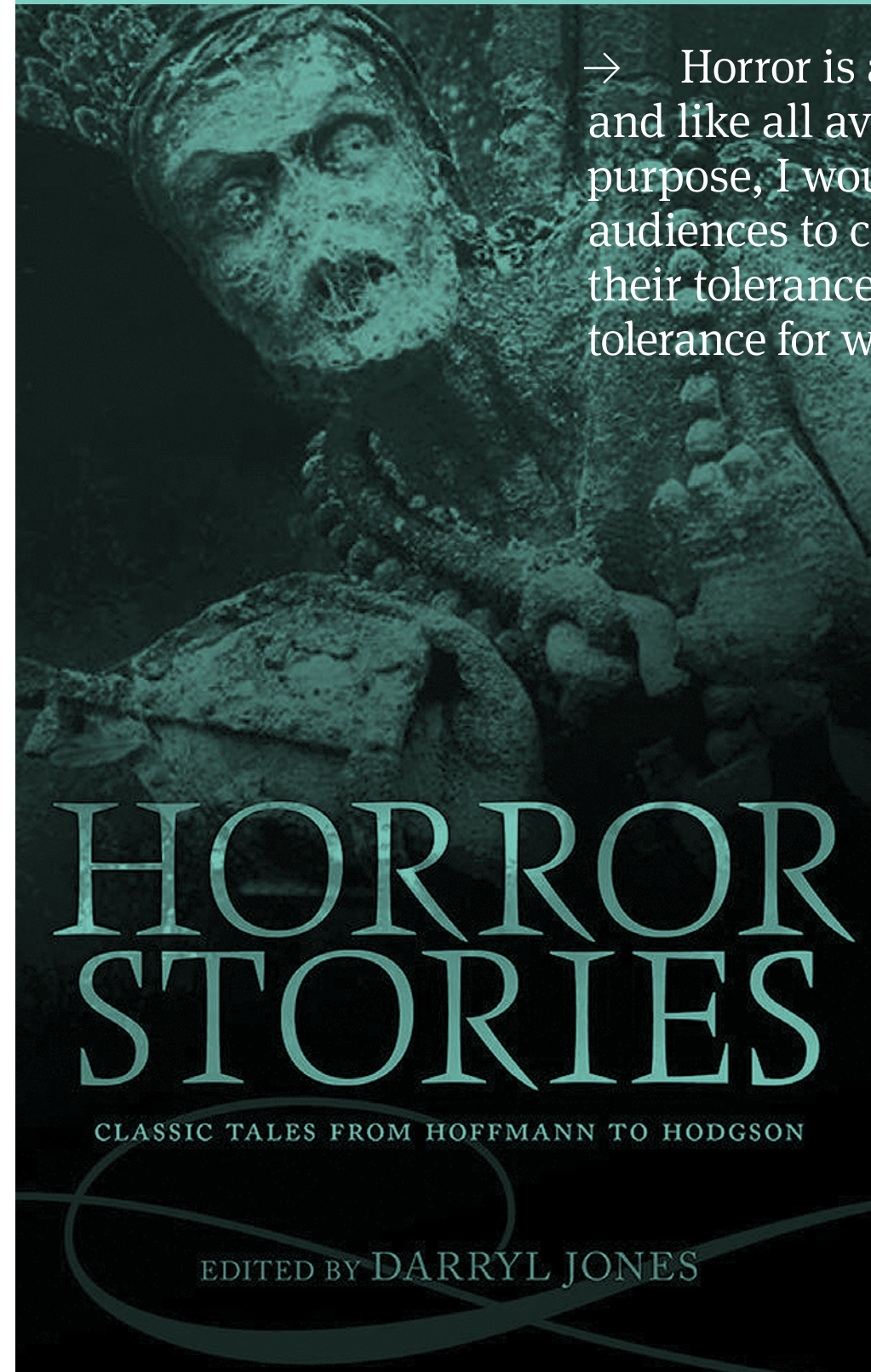
In addition my short essay, 'In Defence of Horror', written for the OUPblog website (blog.oup.com/2014/10/classic-horror-stories), was one of just 34 essays chosen from over 8,000 entries to be part of a commemorative 10th anniversary book showcasing the best of the OUPblog posts.

Such an in-depth engagement with one of the world's most prestigious academic publishers is helping to place me at the forefront of global research into the literature of horror, and I look forward to further developing this and to linking to my other research interests in popular literature, catastrophe literature, and the nineteenth century novel.

“A case could be made that the Western literary tradition is a tradition of horror.”

Darryl Jones received his BA and DPhil degrees from the University of York, and joined the School of English as a lecturer in 1994. He is now Professor in English and Dean of the Faculty of Arts, Humanities and Social Sciences, Trinity College Dublin. His research specialism is in nineteenth-century literature and popular literature. He is the author or editor of nine books and numerous articles, and is currently working on Arthur Conan Doyle and on H. G. Wells.

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→ Horror is an extreme art form, and like all avant-garde art, its real purpose, I would suggest, is to force audiences to confront the limits of their tolerance — including their tolerance for what is or is not art.

03 Uncovering the Properties of the Supersymmetric Vacua Samson Shatashvili

Isaac Newton's *Philosophiæ Naturalis Principia Mathematica* (1687) reflects on the use of the term 'natural philosophy' at a time when no boundary between mathematics and physics existed. Indeed Newton invented calculus and discovered the law of gravitation. But later the two disciplines started to split.

Historically Trinity has held a leading role in the study of the fundamental laws governing our universe, and has given many giants of the field: W.R. Hamilton, J. MacCullagh, G.F. Fitzgerald, E.T. Whittaker, J.L. Synge, E. Walton, to mention a few. Three years before Newton's death, Trinity established the Erasmus Smith Chair of Experimental and Natural Philosophy in 1724 (currently at the School of Physics) and, for a more theoretical and mathematical orientation, the University Chair of Natural Philosophy was established in 1847 (currently at the School of Mathematics). This is the chair I hold — my research discipline is theoretical and mathematical physics.

After Newton there was no drastic improvement in our understanding of gravitation, until in 1915 Einstein introduced his theory of general relativity — we are celebrating the centenary of this milestone in 2015. Ten years earlier, Einstein had introduced the special theory of relativity and contributed to the foundation of quantum mechanics. The unification of quantum mechanics with special relativity was achieved in the mid-20th century, when the powerful quantum field theory was developed.

It has been well established experimentally that quantum field theory describes three of the four known forces of nature: electromagnetic, weak and strong forces.

Unifying quantum mechanics with general relativity, usually called 'quantum gravity', has turned out to be a more difficult task, and the best approach at present is through the framework of string theory. This was invented by accident, in a sense, as it was intended for particle physics of strong interactions. But in the 1970s it became clear that string theory is really about quantum gravity. Importantly, the string theory framework brings back together the powerful methods of modern mathematics with the ideas and intuition of physics.

Supersymmetry — My main research interests are the mathematics and physics of quantum field theory/string theory. An important part of my research concerns 'supersymmetry': a symmetry between bosons (related to particles with integer spins) and fermions (half-integer spins) which is an important ingredient of string theory. Supersymmetry is at the moment a theoretical notion, not yet discovered in experiments. The experimental discovery of supersymmetry (e.g. at CERN) would certainly be revolutionary in our understanding of the universe. At present supersymmetric theories form a subclass of quantum field theories, where one hopes to get exact answers to many interesting physics questions.

Recently my collaborators and I uncovered the detailed structure of supersymmetric vacua of various quantum field theories, motivated by string theory constructions. String theory 'requires' the ideas from supersymmetry and many quantum field theories have a string theory interpretation, so string theory ideas help in the studies of quantum field theories. An important outcome of uncovering the structure of such vacua is that we discovered a mathematical connection between quantum integrable systems and supersymmetric vacua. This is a connection between two large sub-disciplines of modern mathematics and theoretical physics, and until our work nobody had any hints that such connection on quantum mechanical level existed. Hence our work creates a bridge between two frontiers — one in mathematics and another in theoretical physics. More precisely, it turns out that supersymmetric vacua are described by rare quantum mechanical systems that are exactly solvable: where we can find exact mathematical answers to almost all physics questions using the precise mathematical expressions (see Figure 2), which is something extremely rare in quantum mechanical systems.

In 2014 I was invited to deliver a keynote talk at the International Congress of Mathematicians, the most prestigious mathematics event in the world which, since 1897, takes place once every four years, to report on these results.

Samson L. Shatashvili received both his PhD (1984) and Doctorate (1990, analog of *habilitation*) from Leningrad Steklov Mathematics Institute (Russia). He worked at Leningrad Institute of Nuclear Physics, Leningrad Steklov Mathematics Institute, and the Institute for Advanced Study (Princeton, USA). Prior to moving to TCD in 2002 he was a Professor of Physics at Yale (USA) from 1994. Among his awards are: NSF Presidential Young Investigator Award (USA) 1995, DOE Outstanding Junior Investigator Award (USA) 1995, Alfred P. Sloan Research Fellow Award (USA) 1995. He is a member of the Royal Irish Academy, the Royal Irish Academy Gold Medal Laureate (2010), and Ivane Javakishvili Medal Laureate (2014, Georgia). He holds the University Chair of Natural Philosophy (1847) at Trinity and is the Director of the Hamilton Mathematics Institute TCD. He holds visiting chairs at the Institute des Hautes Études Scientifiques (Bures-sur-Yvette, France), and the Simons Center for Geometry and Physics (Stony Brook, USA).
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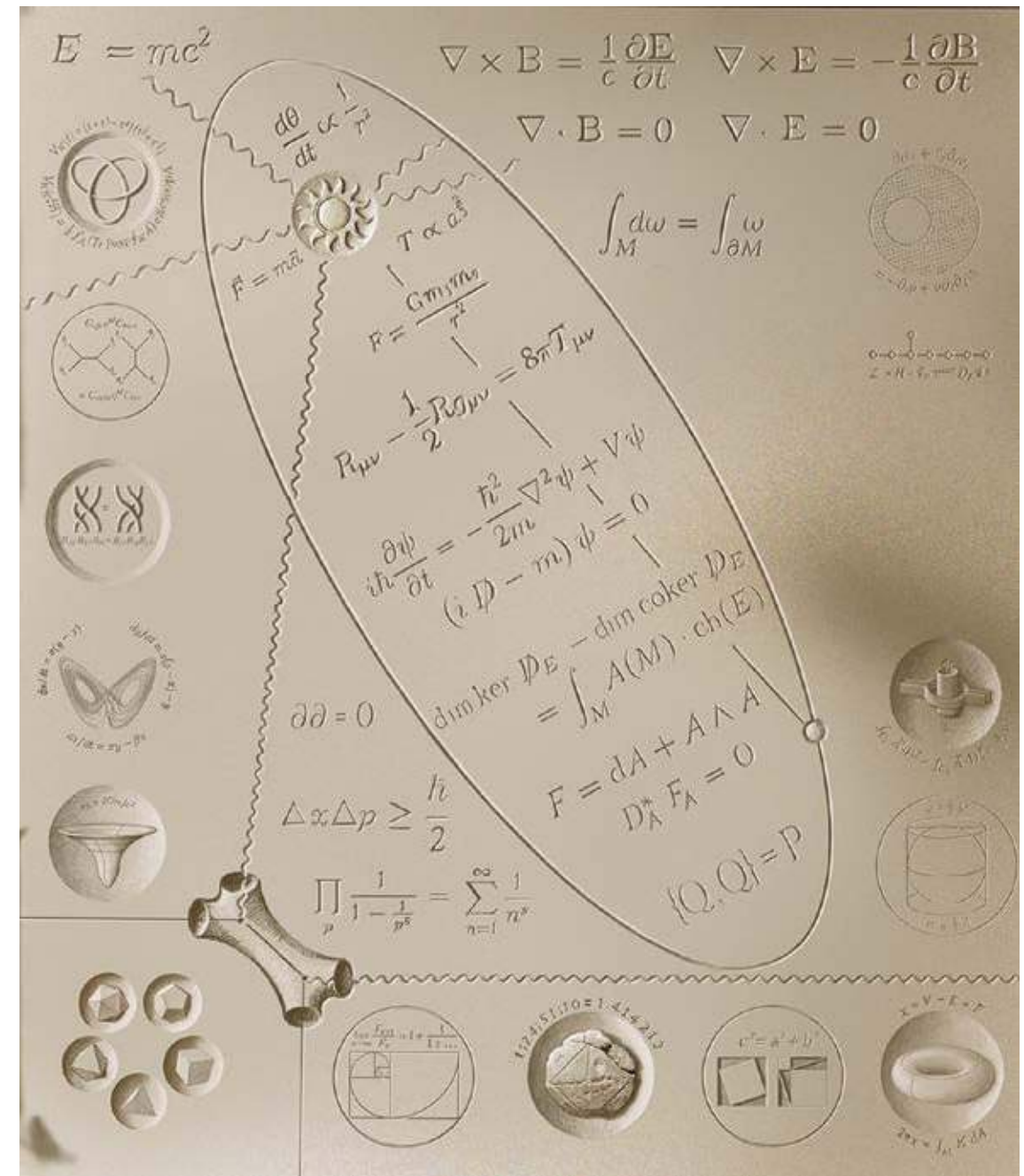


Fig 1. The Iconic Wall, carvings of significant mathematical and physical equations and diagrams, at the Simons Center for Geometry and Physics, Stony Brook University, USA. Image copyright Simons Center for Geometry and Physics, used with permission.

$$\frac{\partial \tilde{W}^{eff}(\{a\}, \{m\}, \{\tau\})}{\partial a_i} = 2\pi n_i, \quad E_i = \frac{\partial \tilde{W}^{eff}(\{a\}, \{m\}, \{\tau\})}{\partial \tau_i}$$

Fig 2. Mathematical expressions describing both the vacuum structure of supersymmetric quantum field theory and energy levels of corresponding integrable quantum mechanical system. Function \tilde{W}^{eff} , in which terms both quantities are expressed, is called *twisted effective superpotential* in supersymmetric quantum field theory and *Yang-Yang function* in integrable systems.

03 Breakthrough in Understanding and Treating Inflammatory Diseases

Luke O'Neill

Inflammatory diseases — which include rheumatoid arthritis, inflammatory bowel disease and multiple sclerosis — can be chronic and severely debilitating. Research is on-going to unravel the complex processes that go wrong in the body during these diseases. Drugs on the market, like aspirin or steroids, can work in some situations, but often have side effects or limited efficacy.

In 2002 a team in the University of Lausanne furthered understanding when they identified components of the innate immune system, multiprotein oligomers called inflammasomes, as being crucial drivers of many inflammatory diseases.

Suppressing Inflammasomes — My laboratory in the Trinity Biomedical Sciences Institute recently made what we believe to be a major breakthrough: we discovered that a small orally active molecule which we have named MCC950 can suppress activation of the NLRP3 inflammasome.

Muckle Wells syndrome is a rare and severe autoinflammatory disorder where the gene for NLRP3 is mutated, leading to persistent activation. We showed, using blood samples from patients, that MCC950 can block NLRP3. Muckle Wells syndrome provides what is called an excellent 'proof of concept' for MCC950, confirming NLRP3 as the key target for the drug. The study is a major collaboration between six institutions, including Trinity College Dublin and the Universities of Queensland, Michigan, Massachusetts and Bonn, as well as the National Institutes of Health in the US.

Our study was published in the world's leading preclinical medical journal *Nature Medicine*. My former PhD student, Rebecca Coll, was lead author and is currently carrying out post-doctoral work on the project at the University of Queensland with key collaborators, Matt Cooper, Kate Schroder and Avril Robertson.

Our finding confirms that inflammatory diseases all share a common process, even though the part of the body becoming inflamed might differ.

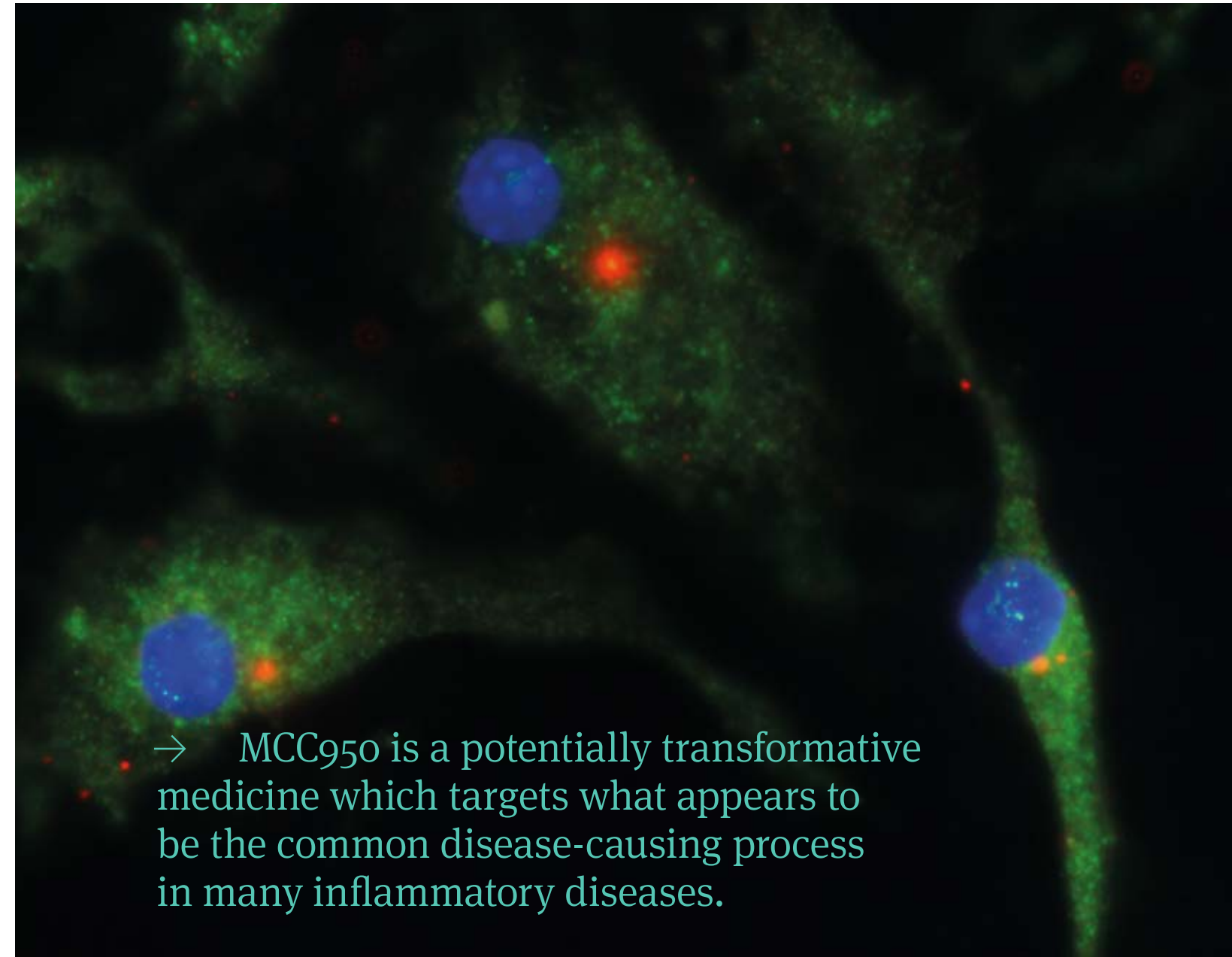
MCC950 is a potentially transformative medicine which targets what appears to be the common disease-causing process in many inflammatory diseases.

Bringing the drug to market — For patients suffering from highly debilitating inflammatory diseases, there is a dire need for new medication. We are currently exploring clinical trials and the establishment of a new spin out company. We hope to get MCC950 and follow-on compounds to patients as quickly as we can. The work in our laboratory was supported by Science Foundation Ireland and the European Research Council.

“Our finding confirms that inflammatory diseases all share a common process, even though the part of the body becoming inflamed might differ.”

Luke O'Neill received his BA (Mod) in Natural Sciences (Biochemistry) from Trinity and his PhD in Pharmacology from the University of London. He worked as a postdoctoral researcher in Cambridge UK, before joining the School of Biochemistry and Immunology in 1991 where he holds the Chair of Biochemistry. He was founder Director of the Trinity Biomedical Sciences Institute (2011–14). An ERC Advanced Grant recipient, he is winner of the RDS/Irish Times Boyle Medal, the RIA Gold Medal for Life Sciences, SFI's Researcher of the Year 2009 and the European Federation of Immunology Societies medal 2014. He is a co-founder of drug development company Opsona Therapeutics. Thompson Reuters named him as being in the top 1% of scientists in the world in 2 areas, Immunology and Pharmacology/Toxicology in 2014. He has published 250+ articles in peer-reviewed journals. Contact: Luke.ONeill@tcd.ie

Fig 1. The novel anti-inflammatory drug MCC950 (in red) is shown interacting with macrophages



03 Keeping Faith with Human Rights

Linda Hogan

The interface between religion and politics has long been an area of fascination and controversy and consumes global politics today. This is likely to continue since new demographic projections suggest that the religious profile of the world is changing rapidly. While in some parts of the western world religious affiliation is declining, the global trend is towards greater and more extensive religious belonging. And if current trends in demographics continue, not only will religious affiliation increase, but religious pluralism within and across countries and continents will also become a more important feature of the global political landscape. When one adds the re-politicization of religion, which has gathered pace since the 1979 Islamic revolution in Iran and now touches almost every nation, then the complexity of this interface, and its importance for the ethical values that guide the global society, become clear.

Human rights – universal and pluralist?

— My research focuses on how human rights can be understood in such a context, one that is simultaneously secular, religious and pluralist. This question has been the source of significant debate for decades, not only among scholars of religion, but also among political scientists and philosophers. Even when the 1948 UN Declaration of Human Rights was being

promulgated there was no agreement on how cultural, religious and ethical pluralism could be reconciled with the claim that human rights are universal. An influential UNESCO Symposium on Human Rights in 1947, that included such world-leading figures as Mohandas Gandhi, Chung-Shu Lo, SV Pantambekar and EH Carr, concluded that they were able to agree on the existence of human rights but only on condition that no one asked them why, since the ‘why’ was where the argument began.

