
Trinity College Dublin

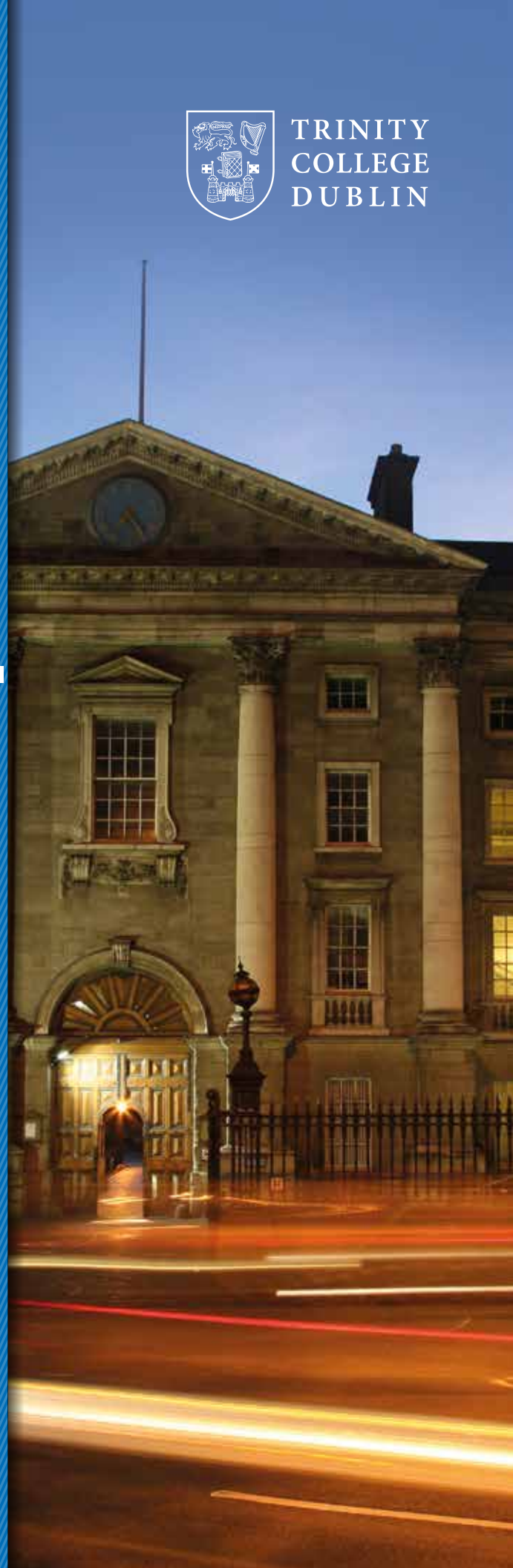


TRINITY
COLLEGE
DUBLIN

Annual Review

2013– 2014

DR PATRICK PRENDERGAST
PROVOST & PRESIDENT



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Introduction from the Provost

The academic year got off to an excellent start with two initiatives in November 2013: the Trinity Global Graduate Forum and the launch of the Innovation and Entrepreneurship Strategy.

The Trinity Global Graduate Forum, or TGGF, was about reconnecting with some of our high-achieving alumni and availing of their expert advice and support. In this Review, we talk to Kingsley Aikins, the graduate who helped make TGGF happen.

TGGF was a huge success, which we hope to repeat. We are constantly moved and impressed by the willingness of alumni to support the university in different ways. This year again saw generous benefaction – alumnus, Eric Kinsella, of Jones Engineering Group, funded a 24-hr study space in the library, as well as endowing six engineering scholarships.

The Innovation and Entrepreneurship Strategy, the first 'leg' of our Strategic Plan, announced the expansion of the Trinity School of Business, to be housed in a new purpose-built €70 million building. As part of the initial implementation phase of the Strategy, we opened in March our new Office of Corporate Partnership and Knowledge Exchange to serve as a direct pipeline for our industry partners, allowing us to support even more start-ups than previously.

The Innovation and Entrepreneurship Strategy builds on existing strengths; this year again saw impressive examples of staff and student innovation. We give some of the highlights in this Review. I'm particularly taken with 'Robbie the Robot', designed by a team in the School of Engineering to assist Cork schoolgirl, Joanne O'Riordan, who was born without limbs due to the rare condition, Total Amelia. Robbie can move around, bend over to pick things up, blink, smile, and frown.

I'm also excited about a completely new material, MRG, discovered by researchers in our material science centre, AMBER. MRG is an alloy of manganese, ruthenium and gallium and it works like a strange new magnet with potential to revolutionise IT, computer processes, and data storage.

Two of our campus companies had great success in fundraising this year: Adama Innovations Ltd, an early stage nanotechnology company, secured €750,000 in seed-funding, and Swrve, a data analytics company for mobile app consumers, raised US\$10 million in second-round funding from Silicon valley investors.

→ I'm amazed by all that's been achieved in 12 short months and delighted at the momentum that propels us into the new academic year and an exciting future.

Our students have been as active as ever and our programme, LaunchBox, in its second year now, is helping unleash their entrepreneurship. Funded by a group of ‘Trinity Angels’ – more of our wonderful, committed alumni – LaunchBox provides students with space, facilities, mentoring, and seed funding to explore their business ideas. One of last year’s projects, the social enterprise *FoodCloud*, has had a hugely successful year culminating in the founder, Iseult Ward, being named a ‘next generation leader’ by *Time* magazine. She has really raised the bar for what undergraduate innovators are capable of, and some of this year’s LaunchBox projects show equal promise.

Our staff continue to drive our education and research programmes and to be recognised globally for their achievements. Here, as in last year’s Review, we bring you interviews with our new professors, and we highlight great examples of Trinity’s multidisciplinary research, from beating prostate cancer to writing operas inspired by the economic crisis, from reassessing Brian Boru to designing energy-efficient buildings – and much more.

Trinity remains committed to engaging the public through lectures, events, and exhibitions in the Long Room and the Science Gallery. Highlights this year included a World War I Roadshow and Discover Research Dublin, with over fifty interactive events and demonstrations showcasing what researchers really do and why research matters – the demos included 3D visualisations of the brain and experimental performances reacting to Allen Ginsberg’s *Howl*.

Public engagement also extended beyond the campus with ‘*DARTofPhysics*’ in autumn 2013. Designed by Trinity’s Schools of Education and Physics together with our nanotechnology centre, CRANN, this campaign treated commuters on the DART to thought-provoking images and statements about physics.

The 2013/2014 academic year finished with four headline-grabbing initiatives in autumn: the feasibility study in admissions, Trinity’s first MOOC, the Irish Universities Association’s symposium on the sustainability of Irish higher education, and the launch of Trinity’s new Strategic Plan 2014–2019. All four caused a stir and delivered on Trinity’s commitment to be a leader, nationally and internationally, in education and research.

The feasibility study saw 22 students admitted to three courses in September 2014, using an alternate admissions system which takes into account motivation and comparative performance. Numbers are small but we’ll be monitoring this study with great interest to see if it’s feasible to move away from sole reliance on the Leaving Cert ‘points race’. The study drew significant media coverage, with some criticisms but great support overall.

With ‘Irish Lives in War and Revolution: Exploring Ireland’s History 1912–1923’, Trinity offered its first MOOC. Within a few days of this course opening for registration in August 2014, ten thousand people had signed up, over half from outside Ireland. This indicates the huge appetite globally for Trinity’s research and teaching.

Like the alternate admissions system, the MOOC is about opening out the Trinity Education to those who would not previously have been able to access it. “Encompassing an evermore diverse student community” is one of three central missions, unveiled in our Strategic Plan which we launched in October 2014.

The new Plan lays out our priorities for the next five years, to 2019. The nine goals and thirty-six actions cross all our commitments – in public and community engagement, innovation and entrepreneurship, creative arts and education, interdisciplinary research, and national and international partnerships. It’s a plan designed to capitalise on global opportunities in education and research, and to strengthen Trinity for future generations.

The Plan is ambitious, and will require at least €600 million in investment. We unveiled it at a time of uncertainty, even crisis, over funding for higher education in Ireland. The publication of the annual global higher education rankings in September brought the unwelcome though not unexpected news that most Irish universities have slipped down in the rankings for the fifth consecutive year. This is because we cannot compete on funding with high-ranking and emerging universities.