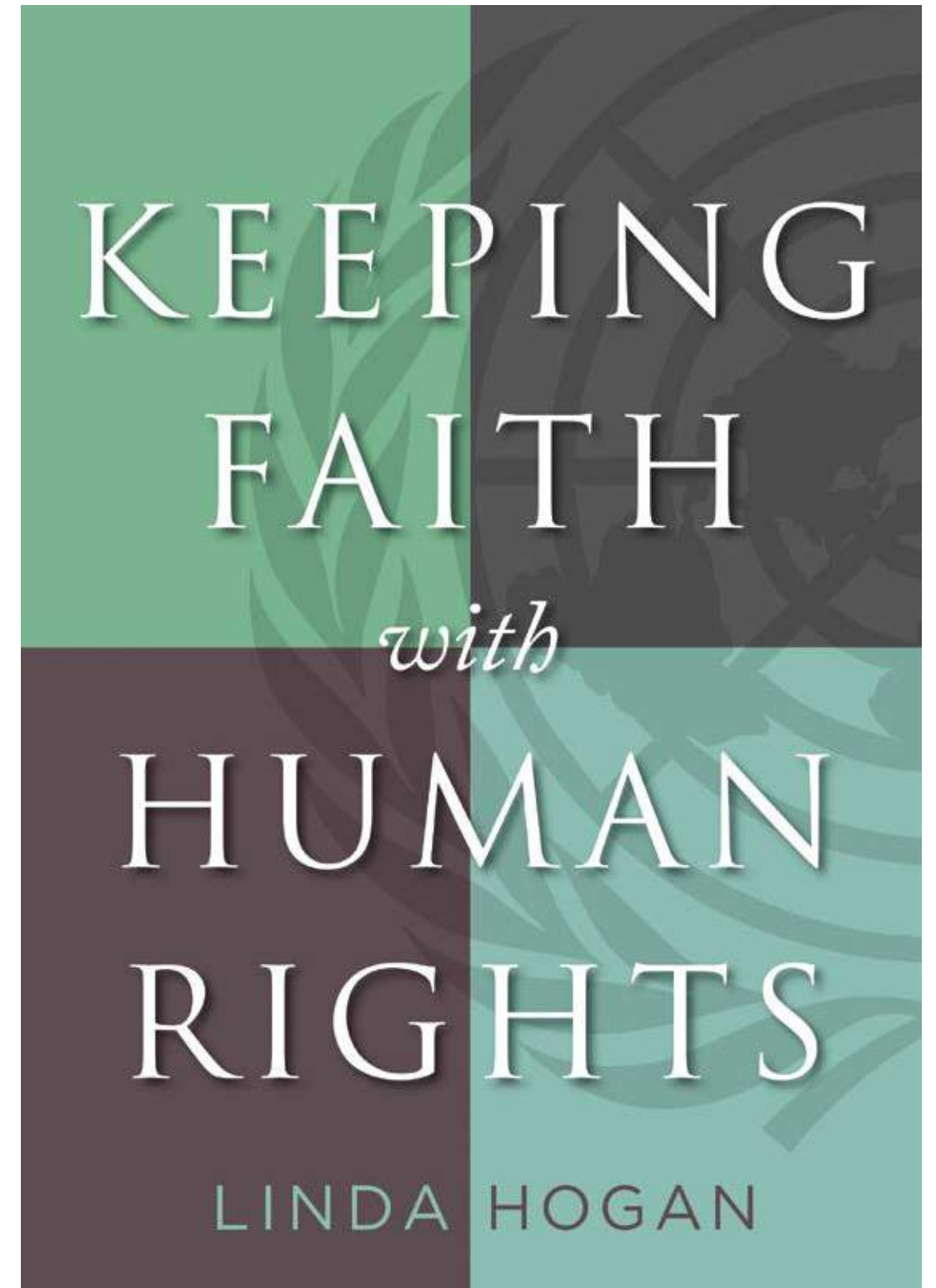
Reconceptualising the foundations — In my most recent book *Keeping Faith with Human Rights* (Georgetown University Press 2015) I set about answering this ‘why’, but I do so in a way that departs from traditional approaches. My starting point is that ethical pluralism need not be seen as a problem for human rights but can be the occasion for a reconceptualization of the philosophical and theological foundations. I demonstrate that the foundations of human rights can credibly lie in a pluralistic discourse that reflect past accretions of power while still being productive of core values and I do this by recasting the three main conceptual pillars on which human rights claims are built, namely the concept of human nature, the structure of moral truth, and the role of culture and tradition.

This book is primarily a work of abstract philosophy but I believe that the new framework which I employ has important practical implications for the ethics and politics of human rights. In particular it proposes a new way of identifying and implementing specific human rights in diverse cultural and religious settings. It demonstrates why we cannot short-circuit the process of intercultural and interreligious debate on contested values or forget that colonialism has been the vehicle through which many societies throughout the world first encountered the language of human rights. Most importantly however it shows that pluralism which for so long was seen as a threat to human rights can be a catalyst for its future development and a source of strength.

“This book is primarily a work of abstract philosophy but I believe that the new framework which I employ has important practical implications for the ethics and politics of human rights.”

Linda Hogan received her BA and M.Th from the Pontifical University, Maynooth and her PhD from Trinity College. She joined Trinity in 2001, having spent almost decade in the UK, primarily at the University of Leeds, in the School of Religions. She became a Fellow in 2007. She is currently the Vice-Provost/Chief Academic Officer as well as Professor of Ecumenics. She has published widely on inter-religious ethics, ethics of human rights, and conscience. She has been the lead academic on a number of research projects focussing on religious pluralism and inter-religious ethics.

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03 Oral Health, Ageing, and the Gnashing of Teeth

Brian O'Connell

As the Irish and global population ages, new challenges emerge in maintaining oral health throughout life. Oral health impacts especially on the quality of life of older people who may, as a result of losing their teeth, eat a low quality diet and even avoid social interaction. There is also increasing evidence to suggest common risk factors between tooth loss and systemic conditions such as diabetes and cardiovascular disease. My team in Trinity's School of Dental Science is working at a national level to help develop strategies that will enable older adults to keep enough of their teeth to eat well and smile well.

Breaking the cycle of tooth loss — In partnership with The Irish Longitudinal Study on Ageing (TILDA), we are collecting detailed oral health data from 3,000 older adults for the first time. This picture of oral health will be combined with comprehensive observations on the physical, cognitive, psychological, and behavioural health of respondents and their health care utilisation. Taken together, this allows us to understand how people enter a cycle of tooth loss and, more importantly, how we can break this cycle and maintain their oral health. In the future, dentists will be part of a primary care team where

all members of the team will be aware of the health needs of their patients and will work together to improve their health. Preliminary results suggest that many older adults have better than expected oral health and are quite satisfied with their status. However, access to care is a barrier to some of the population achieving a basic level of comfort and dignity.

Bruxism — Tooth wear is a major cause of damage and tooth loss over time and the most common cause is bruxism (tooth grinding). Bruxism is a chronic condition that affects 8–20% of the population and falls within the spectrum of sleep disorders with characteristic changes in heart rate, respiration and muscle activity. Because bruxism occurs during sleep, most sufferers are unaware it is happening until significant damage to their teeth has taken place. The diagnosis and monitoring of bruxism are recognised as major obstacles to the management of the condition.

Along with our collaborators in Trinity's institute for nanotechnology, CRANN and the Trinity Centre for Bioengineering we are developing a new medical device (SMARTSPLINT) that measures tooth grinding during sleep.

The SMARTSPLINT is used at home with grinding activity being fed back to the user on their phone. Detailed data is also relayed to the care provider who can customise treatment for the individual. In addition, we expect the availability of SMARTSPLINT will improve our understanding of the aetiology and progress of bruxism.

Fig 1.



Brian O'Connell received his degree in dentistry from UCC and his PhD from the University of Rochester, New York. He began postdoctoral work at the National Institutes of Health in Maryland, where he was chief of the Gene Regulation and Expression Unit, NIDCR. Brian joined Trinity College Dublin as Professor of Restorative Dentistry and is currently Dean of Dental Science and Director of Postgraduate Prosthodontics. He is a Diplomate of the American Board of Prosthodontics and a Fellow of the Royal College of Surgeons in Ireland. His research interest is in the oral health of older people and the use of sensor technology to monitor disease.
 Contact: Brian.O'Connell@dental.tcd.ie

Fig 1. SMARTPLINT which measures tooth grinding at night.

Fig 2. Different types of tooth grinding events recorded by pressure sensor (upper trace) and electromyography (lower trace)

→ The SMARTSPLINT is used at home with grinding activity being fed back to the user on their phone. Detailed data is also relayed to the care provider who can customise treatment for the individual.

Mixed event

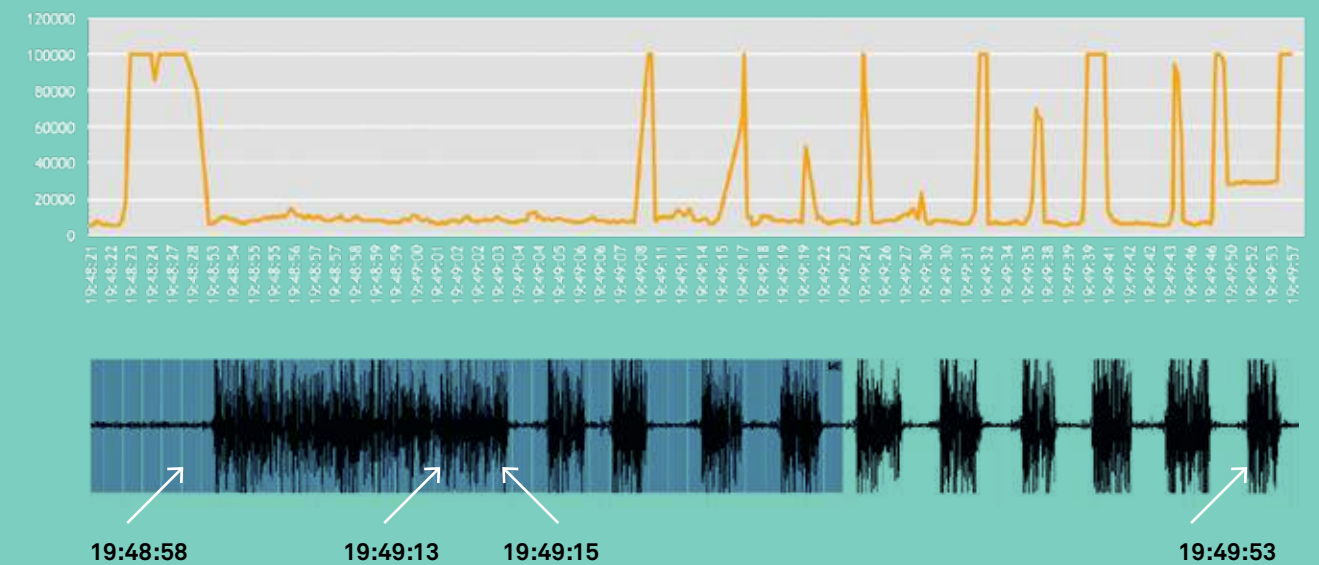


Fig 2.

Mixed event: Tonic 19:48:58 – 19:49:13 (15 s)
 Phasic 19:49:15 – 19:49:53 (10 cycles, ~2s on, ~2s off)

03 Seán O’Faoláin: Literature, Inheritance and the 1930s Paul Delaney

Seán O’Faoláin (1900–1991) was a towering figure in twentieth-century Irish culture. A short-story writer of international repute, he was also a leading commentator and critic who played a prominent role in the fight against censorship in Ireland. Most famously, he co-founded the dissident journal *The Bell* in 1940, serving as its first editor until 1946.

Central to O’Faoláin’s work is the idea that national identities are historically produced and culturally hybrid; equally important is the conviction that Irish history should be interpreted in the context of social and intellectual developments across Europe. Such thinking disturbed the ethos of the newly-independent Irish state, which preferred to trace ideas of national identity back to a single, pure origin (rural, Gaelic, Catholic). Unsurprisingly, O’Faoláin proved a controversial figure in his own lifetime, and had two of his books banned for alleged indecency.

Re-evaluating O’Faoláin — In my book, *Seán O’Faoláin: Literature, Inheritance and the 1930s* (Irish Academic Press 2014), I focus on the early stages of O’Faoláin’s long career and I place his work in relation to Ireland’s colonial inheritance, its

recent revolutionary period, and the establishment of the Irish Free State. The 1930s were crucial for O’Faoláin’s emergence as a prose writer — during this decade he reflected on formative influences (imperialism, the Catholic Church, republicanism, the Gaelic League, bourgeois respectability), and published significant texts, including biographies of Daniel O’Connell, Constance Markievicz and Eamon de Valera.

My book builds on a recent renewal of interest in O’Faoláin and is the first full-length study of him to be published in over a decade. I show that O’Faoláin’s work is far less confident, or certain, than he himself intended or than is generally allowed. I also suggest that this uncertainty makes O’Faoláin’s work more valuable, as we observe him engaging in a sustained manner with issues of influence and inheritance, exploring the complex ways that people are imprinted by their pasts and the societies that they inhabit.

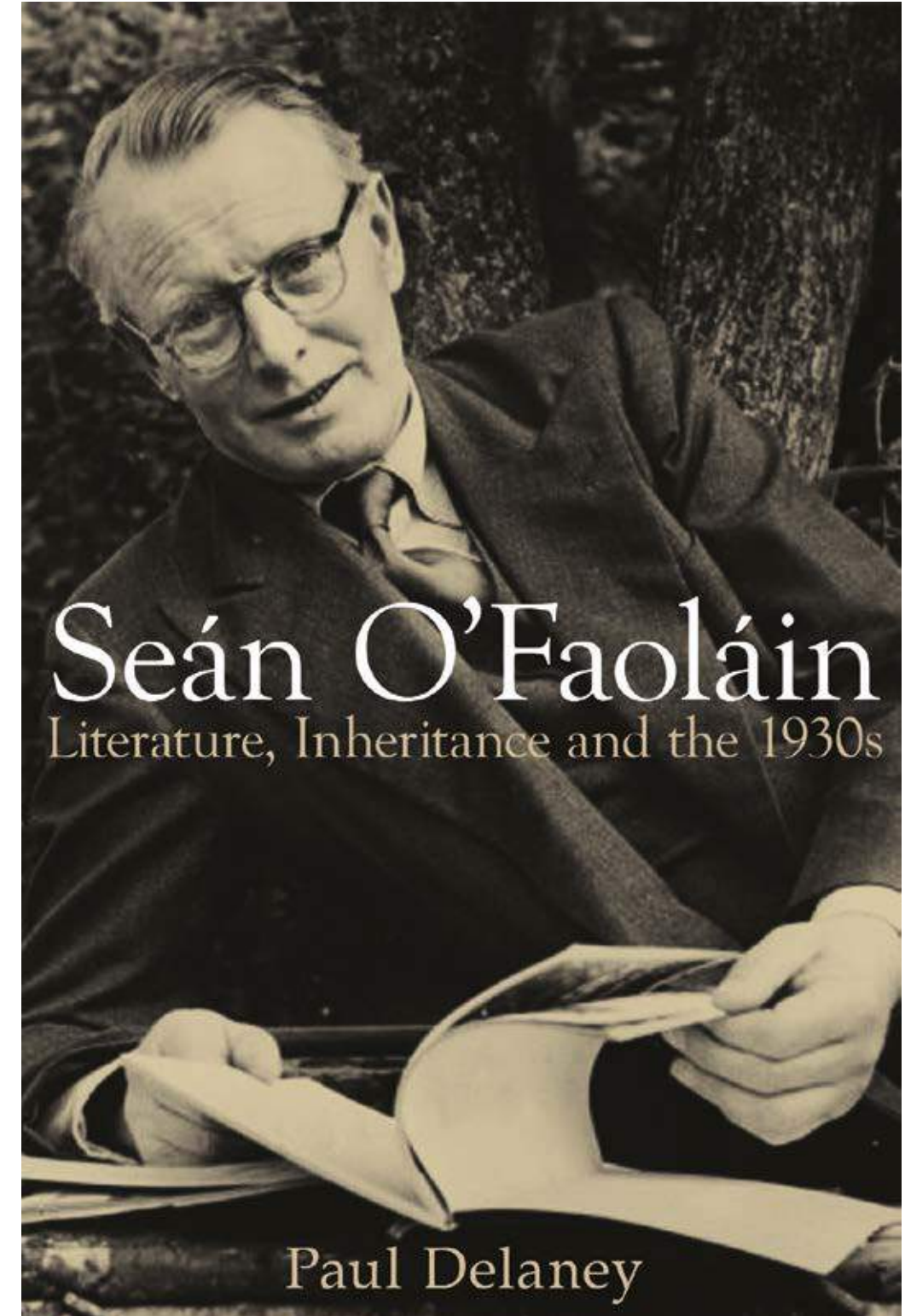
The book was widely reviewed in the mainstream press and has received detailed praise in prestigious journals, such as the *Times Literary Supplement* (27 March 2015). It provided the occasion for a special features programme on O’Faoláin from the RTÉ Radio 1 archives, ‘Bowman: Sunday’ (22 February 2015).

Reflecting on O’Faoláin’s work as a biographer has provided a stimulus for my current research, on the production of life stories in the Irish Free State. This project engages with a range of diverse material, including accounts of the recent revolutionary period by activists, combatants and civilians; recollections of the Irish Literary Revival; narratives from the Gaeltacht; memoirs of empire; reports of the First World War; and religious hagiographies. This study gives a multi-layered account of the many different lives recorded during this formative period in modern Irish history, as well as an investigation of the uses to which those stories were put.

“Central to O’Faoláin’s work is the idea that national identities are historically produced and culturally hybrid; equally important is the conviction that Irish history should be interpreted in the context of social and intellectual developments across Europe.”

Paul Delaney was educated in Trinity and received his PhD as a Chevening scholar from the University of Kent (Canterbury). He returned to Trinity in 2001 to join the School of English, and in 2005 he was appointed lecturer in Irish Writing in English. His publications include *Reading Colm Tóibín* (2008) and *William Trevor: Revaluations* (2013), with Michael Parker. He is currently writing a book on the uses of biography as a literary form in the Irish Free State.

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03 Nanomaterials – the Future of Semiconductor Devices, Energy Storage and Harvesting

Valeria Nicolosi

Nanomaterials are the thinnest and flattest materials known to man — certain special nanomaterials are just one atom thick. These materials have almost magical properties, being super strong, lightweight, and electrically conductive and they are the basis for new technologies which will enable next generation semiconductor devices, energy storage and harvesting.

Probably the best-known nanomaterial is graphene, which consists of a sheet of carbon atoms arranged in a honeycomb lattice. Billions of layers of graphene stacked on top of each other make up crystals of the more familiar graphite, which is used in pencil leads.

My research focuses on the processing, advanced characterisation and applications of certain special nanomaterials, including graphene.

Scaling up Graphene — Graphene is a 21st century material — it was only measurably produced and isolated in the lab in 2003. Five years later I was instrumental in the first demonstration of the liquid phase exfoliation of graphite to give graphene in large quantities (*Nature Nano* 3, 563), and I followed this up by demonstrating that other layered materials can be exfoliated. This was a major breakthrough in its own right and the paper (*Science* 331, 568) detailing my discovery was the most

cited paper in *Science* for 2011 and the fourth most-cited paper internationally in chemistry for the two-month period of May to June 2012.

My work led to the first method of preparing graphene in sizable quantities. This method, which was up-scaled and commercialised last year, offers low-costs and high-throughput, opening the door to many real applications. From 2014 graphene produced by this method became available in the market for everyone to purchase.

The process of chemically manipulating nanomaterials in liquid-phase has crucially provided a promising approach for the fabrication of industrial scale composite films with well-controlled electric properties for microelectronics (e.g. transistors, thin conductive films for electrical displays) as well as for energy storage and high temperature applications.

Storing clean energy — I'm currently looking at ways to harness these special material properties so that they can be used to develop efficient ways of storing energy sustainably and from cleaner resources, something which is of course necessary to mitigate the consequences of climate change, population growth and declining fossil fuels. In 2014 I was successful in using nanomaterials to produce ultra-thin, flexible and ultra-light ink-jet

printed batteries and other systems that can store energy more efficiently than existing products on the market. In 2014 the European Research Council awarded me a Proof of Concept grant (my 3rd ERC grant and 2nd Proof of Concept grant) to bring this closer to commercialisation.

Characterising atom-by-atom — Crucially, when we're talking about materials so tiny in size, then every single atom counts. To understand the properties of nanomaterials and their behaviour in devices, it is imperative to know what they look like. In a landmark paper in *Nature* in 2010 (*Nature* 764, 571) I used novel and advanced electron microscopy techniques to image and identify single atoms in a two-dimensional nanomaterial for the first time. This was another major breakthrough, opening the possibility for the characterization of materials at an atom-by-atom level. In 2012 I received a €5 million grant from Science Foundation Ireland to establish such unique microscopy capabilities in Trinity. The cutting edge technology, currently being installed in Trinity's centre for nanoscience, CRANN, has been operational since October 2015. Only a handful of labs around the world have such technology, so this further positions Trinity as a world-leader in nanomaterials research.

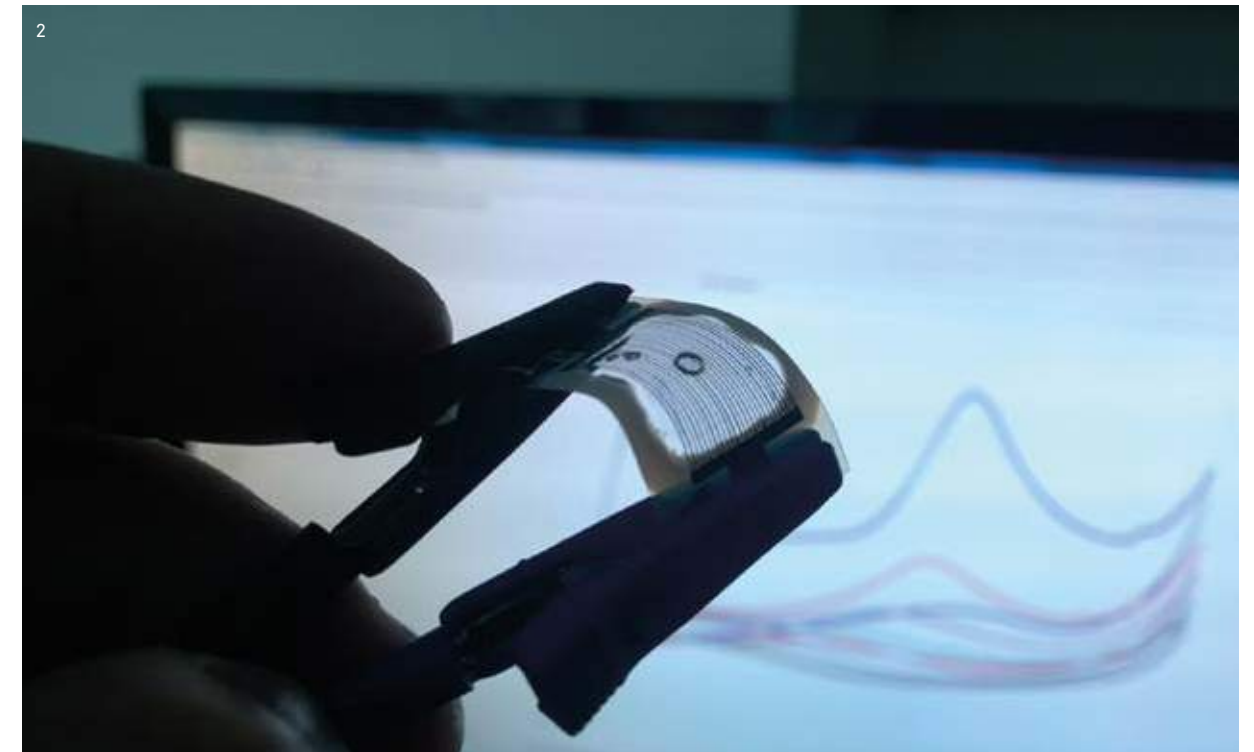
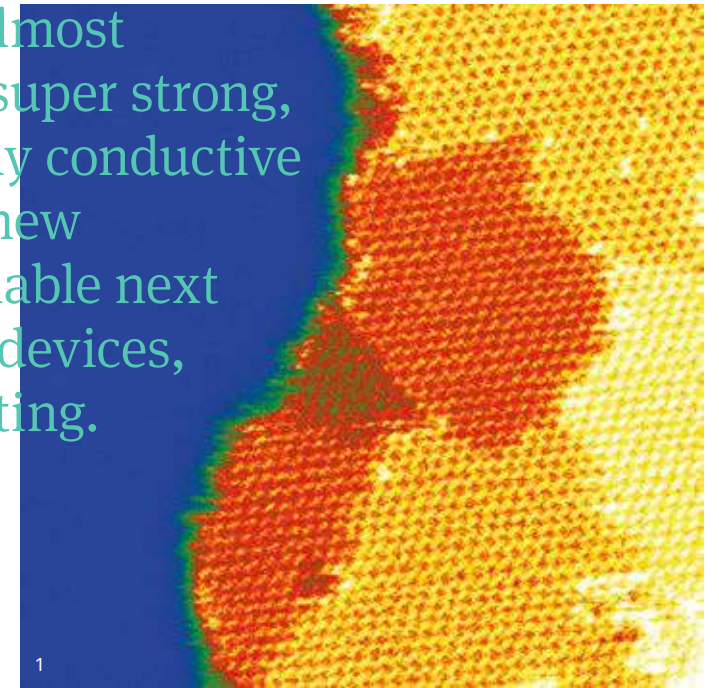
Valeria Nicolosi received a BSc with honours in chemistry from the University of Catania (Italy) in 2001 and a PhD in Physics in 2006 from Trinity College Dublin. In 2008 she moved to the University of Oxford with a UK RAEng/EPSCRC Fellowship, becoming a lecturer in 2011. In 2012 she returned to Trinity as ERC Research Professor at the Schools of Chemistry and Physics and as principal investigator in CRANN nanoscience centre. Professor Nicolosi has published more than 100 papers in high-profile international journals, including *Nature*, *Science*, *Nature Nanotechnology*, *Nature Materials*, and has delivered more than 70 invited/plenary presentations at major conferences and public events. She has won numerous awards: RDS/Intel Prize for Nanoscience 2012, World Economic Forum Young Scientist 2013, WMB Woman in Technology Award 2013, and SFI President of Ireland Young Researcher Award (PIYRA) 2014.

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Fig 1. Atomic-resolution image of a MoS₂ nanosheet

Fig 2. A fully assembled ink-jet printed transparent, flexible battery

→ Nanomaterials have almost magical properties, being super strong, lightweight, and electrically conductive and they are the basis for new technologies which will enable next generation semiconductor devices, energy storage and harvesting.



03 The CONNECTED World Linda Doyle

Looking at the challenges that face our society — health, food security, clean and efficient energy, smart and green transport, climate change, ageing — they all have in common that they drive the need for new and varied forms of networked services. These include mobile Internet, connected health, precision agriculture, smart grids and metering, and environmental monitoring, to list a few. My work, and the work of the CONNECT research centre, is based around the design of the future networks on which any or all of these services can be enabled.

Reconfiguring the network in response to service needs — CONNECT is a national research centre co-funded by Science Foundation Ireland and industry, and headquartered in Trinity. CONNECT focuses on all kind of networks including wireless, cellular, optical and networks that support the Internet-of-Things (IoT). There are ten academic partners and 35 industry partners, ranging from large-scale multinationals, such as Google and Intel, to Irish small and medium enterprises such as Rivada Networks and Benetel. Working with industry enables us to tackle problems that will have real economic impact.

One of my main roles, as Director, is to drive the CONNECT research vision. Our vision is based around the concept that the network is performed into

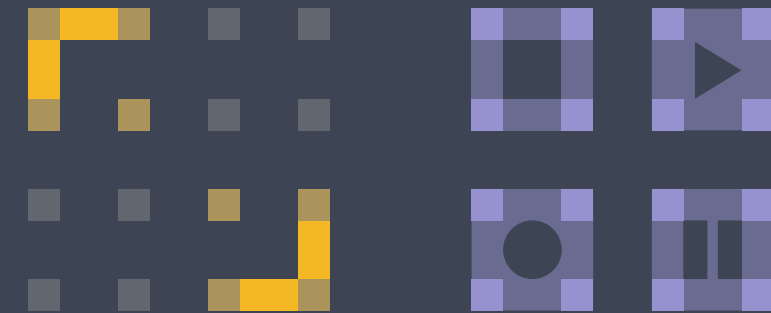
existence in response to a service need. The network is not a static thing upon which services and applications run — it can be better understood as a pool of all sorts of different hardware and software commodities that are dynamically harnessed to deliver the applications a user wants. We see the network as an open programmable, malleable substrate that can be reconfigured as desired. In addition we seek to make as many elements of the network as shareable as possible, to reduce costs, to open up competition, to support new business models, and to promote greener uses of technology.

Internet-of-Things (IoT) — In the last year my work has had an increasing focus on the Internet-of-Things (IoT). One of the major projects on the horizon is one we call Pervasive Nation and it draws on our decades of experience in prototyping and experimentations. Pervasive Nation is about turning Ireland into a giant IoT testbed. We will blanket Ireland in IoT infrastructure. We will connect a million different things to the network, supporting services in smart agriculture, environmental monitoring, security etc. The network will cover urban and rural areas and will facilitate large-scale experimentation at a scale which is not currently possible any where in the world.

Creative Arts Practice — Trinity's strong focus on interdisciplinarity is reflected in my role, within the School of Engineering, as Professor of Engineering and the Arts. Creative arts practices is part of my research methodology. Working with artists is about imagining the kind of future we can create. It is also about questioning that future, understanding the power relationships that can emerge in the systems we create, and driving home the fact that there is no such thing as neutral design. This is especially important to understand as we enter an IoT world that is instrumented with billions of sensors, all gathering information on every aspect of our lives, and in many cases dictating outcomes.

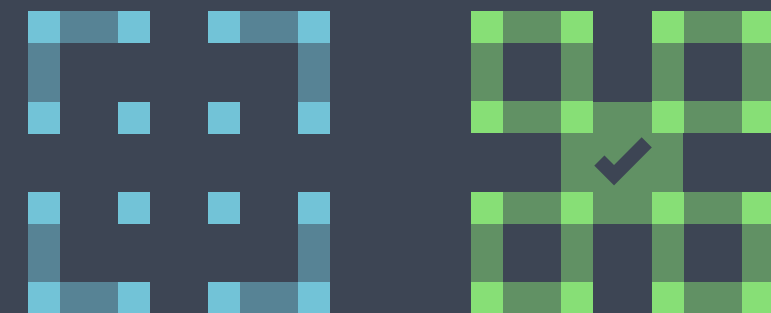
Linda Doyle is the Director of CONNECT and Professor of Engineering and the Arts in Trinity College Dublin. Her expertise is in the fields of wireless communications, cognitive radio, reconfigurable networks, spectrum management and creative arts practices. She has raised over €70 million in research funding in the past decade and has published widely in her field. She is a member of the National Broadband Steering Committee in Ireland, and is a member of the Ofcom Spectrum Advisory Board. She is a Fellow of Trinity College Dublin, and the Chair of the Douglas Hyde Gallery.
Contact: Linda.Doyle@tcd.ie

→ The network is not a static thing upon which services and applications run — it can be better understood as a pool of all sorts of different hardware and software commodities that are dynamically harnessed to deliver the applications a user wants.



Internet-of-Things

Service-Aware Networks



Network-Aware Networks

Integration and Textbeds

Innovation

Trinity has produced more entrepreneurs than any other university in Europe over the last five years, according to *The Universities Report* published in October 2015 by private equity and venture capital-focused research firm, PitchBook.

The report shows that Trinity produced 114 entrepreneurs and 106 companies, and raised €575.7 million in capital between 2010 and 2015. The evaluation is based on the number of undergraduate alumni who go on to create companies that secure first-round venture capital funding.

In July, Trinity, together with NUI Galway and UCC, benefitted from the Blackstone Charitable Foundation's first international expansion of its campus entrepreneurship programme. The Blackstone Charitable Foundation was founded by the eponymous US firm in 2007 with the aim of fostering entrepreneurship. With a €2 million grant, a physical presence on each university campus and access to the Blackstone LaunchPad Global Network Technology Platform, the programme has the potential to generate some 1,500 new ventures and 3,700 new jobs across Ireland over the next five years.

Trinity was involved in another world-first initiative when the University signed a memorandum of understanding with Intel, focusing on talent, research and national policy associated with research and education. This is the first such 'Partnership to Boost Innovation' signed between a major university and a major multinational anywhere in the world. It builds on 25 years of collaboration between Trinity and Intel in research, education, innovation and public outreach.

→ In July, Trinity, together with NUI Galway and UCC, benefitted from the Blackstone Charitable Foundation's first international expansion of its campus entrepreneurship programme.

RIGHT – Taoiseach, Enda Kenny launches Blackstone LaunchPad





'The Trinity Education' project launched in 2015 aims to renew the University's curriculum. One of the aspects of the project looks to further promote innovation and entrepreneurship of all kinds — technological, commercial, cultural and creative. By acting as a focal point in Dublin city centre, Trinity helps support the growth of entrepreneurship across the economy.

Staff Innovation

Trinity marked its 500th invention disclosure at a special event in October 2014, attended by the Minister for Skills, Research and Innovation, Damien English. Also in October, Trinity was announced as the lead institution for two of the five new SFI Research Centres being established on the back of a €245 million funding windfall from government and industry. Trinity will lead in 'ADAPT' — which seeks to change the way that we engage in real time — and the 'CONNECT Centre for Future Networks & Communications' — which aims to develop knowledge in networking services across a range of sectors. Trinity is also partnering in three other research centres.

Trinity was a key partner in two successful multi-million EU bids to tackle ageing and sustainability. In December 2014, the European Institute for Innovation and Technology (EIT) announced the winning consortia for two new Knowledge Innovation Communities (KICs) — large scale partnerships of academic institutions and innovation stakeholders. InnoLife (EIT Health) and RawMatTERS (EIT Raw Materials) are bringing together more than 150 partners from 20 EU Member States to boost innovation and tackle health and raw materials.

Engineers in the School of Engineering, led by Professor Frank Boland, developed 'Thrive', a personal 3-D audio technology for virtual reality applications. Until now, the delivery of audio that matches the visual experience in virtual technology has been challenging, and this has prevented the successful commercialization of these technologies. The 'Thrive' technology solves this problem, providing an overall experience that is more realistic. It was acquired by Google in July, and four of the postgraduate engineers who worked on the technology were recruited by Google as part of the agreement.

IdentiGEN, a Trinity spin-out company enabling the trace back of food products, received a €12 million investment from Enterprise Ireland-backed fund MML Capital Partners to further develop its traceability product which allows food retailers, processors and producers to trace the source of food products as they move through the supply chain. IdentiGEN which employs 60 people plans to double job numbers over the next three years.

Another Trinity spin-out company, SelfSense Technologies Ltd, is tackling tooth grinding, which affects up to half a million Irish people daily. In April SelfSense Technologies Ltd licensed sensor technology from Trinity, and secured €100,000 investment from NDRC for its novel intelligent mouth guard device, SmartSplint.

Mature Trinity campus companies continued to thrive. Swrve, a leader in mobile marketing, raised in excess of €40 million in the last 18 months and is now employing more than 100 people in its offices in Dublin, New York, London, Prague and San Francisco.

2014/15 saw an increase in the value of contracts with industry: over 100 contracts were signed with industry including many house hold names such as Intel, Google, IBM and Pfizer as well as innovative SMEs like Sigmoid Pharma and Vitalograph.

Significant social impact was achieved through granting 46 non-commercial licences of 'Freedom Films' to not-for-profit entities working in dementia and brain health education, training and support across four continents. The 10 animated films, funded by GENIO, were developed to allay fears about memory loss, promote brain health and tackle stigma associated with dementia. Produced by Dr Sabina Brennan, Co-Director of the NEIL Programme, the films are exclusively licensed to campus company Trinity Brain Health Ltd. They were showcased at the European Summit on Innovation for Active and Healthy Ageing, exhibited at the Pacific Science Centre in Seattle, Washington and selected by the European Foundation Centre as an example of significant work funded by philanthropy.

FAR LEFT — Trinity Creative Challenge Award recipients, Jimmy Eadie (Pan Pan), Kate Strain, Dr Patrick Prendergast, Provost, Grace Weir, Enda Bates & Fiona Hallinan

LEFT — Mark Cooney and Dr Ismael Gomez, CONNECT Centre, at the Trinity Research & Innovation Showcase

An innovative crowdsourcing project — *Great Famine Voices* — was launched in September 2015. It allows members of the public to contribute and share family stories and documents about the Famine and emigration in Ireland. The project, led by Dr Danielle O'Donovan, Centre for Research in IT in Education at Trinity and Dr Owen Conlan, School of Computer Science and Statistics, is a collaboration between Trinity, the Great Famine Archive at Strokestown Park House, SFI's ADAPT Centre and the Irish Heritage Trust.

The world's first bone repair technology was launched at AMBER's Industry Day in January to celebrate the SFI-funded materials science centre's first year in operation. The patented bone repair technology was developed by a team of AMBER researchers within the Tissue Engineering Research Group (TERG) in the Royal College of Surgeons in Ireland, led by Professor Fergal O'Brien, deputy director of AMBER. It consists of collagen and hydroxyapatite, components native to bone, formed into a 3D porous 'scaffold' which acts as a bone graft substitute. Bone cells and blood vessels 'cling' to the scaffold, allowing for new tissue regeneration. The technology has already led to an injured racehorse returning to winning after successful jaw reconstruction.

Student Innovation

Thirty-two doctoral students graduated from the inter-university Innovation Academy. Students from Trinity and Queen's University Belfast were presented with Graduate Certificates in Innovation and Entrepreneurship by the Minister for Education and Skills, Jan O'Sullivan in January 2015. Through a series of taught modules the PhD students gain an understanding of how innovation converts knowledge into products, services or policies for economic, social and cultural benefit.

Eleven new teams of budding entrepreneurs participated in Trinity's student start-up accelerator, Launchbox, now in its third year. Eight teams received funding, in addition to office space and mentorship from successful entrepreneurs. Three more boot-strapped teams received programme support without the funding. All teams had access to space and facilities to test out new ventures. The accelerator programme focused on product validation, product development and future strategy.

This year Launchbox progressed from a three-month accelerator to a 12 month programme which includes an 'idea workshop' series and a pre-accelerator element to help potential applicant teams develop from early idea to prototype stage. LaunchBox is supported by Trinity 'Angels' (a business network made up of alumni and friends of Trinity) and Citi Group, the 2015 programme sponsor.

Some of the business ideas incubated were: *SiteSpy*, a hardware device to help telco companies report live data information to engineers; *Blazer*, a new system to remove the dangerous varroa parasite from honey bees; *Unituition*, an online market place for third level students and tutors; and *Sensa FX*, a health tool to help people form healthier habits using scent associations.

Previous LaunchBox programmes have been highly successful. Social enterprise *FoodCloud*, which prevents food wastage and food shortage, was profiled in TIME magazine and secured a major deal with Tesco; Touchtech, a payment processing venture, is now working with payment giants such as VISA; and Artomatix, who develop tools for automating digital media creation, secured €100,000 in venture funding.

The Trinity Entrepreneurial Society and the Dublin University Computer Science Society organised Hack Day in February 2015 to give students the opportunity to work together on building a realistic business concept. With the theme 'encouraging healthy living among young people', business and technology students worked on producing a website, physical product, app, or other platform, and on developing a marketing and business pitch, which was presented to judges at the end of the day.

Trinity Creative Challenge

The Trinity Creative Challenge was launched in spring. Artists were invited to propose interdisciplinary projects with a Trinity focus, with the aim of catalysing the arts in Dublin city, and supporting the development of the creative and cultural industries sector. Five proposals were selected from over 140 applicants to share the award fund of €40,000. The five projects include performance, visual art, music, film, design, new media, animation, gaming and creative technologies. All involve a collaboration with Trinity.

The following *Trinity Creative Challenge* Award Recipients will present their work in Trinity in April 2016:

- Pan Pan — An immersive theatre performance featuring binaural technology to be developed with Trinity.
- Enda Bates — 'Trinity 360': a new composition of spatial music to be performed in Front Square.
- Grace Weir — 'A Reflection on Light': a film piece telling the history of a painting, *Let there be Light* by Mainie Jellett, which hangs in the School of Physics in Trinity.
- Declan Clarke — 'Casement in Kristiania': a film project exploring the social and political heritage of contemporary Ireland through the lens of Trinity.
- Fiona Hallinan & Kate Strain — 'Department of Ultimology': an art research project exploring the evolution and disappearance of forms of knowledge within academic disciplines.

Public Engagement

Trinity's mission, encapsulated in the current Strategic Plan, is to engage wider society, demonstrate leadership, and promote the values of equality and pluralism.

Trinity has honoured this mission by taking a leading role in publicly commemorating the First World War. As part of the Decade of Commemorations, it was decided to commission a memorial stone to be placed in front of the Hall of Honour and the 1937 Reading Room to draw attention to the commemorative nature of the Hall of Honour (it memorialises the 471 Trinity students, staff and alumni who lost their lives in World War 1). In September 2015 the stone, sculpted by Stephen Burke, was unveiled by Pro-Chancellor, Professor Dermot McAleese, in a public ceremony attended by ambassadors representing countries in which Trinity people died.

On the morning of 20 March 2015 hundreds of people gathered in Trinity's Front Square to witness the near-total solar eclipse. Associate Professor in Physics, Peter Gallagher and colleagues organised ECLIPSE 2015. Despite the inclement weather, the crowd glimpsed a partial eclipse thanks to high-tech telescopes and specially designed eclipse shades.

On-going annual synergies with national events included Trinity welcoming the public on campus for Culture Night in September and Open House in October. As part of the Dublin's New Year's Eve festival, Trinity's front façade was lit up with animated illuminations, and again for St Patrick's Day.

Panti Bliss swung open Trinity's iconic Front Gate for the official launch of Discover Research Dublin 2015. Organised by Trinity and the Royal College of Surgeons in Ireland, the event allows the public to get up close and personal with the world of research.

RIGHT – Dr Patrick Prendergast views the near-total solar eclipse in Front Square at ECLIPSE 2015

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With 66 separate exhibits, and using a variety of digital and traditional formats, Discover Research Dublin featured something for everyone: 3D visualisations of the brain, colourful visualisations of music played with magnetised instruments, real-time experiments to find out which bacteria live in our mouths, behind the scenes at the Trinity Biomedical Sciences Institute, and much more.

Public Lectures

The University hosts a range of public lectures organised by its research institutes, centres, and schools. 2015 was declared International Year of Light by UNESCO, and that was the theme of this year's Trinity Week. The public were invited to events demonstrating the properties of light, with Professor Robert Eason from the Optoelectronics Research Centre in the University of Southampton giving the keynote talk "Photonics: Tripping the Light Fantastic". Each day was topped and tailed by a 'Sunrise' sporting activity and an evening 'Disco Lights' spin or Zumba class in the Sports Centre.

Marking the 70th anniversary of the division of the Korean peninsula, Trinity's Centre for Post-Conflict Justice held a public lecture in August 2015: 'Rights in the Korean Peninsula: Challenges to Peacebuilding', and invited two leading international human rights experts — Professor Bo-Hyuk Suh

of Seoul National University and Dr Rajiv Narayan, International Commission Against the Death Penalty.