I’m chairman this year of the Irish Universities Association so I took the opportunity to convene a symposium to look at issues of performance and financing in Irish higher education. The symposium, and the reaction to it, showed that while there may be disagreements, nationally, about how to best fund our universities, there is consensus that we need to bring sustainability into the system. We know that growth, competitiveness and societal progress depend on our maintaining an excellent higher education system.

Let me conclude by thanking all staff and students most sincerely for making the year such a success. As ever, I’m amazed by all that’s been achieved in 12 short months and delighted at the momentum that propels us into the new academic year and an exciting future.

Dr Patrick Prendergast
Provost & President

Among the contributors and representatives of areas included in this Provost’s Review, are, standing (L–R) Prof Vinny Cahill, Dean of Research; Orlagh Ennis, Provost’s Office; Adrian Neilan, Commercial Director; Catherine Giltrap, Curator of the College Art Collections; Prof Kevin O’Kelly, Dean of Students; Dr Gillian Martin, Senior Lecturer/Dean of Undergraduate Studies; Prof Timothy Savage, Associate Dean for Online Education; Prof John Parnell, Department of Botany; Jonathan Fitzpatrick, Operations Manager, Sports Centre; Ian Mathews, Chief Financial Officer; 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.

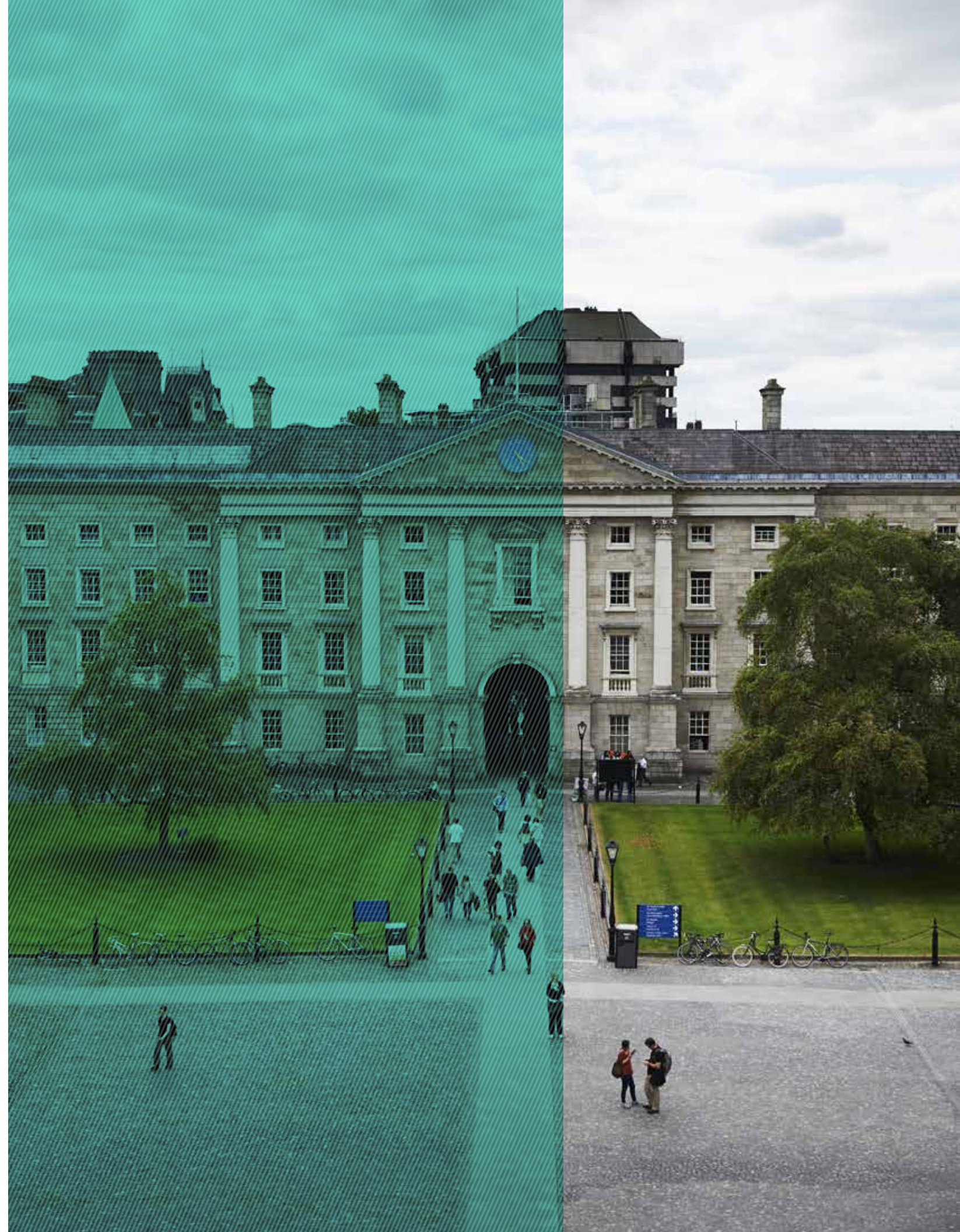


LEFT – Recipients of the Provost’s Teaching Awards 2014, Dr Louise Gallagher, School of Nursing and Midwifery, Dr Niamh Connolly, School of Law, and Dr David Prendergast, School of Law, who received the Early Career Award.

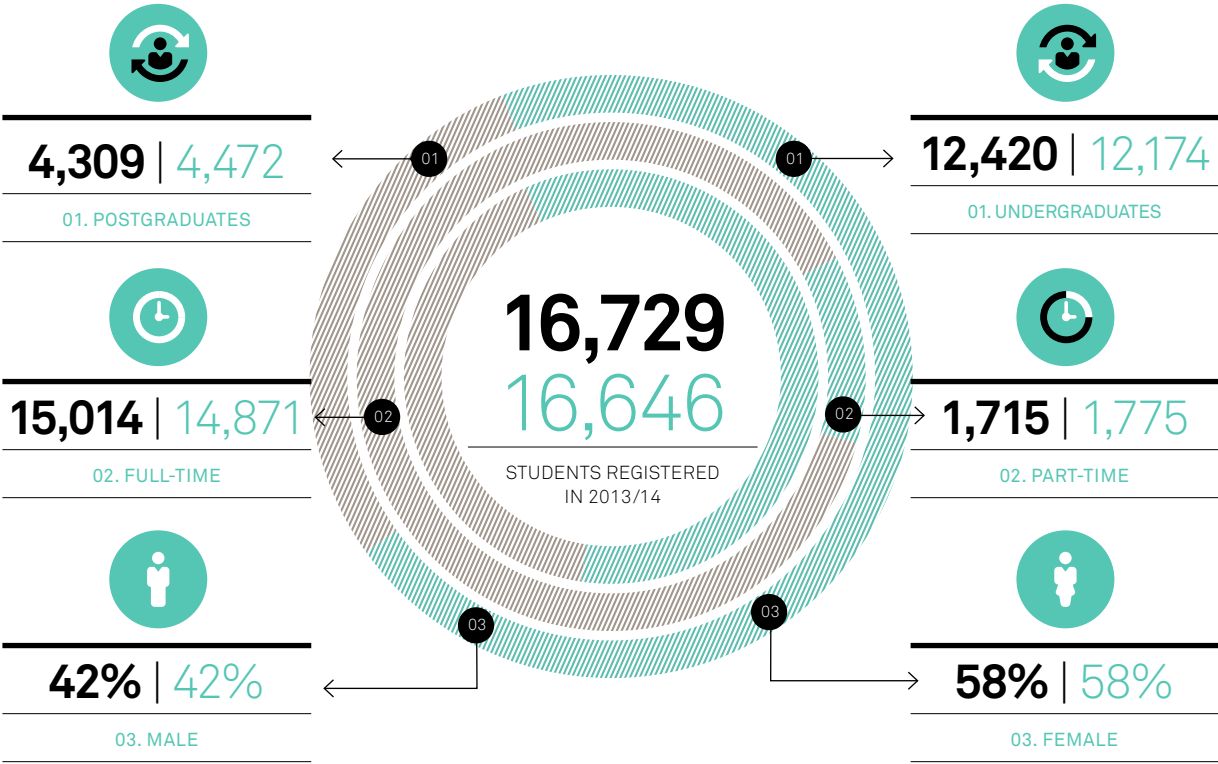
Trinity at a Glance

Trinity is Ireland's
No. 1 University

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



02 Student Statistics
2014 | 2013



ALUMNI

103,518 | **100,277**

REPUBLIC OF IRELAND	76,720 74,170
GREAT BRITAIN	9,754 9,616
NORTHERN IRELAND	4,662 4,621
USA	3,670 3,557
CANADA	1,195 1,102
REST OF WORLD	7,517 7,151