The *First Up* series of lunchtime talks from 'creative minds at the forefront of Irish culture, science and the arts' took place between November 2014 and April 2015. Speakers as diverse as Cathal Gaffney (co-founder Brown Bag Films), Dorothy Cross (visual artist) and Aisling Rogerson (co-founder Fumbally Café) were invited to tell their own stories and talk about making ideas happen. *First Up* is a collaboration between Trinity's M.Phil in Creative and Cultural Entrepreneurship, Science Gallery Dublin and the Trinity Long Room Hub.

The Oscar Wilde Centre for Irish Writing at the School of English celebrated the career of the great contemporary Irish poet and Trinity alumnus, Derek Mahon, in April with a performance featuring actor Stephen Rea and a lecture by Hugh Haughton, Professor of English at the University of York.

Trinity hosted 'After Charlie Hebdo: A Public Forum on Religion, Freedom and Human Rights' in February, inviting experts from the School of Law, and the Departments of History and Near and Middle Eastern Studies to speak. The event, attended by over 300 people, aimed to counter simplified narratives on questions around religious fundamentalism, terrorism and freedom of speech by facilitating respectful public discussion of the Paris terrorist attacks.

LEFT – Panti Bliss opens Front Gate for the official launch of Discover Research Dublin 2015

BELOW – Trinity's front façade lit up on New Year's Eve

The Board of Trinity decided not to adopt a formal position on the marriage referendum, but to facilitate the use of the college as a public forum where important national issues can be discussed. The public forum held in May and chaired by the Registrar, Professor Shane Allwright, brought together a panel representing different shades of opinion. Also in May, the Trinity Long Room Hub invited Impac-winning author, Colm Tóibín to speak about his experience. His talk, 'The Embrace of Love, Being Gay in Ireland Now' made international headlines.

Exhibitions

Science Gallery Dublin held four exhibitions in 2014/15, curated by Trinity staff and guest curators: *Blood: not for the faint-hearted*; *Lifelogging: do you count?*; *Home/Sick: post domestic bliss*; and *Secret: nothing to see here*. The main exhibition in the Long Room was *Upon the Wild Waves: A Journey Through Myth in Children's Books* which celebrated the wealth of children's literature held in the Library.

In February a group of patients with respiratory illnesses breathed new understanding into their condition through a photography exhibition organised by Trinity's School of Nursing and Midwifery and St James's Hospital, on display in Ballyfermot Library.

The Suas 8x8 Photographic Exhibition was displayed outside the Berkeley Library as part of a development-focused arts festival organised by Suas with the Trinity International Development Initiative (TIDI) and the Students' Union. The images focused on consumerism, climate change, and innovative solutions to development challenges.

Trinity campus hosted five life-size fibreglass pigs as part of the Pigs on Parade public arts initiative, in aid of the Jack & Jill Foundation. The project involved 100 pigs being decorated by Irish artists and displayed in iconic Dublin sites, before being auctioned for the Foundation.

Beyond the Campus

Trinity demonstrated leadership with the launch of National College Awareness Week in November 2014. The brainchild of Kathleen O'Toole-Brennan, programme manager with the Trinity Access Programme, the initiative was launched by the Minister for Education and Skills, Jan O'Sullivan. Over 360 activities were held in schools and communities round Ireland, with the goal of celebrating the benefits of going to college, supporting students to become 'college ready', and showcasing local role models who attend college.



As part of Engineers Ireland's 'Engineer's Week', Professor Roger West from the School of Engineering visited St Oliver Plunkett National School with an engineering challenge: to build the tallest tower possible from a single broadsheet, capable of supporting an egg on top for five seconds, using only sellotape and scissors. The winning team got to leave hand-prints in an environmentally friendly concrete slab.

Online initiatives are part of Trinity's outreach activities, with staff and students encouraged to find innovative ways of disseminating knowledge online. Three showcase initiatives were launched this year:

— Inspired by coffee house culture, *KaffeeHouse.com* opens up access to the world's literary classics by allowing users to break through language barriers and connect with writers, publishers, translators and readers worldwide. The website was founded by two PhD students, Dr Emmett Tracy (Classics) and Dr Kevin Koidl (Computer Science), in collaboration with Dr Peter Arnds, Director of Trinity's postgraduate programmes in Literary Translation and Comparative Literature.

— The '1641 Depositions Bridge 21 website', aimed at second level students, was created by a team of Trinity historians in collaboration with educational innovators Bridge21. The 1641 Depositions comprise a collection of 8,000 witness statements taken during and after the Irish Confederate Wars and the Cromwellian conquest. The new website, which was launched by the secretary general of the Department of Education and Skills, Seán Ó Foghlú, contains 21st century learning activities to embed and contextualise the learning.

— Earth and planetary researchers from the School of Natural Science launched 'Beautiful-Mars' website in Irish to encourage budding scientists to learn about the Red Planet, and to engage school children with learning Irish. With a website, Tumblr and dedicated Twitter feed (@HiRISEIrish), this is the only Irish-language resource from an active NASA mission.

The Student Experience

“We provide a liberal environment where independence of thought is highly valued and where all are encouraged to achieve their full potential”.

This is Trinity’s mission statement, and our hope for our students is that they leave Trinity transformed, not only by their academic achievements but by their personal development.

The Trinity Student Experience strives to ensure that extra- and co-curricular activities are supported and integrated with the academic life. The Dean of Students, Professor Kevin O’Kelly, champions this and academic and support staff play a role in ensuring that graduates are prepared and willing to engage positively with society in all of its facets. Trinity wants students to be ambitious for themselves, to seek out every opportunity to develop intellectually, socially, creatively, physically, morally, and to become active citizens within their local, national and international communities.

The vitality and energy of the student body in rising to this challenge is self-evident. There are 48 sports clubs and 119 student societies with thousands of students involved in extra- and co-curricular activities.

→ Fundraising activities are an integral part of student societies. Raise & Give (RAG) Week 2015 was the University’s most successful to date.

RIGHT – Freshers’ Week





TOP LEFT – Students in the Trinity Long Room Hub

BOTTOM LEFT – SOFIA inaugural Ambassadors Ball

BELOW LEFT – At the launch of RAG Week 2015, Students' Union Ents Officer, Finn Murphy; Trinity Foundation Board member, Fergal Naughton; Provost, Dr Patrick Prendergast; and Co-chairs of Trinity Volunteering, Sarah McAvinchey and Tara O'Broin

→ The Trinity Student Experience strives to ensure that extra- and co-curricular activities are supported and integrated with the academic life.

This year saw the enhancement of the Dean's Roll of Honour for Volunteering with the introduction of three levels of recognition: the Dean's List for Volunteering, Dean's Leadership Award for Volunteering and the Trinity Legacy Award for Volunteering. The primary purpose of the Dean's List is to encourage student engagement and the primary purpose of the top two levels is to acknowledge students who have made a more significant contribution. Trinity recognized 107 students on the Dean's List with 60 students receiving the Leadership Award. In addition two students, Aoife Price of Headstrong and Gareth Walsh of the Volunteer Tuition Programme were recognized with the Trinity Legacy Award for Volunteering.

Fundraising activities are an integral part of student societies. Raise & Give (RAG) Week 2015 was the University's most successful to date. The event held in March raised over €23,500 in total, including a challenge grant of €10,000 matched funding provided by alumni donations. The aim of RAG Week is to raise awareness and donations for several worthy Trinity charities, in support of student education and engagement with society. The week is organised and run by the Students' Union and Trinity Volunteering.

The same month, an international gathering of diplomats attended the Society of International Affairs (SOFIA) inaugural Ambassadors Ball in aid of UNICEF Ireland. The event was the first of its kind in Trinity, and in Ireland. The purpose of the Ball was to raise funds for vulnerable children round the world through UNICEF, and to provide a space for students with an interest in international relations and foreign affairs to meet with diplomats.

In November 2014, 500 students participated in Trinity Med Day and raised over €46,000 for Trinity's teaching hospitals across Dublin, benefiting palliative care services, infectious disease investigations, prostate cancer research and Crohn's disease therapy research.

Clubs and societies enjoyed great success at national and international tournaments and awards this year. A small representative taster of these achievements include:

- Trinity Rowers won the annual Colours Boat Races on the Liffey;
- Trinity Hurling team won the Ryan Cup for the first time in their history and the Ladies Gaelic Football team won the Giles Cup, also for the first time.
- MathsSoc won the Maths intervarsities, in both the team and the individual sections;
- Both Trinity debating clubs, the College Historical Society (The Hist) — which is the oldest student society in the world, founded in 1770 — and The Philosophical Society (The Phil) had successful years, with the Phil fielding a finalist in the Edinburgh Cup. Both societies are sending reps to the World University Debating Championships in Thessaloniki in January 2016;
- Trinity was the outright winner of the National Student Media Awards, the Smedias, scooping ten awards at the ceremony held in April 2015. The awards received over 1,000 entries from student journalists, broadcasters and producers from all across Ireland.

The first Trinity College Dublin Irish Language Awards were held in April 2015 in Seomra na Gaeilge, Trinity's Irish language common room. The awards, presented by Minister of State for Gaeltacht Affairs, Joe McHugh, TD were given in recognition of the important and exceptional work being done by Trinity students and staff for the promotion of the Irish language. The Traditional Irish Music Society won the Student Society category while 4th year Law student, Fionn Ó Deá won the Individual Student award.

Trinity's An Cumann Gaelach student society and Irish Language Office were part of Comhrá '14, which broke the world record for the longest ever Irish language conversation. The event, which was run by Seachtain na Gaeilge, ran over a mammoth 169 hours.

Trinity's Online Education

This year marked the conclusion of the two-year online education pilot and the start of an exciting five year strategy to develop multiple online courses and initiate research.

Trinity's first online students from the Diploma in Applied Social Studies are graduating in late 2015, a significant milestone for online education provision in Trinity.

Online education in Trinity is led by the Associate Dean for Online Education, Professor Timothy Savage, who has been actively teaching and researching online learning in Trinity since 2002. Starting in September 2015, Trinity welcomed a new cohort of students to five fully online postgraduate courses in Social Studies, Dementia, Radiotherapy, Managing Risk, and Clinical Exercise.

These courses have been developed together with a new entity, Trinity Online Services Limited. Led by head of operations Thomas Aherne and senior multimedia developer Niamh O'Mahony, the team of ten instructional designers and multimedia developers worked with academics to convert content, teaching styles, and experience to the online space. Trinity Online Services provide a high quality student experience, as well as translating the Trinity education into online teaching, and driving research-led innovations in instructional design.

→ We believe MOOCs offer an opportunity to universities to disseminate research and excellence in teaching to a wide global audience.



LEFT – Dr Áine Kelly, Head of Physiology recording content for the Cardiovascular and Respiratory Systems online module



Timothy Savage describes the importance of flexibility in online learning: “Our online course offerings focus on the needs of the knowledge economy and lifelong learning by providing a high-quality Trinity educational experience to learners who require additional qualifications for progression within their existing career, or to start a new one. The flexibility of online education allows them to study while maintaining existing commitments to employment and families.”

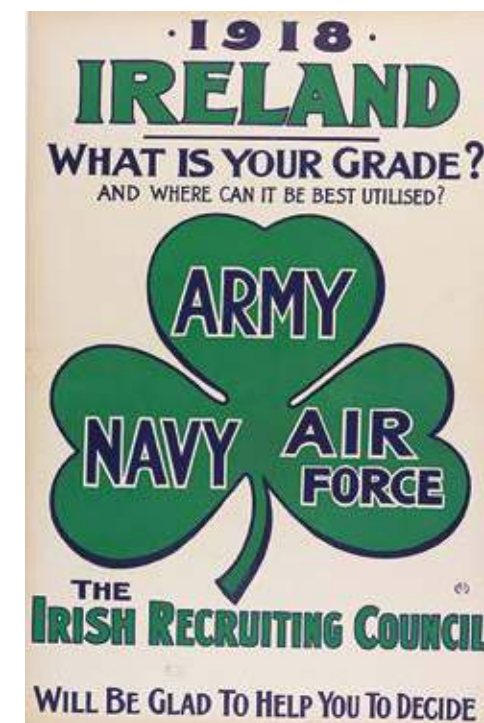
Alongside the five new online courses, Online Education continued its engagement with Massive Open Courses (MOOCs) in collaboration with Trinity academics and Futurelearn. The success of the ‘Irish Lives’ MOOC in 2014 led to another iteration of the course in March 2015. Over 11,000 learners took part in this free course delivered jointly by Online Education and the School of Histories and Humanities, bringing the total of registered learners on the MOOC to almost 30,000. To further align with the Decade of Commemoration, ‘Irish Lives’ will be available to more online learners in February 2016.

“We believe MOOCs offer an opportunity to universities to disseminate research and excellence in teaching to a wide global audience. A high-quality course raises the identity and profile of the institution and the academic staff delivering the course. It has a positive impact on the adoption of technology-enhanced learning within the institution.

MOOCs have the potential to fulfil diverse learner needs in areas such as informal learning, unaccredited continuing professional development, and the investigation of a potential area of study — plus they offer users the chance to experience the quality of teaching at a particular institution.”

The development of Trinity’s second MOOC is well underway. Led by the Professor of Medical Gerontology, Rose Anne Kenny, the ‘Positive Ageing’ MOOC aims to empower older adults to advocate for their health and well-being. A team of Trinity academics from the EngAGE Centre for Research in Ageing, in collaboration with Online Education, will showcase current research in ageing, and encourage learners to share their ageing experiences and personal strategies in a global online community. Population ageing is one of the major global demographic trends, and this course will appeal to older adults, family members and caregivers.

Research directs the vision for Online Education. “We are keen to drive innovation, and to adopt best practice design, implementation and assessment in the online learning space through research. This year we have undertaken research projects in online communities, MOOC learner behaviour, and with the School of Histories and Humanities on the impact of MOOCs on the humanities. We are also embarking on a longitudinal study investigating changes in teaching practice, learning outcomes, and perceptions of online education by lecturers.”



The University’s Strategic Plan 2014–19 commits to providing “technology-enhanced education to support student learning, develop innovative teaching strategies, and cater for the needs of 21st century learners no matter where they are around the world.” The courses and studies put in place for the delivery and research of online education are delivering on this commitment.

The success of the ‘Irish Lives’ MOOC in 2014 led to another iteration of the course in March 2015. Over 11,000 learners took part in this free course delivered jointly by Online Education and the School of Histories and Humanities.

New Professor Interviews

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08 Professor Jane Alden

Professor of Music (1764)

→ “As an undergraduate doing single honours Music in Manchester I couldn’t decide if I wanted to write about music or perform. I feel very lucky that practice-led research has become a part of what we do, so I have the good fortune to be able to continue to do both.”

Jane Alden, Trinity’s new Professor of Music, is talking about her career as an academic and musicologist — with particular interests in medieval manuscripts and in the experimental 1970s collective, the Scratch Orchestra — and about her London-based group, the Vocal Constructivists, who work with graphic scores (rather than traditional sheet music) and use no instruments, “only the human body, although we sometimes use the venue as percussion.”

Hers is an historic appointment: she is the first female Professor of Music since the chair was founded 250 years ago, and she is also the first holder of the chair in 20 years. It has stood empty since the previous Professor, Hormoz Farhat, retired in 1995.

Originally from London, she has spent the past 20 years in the US, most recently at Wesleyan University, a liberal arts college in Connecticut primarily dedicated to undergraduate teaching, which she loved, but she was keen to return to Europe to “be part of a lively postgraduate community”, to be near her group in London, and because “in the States, practice doesn’t yet count as research. My group was something I did in the summer; in Europe, there is more institutional support for academics as performers.”

She speaks admiringly of the many pioneering moments in the history of Trinity’s Music Department: “The appointment of Professor Farhat, who is himself Persian and a world expert on the music of Iran, was really historic”, while the Music and Media Technology Master’s programme, jointly established with the Department of Electronic and Electrical Engineering, is “a really amazing and successful example of interdisciplinarity”.

As an innovative and experimental performer, and a newcomer to Trinity from a background in an American liberal arts college, Professor Alden is alive to ways to maximise potential. She would like to see music become more part of “the broader

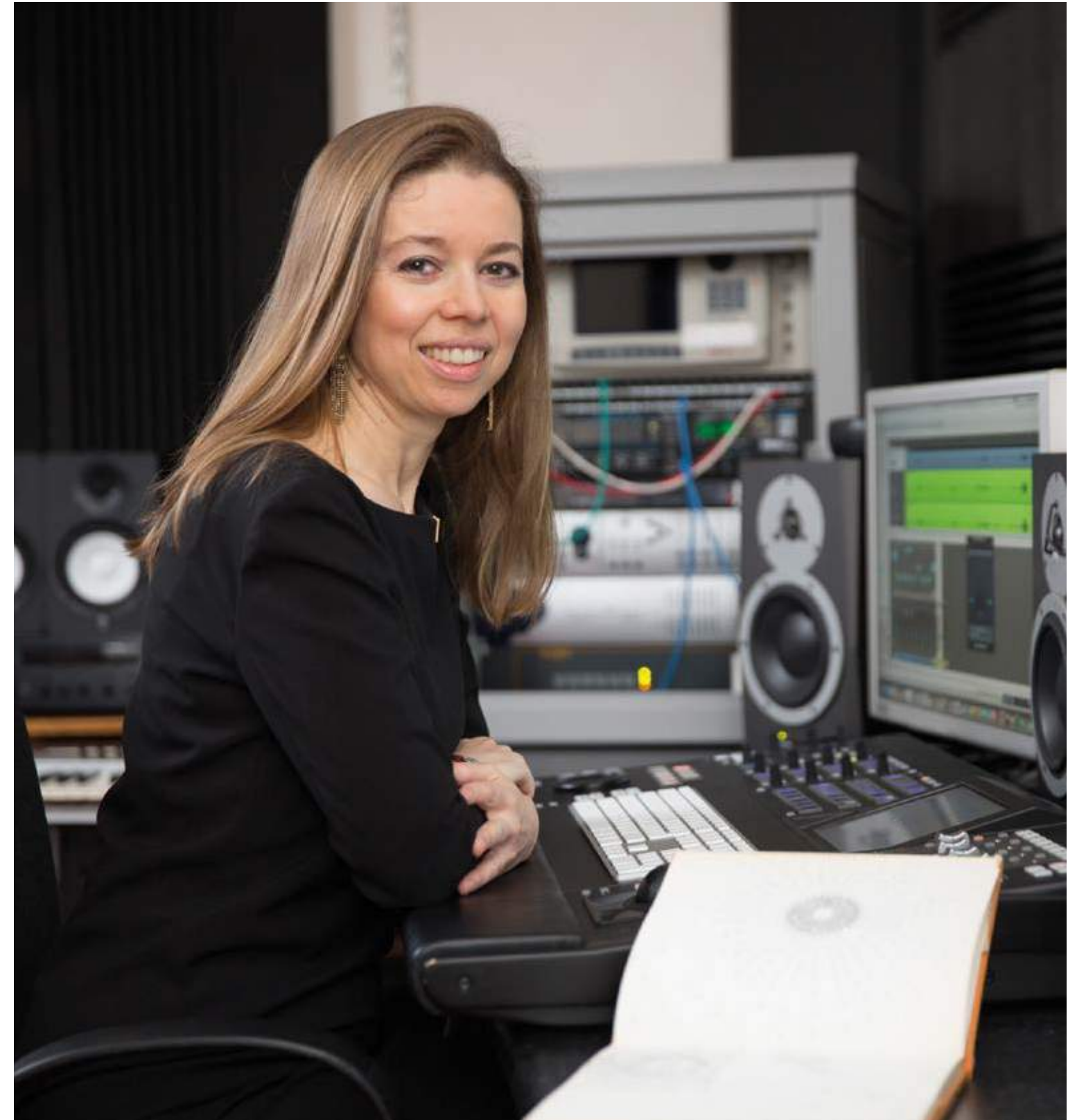
humanities discourse” — more melded into the Faculty of Arts, Humanities and Social Sciences, and to the college overall.

“Historically, in many universities, music has been somewhat removed from the mainstream. Due to the intensive background training musicians undergo, it could seem that students doing music were talking a different language. But that’s not the case anymore, as vernacular and popular musics increasingly figure in musicological discourse. Modern students are better able to share their practices and interests with non-experts.”

The Trinity Long Room Hub, the University’s arts and humanities research institute is, she feels, the ideal place to broaden the discourse around Music. She has started a lecture series, ‘Music at Trinity’, which is hosted in the Hub: “I like that people who are not musicians can come along and see that you can talk about music in the way you can talk about anything else.”

These discussions will help correct students’ perception of music as a ‘risky’ degree. “Music is as diverse as any other arts and humanities degree; it trains you in critical thinking and immersive research. It’s creative and there’s a technical aspect — students learn to take apart a piece of music and put it back together, which amounts to an engineering-type training. Graduates go on to do accountancy, arts management, law, medicine, public relations, all kinds of careers.”

Music is highly compatible with disciplines like history and literature — “we have a PhD student studying music in Shakespeare’s plays” — and education and social policy — “another PhD student has set herself the goal of changing government policy on choral education in secondary schools” — but also with science. “Eric Finch, Emeritus Professor of Physics, taught a very popular musical acoustics class, which I’d love to revive — though it would involve persuading him out of retirement.”



There are many links between music and mathematics and computer science, as well as natural sciences; she is delighted to be building links with the ‘Music and Health’ initiative at Tallaght Hospital, working with Professor Desmond O’Neill (Professor of Gerontology in Trinity) and Dr Hilary Moss (Director of the National Centre for Arts and Health), to provide opportunities for the many students interested in music therapy.

Currently students can take two subject moderatorships, but only within the Faculty of Arts, Humanities and Social Sciences. Professor Alden is used to the US model where music modules are open to all and “it’s normal for students to take courses across the curriculum” and she’d love to see Trinity enabling this. “It would involve fixed timetabling, but it’s not impossible.” She observes that students who go on to lucrative careers in law, medicine, or business, often recall their college music courses with affection, and that this helps shape alumni relationships.

Students who elect to do music come from a variety of backgrounds — some have spent years studying an instrument, others don’t have a formal music background. “The curriculum needs to help those who are less well-prepared, but actually in some ways students who don’t have a formal background are freer to explore. Often the more experienced ones don’t know how to move forward. I was one of those — it took a lot to make me work in areas where I wasn’t good.”

At school in London (Camden School for Girls), she was immersed in violin. “I did wonder if I should apply to Conservatory — I greatly admire the discipline involved — but I knew I wanted to write; I wanted to think, to sing, to research, to do more than play the violin. Manchester University was absolutely the right place for me.”

In Manchester she developed her interest in “the visual impact of musical notation”, which led to her focusing on medieval music manuscripts for her Master’s thesis at King’s College London, and doctoral work at the University of North Carolina at Chapel Hill, a leading venue for the study of music and manuscript culture. This was the start of her American odyssey, which took her to Stanford, Harvard, and eventually to Wesleyan University.

The composer Mark Applebaum was her colleague at Stanford, and she became very interested in his way of working: “It fascinated me to see a composer sitting there with the draughtsman’s tools my father used as an architect. When Mark makes a score, he mightn’t specify which instruments, or whether it’s loud or soft. There might be some gestures that can be interpreted melodically, but there’s much more

freedom. Certain composers are willing to hand over more decision-making to performers. Mark said there was no sound in his head — he wanted other people to find the sound.”

Professor Alden has performed Mark’s music with her group, the Vocal Constructivists: “We agreed between us how we would approach it, and no-one’s ideas were rejected.” The group are purposefully eclectic, including some who aren’t trained singers and can’t read music. This follows on from the ideas of the experimental English composer Cornelius Cardew, who formed the Scratch Orchestra in 1969.

“Cardew had a belief in musical innocence — that people who haven’t been encumbered by the limitations of a musical education would make the best music. He was influenced by John Cage, who said ‘listen to a sound, and if you find it boring, listen longer’. I’m interested in the discipline of what it means to do experimental music. Because it isn’t just ‘anything goes’, it’s ‘anything but anything goes.’”

Her commitment to the ideas of Cardew and Cage goes beyond performing; she is also writing a book on the Scratch Orchestra: “It’s important to do this now while I can still learn directly from Scratch Orchestra players. I’ve performed with them several times in the last few years — a rare and wonderful opportunity that will simply not be possible in the future.”

The Vocal Constructivists perform in unconventional venues, such as, in coming months, the iconic art deco Senate House Library in Bloomsbury and Freemason’s Hall, Dublin. She is looking forward to finding other such non-traditional concert venues in Dublin, for performances by students. “There are brilliant venues here, places like the Douglas Hyde Gallery, which have perfect performance acoustics, and atmosphere. One of our former students is now the organist at Christchurch, and I’d love to develop Trinity’s relationship with the cathedral, and town. A future collaboration might involve Trinity students performing a medieval drama in the crypt.”

Her primary goal at the moment is “to get more hires” for the Music Department. “We are very short-staffed. More staff will enable us to accept more students, start new postgrad programmes, and increase our presence on campus.”

After almost a year in her new role, she’s impressed by the level of cultural activity in Dublin — “it’s great to be in a city where there’s culture all year round” — but what she’d really like is for Ireland to celebrate music to the extent it does literature. “This country has an incredibly rich musical heritage, I’d love it if we could put on something for contemporary music with as high an international profile as the Dublin Theatre Festival. We have the talent, let’s find the will.”

Professor Mark Bell

Regius Professor of Laws (1668)

→ “Trinity is a unique combination — it’s large and internationally oriented yet it retains a real sense of community and closeness and collegiality”.

Mark Bell, recently appointed Regius Professor of Laws, is giving his impression of his first nine months as Regius Professor of Laws in Trinity, a chair established in 1668 and the second oldest in the University. “Colleagues have been incredibly welcoming — both within the Law School and the college. And I’ve enjoyed taking part in events with other disciplines. The Long Room Hub seems particularly good at enabling people to cross the boundaries of disciplines, something that’s important for my research.”

The Regius Chair of Laws is open to all fields of legal scholarship, and Professor Bell welcomes this freedom: “What’s particularly attractive about academia is that you pursue things that really interest you, and over time the focus of your research can change.” The “thread that runs through [his] research is equality”, but where he began in the 1990s looking at issues of migration, this has evolved to looking at “the nature of precarious work and the growth of insecurity in the workplace”.

Equality law lends itself particularly well to evolving research interests because “it’s an unfolding agenda”. He gives examples: “We’re now looking at protecting casual and temporary workers by applying principles of equality. Just because someone is temporary, do they not deserve similar working conditions to someone who is permanent? That’s a new way of using equality law, taking it beyond the traditional remit of sex and race.”

Another new area is mental health. “Under disability law, there’s a duty to make reasonable accommodation for disability in the workplace. Traditionally that’s been thought of in terms of measures like installing a ramp for wheelchair users but in relation to those with mental health problems, what are

‘reasonable accommodations’? Employees might benefit from mentoring, stress management, additional personal support, and flexibility in working from home.”

The issue is starting to gain prominence in the media and in public policy. It’s a rights issue, but also an economic one: “Mental health is one of — if not *the* biggest — reason for absence from the workplace, and it’s the main reason why young people move from work into dependency on welfare. Equality law is not the answer to every social challenge that arises, and it’s important to be aware of its constraints, but my interest is the role that law might be able to play.” It’s an area that benefits from an interdisciplinary approach and he has found the “work that the School of Nursing and Midwifery are doing around mental health” extremely useful.

He was born in Belfast and agrees that “growing up in Northern Ireland [in the 1980s], you do think about issues of equality and discrimination. Northern Ireland provides an example of a worst-case scenario of what can happen to society if issues of discrimination are allowed to embed themselves in institutions over years.” What particularly spurred his interest in equality issues was studying law in the University of Ulster in Jordanstown. “I was very fortunate in entering in the first year of a new programme — there was a committed and enthusiastic group of staff and a very small student cohort. Some of the members of staff went on to great prominence in public life, like Nuala O’Loan who became first police ombudsman and Brice Dickson, first head of the Northern Irish Human Rights Commission. It was inspirational to be taught by people like that, and the course left me with an interest in how law works in society.”

He went on to do a PhD in anti-discrimination policy in the European University Institute in Florence, and during those years did an internship in the European Parliament in Brussels, where he was attached to the civil liberties committee looking at the role of the EU in combating racism, which chimed with his research. He made connections in the European Commission and with NGO organisations in Brussels, which have remained useful. He is part of a team of legal experts who monitor the way in which EU non-discrimination law is being implemented in member states, and he has always worked closely with NGOs dealing with equality issues at national and EU level.

His first academic job in autumn 1999 was in the University of Leicester. “I knew very little about Leicester, but it was wonderful. It’s one of the most ethnically diverse cities in the UK and it’s seen as a success story in how an ethnically plural society can function. The Law School was large and also diverse — half the staff and students were from outside the UK. I was there for fifteen years and was Head of School, which gave me whole fresh set of challenges.”

When the vacancy was advertised in Trinity, it seemed a natural progression. He had maintained through the years an interest in legal developments in Ireland — “growing up in Belfast, you keep that connection” — and in the early 2000s had reported to the European Commission on Irish equality law. He retained a particular affection for Trinity after participating, as an undergraduate, in a summer school in 1994. “I spent an extremely enjoyable month in a room overlooking College Green. Belfast was then quite insular — in my studies all the students were from the North — so studying in Dublin with sixty US law students and seeing their different perspectives was eye-opening for me.”

After nine months in the chair, he’s finding the Trinity Law School and the students “very energetic and committed” and, as a teacher, he’s delighted about how engaged students are in EU law. “In Britain, public discussion of the EU tends to be negative, and of course the UK doesn’t participate in the single currency, and has opted out of a lot of justice and criminal law. All this changes the context of how you teach. Masters programmes on EU law have declined in the UK — if you’re a UK student today choosing which area of law to specialise in, would you opt for EU law? In Ireland, on the other hand, the relevance of EU law is unquestionable.” In Trinity, as well as contributing to research and teaching and to growing the Law School, he would like to get involved in local discussions and debates around how, as a country, we shape equality law and policy: “The city has changed dramatically and the social changes are huge. I’ve always engaged in debates around policy, and I’m sure there’s the opportunity to continue that here, to work with government and NGOs and participate in public forums.”

Meantime he’s getting to know the city he’s frequently visited but has never previously lived in: “I try to swim a couple of times a week — so far only indoor, but I live in Dun Laoghaire and I walk often to the 40 Foot so I will ‘take the plunge’. Having lived for so long inland in Leicester and even Florence, it’s been a real luxury to rediscover the proximity of the sea and the joy of walking the coastal line. When you’re visiting Dublin for conferences, you see it through the city centre, but in such a short space of time, you’re away from urban congestion and out to the open sea. That’s a remarkable characteristic, which not many capitals have.”



08

Professor Orla Hardiman

Professor of Neurology (2013) and Academic Director of the Trinity Biomedical Sciences Institute

→ “My interest in neurology wasn’t really driven by an interest in biology — it was driven by an interest in the human condition.”

At school in Coláiste Iosagáin in Dublin in the 1970s, Orla Hardiman had to join the boys’ class in the adjacent Coláiste Eoin in order to do Honours Maths. She didn’t mind that, but then she was faced with making the choice between History, Latin, and Physics, and that she did mind. Because she wanted to study medicine, she knew she had to take physics but “it nearly broke my heart to give up history — and I’d have also loved to do Latin.”

The curriculum that would have suited her broad interests has probably still not been devised. She sees absolute continuum between her love of history and her chosen career: “My interest in neurology wasn’t really driven by an interest in biology — it was driven by an interest in the human condition.”

This interest has fuelled a remarkable career in which she has developed multi-faceted skills as doctor, researcher, teacher, advocate, administrator, and manager. All of these talents will be required in her new role as academic director of the Trinity Biomedical Sciences Institute (TBSI).

Established in 2011 and located in a state-of-the-art building on Pearse Street, TBSI brings together hundreds of researchers from the Schools of Biochemistry, Immunology, Medicine, Chemistry, Pharmacy and Bioengineering to “facilitate cross-disciplinary research, some of it blue skies, some of it translational — the idea is to have a stream of very fundamental research moving into applied.”

The research coming out of TBSI includes investigations into diseases such as multiple sclerosis, Alzheimer’s, arthritis, diabetes, cancer, and Professor Hardiman’s particular area of research, motor neurone disease. Last year she and her Trinity team made headlines for their role in discovering

a new gene associated with motor neurone disease, and for their involvement in a large-scale genetic mapping project, called Project MinE, which will map the DNA of at least 15,000 people worldwide with the disease.

Professor Hardiman is only the TBSI’s second academic director — the first was immunologist Luke O’Neill — so these are early years for an institute which, she says, “has all the ingredients to be brilliant — with a bit of money and a bit of push”. She doesn’t underestimate the challenges — “the university sector in Ireland is threatened from a financial point of view, and raising money is really hard” — but she has made a career out of taking on pioneering projects, so she isn’t fazed either.

In 1984, fresh out of her BSc and medical degree from UCD, and a year’s internship in St Vincent’s hospital, she took the decision to specialise in neurology, then a nascent field in Ireland. “In Vincent’s I realised that I didn’t like the high-octane decision making of the emergency room. I could do it but I didn’t enjoy it. That ruled out a lot of disciplines in medicine. Neurology played to my strengths around physiology and data-driven forensic analysis.”

At that time Ireland’s main neurology unit was in the Richmond Hospital, then “very run-down but with a great sense of place”. After two years she left Ireland, having just married, for further training in Harvard. There she worked “with a guy called Bob Brown, a world leader in motor neurone disease, although my own area at the time was muscle disease. He was a great mentor and role model because he was very engaged clinically but was also a superb scientist.”



Combining these two — the clinic and the lab — has been her goal throughout her career. Returning to Dublin in 1991 — “we had two kids and another on the way and wanted to be nearer home” — she was awarded a Newman Fellowship by UCD and took up a position in the Physiology Department while continuing the cell biology work she had been doing in the States.

In 1996 she was taken on as a neurologist by Beaumont Hospital. “There was such a huge unmet need: we had to set up clinics — in migraine, multiple sclerosis, motor neurone, post-polio — and we had to build training programmes to bring up the next generation of neurologists, and there was a huge demand for patient-oriented services.”

To meet such needs she had to develop skills in advocacy, management, and human resources — this on top of doing five clinics a week. She took an advocacy course with the American Academy of Neurology, and won the Palatucci Advocacy Leader of the Year award — the selection committee commended her “tireless efforts on behalf of the neurology profession and patients in Ireland”. These efforts included putting together the Neurological Alliance of Ireland to combine the forces of different voluntary organisations because she felt that Ireland “needed a single voice in defining the needs for people with neurological disease, particularly chronic disease”.

Another area she felt strongly about was “finding ways to empower and develop the skills of my colleagues who aren’t doctors, like nurses, physiotherapists, occupational therapists, psychologists”. Medicine, she says, is “very hierarchical” and she’s never been comfortable with the view that “the consultant is at the top.” Rather, she feels that “each of us has different skills — synergistically we can work together to everyone’s advantage”. To this end she helped set up training programmes for nurses and physiotherapists to specialise in multiple sclerosis, migraine, or other neurological diseases, and she ensured that the neuro-psychology unit put in place in Beaumont was not under the governance of a doctor.

By 2007, she had been head of neurology in Beaumont for seven years and felt she needed a break. She had kept her hand in research-wise — in 2004 she and RCSI research fellow, Dr Matt Greenway, discovered a novel gene, angiogenin, implicated in motor neurone disease — so was well-positioned to answer a call from the Health Research Board (HRB) for clinical scientists. This led to her affiliation with Trinity — she became a clinical professor associated with the School of Medicine. She continued to do three clinics a week in Beaumont (down from five) and was on call. This changed last year when she was appointed Ireland’s first full Professor of Neurology so she is “now a Trinity employee who does clinical work, as opposed to a HRB employee who does academic work”.

She is of course a huge role model for women in medicine and academia. How did she manage to build a career while bringing up four children? “It’s really difficult. I tried to juggle everything like every modern woman does. Women who have fulltime jobs and children feel guilty, and I feel as guilty as anyone.” She did the school runs and the bedtime stories — “I’d fall asleep on the bed with them, and then wake up and go back to work.”

And she has even managed to pursue other interests outside medicine. She remains what she calls a “historian manqué” with a particular interest in the late Roman Empire, the early church and the Reformation. For holidays she likes to visit classical sites: “A few years ago I took my youngest daughter on a trip of the eastern Mediterranean — I was really happy, she was really bored!”

She comes from a family of musicians — her brother is the composer Ronan Hardiman — and she played the flute for years before switching to the clarinet. She is also learning Spanish to communicate better with colleagues in Cuba; and she recently got engaged to Gerry McNamara, Professor of Education in DCU, having divorced from her first husband in the early 2000s. “I’ve a friend who says I reinvent myself every ten years,” she says wryly.

Academic director of TBSI is certainly a good position for someone who likes a challenge. Her priorities are: first, to raise money, which she knows won’t be easy but she is hugely appreciative of the Trinity Development office and also of the Research and Innovation office for their expertise with finalising grant applications.

Secondly she wants to build up clusters of research to drive forward for the next funding rounds: “Trinity bats very high globally in fields like neuroscience, immunology and genetics — we want to bring that level of expertise across the disciplines and build up three or four high-octane clusters of research positioning us to be competitive at the interdisciplinary as well as the individual investigator level.”

And thirdly, she wants to look at the use of space in TBSI and work with colleagues to maximise it. “I come from a place [hospital] where space is very important.” Maximising space will include creating an area for “down-time knowledge exchange for students — somewhere they can chat and hang out, where ideas are developed.”

That’s three clear priorities — are they achievable in her three years as director? True to form, she quotes not a doctor, but Martin Luther: “Here I stand, I can do no other”.

Professor Douglas Leith

Professor of Computer Science (1990)

→ “It turns out we’re not as individual as we might think. At the moment, the way recommender systems work is that they gather information regarding our individual likes and dislikes and use that to make predictions e.g. what movies we might like to watch or what search results are likely to be of interest.”

“But the research we’re doing suggests there’s no need for all that — you can get better or comparable performance using group demographic methods. So, for instance, if you’re an Irish man in your thirties and you like football, well with that information we can already make some recommendations that are useful because your needs and interests will be similar to others in your demographic. This has obvious implications for data privacy.”

Professor Douglas Leith, recently appointed Chair of Computer Science in Trinity College Dublin, is talking about the research he’s doing on data privacy in the online world. It is, he says, “a funny old subject” because “on the one hand, in surveys users often insist that privacy is very important to them but on the other hand, they’re not really changing their behaviour or opting out of things.”

It’s the technical end he’s involved in but his research will be of interest to those on the legal and ethical side. The tools he’s developing aim to give people new options for using existing online services in a more privacy-preserving way — just now the available options are often limited to either not using a service or to giving up control over personal data — and he wants to “create a middle ground with the ability to deliver a good service without users having to entirely give up on privacy.”

Research is still tentative but “there’s loads of interest from online businesses. They understand consumer concerns and the PR battle for public opinion, so if they can get good options which don’t compromise quality of service, of course they’re interested”.

He is delighted to be pursuing this research in Trinity, which is “strong on networking through the national centre CONNECT” and good at building “valuable partnerships with industry”.

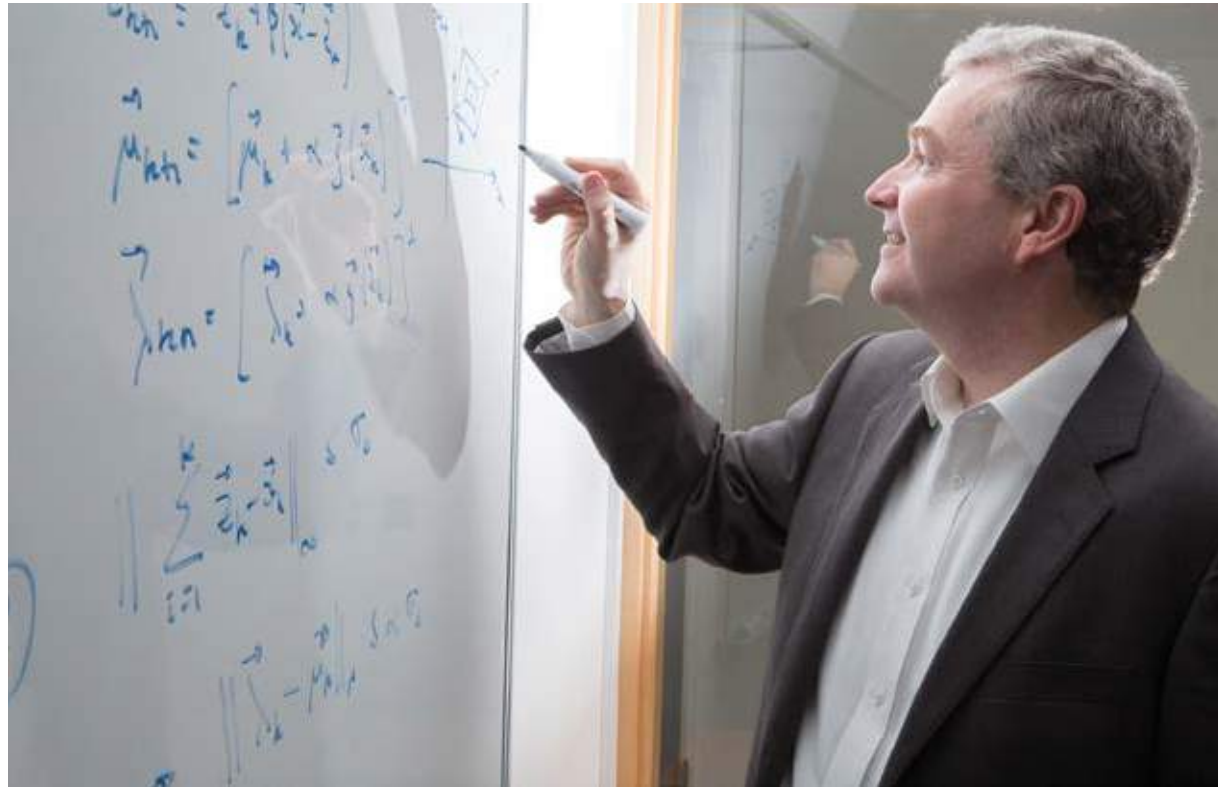
He comes to Trinity from the Hamilton Institute in Maynooth University, of which he was founding director. He arrived in Ireland from the University of Strathclyde under the first round of SFI PI grants in 2001 and, together with colleague Robert Shorten, set up the Hamilton Institute, an applied maths institute aimed at providing a bridge between maths and its applications in ICT and Biology.

“It’s the combination of maths with real world applications that allowed us to do really significant work.”

It’s a combination that comes naturally to Professor Leith. “I grew up in the 1980s during the microprocessor revolution and the move from mainframes to PCs. At school I really liked programming but I also liked building things so I decided to do a joint computer science-engineering undergraduate degree in Glasgow, where I’m from.”

He stayed on at the University of Glasgow to do his PhD in statistical experiment design and then spent a few years in Australia “just chilling and travelling around” before returning to Scotland to the University of Strathclyde where he worked on control of wind turbines — “in the middle of that I got Royal Society funding, which is a bit like winning the lottery — it allowed me to focus on research”. By the time he moved to Ireland this had morphed into work on control of networks generally.

From just a couple of researchers in 2001, the Hamilton grew to eight faculty and 45 full-time researchers in 2008, and it has been involved in research areas ranging from the Next Generation Internet to Systems Biology and in initiatives such as the Network Maths graduate programme. Professor Leith is proud of his directorship but was ready for a new challenge when the Chair arose at Trinity.



Since he always lived in Dublin and commuted to Maynooth, changing universities has not involved much family upheaval. His three children are continuing in their schools and he now has the pleasure of cycling to work. “Cycling is one of the activities I really enjoy, together with hiking and mountain climbing. I’ve walked most of the peaks in Ireland, and I cycle up to the hills when I can. One of the things that’s great about Dublin is how easily you can escape to countryside.”