CLUBS AND SOCIETIES

49 49	118 112
SPORTS CLUBS	STUDENT SOCIETIES

THE LARGEST SOCIETIES ARE:

THE VINCENT DE PAUL SOCIETY

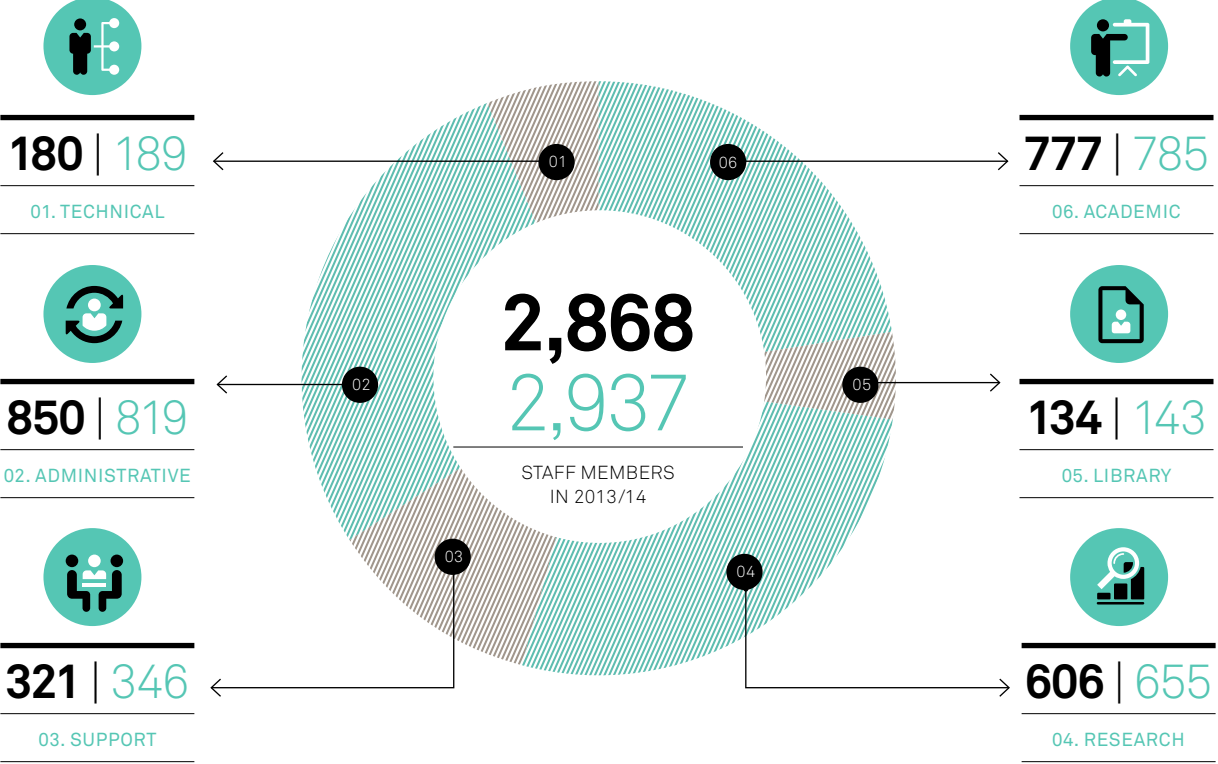
THE PHILOSOPHICAL SOCIETY (THE PHIL)

DU PLAYERS

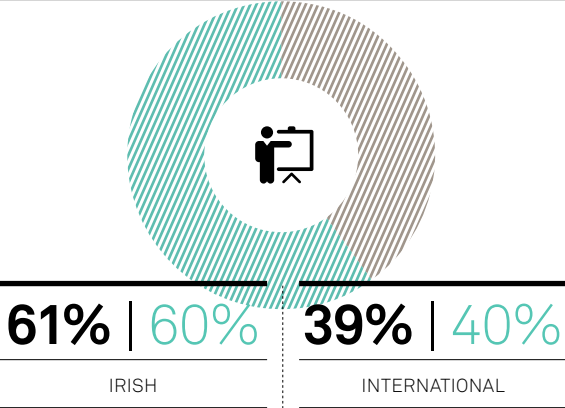
THE COLLEGE HISTORICAL SOCIETY (THE HIST)