The Hamilton is a postgraduate institute, so he’s enjoying the return to teaching undergraduates in Trinity. “The students here are excellent, really high quality. Already we’re the second largest School in the University with 68 faculty, and demand for student places continues to be very strong.”

Industry collaboration is important for his research. An area he’s currently very interested in is improving wireless networks: “Interference between wireless networks slows connections down so managing that is a fundamental. We’ve been working on a whole bunch of things related to the convergence that’s currently happening between the cellular network and the WiFi/hotspot network.”

He’s collaborated with Muriel Médard in MIT to commercialise some of this research via two start-ups, Code On Technologies and Speedy Packets — with founders from MIT and Caltech — to improve the performance of fundamental network protocols such as TCP/IP over wireless networks, using software which he has developed. The improvements are, he says, “really dramatic — and there’s some nice new maths underlying the software.”

He is happy that the “fundamentals for IT” are now good in Ireland. “IT and computer science is recognised as being economically important so there’s political will behind it”. Historically, there has not been significant industry R&D here but “over the last eight or ten years there’s been a drive by the IDA to attract R&D into the country and that’s really worked, with big companies now setting up research labs and actually doing their R&D in Ireland.”

It is, he concludes, “a really exciting time for IT in Ireland, and Trinity is very well placed to take advantage of it.”

Professor Richard Layte Professor of Sociology (1974)

→ “How does social inequality get under the skin and affect your health? I’m currently working with genetic epidemiologists and biologists, looking at the different pathways through which social and economic circumstances impact on later health inequalities between groups.”

“We know that some people are ageing much quicker than others, and we know that income, social class and education are major structuring elements to health and life expectancy, but what we don’t yet know is why.”

Richard Layte, newly appointed Professor of Sociology, is talking about his new research project, LIFEPAATH, funded by the European Commission’s Horizon 2020 programme and bringing together a consortium of social scientists and natural scientists from institutions across Europe and in the US. They know, says Professor Layte, that early development has outcomes for later health: “The capacity-building phase, from conception to age 26, when your development peaks, sets the pathway that you’re going to follow. If you reach a high peak by age 26, your subsequent decline will be shallower. We know this but we don’t know how or why. Is it a question of a critical early period, say in the womb, when the pattern is set? Or does a drip-drip-drip accumulation of deprivations over years lead to physiological wear and tear? Or is it the particular social pathways you follow that push you in a certain direction?”

The aim of LIFEPAATH is “to provide relevant evidence to underpin future policies and strategies for the promotion of healthy ageing”. Trinity is an important partner because it leads the longitudinal interdisciplinary studies, Growing Up in Ireland and TILDA (The Irish Longitudinal Study of Ageing), which are collating “really vital data” on health and social circumstances, at both ends of the lifecycle. Professor Layte is involved in both studies and is one of the directors of Growing Up in Ireland. His involvement started before he came to Trinity — he was one of the team in the Economic & Social and Research Institute (ESRI) who sat down in 2000 to set out the terms for the study and persuade government it was worth investing in.

He joined the ESRI in 1998, after completing his PhD in Oxford University on the division of domestic labour and its relationship to paid work in families. “What my PhD is about, in essence, is the interaction between paid work and unpaid labour, and the way families decide to allocate their time. From there I started looking at labour markets, unemployment, and the structure of poverty deprivation and social exclusion. When I came to Ireland I wanted to combine that with health research — health as an outcome of poverty and exclusion.”

His work has always been interdisciplinary — “My PhD brought together economics and sociology, and now I cross lines between social science and medicine”. He’s delighted to have come to a university with such a strong emphasis on interdisciplinarity, but he doesn’t underestimate the difficulties: “Different disciplines have different ways of triaging a problem — economics has one way, sociology another, medicine another — so they use different languages and techniques. And each has a favoured methodology. If you don’t satisfy another discipline’s methodology, they think you’ve done it ‘wrong!’”

Unsurprisingly, after spending 17 years in an organisation whose main objective is the improvement of Irish public policy, Professor Layte believes that social scientists should try to communicate the implications of their research for policy development. “Sociological research should influence public policy, and in well-functioning societies it does. But there can be issues around perspective: academics, like me, tend to see the world via formalised analysis with a lot of numbers and statistical analysis, but that approach mightn’t work for policy makers who prefer flesh and blood examples and case studies. You have to find accessible arguments.”

Ideally, “the research we do should go both ways: policy makers have to tell researchers what they’re interested in finding out, but researchers have to tell policy makers what’s important in terms of outcomes. Policy makers might assume, going on certain data, that they should adopt a particular policy; but then we might come back and say not necessarily because we’ve looked and that could have this result... That interchange has to go on but it can be difficult.”

As he talks, it appears that the art of sociology is never jumping to conclusions. It clearly takes rigorous training and methodology not to do this. Throughout a discussion ranging from town planning to social networking to caesarean sections, one’s mind can naturally leap to conclusions only to be brought back to consider other possible permutations or causations. It’s easy to see why, as he says, sociology is such a popular third-level choice for students. “It allows them to engage in understanding society and being critical of it, because sociology by its very nature suggests that there are things we can do differently and better.”

His own interest in sociology may, he feels, have something to do with his upbringing in a town that was a kind of sociological experiment: “The town I was brought up in, Stevenage in Hertfordshire, didn’t exist in 1945. It was a new town, established by Stevenage Development corporation, and growing up I realised that our town wasn’t like other places. It was great in lots of ways, really well-designed — you could cycle anywhere without crossing a road, there were no traffic lights, just roundabouts — but I sensed that something was missing that was important.”

What was missing, he realised when he studied sociology was “a sense of community. The people who were there had all arrived from somewhere else, so the town didn’t have community structures. People had friendships but they didn’t run deep. When I would visit North London, where my parents are from and my relatives are, I could see that there was history there and structures that had existed a long time.”

He has now lived in Dublin for 17 years, and all three of his children were born here. His wife — also a sociologist with the ESRI — is Irish. The experience of his own children growing up is, he says, very different from his own. “Family and social networks are tighter in Ireland and this has real consequences in daily life from the importance of family supports to the role of reputation”.

He enjoyed working in the ESRI, and the period he was there was particularly interesting: “When I arrived in the late 1990s there was very little data, and almost no longitudinal data. Since then we’ve built up loads. The government has invested strongly. For instance €24.7 million was put into ‘Growing Up in Ireland’ for the first tranche, and €16 million for the second. We need to make sure this value is returned to Irish society in terms of better outcomes for all children.”

Because Ireland came to longitudinal data later than other countries, “we can benefit from their experience as well as carrying out comparative studies which can provide valuable insights.”

After 17 years with the ESRI, he was ready for a change. He had already been adjunct professor with Trinity so he knew the department. He’s enjoying “engaging with enthusiastic young people. It’s great to get their sense of the world, and really interesting because they’re experiencing such different things to me.”

In terms of the department, he would like to see growth. “At the moment we have the highest ratio of any School between staff and students, which is partly a function of our popularity but we certainly need more staff. And it’s important we grow in the right way so that there’s a balance of disciplinary subject matter amongst staff.” Growth should include more high quality PhD students: “We need to create more feeder channels to take in excellent students from other universities.”

He is also looking to “find ways and practises which encourage social mixing, with people mixing more and working in a coordinated way — within the School, and across Schools.”

In terms of his own research, in addition to LIFEPATH, he is currently looking into the way that “the institutional macro-economic structure influences health and social trust” as well as two other funded project for the Health Research Board: one on trends in socio-economic differentials in mortality patterns over time, and a second on the reasons for variation in levels of caesarean section across Irish hospitals and the impact that this has had on trends — “caesarean sections in Irish hospitals have more than doubled since 1991 — I’m asking why and what are the consequences”.

All his research is “geared towards the primary goal of sociology — understanding the way in which the interaction of people in groups — families, communities, countries — influences behaviour and ultimately well-being”.



08 Professor Andrew Burke

Dean of Trinity Business School & Professor of Business Studies (1979)

→ “It always struck me that business schools in Ireland haven’t realised their full potential. In the UK I worked in two top-tier business schools, and I’d think ‘there’s no reason why Dublin shouldn’t have at least one at this level, especially when a city like Barcelona has two’.”

“You take Warwick: it’s not located in a major hub; the University was only founded in the 1960s, and yet the Business School grew by being entrepreneurial and now it’s consistently ranked in the world’s top 30 or 40. Given Dublin’s advantages, there’s no reason why a School here can’t achieve what Warwick has... Then Trinity announced their global growth strategy for their Business School, and I just thought what a brilliant opportunity.”

Professor Andrew Burke is explaining why he left the Bettany Centre of Entrepreneurship, which he founded at Cranfield School of Management, to return to Dublin in January to become Dean of the new Trinity Business School and Chair of Business Studies.

Originally from Dublin, he’s a UCD graduate in economics, and a postgraduate of London School of Economics and Oxford University. He started his academic career lecturing in Trinity but soon moved to the UK and switched disciplines from Economics to Management — “I wanted to make an impact on real business and work with companies and students who were interested in entrepreneurship”. He was instrumental in driving innovation at business schools in three universities — Edinburgh, Warwick and Cranfield, and he “wasn’t homesick” but was “looking for a new challenge” when Trinity presented its “once-in-a-lifetime opportunity”.

He lists Trinity’s advantages: “The location is second to none: we’re bang in the centre of a world-class city, surrounded by cutting-edge international management in financial services, tech industries, the public sector, retail, professional services and cultural industries. The University is internationally-renowned and our graduates do really well on the job market. And Trinity is the only university campus

listed in the Lonely Planet’s Top 500 places to see in the world, which makes us unique. That’s what I mean by a sleeping giant. Lots of the business schools who are now in the Top 50 started without these advantages and achieved their success in a generation of faculty.”

A highly-ranked Business School raises the performance of the whole university: “You look at the top universities and they all have a leading business school — so MIT has Sloan, Penn has Wharton, Cambridge has Judge, Harvard has the Harvard Business School...”

He puts it succinctly: “High performing universities in famous cities usually have leading global business schools so why shouldn’t that be the case in Ireland?”

He thinks that, when it comes to business research, Irish business schools have lacked focus. “They haven’t engaged strongly enough in the international arena — their research too often appears in places that wouldn’t be read by international scholars, or it’s not the type of research that international scholars rate. In the global market, business schools are clear about the research they value and the publications they read. You need to be publishing in the *Harvard Business Review* and the *Journal of Management Studies* and similarly ranked journals.”

The research agenda is critical but must be balanced with delivering an excellent, innovative education for students. Trinity has a strong track record in education: “Some universities have gone too far with their focus on research, to the point that students are getting ignored, and people are being promoted who haven’t a track record of excellent teaching or innovation. In Trinity we are clear that we want to deliver all three.”



The new Business School will be strongly centred on students, with the focus on career building, personal development, and educating for ethical thinking. “To really put an emphasis on students’ careers, you need faculty who are at the cutting edge of research and industry. We already have a track record in this area and want to extend it further. We have courses which are co-created with industry — for example, our undergraduate entrepreneurship course is designed and delivered by a leading entrepreneur and researcher of entrepreneurship. That’s quite unique — we will be adopting this approach much more across our programmes.”

At the same time, the School will pay close attention to students’ well-being and personal development. “There are huge stresses involved in management and entrepreneurship so students need to be made aware of this and familiarised with the means of reducing and managing stress. We need to ask our students questions such as: how will you feel about implementing a strategy that costs people jobs? How will you cope, mentally and physically, with the strain of managing a high risk / high growth new venture? Business Schools are good at addressing the financial and business risks, but we should also get students thinking about personal consequences, and provide a safe learning environment where they can explore the boundaries of their managerial capability.”

He is fascinated about the importance of developing a moral compass. “For the first time, there is a generation of students joining university who have not had religious education at school and one consequence is that if you ask them to define the borderline between right and wrong, or ethical and unethical, they often struggle — it’s not on their radar. We’re lucky in that Trinity is multidisciplinary — we can bring in scientists to give an understanding of the actual environmental damage caused by some managerial decisions, philosophers who are experts in ethics and sociologists to talk about social impact. The aim is to get our students evaluating a much broader range of performance indicators which embrace values — in general, encouraging our graduates to put in more than they take out.”

Underpinning this ethical sense is “intellectual rigour”. For too long, he says, “business schools over-relied on case study learning which tends to skim over rigorous theoretical analysis — they would recommend ‘rules of thumb’ that apply to current business situations but unfortunately, when the real world changes, rules of thumb often don’t work. You need to have a good grasp of theory to figure out what new rules apply to the new environment. That was certainly a factor in the financial crisis.”

Close engagement with industry will inform the School’s education and research programmes. “We know that

businesses are looking for combined skills — say computer science with business knowledge, so we’re developing more ‘management plus a non-business discipline’ courses. Trinity’s interdisciplinary approach lends itself to that.”

Research will be strongly industry-focussed: “We want to keep research relevant to real businesses or to public policy, so that it has impact. It’s getting to the stage where entrepreneurs and CEOs look at research coming out of universities and conclude that it doesn’t shed new light on what’s happening for them.”

He gives an amusing example: “The term ‘effectuation’ was developed by academics in the mid-2000s to describe the way that businesses develop and innovate on a trial and error basis. Fine, but that was already known in the real world and it was well-documented. The new vocabulary made it seem like novel research when it wasn’t. That just makes CEOs question what the value of research is to them. We want to do research that adds value. And then we want to get the message out. If you write a great song but no one hears it, what value does it have? Researchers should take responsibility for promoting their research — the academic equivalent of doing gigs and getting on the road.”

Professor Burke, it turns out, used to be in a band - “blend of 1960s and punk rock, kind of Britpop before the term was coined” — hence the music terminology. He has almost no time for music now, nor for his other passion, rowing (he won Torpids blades with Balliol while at Oxford University). He sailed when living in England and is hoping next year to get one night a week sailing in Dun Laoghaire, but since he arrived in Trinity, it’s been non-stop, at work obviously and also at home. “We had a second daughter in March — so yes, changing jobs, changing countries, changing a business school and changing nappies — quite a year!”

Planning permission has been granted to build the new Trinity Business School on the site of the old Luce Hall, beside the Science Gallery. The state-of-the-art building — complete with rooftop conference room and space for prototyping and company incubation — should be up in a few years, and the planned expansion “to double student numbers [to 1800] and increase revenue by 150 percent” he estimates at “between five and seven years”.

Given the ongoing funding crisis for Irish universities, is this achievable? “The old model of state-funded universities in Europe is being replaced by fees and philanthropy. Trinity has been impressive about engaging alumni. We need to grow awareness that if you gain a lot from your Trinity education then you should put something back in so that more students can get the same opportunity in the future.”

Professor Seamas Donnelly

Professor of Clinical Medicine (2001)

→ **“Trinity invests in people — other universities can be seduced to putting all their efforts into investing in the latest technology. The problem with this is the current ‘latest technology’ has a limited shelf life. Investing in bright people does not.”**

“Trinity invests in bright people, and builds critical mass of scientific inquiry around them. That, for me, is very attractive and one of the reasons I wanted to come here.”

Seamas Donnelly, recently appointed Professor of Clinical Medicine, is enthusing about the opportunities for quality teaching and interdisciplinary research in Trinity, particularly in his field of immunology and translational medicine. “With the recent award of the Nobel Prize in Medicine to Bill Cambell, a Trinity graduate, it reinforces the excellence of the teaching and research being done here at Trinity.”

These are challenging times both within the university and healthcare sectors. He sees the Chair of Medicine playing an important national role in advising on health policy, medical education and broadening the investment in research.

He welcomes these challenges — indeed he went into medicine for the diverse challenges and opportunities it offers in “patient care, research, teaching, public health, global strategizing” and he’s “never regretted it”. His background is steeped in medicine: his grandfather was a doctor, his father is a doctor — a rheumatologist in Galway — and all his four siblings went into medicine. “But round the dinner table we don’t talk about medicine at all — its more history, politics, current affairs with a little bit of sports thrown in”. His father provided good guidance: “When I was sixteen I said I was thinking of becoming a doctor and he said ‘okay, work on the geriatrics ward this summer as a nurses aid and we’ll

see how you go’. Anyway I loved it — I loved chatting to the old people, hearing stories about the history of Galway, and that was it for me.”

He did his undergraduate degree in University College Galway, and was then in the University of Edinburgh for ten years, focusing on respiratory medicine and funded by the Wellcome Trust. This included a period in the States, in the Picower Institute, just outside New York. He returned to Ireland as a clinical professor in UCD and was there ten years until his appointment to Trinity.

His research lab is in the Trinity Biomedical Sciences Institute (TBSI), where he focuses on “diseases caused when inflammation goes awry, we investigate key pathways that cause diseases such as arthritis, inflammatory bowel disease, asthma, cystic fibrosis — we then devise potential therapies targeting key components of these important pathways”.

His research has always been interdisciplinary — “no matter how good you are, you get better by linking to others.” Interdisciplinarity is, he says, “always a challenge for universities” but TBSI has the advantage of bringing together researchers from different Schools — Biochemistry and Immunology, Medicine, Chemistry, Pharmacy and Bioengineering — and locating them on-site. “Working at Trinity with Padraic Fallon, Andrew Bowie, Luke O’Neill — it’s a great melting pot of ideas and scientific enthusiasm”.

He loves being in the lab: “to see a young PhD student as they mature, use scientific thinking, and then start to get it, begin to have their own ideas — it gives you a great buzz”.

Teaching is particularly important to him: “I’m very proud of the medical teaching I’ve done in different universities, and the work I’ve put into expanding and modernising medical curricula”. He was delighted recently at a conference when a former student from Edinburgh came up to say that he remembered so well his first tutorial on the wards.

In his clinical teaching, Professor Donnelly is concerned to impress on students the importance of seeing the patient as a person, first and foremost, not as a collection of symptoms. This is something he puts into practice in his own clinic — “little things are important, like shaking hands, remembering the patient’s name, inquiring about the family”.

A university’s most important role is “educating quality doctors that are a credit to the university, and to themselves.” He talks about what makes a quality doctor: “By definition all our students are smart, but so much more is involved. You have to be prepared for hard work, which means you should like what they’re doing and want to succeed. The ability to think on your feet, that’s very important. Being able to join the dots, that comes with experience. And empathy, that’s key. So much of being a good doctor is being a good listener, and leaving your arrogance at the door, because it’s not about you.”

Can you educate people to be more empathetic? “We can assess empathy and then try to improve it. It’s a challenge, and it obviously helps to be naturally empathetic, but we can provide templates that help improve empathy.”

Because teaching “is the bedrock of what we do”, he cites “maintaining and improving quality teaching” as one of the main priorities for the School of Medicine over the next five years, but he knows that “in a constrained budgeting environment, it will be challenging”.

Another priority is “to maximise interdisciplinarity so that we can compete externally for large-scale funding. The challenge for the School, as for the University as a whole, is to coordinate the skill-sets out there, in a focussed way that allows us to continue to do the good research we’re doing. There are opportunities in Ireland in Horizon 2020 and other funding programmes — it’s a matter of Front square scientists coming together and batting for Trinity.”

His other goals concern his personal research — “I want to be a catalyst that brings disparate groups together” — and he’s conscious of his role as a doctor — “I want to maintain and improve clinical services and be an advocate for the hospital network and for patients in relation to cutbacks. In a constrained budgeting environment, we need to look at what we’re doing well, and what not so well, and ask what the patient needs. Sometimes that’s lost under other pressures.”

Outside work, he relaxes with the family and has a keen interest in sports, particularly basketball. “I have coached club, provincial and Irish teams. I played basketball growing up and was drawn back to the game by my daughter when she was five or six — this led me to coaching her club team for a while, before I began coaching Leinster, and I’ve just finished my second stint as coach of an Irish national team.”

He also helps out with Trinity Basketball Club — “this year the Trinity ladies won the “A” Intervarsities for the first time” — and has been involved establishing a Trinity community basketball outreach programme aimed at primary schools in the city centre: “It’s gone from strength to strength and we hope to develop Trinity’s own underage basketball teams, and going forward ideally align them with the Trinity Access Programme”.

He sees continuum between all his activities — the clinic, research, teaching and community basketball — “It is all part of giving a little back to society”.



08 Professor Eleanor Molloy Professor of Paediatrics and Child Health (1960)

→ “At the moment paediatrics is fragmented so combining on one site will have huge advantages for services. The seven universities in Ireland are collaborating to create a harmonised national paediatric curriculum and to develop paediatric research in Ireland.”

Eleanor Molloy, recently appointed Professor of Paediatrics and Child Health in Trinity, is aware that there have been controversies around the proposed new children’s hospital in St James’s — the delays, the choice of site — but she sees the positives: the hospital will unite the country’s paediatric expertise in one place, providing opportunities for enhanced patient services, translational research, and improved collaborations.

At the moment, she explains, there is “really impressive research into child health being carried out in Irish universities and hospitals”, but in the absence of a unifying body, it’s disparate and not always easily accessed and so bringing all strands of paediatric research together is an important goal in the future.

The new hospital and planned national paediatric networks should also help improve advocacy: “In a UK audit, it was shown that while for many areas of medicine, funding has massively increased, in paediatrics it has been static or has actually decreased.”

This is surprising to hear because what could be more urgent — and easier to sell — than helping sick children? “I know. It’s hard to say exactly why. But at least now there’s growing awareness that paediatrics is under-funded, and with this new hospital acting as a national hub we’ll be able to map the issues much more effectively.”

Will the new hospital help locate her in one place? She’s head of department in Trinity; has clinics in Tallaght, the

Coombe, and Crumlin; and to teach she “follows the students” round these three hospitals and Temple Street. So on any one day she could be between three or four places. The new hospital may cut out some travel but she’s reconciled to this way of working between places, and is used to flexible hours, something that’s necessary in her specialisation, neonatology.

Neonatology is the care of critically ill newborns in intensive care due to multiple reasons including prematurity, infection, or congenital abnormalities. It involves, she explains “collaboration with all the child health specialties in the initial care and follow-up of these infants. Major scientific advances over the last 20 years have significantly improved survival and outcomes.”

She has experience with three Irish universities and numerous Dublin hospitals. After completing her undergraduate degree in University College Cork, she worked in Crumlin and the Coombe and did her PhD in UCD (on perinatal inflammatory responses). This was followed by a fellowship in University Hospitals of Cleveland in the United States. She returned to a consultant job in Holles Street and to teaching in UCD and the RCSI, before taking up her role in Trinity and in Tallaght hospital. Such broad experience of different institutions is “very helpful now that we’re harmonising paediatrics training across Ireland and mapping our research — it’s useful to have worked in so many places, and to understand their structures.”



She's been in Trinity just over a year, and finds it a stimulating environment in terms of teaching and research: "The students are very engaged — they've started a Paediatric Society which has been very successful in raising awareness of child health as a career, and in interacting with the Youth Advisory Committee who represent children in hospital."

She's enjoying taking the opportunity to meet people across the university to talk about child health: "Trinity is so interdisciplinary and that's really important for paediatrics."

Professor Trevor Spratt, Director of the Children's Research Centre in Trinity has created a Children's Forum to create cross-disciplinary groups and develop a children's research strand across the University. Because of large-scale research projects like 'Growing Up in Ireland' and the 'Irish Longitudinal Study on Ageing' (TILDA), Trinity has the potential, she says, to develop "a lifecycle strand connecting maternal, neonatal and children health research to adult outcomes. The ability to follow through and tie it all together could be harnessed as a real Trinity strength." Given Trinity's expertise in immunology, genomics and neurosciences, there are great potentials for research collaboration.

It's not only Schools in the Faculty of Health Sciences that she's connecting with: "We're delighted that Amanda Piesse from the School of English will teach our students. It can be difficult looking after sick children and communicating effectively — Amanda is an expert in children's literature and she'll use narrative to show our students how children see themselves." The undergraduate programme also teaches Ethics and Law in Child Health, which presents opportunities for collaborating with the School of Law.

Her own research specialisation is neonatal brain injury — "How can we alter inflammation in newborns, and what effect does inflammation at birth have on longer-term child development?" The facilities and expertise in Trinity's Institute of Neuroscience (TCIN) give the opportunity "to explore neuroimaging and neurophysiology as well as neurodevelopmental outcomes in infants with brain injury to find the most successful interventions."

She has found the research of colleagues particularly useful. "Luke O'Neill is doing fascinating work into how

immune functions are affected by circadian rhythms, and that's really relevant because we've found that if there's brain injury at birth, it takes much longer for babies to settle into a normal sleep wake cycle, and that may affect their immune responses."

The aim is "to promote translational research in paediatrics and child health enabling basic science discoveries to reach the outside. We are mapping research activity across the university in preparation for the new children's hospital and further collaborations with other institutes. The recent HRB funding of a perinatal clinical trials network has been a great advantage to researchers and is a template to create a national paediatric research network."

Another important goal for the department is recruitment: "We need more staff. Whatever area of medicine you're specialising in — surgery, psychiatry, public health, or general practice — it involves the care of children. That's reflected in the teaching — paediatrics is one of the core subjects — but it's not sufficiently reflected in the staffing. I do think we need to grow."

Growth will enable universities to work better with hospitals to deliver improved services for children — for instance the provision of dedicated multidisciplinary clinics for children with congenital abnormalities or complex needs so that instead of parents going to multiple clinics for different therapies — nutrition, psychology, occupational therapy etc — they can go to one clinic to access all the services their child needs. "The goal is to get children out of hospital and back home, and that's starting to happen more. Parents are amazing — they learn everything, how to work feeding tubes and breathing tubes, everything — but they should be supported by specially trained paediatric nurses."

She spends her spare time with her family — she has two daughters with her husband, a surgeon — and enjoys kayaking, and reading. Getting any free time is of course a balancing act but she counts herself extremely lucky. "A former colleague [John Murphy, editor of the *Irish Medical Journal*], always said that if you can teach as well as doing research and clinics then you've got longevity and you feel in control. The mix I have is perfect — I want other people to have the same opportunities."

Professor Cathal Moran

Professor of Orthopaedics and Sports Medicine (2014)

→ **“We’re investigating new biological treatments in our laboratories, and in addition we’re building sports medicine infrastructure here in the Trinity Sports Centre that will enable us to deliver a comprehensive programme of research, education and clinical care to students and athletes on campus, and will have a global impact.”**

"As well as treating injuries through modern regenerative approaches, we need to create a system of research, looking at injuries, why and how they're happening. We want to show our students — in medicine, nursing and physiotherapy — that research has to take place alongside delivery of care. Ultimately because we're all on campus together, we'll be working with engineers and scientists in a ground-breaking orthopaedic and sports medicine unit which captures biologics research and clinical care alongside delivery of education."

Cathal Moran, new Professor of Orthopaedics and Sports Medicine, at Trinity's School of Medicine, is talking about his vision for the campus. An Orthopaedic and Sports Medicine unit delivering on-site care to student athletes, with a research and education component, will be a first for any Irish university but Professor Moran is used to leading the field: Trinity's is only the second academic unit in Orthopaedics in Ireland — the first is in the Royal College of Surgeons (RCSI) where he is an honorary professor — and his chair is an entirely new post.

Sports medicine is a growing area of academic research — driven by the expansion of professional sports as an industry and amateur sports as recreational activity.

Professor Moran works at the forefront of delivering specialist care — his clinical practice is based at Sports Surgery Clinic in Santry, Dublin, Ireland's largest private hospital for orthopaedics and sports medicine, where they treat elite athletes and 'weekend warriors', as well as people seeking joint replacements and spinal surgery.

His new appointment divides Professor Moran's time 50:50 between the Sports Surgery Clinic and Trinity. It is, he says "a natural partnership between a high volume clinic and a high quality research site. Trinity does world-class research in bioengineering, biologics, regenerative medicine, and stem cells — these are key areas for sports medicine and orthopaedics."

His own area of specialisation is knee surgery and shoulder surgery and his research focus is orthobiologics — harnessing cells and proteins naturally found in human biology to stimulate regrowth of musculoskeletal tissues, including cartilage, bone, tendons, and ligaments. He works closely with colleagues in the Trinity Centre for Bioengineering (TCBE), led by Professor Danny Kelly, to deliver combined clinical and scientific supervision to students and researchers.



“The biggest strength that I bring is an understanding of the regulatory environment and of the clinical questions. So, for instance, in the TCBE, researchers are taking cartilage-derived stem cells and replanting them into a defect, and they’ve brought the time down from days and weeks to an hour, but in the operating room, even an hour is too long. It’s about understanding the clinical and research challenges, and constantly driving the agenda.”

He is looking forward to “developing a novel idea for biological therapy within the TCBE and bringing that as far as clinical care within the next few years. That’s ambitious because novel therapies can take decades, but we’re doing exciting work at the moment on cellular treatments for augmenting tissue repair.” The recent launch of the National Cartilage and Orthobiologics Centre represents a key step — it bridges Trinity, RCSI and Sports Surgery Clinic, establishing critical translational infrastructure in Ireland for the first time.

He has experience of the regulatory environments in Ireland, Europe, and the US. After doing both a Medicine degree and a BSc in Pharmacology in NUI Galway, he did his first doctorate degree in tissue engineering for spinal cord injury in NUI Galway and the REMEDI Regenerative Medicine Institute in Galway, and later completed training in the Orthopaedic Sports Medicine and Shoulder Fellowship at Hospital for Special Surgery (HSS) and Cornell Medical College in New York, and at the Cartilage Repair Centre at Harvard Medical School / Brigham and Women’s Hospital in Boston, and Antwerp Orthopaedic Centre in Belgium.

In New York, he says, they treated elite athletes and conducted research alongside clinical care and it’s this “360 degree approach” which he’d like to bring to Trinity.

His interest in orthopaedics initially came from playing sports — “I played a lot of GAA and hurling growing up in South Galway, so combining sport with my research came naturally to me, and I felt orthopaedics was a growing area.”

He hasn’t had a serious injury himself yet as a player — he now plays recreational five-a-side and golf, and also coaches local junior teams in GAA. His kids, aged seven and five, play hurling, football and hockey. Kids, he says, are starting “younger and younger every year” and this is indicative of the trend in the general population to play sports more frequently and intensively. “There are thousands of GAA games happening across Ireland this weekend alone.”

At the professional level, he says, collisions may carry more risk now than they would have a generation ago because players are bigger and bulkier, but this is offset by increasing awareness and programmes of care: “Players are putting more into preparation and protection. All sorts of systems of care are improving.”

The general public is benefitting from these improved systems. “There’s a lot of industry interest, and funding, around improving care to athletes; we can apply what we learn about injuries to the general public.”

In Trinity he is helping with “a new outreach programme to reach out to primary and secondary schools to educate about awareness of injuries” — this will involve a social and digital media aspect as well as one-to-one interactions with sports teachers who’ll be invited to campus. “It’s about raising the understanding of injury prevention and management in the general population — I hope that will feed back into public support for the translation programmes we’re building at research level.” The outreach sports medicine initiatives are being delivered through partnership with the Department of Sport and Recreation. “We’ve developed a strong relationship with Michelle Tanner and all the staff of Trinity Sport.”

Biologics is expensive and depends, as well as industry support, on public funding. Professor Moran is aware of the “need to reach out to the taxpayer and explain the benefits. Yes, orthobiologics and stem cell research is expensive but so is mismanagement of injuries — that puts huge long-term burdens on patients, their families, and the economy. Trauma injuries will always be with us, and that includes of course older people falling and damaging joints. We need to get treatments right.”

Ireland is well-placed to be a leader in orthopaedics. “We’re the only English-speaking country in the Euro-zone and an impressive number of multinational companies have their European headquarters here, in the technology domain and in medical devices. Take Arthrex, which is huge in sports medical devices — they could have offices anywhere in the world; the fact that they choose to come to Dublin is an indication of how strong we are on the ground.”

This strength comes not only from the regulatory environment but from the depth of research being carried out here. “Arthrex is funding a Fellow for us for the next few years. Industry interest in what we’re doing is strong.”

Irish institutes are also increasingly collaborating, to mutual benefit. Professor Moran was away from Ireland — in New York and Antwerp — for almost three years, 2011 to 2014, and on his return he noticed “how much people from different institutes are recognising the benefits of working together and how easy that has become”. He himself is currently honorary professor in the RCSI, principal investigator in REMEDI Regenerative Medicine Institute in Galway, and works closely with colleagues in UCD on diagnostics.

His new position in Trinity involves teaching as well as research. Getting student training right is a priority for him: “Interdisciplinarity is essential because making that translational leap — bringing research into the clinical arena - is based on people understanding each other from an early stage in the undergraduate curriculum.” One example is the Trinity MSc in Bioengineering coordinated by Professor Conor Buckley in the TCBE, which “takes in medical and engineering students and educates them together in their 3rd and 4th years”.

As a teacher, his concern is to “emphasize the way that clinical questions arise — they always arise from a dilemma. Students have to navigate such a growing volume of information - what’s important is curiosity and critical thinking. I always set my students problems based on situations.”

He is delighted at the environment in Trinity, the level of cross-disciplinary expertise and enthusiasm: “The research of others stimulates your own research. For instance, Professor Ciaran Simms in the School of Engineering is doing extensive video analysis of injuries, using kinematic models to see if we can identify patterns in the way that injuries are happening. That is going to be very important for prevention.”

He believes the new Trinity School of Business and Innovation and Entrepreneurship Hub will have a wonderful effect on students across campus: “Medical students are focussed on getting good grades, which is important, but they can benefit, I think, from more learning outside the classroom and thinking entrepreneurially.”

Such training will be part of the “360 degree picture between research, clinical care, and education” which he is looking forward to developing in Trinity.

Trinity Growing Globally

Between 2012/13 and 2014/15 Trinity's student body coming from outside the EU increased by over 30% and that rate of increase is continuing into 2015/16.

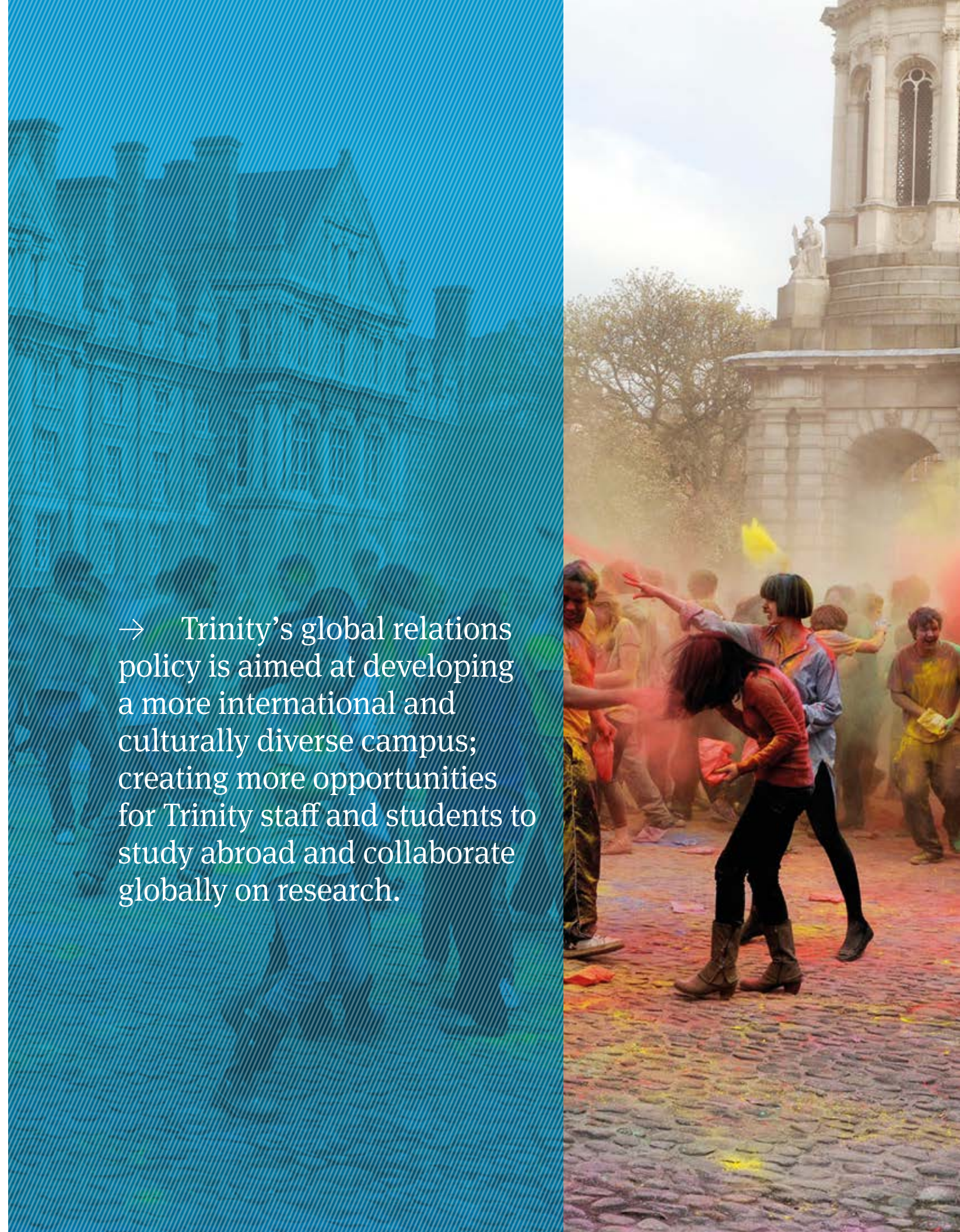
This indicates the strength of Trinity's global relations policy, which is aimed at developing a more international and culturally diverse campus; creating more opportunities for Trinity staff and students to study abroad and collaborate globally on research; and showcasing Trinity's world-class research and education at events outside Ireland.

Trinity's first ever international research showcase, FUSION, was held at District Hall in Boston, Massachusetts in May 2015. At this high profile event, attended by Minister for Education and Skills, Jan O'Sullivan, five renowned Trinity academics presented the global, societal and economic impact of their research and innovation to an audience of academics, educators, and industry representatives, as well as alumni and friends in the Massachusetts area.

The success of initiatives to build Trinity's presence globally and internationalise the campus was confirmed when, for the second year running, Trinity emerged as one of just 380 Colleges recommended for undergraduate study in *The Princeton Review's* annual college guide. Only 15% of America's 2,500 four-year colleges, and only four outside the US, are profiled in the prestigious guide.

→ Trinity's global relations policy is aimed at developing a more international and culturally diverse campus; creating more opportunities for Trinity staff and students to study abroad and collaborate globally on research.

RIGHT – Celebrating the Indian festival of colours, Holi





Student Exchanges and International Collaborations

This year over 30 new agreements were signed with leading universities in the US, Latin America and Asia, including ten new student exchange agreements. These agreements, fostering outward mobility, will bring the number of places available for Trinity students to undertake an exchange to a non-EU partner university on a college-wide basis to over 100 in the next academic year. This represents a five-fold increase since the Global Relations Strategy was launched in 2012.

Students in Health Sciences can avail of overseas electives during the summer and are placed in hospitals and health care centres across the globe including Vietnam, Cambodia, India, Malaysia, Malawi, Zambia and South Africa. The success of Trinity's one-year programmes in allied health sciences, delivered in collaboration with Singapore Institute of Technology, continues — October 2015 saw 130 students from the 2014/15 cohort graduating.

In July 2015, the Provost signed an agreement with Thapar University in India to collaborate on teaching and research in Engineering and Computer Science. High calibre undergraduate students will come to Trinity for year 3 of these disciplines, while staff will collaborate on research and academic practice.

Taken together, and including the well-established Erasmus Programme for study in the EU, the increases in college-wide and School-level placements and exchanges mean that over a quarter of our undergraduate student body now have the opportunity to develop experience abroad.

International Campus

2015 was the inaugural year of the Trinity Global Engagement Awards which recognise the contributions made by staff to global education, cultural understanding, and global experiences that directly benefit the Trinity community, raise the University's profile, and support the development of students into global citizens.

LEFT – Trinity College Global Room

BELOW – Minister for Education and Skills, Jan O'Sullivan with the Provost, Dr Patrick Prendergast at FUSION in Boston

BOTTOM – Trinity Global Engagement Awards recipients, Prof Mac MacLachlan, Dr Lorna Carson, and Dr Roger West

The first recipients of the awards were Dr Roger West from the School of Engineering for his work in developing extensive research links between his School and various institutions in India; Dr Lorna Carson for establishing the Trinity Centre for Asian Studies; and Professor Mac MacLachlan for directing the Trinity Centre for Global Health and developing the International Doctorate in Global Health (INDIGO), for which Trinity partners with universities in Ethiopia, Malawi, Nigeria, Uganda, USA, and the UK.

The support of Trinity medical alumnus, Dr Sam Lam, and his wife Ellen, helped make the M.Phil in Chinese Studies at the new Centre for Asian Studies possible, while alumni Eoin and Cliona Murphy also endowed scholarships on this M.Phil. The Centre and the M.Phil will deepen the study of Mandarin, Korean and Japanese languages on campus, and further enable the study of Asian history and culture.

In February Trinity was honoured to receive delegates and researchers from a number of Brazilian universities, as part of Brazil Ireland Week, which was coordinated by Research Brazil Ireland and Science Foundation Ireland with the aim of strengthening research ties between the two nations. Trinity's links with Brazil were further enhanced by the funding of the ABEI-Haddad Fellowship in Irish Studies for a Brazilian student, through the support of the Brazilian Association of Irish Studies Associação Brasileira de Estudos Irlandeses (ABEI) and Claudio Haddad.

Summer and winter schools allow the University to welcome international students and showcase research and teaching. Following on the success of its summer school in 2014, the School of Nursing and Midwifery held an international winter school in January 2015, during which nursing students, along with faculty from participating US universities, explored Irish nursing and midwifery, comparative health structures and global health issues. In summer 2015 the Lir, Ireland's National Academy of Dramatic Art at Trinity College Dublin hosted the first international summer school to be taught by Riverdance professionals.

Over 300 internationally themed events were held in the Global Room during the year. This space, which links Trinity to the world, acts as platform to celebrate cultural diversity within Trinity.



International Events

As well as FUSION showcasing Trinity research, the university held two campus open days in New York and Boston in April. Prospective students, their families and guidance counsellors were invited to experience Trinity through talks from faculty and alumni, virtual campus tours, and opportunities to engage with staff from Global Relations and Admissions.

Science Gallery continued to develop its Global Network with new galleries due to open in King's College London in 2017, and in tech hub Bengaluru (formerly Bangalore) in 2018, in partnership with Indian Institute of Science. Young adults from Bengaluru engaged with Science Gallery Dublin in November 2014 when astrophysicist, Dr Joseph Roche, assistant professor in STEM Education at Trinity and a previous research projects coordinator in Science Gallery Dublin collaborated with Mallya Aditi International School on a three day innovation workshop exploring mobility and climate change. Sixty-one students from seven schools were challenged to work in teams to depict a worst case scenario for the human race, using existing evidence of climate change.

Philanthropy and Alumni Engagement

Trinity is recognised as a world leader in ageing research, thanks in great part to the foundation, Atlantic Philanthropies which over the past decade has given around €25 million for specific ageing projects and €40 million for infrastructural projects which have enabled the University to put in place a comprehensive ageing programme. This endowment has helped Trinity with leveraging further funding (about €185 million), and emerging as a key partner in one of the EU's major research projects — InnoLIFE, a consortium of industry, higher education, and research institutions funded by the European Institute of Innovation and Technology to develop projects, products, training and services for 'Healthy Living and Active Ageing'.