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

Staff Statistics
2014 | 2013



ACADEMIC STAFF

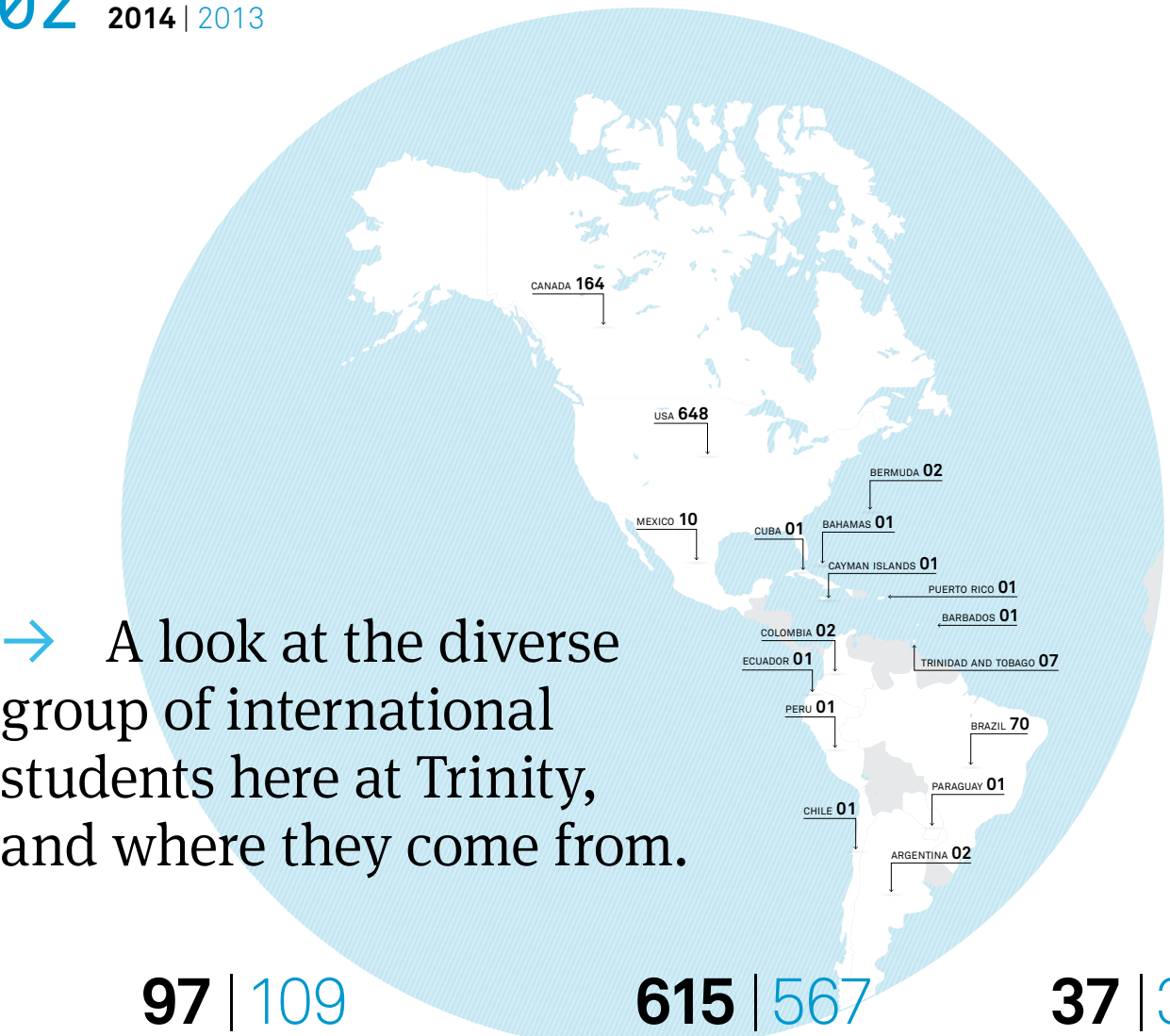


FACULTIES

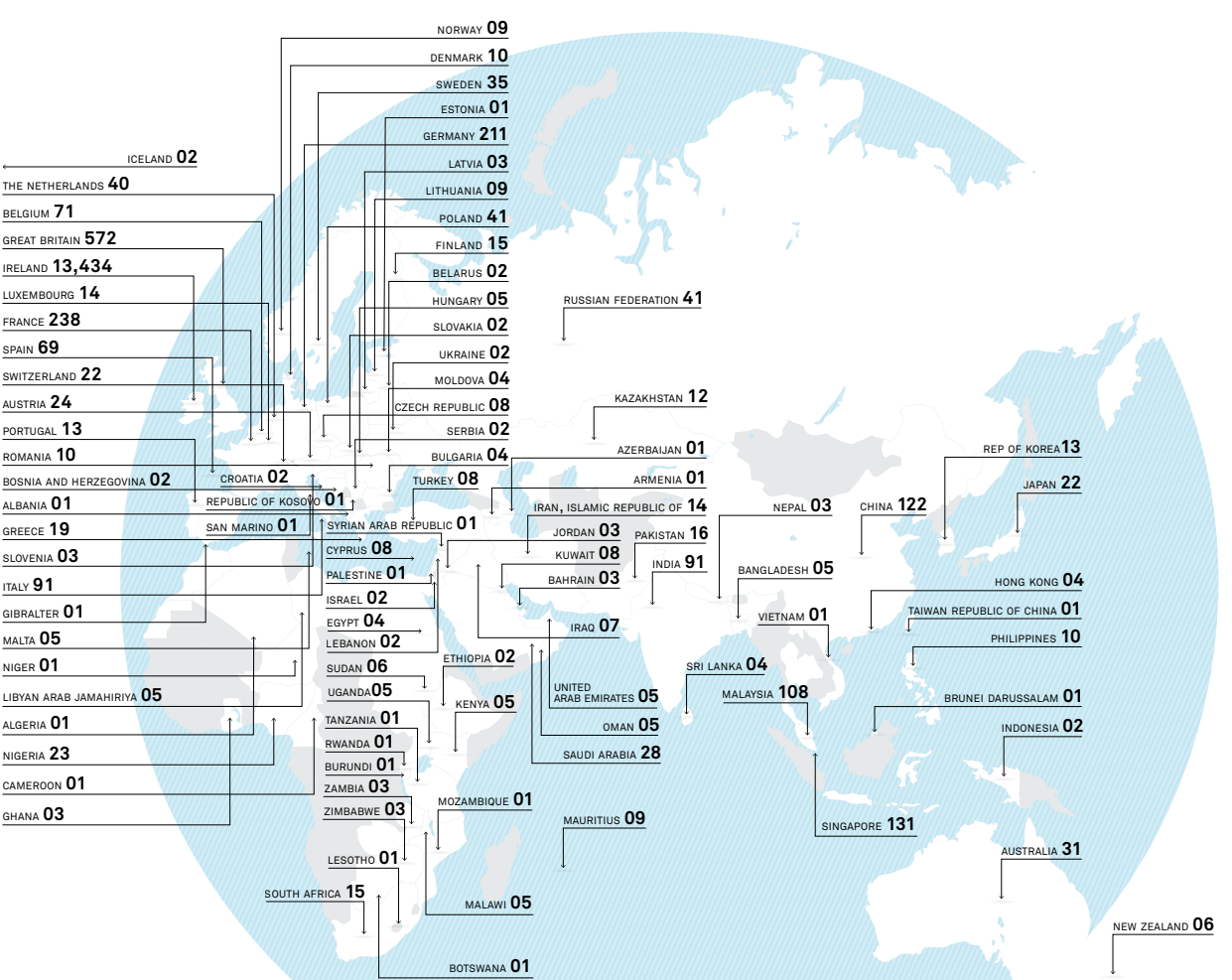


02 International Students
2014 | 2013

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



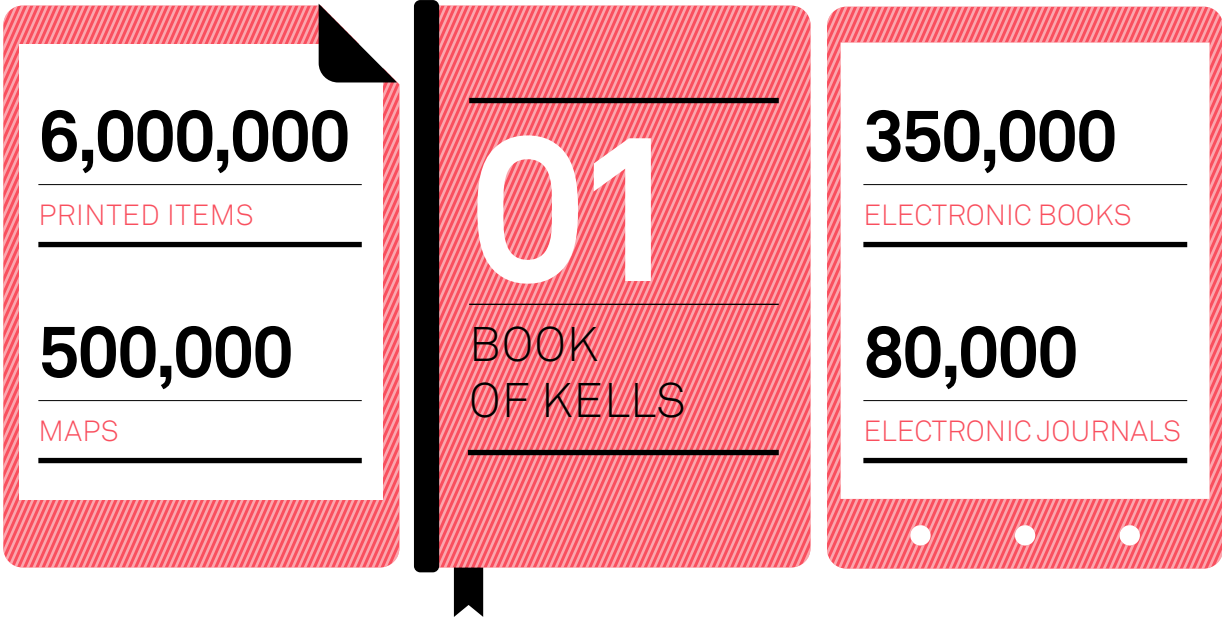
97 109			615 567			37 33		
AFRICA			ASIA			AUSTRALASIA		
ALGERIA	1 1		MOROCCO	2		ARMENIA	1 1	
BOTSWANA	1 5		MOZAMBIQUE	1 1		MAKALASIA	108 107	
BURUNDI	1		NIGER	1 1		NEPAL	3	
CAMEROON	1 1		NIGERIA	23 33		BAHRAIN	3 2	
EGYPT	4 3		RWANDA	1 1		OMAN	5 3	
ETHIOPIA	2 3		SOUTH AFRICA	15 18		PAKISTAN	16 17	
GHANA	3		SUDAN	6 6		PALESTINE	1	
KENYA	5 4		TANZANIA	1 1		PHILIPPINES	10 10	
LESOTHO	1 1		UGANDA	5 3		QATAR	1	
LIBYAN ARAB JAMAHIRIYA	5 6		ZAMBIA	3 3		REP OF KOREA	13 14	
MALAWI	5 4		ZIMBABWE	3 5		SAUDI ARABIA	28 24	
MAURITIUS	9 7		TOTAL	97 109		SINGAPORE	131 120	
						SRI LANKA	4 2	
						SYRIAN ARAB REPUBLIC	1 1	
						TAIWAN REPUBLIC OF CHINA	1 1	
						THAILAND	1	
						UNITED ARAB EMIRATES	5 6	
						VIETNAM	1 3	
						TOTAL	615 567	