Atlantic Philanthropies has now announced as one of their five legacy projects before the foundation closes down activities, the Global Brain Health Institute (GBHI). This is a 15 year joint, single programme between two partner institutions — Trinity and University California San Francisco. The aim of GBHI is to train global leaders in brain health by the rapid translation of research in neuroscience and ageing into policy. Trinity has been awarded about US\$70 million. The programme is led by Ian Robertson, Professor of Psychology at the Trinity College Institute of Neuroscience, and Brian Lawlor, Conolly Norman Professor of Old Age Psychiatry at Trinity's School of Medicine.

→ Alumni support Trinity in many vital ways, including through financial contributions, mentoring students, running alumni associations, involvement in clubs and societies, and advice and expertise in their fields.



LEFT – Chief Executive of Jones Engineering Group, Eric Kinsella (second from the right), and his wife Barbara with (l-r) Head of the School of Engineering, Prof Brian Foley, Librarian and College Archivist, Helen Shenton, SU Education Officer, Katie Byrne, and Students' Union President, Domhnall McGlacken-Byrne

BELOW TOP – Benefactors' Wall in the Dining Room

BELOW BOTTOM – Film Director, Lenny Abrahamson, crime writer John Connolly, former Judge Catherine McGuinness and VP of Intel's Internet of Things, Philip Moynagh, Alumni Award 2015 recipients

This is one of the most generous philanthropic projects anywhere in the world, and Trinity is proud to be associated with Atlantic Philanthropies and its single benefactor Charles F. Feeney, whose philosophy of 'Giving while Living' has inspired philanthropists like Bill Gates and Warren Buffet. We look forward to helping deliver solutions for the ageing population in general, and in the area of cognition specifically.

Benefactors through the Centuries

In 2013 the University honoured those whose cumulative philanthropic giving has had such a transformational effect on Trinity since 1592 by inscribing the names of these 'Benefactors through the Centuries' on the Benefactors' Wall in the Dining Room. In 2014 a further seven names were added to the seventy originally inscribed, and this academic year, three more exceptional donations were commemorated. We recognise the vision and generosity of the following donors in supporting high-quality education and cutting-edge research here in Trinity:

Donald G. Weir served as Regius Professor of Physic in Trinity for many decades and as head of the Department of Clinical Medicine in 1977. He achieved international renown

when, with colleague John Scott, he established that taking folic acid during pregnancy could prevent neural tube defects. This finding was adopted as a preventative measure in the USA in 1998, and thereafter internationally. As well as this major contribution to world health, Professor Weir has given quietly and generously to Trinity and St James's Hospital since the 1960s gifts totalling over €1.5 million.

Terry and Marjorie Neill, Trinity graduates whose support for Trinity's leadership in teaching and research in the Arts and Humanities has now been benefiting the University for over a decade is deeply appreciated. Terry and Marjorie's latest gift is to promote the activities of the Trinity Long Room Hub and they wish that their gift will encourage not only others to give, but also more academics to engage with philanthropic supporters.

They are joined on the Benefactors Wall by Eric and Barbara Kinsella, whose generous endowment has made possible a 24-hour library study space, accommodating 600 students for use throughout the year in the Ussher Library. The new area is named Kinsella Hall in honour of Eric Kinsella's parents, William and Kathleen.

Supporting Education and Research

In addition to the study space, the Kinsellas have permanently endowed scholarships for up to six engineering students to study in Trinity. Alumni Sam and Ellen Lam supported the establishment of the Associate Professor in Chinese Studies post in the new Trinity Centre for Asian Studies.

Alumnus Sean Reynolds and his wife Sarah are funding a scholarship to support a US student to enrol in the School of Engineering in 2015, and alumni Eoin and Cliona Murphy support scholarships on the M.Phil in Chinese Studies in our Centre for Asian Studies. Such scholarships help position Trinity as a leading choice internationally.

Alumni Engagement

High profile alumni events were held on, and off, campus all year. At the Alumni Awards in March we celebrated four outstanding alumni, important role models for our students: film director, Lenny Abrahamson, crime writer, John Connolly, former judge Catherine McGuinness and vice president of Intel's Internet of Things, Philip Moynagh. The Alumni Weekend in August saw some 400 alumni and their families return to Trinity, many of them traveling from far afield. Throughout the year, the Provost and other college officers have been engaging with alumni associations on trips abroad, from Tel Aviv to San Francisco, and from Boston to Mumbai.

Alumni support Trinity in many vital ways, including through financial contributions, mentoring students, running alumni associations, involvement in clubs and societies, and advice and expertise in their fields.

The University greatly values the interest and support of all Trinity alumni, and this year we strengthened Trinity Development & Alumni, the office that serves as the main interface between the graduates and supports and Trinity.

Trinity Development & Alumni has the support of the new Dean of Development, Professor Gerard McHugh, appointed in early 2015, and resources are in place to implement high quality outreach activities which will lead to increased alumni participation, as well as meeting the expectations of the wider Trinity community. Alumni can now avail of new benefits, including free Wi-Fi on campus, assistance with individual class reunions, and access to the Library.



Visitors

This year saw an increase in visitors to Trinity particularly from the USA, China, France, Great Britain and Ireland. Visitor numbers to the Old Library and the Book of Kells exhibition were up 17% for the first half of the year compared to the same period last year.

Welcoming the public

As part of the Trinity Visitor Experience, a team of nine Welcome Ambassador Students worked during the peak tourist season, June to September, promoting the university's venues and facilities open to the public including the Zoological Museum, Book of Kells, Trinity Tours, and the Science Gallery, as well as campus cafes, restaurants and accommodation. These student ambassadors also dressed in costumes representing different periods of significance in Trinity's history and engaging with visitors to tell them about the University's history.

Visitor numbers to the Zoological Museum reached a record 8,000 people from 15 countries. The museum was awarded full accreditation by the Museum Standards Programme for Ireland and was the first of its type to receive this prestigious Heritage Council award, presented by Minister for Arts, Heritage and the Gaeltacht, Heather Humphries TD. This rewards five years of commitment to improving the care and governance of the museum's iconic 200-year-old collection, which includes approximately 25,000 specimens from Ireland and much further afield.

→ The German President, Joachim Gauck, visited Trinity in July as part of a three-day state visit to Ireland. President Gauck visited Trinity's Old Library to view to Book of Kells, the Brian Boru harp, and an exhibition on W.B Yeats, among other Library treasures.

RIGHT – German President Joachim Gauck visits the Long Room with the Provost, Dr Patrick Prendergast and Helen Shenton, Librarian and College Archivist





BOTTOM LEFT – Astronaut Cmdr Chris Hadfield

BOTTOM RIGHT – Stanley Quek, Grigory Kruzhkov, Margaret Murnane and Camille Souter, Honorary Degree recipients with Provost Dr Patrick Prendergast and Chancellor of the University, Mary Robinson

TOP LEFT – Mrs Carrie Lam, Chief Secretary for Administration of Hong Kong SAR Government

TOP RIGHT – French Prime Minister, Manuel Valls viewing Beckett material with the Vice-Provost / Chief Academic Officer, Prof Linda Hogan and Dr Bernard Meehan, Keeper of Manuscripts at Trinity College Library

A special visitor in August was Lucie Norwell who, on the way to visiting her great-grandfather's butterfly and moth collection in the Zoological Museum, was proposed to on the front steps of the Zoology Building by her fiancé Paul Wolstenholme. The collection of Dr Henry Murray, a Trinity alumnus, is among the most important collections held in the Zoological Museum.

Since opening in 2008, over 1.9 million visitors have visited Science Gallery Dublin — ranking it amongst the top ten free cultural attractions in Ireland. Through a cutting-edge programme that ignites creativity and discovery where science and art collide, Science Gallery Dublin encourages young people to learn through their interests. In 2014/15 Science Gallery Dublin's four shows *Blood: not for the faint-hearted*; *Lifelogging: do you count?*; *Home/Sick: post domestic bliss*; and *Secret: nothing to see here* showcased different science disciplines.

Welcoming dignitaries

During 2014/15 Trinity welcomed many leading politicians from round the world to view the treasures of the campus, and meet staff and students.

Trinity marked the joint visit of the German Federal Minister of Finance, Wolfgang Schäuble and the Minister for Finance, Michael Noonan, TD in October 2014, with a special moderated discussion on 'Financial Policy for Growth and Stability in Europe'. The discussion in the Trinity Long Room Hub was chaired by RTE's Sean Whelan.

In April 2015, the French Prime Minister, Manuel Valls visited the campus and was particularly interested to view the Old Library's collection of Samuel Beckett letters — the largest such collection of any research library in the world. Beckett, who lived in Paris and wrote in French and English, is one of Trinity's most renowned alumni and scholars.

The German President, Joachim Gauck, visited Trinity in July as part of a three-day state visit to Ireland. President Gauck visited Trinity's Old Library to view the Book of Kells, the Brian Boru harp, and an exhibition on W.B Yeats celebrating the 150th anniversary of the poet's birth, among other Library treasures. Concluding the visit, he met with German students attending Trinity and members of the German Department as well as academic staff with German links across a range of disciplines.

The same month saw Speaker of the U.S. House of Representatives, John Boehner, along with a number of other members of US congress, visit Trinity and the Old Library.

Other dignitary visits throughout the year included the Chief Secretary for Administration of Hong Kong SAR Government, Mrs Carrie Lam, who gave a speech on "Hong Kong, Asia's World City".

Also visiting in 2014/15 were the Chinese Ambassador to Ireland, H.E. Mr Jianguo Xu, the Mexican Ambassador to Ireland, H.E. Mr Carlos Garcia de Alba, the Ambassador of Chilean Republic, H.E. Mr Manuel Hinojosa Muñoz, the Ambassador Extraordinary & Plenipotentiary of the Republic of Colombia, H.E. Mr Nestor Osorio-Londono, and the Iranian Ambassador, H.E. Mr Javad Kachoueian.

The One Young World Summit in October 2014 saw 1,300 young leaders from across the world gather in Dublin to debate, formulate and share innovative solutions to current global challenges. Trinity, as one of the official partners of the Summit, hosted two break-out sessions on campus, one on youth entrepreneurship and one associated with the Science Gallery.

Astronaut Cmdr Chris Hadfield visited Trinity when he arrived with his guitar to an event organized by the Philosophical Society (The Phil), The Law Society and the University. He addressed students and staff before participating in a Q&A session and entertaining the packed Public Theatre with some songs.

The global relations strategy continued to prosper in 2014/15 with numerous academic visits from delegations from China, Japan, Singapore, USA, South Korea, Malaysia, Hong Kong, Bahrain, India, Austria, Italy, Canada, Denmark, and Mexico.

The EU Ambassador to the US, David O'Sullivan, poet Paul Muldoon, founder of Front Line Defenders, Mary Lawlor and leading scientist Nancy Hopkins were conferred with honorary degrees at Trinity's Winter conferrals. At the summer conferrals in June 2015, painter Camille Souter, poet Grigory Kruzhkov, Singaporean diplomat and businessman, Stanley Quek and leading US-based optical physicist, Margaret Murnane were honoured.

A Sporting Year to Remember

This was an exceptional year for Trinity Sport, both in terms of awards and titles won by exceptional student athletes, and in terms of the continuous growth in participation of all students in sporting activities.

Trinity Sport continues to grow year on year, with over 10,500 students — or just over 60% of the student body — actively involved in sport and recreation in 2014/15. The introduction of an intramural sports programme, focussing on fun and participation, catered for over 900 students in events like dodgeball, 5-a-side, basketball and volleyball. Over 10,000 students participated in the recreational fitness classes and courses while participation in the annual campus 5K run increased by 35%.

The parade of silverware by student club captains at the 2nd Annual Sports Awards acknowledged the unrivalled success by Trinity teams at intervarsity and national levels and reflected the sporting buzz that threaded through the college community this year. The Strategy for Sport aptly named 'Raising Our Game' highlights the importance of sport to the University and provides a pathway of varying opportunities for involvement in sport and recreation. Trinity Sport matters and the achievements in 2015 evidence this.

→ The Hockey clubs were delighted to have a full season on the new international standard water-based hockey pitch, at Santry sports grounds, where further upgrades included a new sand based GAA pitch and recreational 5-a-side pitches.

RIGHT – The new international standard water based hockey pitch at Santry



Student Achievement

Trinity Ladies Basketball made history by winning the 'double' of Division 1 League and Intervarsity titles, for the first time. The Ladies Gaelic Footballers also claimed league and cup honours in 2014/15 whilst the Hurling Club won the Ryan Cup, led by Dublin Senior hurler Danny Sutcliffe and sports scholar, Darragh O'Donoghue. There was 'treble' success for Men's Hockey who won their division as well as the Railway Cup and Irish Hockey Challenge. The Swimming & Waterpolo Club hosted a hugely successful intervarsity tournament, and swept the boards in home waters, winning both Men's and Women's titles, and the girls went on to win the Leinster Senior Cup for the first time ever. Rowing at Trinity continues to go from strength to strength and as well as retaining the overall intervarsity title and recording a memorable clean sweep against UCD in the Annual Colours on the Liffey, Trinity crews featured prominently at the national championships. The ladies won the Senior IV title for the first time in 12 years and the men claimed the coveted Senior VIII after an 8 year gap.

Other notable successes at intervarsity level were recorded by Trinity sports clubs including Boxing, Cycling, Fencing, Harriers & Athletics, Ladies Hockey, Rifle, Squash, Tennis and Ultimate Frisbee.

The second Annual Sports Awards in April was a fitting celebration and acknowledgement of students' success, on

and off the field of play. RTE's Michael Lyster hosted and invited guests included boxer Bernard Dunne and cricketer Cecelia Joyce. The following recipients were announced:

Sportsperson of the Year: Ruth Morris, Ladies Boat

Team of the Year: Ladies Basketball

Coach of the Year: Andrew Coleman, Ladies Boat

Administrator of the Year: Ryan Hewitt, Basketball

Contribution to Sport Award: Bert O'Brien, Swimming & Waterpolo.

On the same night where Sporting Commons celebrated 40 years, ten Pinks were awarded by the Captains Committee of DUCAC, including the first ever for netball: Victoria Mullin (Air Pistol Shooting), David Fitzgerald (Climbing), Maxton Milner (Fencing), Omar Nouhi (Judo), Susannah Cass (Rowing), Sinead Dolan (Rowing), Ruth Morris (Rowing), Sacha Shipway (Netball), Conor Short (Orienteering) and Cian Quinn (Ultimate Frisbee).

Sport at Trinity reached another milestone when two students from the College's Centre for Inclusivity and Intellectual Disability (CIID) were amongst the 61 sports scholarships announced. Maeve Philips won gold, silver and bronze medals at European and World Down Syndrome swimming events, and Fiachra Costello won minor football championship and minor hurling league honours with Whitehall Colmcilles Club. They were presented with their awards by CIID champion and former Irish international rugby player, Hugo MacNeill and his wife Jennifer.

LEFT – DUFC's Angus Lloyd at the Grand Opening of College Park – Dublin University FC vs Malone. ©INPHO/James Crombie

BELOW TOP – Maeve Philips and Fiachra Costello, Sports Scholarship recipients with Maura Gallahue, Disability Officer, Hugo MacNeill, Dr Carmel O'Sullivan, School of Education and Michelle Tanner, Head of Sport and Recreation. ©INPHO/Cathal Noonan

→ The second Annual Sports Awards in April was a fitting celebration and acknowledgement of students' success, on and off the field of play.

Twenty-seven sports scholarships were awarded in 12 different sports including Commonwealth Games athletes Victoria Mullin (Air Pistol Shooting) and Prakash Vijayanath (Badminton) as well as international kayaker Tom Brennan and Sky Sports athlete mentor, Aoife McDermott (Basketball). Two American students, Christine Ganser and Jennifer Morabito were also acknowledged as Victory Sports Scholarship recipients, a programme which enables them to study a masters programme in the Business School, compete for Trinity and also co-ordinate community basketball development initiatives.

The current outstanding performances of Trinity Rugby reflect the talents of the 30 students from the club who were awarded a sports scholarship. Captain and 3rd Year BESS student, Patrick Lavelle, was also presented with the inaugural Trevor West Sports Scholarship.

Sport Facilities

The Hockey clubs were delighted to have a full season on the new international standard water-based hockey pitch, at Santry sports grounds, where further upgrades included a new sand based GAA pitch and recreational 5-a-side pitches. The Rugby Club (DUFC) also benefited from the newly resurfaced pitch at College Park, which also included recently installed floodlights.

To boost the portfolio of sports facilities and respond to ever increasing demands, further developments are planned for the Fitness Theatre, the sports pitches at Santry, the Boat House facilities and on-campus sports facilities in the new development of Oisín House.

Clinical Care

The new Chair of Orthopaedics and Sports Medicine, Professor Cathal Moran is spearheading an exciting initiative in conjunction with the Department of Sport and Recreation and the College Health Service: the implementation of a new Sports Medicine Clinic and service that will provide a structured pathway of clinical care for injured student athletes, as well as providing a focus for real-time education for medical students and allied health professionals, and establishing new clinical research registries in the University.

For more information on Trinity sport see www.tcd.ie/sport and/or follow us on Facebook.



ABOVE – Trinity Ladies Senior 8 beating UCD to the line in the Annual Colours on the Liffey

Financial Elements

Audited Financial Statements

The Consolidated Financial Statements for the year ended 30 September 2014 were approved by the Board on 24 June 2015.

Results of Operations

The University reported a planned deficit of €21.8m (2012/13: deficit of €22.5m) for the year ended 30 September 2014. The University's Balance Sheet was strong with net assets in excess of €900 million, having made significant capital investment in recent years. The University has invested heavily in IT transformation and capital projects including the new college-wide Financial Information System which is currently being embedded. The Trinity Endowment Fund continues to be a significant source of income to the University, €7m for 2013/14 (2012/13: €6.5m). Endowment assets have grown 12.7% in this financial year and were €165.1m as at 30 September 2014.

The level of research activity for 2013/14 recorded in the Consolidated Financial Statements (measured on the basis of expenditure activity during the year and not income received) amounted to €78m (2012/13: €74.7m). The value of new awards entered into in the year amounted to €67m (2012/13: €127m), bringing the total value of the Research Portfolio to €480m as at 30 September 2014. Trinity's recent success in the SFI Research Centres Programme (whereby Trinity is hosting three Centres and has a significant role in three others) as well as a strong start to Horizon 2020 (Trinity has received nine ERC awards to date) means that there is cause for a certain amount of optimism. Current projections are that research expenditure may remain at c.€80m over the next 3–4 years. This positive outlook is dependent on Trinity meeting the challenging targets set by the Research Diversification Strategy as well as the Exchequer at least maintaining its current level of investment in Research.

Financial Strategy

Trinity has managed its income well in spite of the challenging financial environment it operates in. By actively managing its cost base through incentivised budget allocations and savings realised in procurement it has shown itself to be resilient throughout the period of economic crisis since 2008. Furthermore, it is hoped that the financing of higher education on a sustainable basis will be addressed comprehensively by the Expert Group on Future Funding for Higher Education which is due to report in December 2015.

Currently the University is planning balanced operational budgets, however with provision for asset renewal and investment in approved income generation and cost reduction strategies, the University will report planned deficits for the next 3–4 years. The University has a clear plan to return to surplus in 2018/19 with strategies in place to achieve its target of 2%–3% surplus by this time.

It is recognised that producing consistent surpluses is crucial to support the University's strategic objectives and to secure its financial sustainability. The University is committed to focusing on the key areas of income generation (e.g. Internationalisation, Online Education and Commercialisation) and cost management as outlined above to realise its ambitions as set out in the Strategic Plan 2014–2019.

13 Consolidated Income and Expenditure Account

Year ended 30 September 2014

Income	2014 (€'000)	Restated 2013 (€'000)
State grants	47,279	54,469
Academic fees *	122,169	116,138
— UG EU	70.6	69.5
— UG Non EU	21.1	17.3
— PG EU	22.1	22.3
— PG Non EU	6.7	5.6
— Other	1.7	1.5
Research grants and contracts	78,004	74,670
Amortisation of deferred capital grants	11,599	13,245
Other operating income	51,243	50,535
Interest income	866	2,811
Other finance income/(expense)	–	–
Endowment income	7,022	6,529
Gain on revaluation of investment properties	7,881	
Total	326,063	318,397
Expenditure		
Staff costs	225,756	221,756
Other operating expense	89,368	84,991
Interest payable	4,217	4,171
Depreciation	28,554	27,307
Loss on revaluation of investment properties		2,681
Total	347,895	340,9062
Deficit for the year before taxation	(21,832)	(22,509)
Taxation	–	–
Deficit for the year after taxation	(21,832)	(22,509)
Less: Surplus for the year transferred to accumulated income in endowment funds	(1,588)	(1,865)
Deficit for the year retained within revenue reserve	(23,420)	(24,374)

Consolidated and College Balance Sheets

At 30 September 2014

	Consolidated		College	
	2014 (€'000)	2013 (€'000)	2014 (€'000)	2013 (€'000)
Fixed Assets				
Tangible assets	761,668	765,807	761,620	765,727
Investment properties	46,369	42,517	46,369	42,517
Total	808,037	808,324	807,989	808,244
Endowment assets	165,113	146,508	165,113	146,508
Current assets				
Debtors	47,916	53,837	47,859	54,877
Stock	320	468	320	468
Cash at bank and in hand	21,677	44,736	10,383	35,903
Short term deposits	148,048	140,835	135,563	128,230
Creditors: amounts falling due within one year	217,961 (147,528)	239,876 (144,443)	194,125 (135,900)	219,478 (137,274)
Net Current Assets	70,433	95,433	58,225	82,204
Total assets less current liabilities	1,043,583	1,050,265	1,031,327	1,036,956
Creditors: amounts falling due after more than one year	(134,280)	(134,132)	(134,280)	(134,132)
Net assets excluding pension (liability)/asset	909,303	916,133	897,047	902,824
Pension liability	(1,423,616)	(1,179,497)	(1,423,616)	(1,179,497)
Pension receivable	1,423,616	1,179,497	1,423,616	1,179,497
Net Assets	909,303	916,133	897,047	902,824

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TRINITY COLLEGE DUBLIN

A 423 year old University in the
heart of Dublin City Centre