14,954 15,062			112 106			836 718			78 19		
EUROPE			EUROPE NON EU			NORTH/CENTRAL AMERICA			SOUTH AMERICA		
AUSTRIA	24 20		ITALY	91 74		ALBANIA	1 2		ARGENTINA	2	
BELGIUM	71 61		LATVIA	3 3		BELARUS	2 1		BRAZIL	70 12	
BULGARIA	4 3		LITHUANIA	9 11		BOSNIA & HERZEGOVINA	2 1		CHILE	1 4	
CYPRUS	8 8		LUXEMBOURG	14 12		CANARY ISLANDS	2		COLOMBIA	2 2	
CZECH REPUBLIC	8 7		MALTA	5 4		CROATIA	2		ECUADOR	1	
DENMARK	10 11		POLAND	41 40		GIBALTAR	1 1		PARAGUAY	1	
ESTONIA	1		PORTUGAL	13 10		ICELAND	2 1		PERU	1 1	
FINLAND	15 18		ROMANIA	10 11		KAZAKHSTAN	12 16		TOTAL	78 19	
FRANCE	238 205		SLOVAKIA	2 6		MOLDOVA	4 3				
GERMANY	211 190		SLOVENIA	3 1		NORWAY	9 14				
GREAT BRITAIN	572 637		SPAIN	69 70		REPUBLIC OF KOSOVO	1				
GREECE	19 22		SWEDEN	35 28		RUSSIAN FEDERATION	41 36				
HUNGARY	5 5		THE NETHERLANDS	40 35		SAN MARINO	1				
IRELAND	13,434 13,600		TOTAL	14,954 15,062		SERBIA	2 1				
						SWITZERLAND	22 19				
						TURKEY	8 8				
						UKRAINE	2 1				
						TOTAL	112 106				

02 Library

LIBRARY COLLECTION HAS



TRINITY'S RESEARCH THEMES

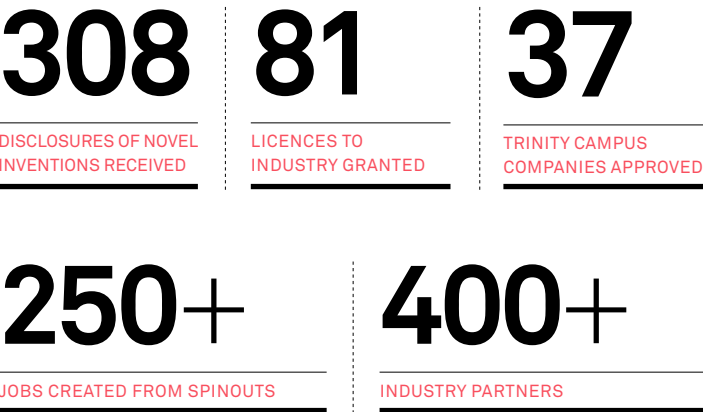
— AGEING	— IMMUNOLOGY, INFLAMMATION & INFECTION	— MANUSCRIPTS, BOOK & PRINT CULTURES
— CANCER	— INCLUSIVE SOCIETY	— NANOSCIENCE
— CREATIVE ARTS PRACTICE	— INTELLIGENT CONTENT & COMMUNICATIONS	— NEUROSCIENCE
— CREATIVE TECHNOLOGIES	— INTERNATIONAL DEVELOPMENT	— NEXT GENERATION MEDICAL DEVICES
— GENES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

LEADING FLAGSHIP RESEARCH INSTITUTES

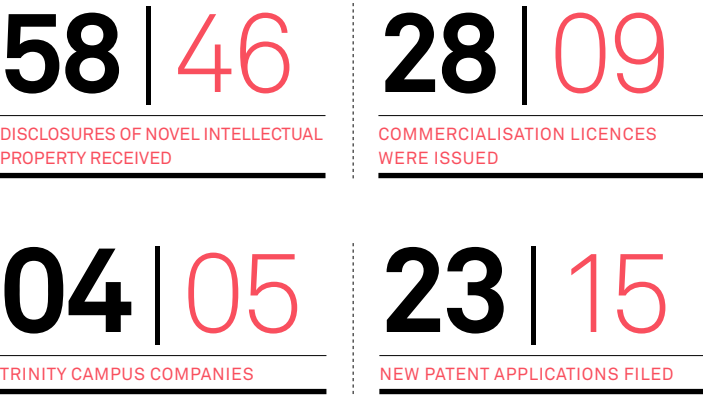
05	— TRINITY BIOMEDICAL SCIENCES INSTITUTE
	— CENTRE FOR RESEARCH ON ADAPTIVE NANOSTRUCTURES AND NANODEVICES (CRANN)
	— INSTITUTE FOR INTERNATIONAL INTEGRATION STUDIES (IIIS)
	— TRINITY COLLEGE INSTITUTE OF NEUROSCIENCE (TCIN)
	— TRINITY LONG ROOM HUB, ARTS AND HUMANITIES RESEARCH INSTITUTE

Commercialisation of Research
2014 | 2013

IN THE PERIOD 2009–2014 TRINITY HAS



IN THE YEAR ENDED SEPTEMBER 2014



INCOME

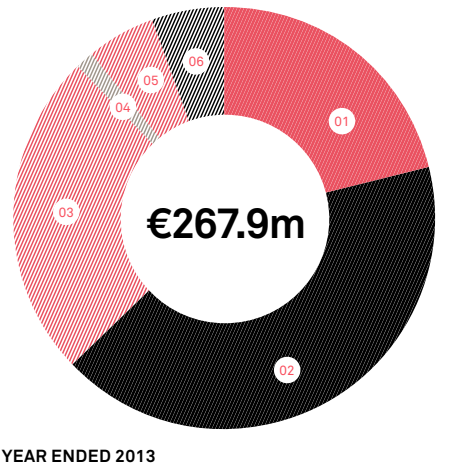
€267.9m

TOTAL INCOME FOR YEAR ENDED 2013

€265.9m

TOTAL INCOME FOR YEAR ENDED 2012

01. STATE GRANT	€55.2m €64.7m
02. STUDENT FEES	€116.2m €107.6m
03. RESEARCH INCOME	€65m €65.2m
04. FUNDED POSTS AND DONATIONS	€3.7m €3.1m
05. RESEARCH GRANTS & PROJECTS CONTRIBUTION	€14.1m €15m
06. OTHER INCOME	€13.7m €10.3m
TOTAL NET ASSETS OF THE COLLEGE	€677.9m €696.5m



YEAR ENDED 2013

Sculptures and Gardens — Enhancing the Campus

At the edge of the rugby pitch, by the path leading towards the Science Gallery and Westland Row, visitors to the College may admire a new stainless steel sculpture: four spheres of ascending size reach to the sky. This is 'Apples and Atoms' by Eilís O'Connell RHA and it commemorates Trinity's Nobel Laureate, Ernest Walton.

In 1932, at the Cavendish laboratory in Cambridge, Trinity graduate Ernest Walton and fellow physicist John Cockcroft split the nucleus of a Li (lithium) atom, often called 'splitting the atom'. Nineteen years later they were recognised with the Nobel Prize in Physics. Cockcroft went on to found the Atomic Energy Research Establishment at Harwell in Oxfordshire; Walton returned to Trinity where he helped build up the Department of Physics into the world-class School it is today.

In 2012, eighty years after the 'splitting of the atom', Trinity determined to recognise Walton's remarkable achievement by commissioning the first ever site-specific sculpture

commemorating a Trinity scientist. A public competition was launched, and Eilís O'Connell's winning entry was formally opened by the Provost on 15th November 2013.

Eilís O'Connell explained the thinking behind her design: "Spheres as a formal sculptural element appealed to me because they were used to create spark gaps for the particle accelerator with which Walton and Cockcroft 'split the atom'. Reflected in the stack of spheres are specially planted native Irish apple trees that refer to the private man and his keen interest for growing fruit trees."

Around the corner from 'Apples and Atoms' is this year's other main campus enhancement project: the new garden by the Botany Department. This was formally opened on 6th September 2014 by Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand.

The Princess was visiting Dublin specifically to view the 'Flora of Thailand' collection in Trinity's Botany Department.

'Flora of Thailand' is an international project, launched in 1963 to celebrate that country's extraordinary biodiversity. Thailand, which is only slightly larger than France, enjoys between 10 and 12 thousand native plant species – almost as many as the whole continent of Europe. 'Flora of Thailand' aims to produce a complete account of all the native vascular plants. In 1985, Trinity joined the project and has since made major contributions with the discovery and publication of many species new to science.

One of the new shrubs, discovered by Trinity, has been named *Buxus sirindhorniana*, in honour of the Princess, who has a life-long interest in biodiversity, and is a long-term advocate of sustainable development.

On opening the garden in the newly developed square, the Princess planted a Thai Rhododendron as a reminder of the botanic link between Trinity College Dublin and the glorious biodiversity of Thailand.

TOP – Eilís O'Connell RHA with her sculpture 'Apples and Atoms' which commemorates Trinity's Nobel Laureate, Ernest Walton

ABOVE – The new Botany Garden

Research Case Studies

- | | |
|---------------------|------------------------|
| 01 Evangelia Rigaki | 07 David Dickson |
| 02 Shane O'Mara | 08 John Boland |
| 03 Seán Duffy | 09 Biswajit Basu |
| 04 Sarah Doyle | 10 Mary McCarron |
| 05 Jane Stout | 11 Thorri Gunnlaugsson |
| 06 Michael Rowan | 12 Laure Marignol |



BACK (L-R) – Prof Shane O'Mara, Prof Seán Duffy, Prof Thorri Gunnlaugsson, Dr Sarah Doyle, Prof John Boland, Prof David Dickson.

FRONT (L-R) – Dr Laure Marignol, Prof Mary McCarron, Dr Evangelia Rigaki.

04 *AntiMidas, or, Bankers in Hades* Evangelia Rigaki

Opera and music theatre are flexible and dynamic art forms. They enable the use of voice, music, text, space and collaboration with artists from different disciplines. Increasingly the international contemporary opera scene is focusing on social issues of relevance to people's lives and finding innovative ways of exploring such issues through sound and music.

Playing with audience expectations

As a composer, researcher, and teacher of composition and contemporary opera, my work references the latest international developments and productions. I experiment with instrumental techniques and compositional approaches by, for instance, adding to traditional ways of playing an instrument and writing for the voice. I like to take an unconventional theatrical approach to the performance in order to play with the audience's expectations.

Theatricality informs the core of my compositional vocabulary. My vocal writing is predominantly concerned with the rhetoric of composition, and surprise, humour and innovating the musicians' roles are fundamental to my approach. For every new piece I write I consciously avoid repeating approaches from my past pieces and instead try to create something new and to approach composition from a different angle.

Playing the economic crisis

My latest opera *AntiMidas, or, Bankers in Hades*, is a satire, inspired by the international economic crisis. It is a collaborative piece, developed with the poet and professor of creative writing in Newcastle University, W.N. Herbert, and with acclaimed opera director John Lloyd Davies. As producer and writer, I consulted with students while writing and invited their feedback at rehearsals and the preview.

Economic crisis is a natural operatic theme because it has affected all of us and because the debate around what caused it generates such emotion and polarity of opinion. We wanted to create an opera that was relevant to what has been happening in our society.

Traditionally operas have drawn on classical and literary themes and tropes in order to frame topical issues in timeless settings. Ours is no different – to frame our ideas we turned to the Greek myths and the story of Midas – but we subverted it. Famously, everything King Midas touched, turned to gold, but everything our banker, *AntiMidas*, loves turns into quite another substance – which understandably makes for trouble at home...

AntiMidas, or, Bankers in Hades was premiered at the Beckett Theatre in December 2013, with support from the Arts Council and Trinity, as part of the Music Composition Centre's series. It was widely and favourably reviewed, with the *Irish Left Review* (24 Jan 2014)

terming it "effective satire", the *Irish Theatre Magazine* (12 Dec 2013) calling it "a kind of modern Wagnerian *gesamtkunstwerk*", the *Irish Times* (18 Dec 2013) noting that "the timing could hardly have been better" and the music magazine *GoldenPlec* (17 Dec 2013) writing: "Witty, entertaining and current, it's an unusual but apt take on the banking crisis in Ireland". We are currently in discussions to take the performance abroad.

In 2013 only four contemporary operas were staged in Dublin – the other three were by senior composers (Gerald Barry, Raymond Deane and Roger Doyle). My writing, producing and staging this opera has been inspirational for those of my students with operatic ambitions of their own.



Evangelia Rigaki joined Trinity's School of Drama, Film and Music as an Ussher lecturer in Composition in 2010, and has since been involved in the genesis of the Music Composition Centre and the MPhil in Music Composition. Evangelia has a BA (Hons) from the University of Leeds and an MMUS and PhD from Royal Holloway, University of London. Her composition portfolio is diverse, ranging from instrumental works to experimental music theatre, opera and dance. She had pieces performed at the London Tête à Tête opera festival in 2008, 2009 and 2010; other recent pieces include *Professional Suicide*, Vox-Linbury Studio 2011; *Ode to Debt*, Beckett Theatre, 2012, and *The Pregnant Box*, installation – miniature operas, Front Square, Trinity College Dublin, 2014.

→ Traditionally operas have drawn on classical and literary themes and tropes in order to frame topical issues in timeless settings. Ours is no different – to frame our ideas we turned to the Greek myths and the story of Midas – but we subverted it.



04 Making Memories
Shane O'Mara

Our memory is remarkable: to take a simple example, we can and do learn our own names before we learn to speak, and we retain this information perhaps a hundred years later (unless we have suffered some form of serious brain insult). This is an astonishing feat of memory given the range of experience and change – development, education, maturation, senescence – that a brain undergoes over such an extended time period. How can your brain, my brain, indeed any brain, perform such an astonishing feat? This is a difficult question, which speaks to the heart of what it is to be human.

I ask you to imagine what your life would be like without your enduring personal record of hopes, experiences, desires, wishes, needs, loves and hatreds? Without memory, we would live in a continual present, for the experience of memory gives meaning and continuity to our lives. My research is focused on understanding the brain systems that support memory in the brain. I also want to understand what goes wrong in these brain systems during ageing and depression – and how we can protect our brains from the consequences of these conditions.

How do brain systems support memory?

We now know the identity of these interconnected brain systems (the prefrontal cortex-hippocampal formation-thalamus system). We know that damage to these brain areas causes severe and mostly irreversible amnesia. We also know that, via their widespread connectivity, nuclei within the thalamus support these memory networks. We know remarkably little, however, about the nature of thalamic information and how it impacts upon memory.

I recently became the first Irish-based scientist to be granted a Senior Investigator Award under the Science Foundation Ireland (SFI), Health Research Board (HRB) and Wellcome Trust Biomedical Partnership. The research that I and my colleagues are carrying out will determine if information in the thalamus comes ‘top-down’ from the prefrontal cortex-hippocampal formation, or whether it represents a second, parallel memory system in the brain. The overall goal is to understand how the interactions between these brain areas support normal memory and how, when compromised, they might contribute to disorders of learning and memory.

I also work with the biopharmaceutical industry to develop drug therapies to ameliorate brain ageing and depression. It would be a great breakthrough if we were able to couple drug treatments with treatments focused on behavioural change that would maximise the resilience of the brain in the face of ageing or traumatic events, such as stress or stroke.

Public Policy Focus

I also have a public policy focus. I work on understanding the consequences of torture on brain function, and I have attempted to understand why it is that many people, including public policy-makers and others, think that torture is a reasonable tactic for eliciting memories from prisoners in captivity. I have also started work recently on the applications of the brain sciences to business and business practice.

The quest to understand how the brain works is one of the most exciting endeavours in contemporary science, reaching as it does across every domain of human activity, from development to education to cognitive decline in the elderly. I feel deeply privileged to be involved in some small way in this research endeavour.

Shane O'Mara is Professor of Experimental Brain Research in Trinity College Dublin, and is director of the Trinity College Institute of Neuroscience. He is a graduate of NUI Galway (BA, MA) and of the University of Oxford (DPhil). He joined Trinity as a lecturer in 1995 and is now a Fellow of the university (FTCD), as well as a Fellow of the Association for Psychological Science (FAPS) and an elected member of the Royal Irish Academy (MRIA). His research focuses on the brain systems supporting learning and memory. He is also interested in public policy and applied business applications of neuroscience.

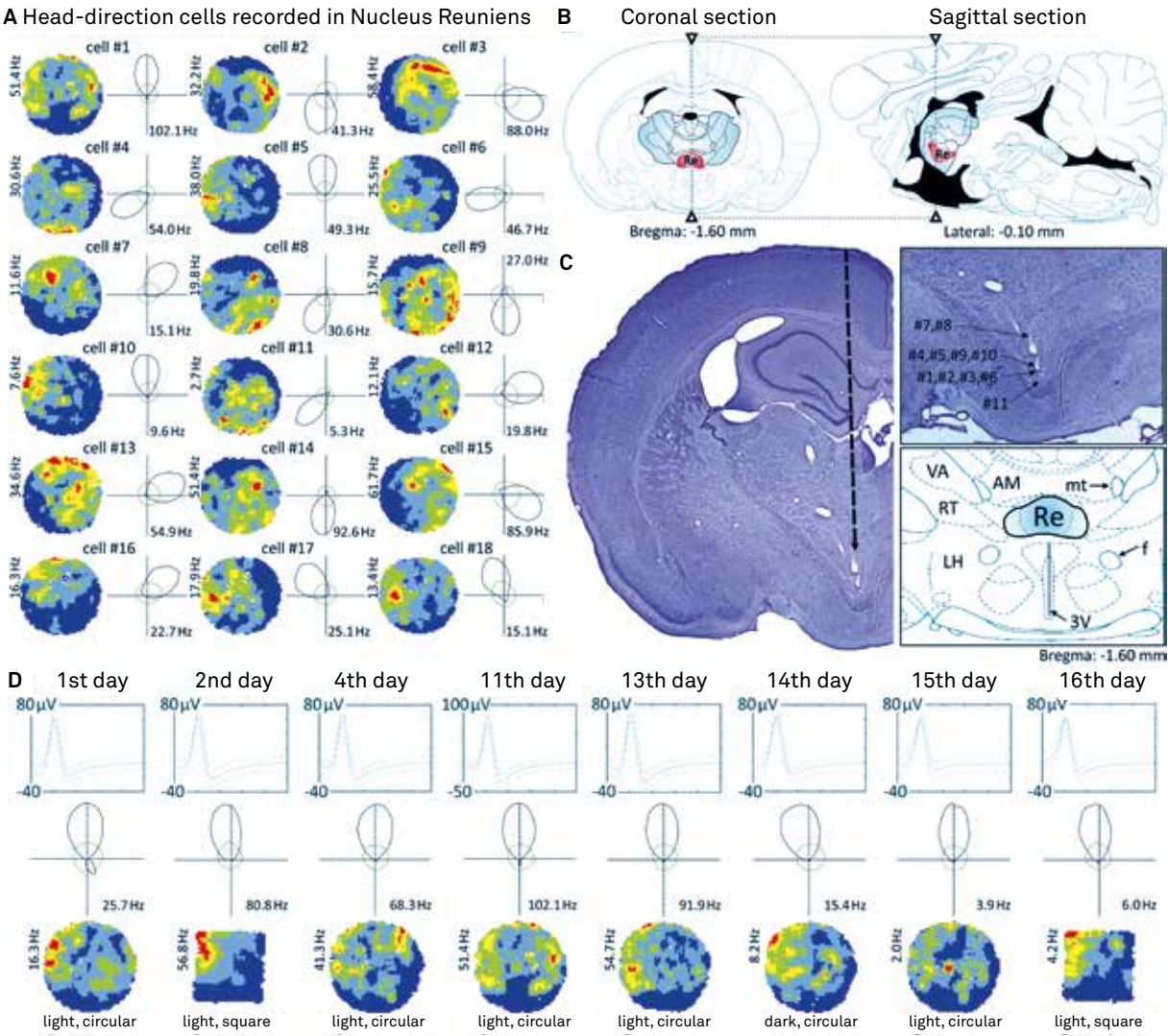


Fig 1. Head direction cells recorded in the nucleus reuniens. (A) 18 representative head direction (HD) cells in nucleus reuniens (NRe); (B) NRe location on a coronal (left) and corresponding sagittal (right) rat brain section (adapted from Paxinos and Watson, 2005); (C) representative histological specimen showing electrode track (left); recording positions corresponding to cell locations presented in panel A (upper right inset) showing location of NRe and detailed atlas (lower right inset); (D) representative recordings showing multi-day stability of HD cells: a representative cell recorded on each day of 16 days (multiple transitions from light-dark-light, and environmental transformations from circle to square to circle). The solid line is the mean spike waveform and dashed lines are $M \pm SD$ of the spike waveform. The green outline shows predicted firing rates given the proportion of time the animal spent looking in each direction, calculated according to the distributive hypothesis.

04 Brian Boru – Rewriting the History of Ireland’s Greatest High-King
Seán Duffy

Brian Boru is the most famous Irishman before the modern era, and his death at the Battle of Clontarf in 1014 is one of the few events in Ireland’s medieval history to maintain a hold on the popular imagination. The legend of Brian was always that the great Christian king gave his life in a battle on Good Friday against pagan Viking enemies whose defeat banished them from Ireland forever. More recent interpretations have portrayed the conflict as merely a rebellion against Brian, king of Munster, by his enemies in Leinster and Dublin.

2014 was the millennium year of Clontarf, and proved the occasion for a major re-evaluation and presentation of all available research on Brian Boru, as well as an important raising of public awareness of Ireland’s medieval heritage generally.

Understanding Clontarf and getting public buy-in

I’ve been researching the life and times of Brian Boru for over twenty years. Some of the questions that have preoccupied me and other scholars include: What was the role of the high kingship in medieval Ireland? What role did the Vikings play in Irish political affairs? When was the myth of Brian Boru created, and how, and by whom? What really happened at Clontarf? What might have been the consequences had Brian lost the battle?

To debate these and other questions, I organised a major conference, in partnership with Dublin City Council, which was held in Trinity on 11th and 12th April before a capacity attendance of four hundred. Admission was free and open to the public. This was a focal point in the national millennium commemoration of Clontarf, and featured leading experts in Irish and Scandinavian history and archaeology from universities throughout Ireland, Britain and further afield. The conference proceedings will appear in 2016 as Volume XVI in my *Medieval Dublin* series.

Trinity was the perfect location for the national Clontarf conference since it is home to Brian Boru’s harp (which, although later in date, is the national symbol of Ireland) and to the largest collection of relevant manuscript sources, including the famous *Cogadh Gaedhel re Gallaibh* which, more than anything else, created the myth of Brian Boru. Trinity also cares for the only surviving artefact likely to have been touched by the high-king himself: the world-famous *Book of Armagh* with its inscription from AD 1005 in which Brian is described as *Imperator Scotorum* (‘Emperor of the Gaels’). These and other priceless objects formed the centrepieces of an exhibition in the Long Room, opened to coincide with the conference.

To also coincide with the conference I published my own book, funded by Dublin City Council, *Brian Boru and the Battle of Clontarf*, which contains the fruits of my ongoing research. I offer a new analysis, uncovering the origins of Brian’s greatness, reinterpreting the role of the Vikings in Irish affairs and showing how Brian exploited their presence to secure the high-kingship for himself. I conclude that the Battle of Clontarf was deemed a triumph, despite Brian’s death, because of what he averted – a major new Viking offensive in Ireland – on that fateful day.

Our role in the millennium commemorations

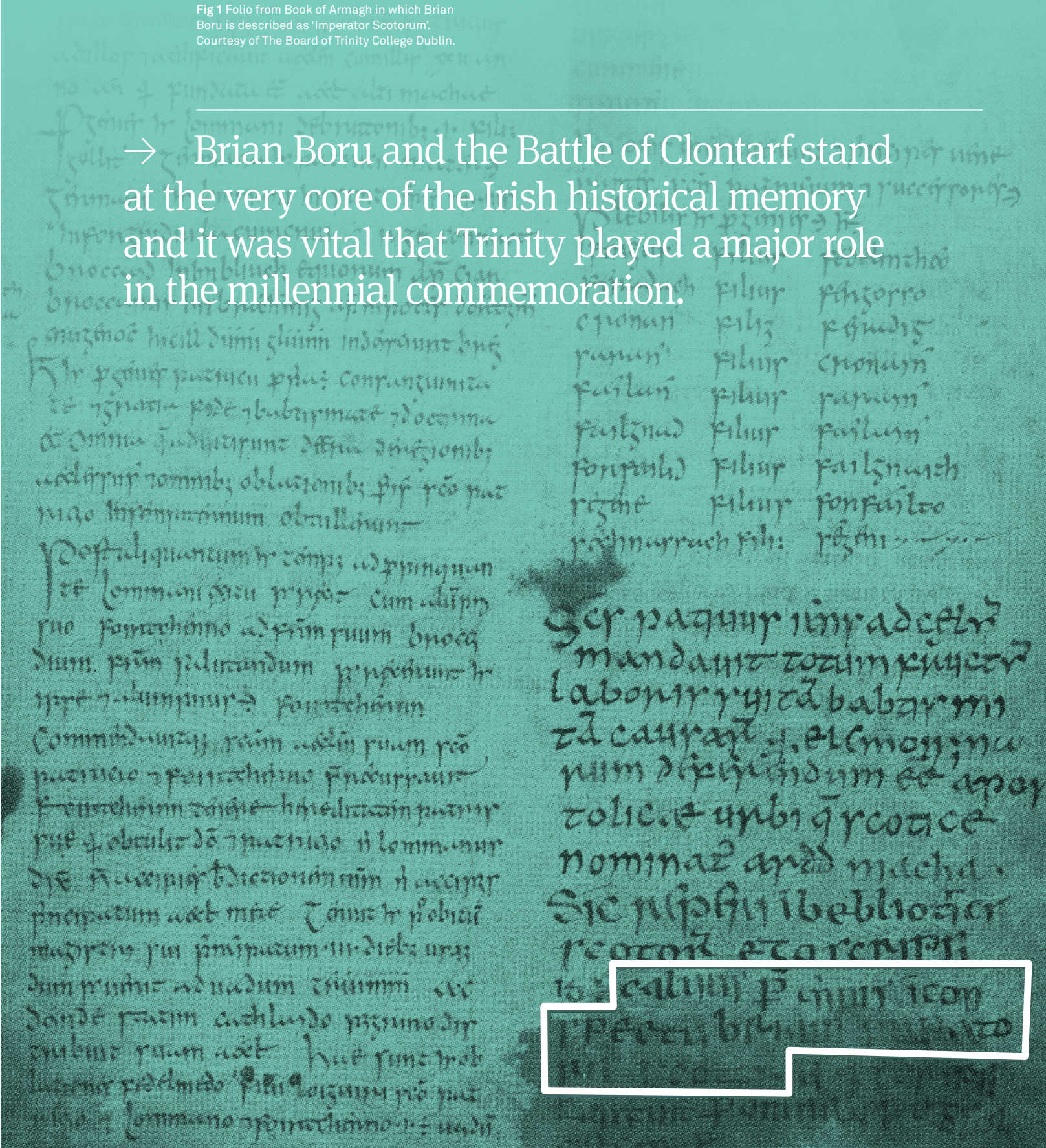
Brian Boru and the Battle of Clontarf stand at the very core of the Irish historical memory and it was vital that Trinity played a major role in the millennial commemoration. Our national conference, the Long Room exhibition, my own book and a vigorous schedule of public engagement, have meant that Trinity made a great contribution and reinforced its presence at the forefront of Irish medieval studies.



Seán Duffy has a BA (Mod), MLitt and PhD from Trinity and spent three years as a Research Scholar in the School of Celtic Studies, Dublin Institute for Advanced Studies before returning to take up a lectureship in the History Department. He is now Professor in Medieval History. The author and editor of about 30 books and numerous articles on Irish history and on Irish relations with Scotland and Wales in the Middle Ages, he also organises an annual symposium on medieval Dublin and has recently launched a new biennial symposium on medieval Ireland. The proceedings of both are published by Four Courts Press.

Fig 1 Folio from Book of Armagh in which Brian Boru is described as ‘Imperator Scotorum’. Courtesy of The Board of Trinity College Dublin.

→ Brian Boru and the Battle of Clontarf stand at the very core of the Irish historical memory and it was vital that Trinity played a major role in the millennial commemoration.



04 Preventing Blindness Caused by Age Related Macular Degeneration

Sarah Doyle

Age related macular degeneration (AMD) is the most common form of central blindness in the over-50's age group worldwide. More than 70,000 people in Ireland suffer with this debilitating condition, which can leave people unable to recognize faces, to drive, read or watch television.

AMD has both early ("dry") and advanced ("wet") disease stages. "Wet" AMD is the minority form of the disease but it's very aggressive and accounts for 90% of cases of blindness caused by AMD. It's been named by the World Health Organization (WHO) as the leading cause of sight loss in the developed world.

An excessive immune reaction

I became interested in AMD through my research into the causes of inflammatory disease. In our bodies, an initial inflammatory response is required to clear infections and heal wounds – however in chronic diseases, the balance is tipped and an excess of uncontrolled inflammation then causes local tissue damage. In certain chronic conditions, you will see a form of "sterile" inflammation whereby immune responses occur in areas of the body where they are not needed (where there is no infection) – this often happens in response to a build-up of self-made deposits, which for some reason our bodies cannot dispose of.

Why does our immune system over-react like this? My research focuses on identifying the actions of molecules contained within the cells of our immune system which allow for a relay of signals that inform the genes about the cells' immediate environment so that the immune system can react appropriately. Identifying the components involved in these inflammatory signaling pathways and understanding the underlying mechanisms of how these intermediates interact, in both health and disease, is vital. Manipulation of these molecules holds enormous potential for drug development.

Inhibiting new blood vessel growth in 'wet' AMD

A number of years ago, I began collaborating with my colleagues Matthew Campbell and Peter Humphries in Trinity's Ocular Genetics Unit. Our research was supported by Enterprise Ireland, SFI, GlaxoSmithKline and a U.S. charity, Bright Focus Foundation. Our collaboration led to the discovery that 'sterile' inflammation is central to AMD – in fact, the presence of yellowish-white deposits in the central area of the back of the eye is usually the first indication of disease. In 'wet' AMD, new unwanted blood vessels grow from the back of the eye, disrupting the retina.

We identified Interleukin-18 (IL-18), a natural component of our immune system, as a factor that can reduce unwanted new blood vessel growth, and we started looking into whether administration of IL-18 might prove useful as a therapy to prevent progression to "wet" AMD.

With GlaxoSmithKline, we began investigating strategies for IL-18 use in the clinical setting. We found, through a series of rigorous tests, that IL-18 had a good safety profile and furthermore that it could inhibit new blood vessel growth in a model of "wet" AMD. We published the findings of our research in *Science Translational Medicine*, 2nd April 2014.

Due to the immediate translational potential of IL-18 as a therapy for "wet" AMD, our studies have attracted both national and international media attention and were the subject of numerous commentaries in high impact translational and applied scientific journals including *Nature Rev Drug Discovery* (May 2014) and *Nature-SciBx* 1st May 2014, where it made the cover story.

We also have funding from the Health Research Board to work with TILDA (the Longitudinal Study on Ageing) with whom we hope to identify inflammatory biomarkers for those at greater risk of developing "wet" AMD.

Sarah Doyle received her BA Mod Biochemistry in 2002 and her PhD in 2006 from the School of Biochemistry and Immunology, Trinity College Dublin, and joined the School of Medicine as a lecturer in Immunology in 2012. She is now an Assistant Professor heading the Molecular Inflammation Research Group. Her research focuses on understanding the ways cellular components communicate with each other, passing information about the extra-cellular environment into the cell so we can respond appropriately to injury.

Fig 1 Immune cells respond to extracellular drusen deposits, a hallmark feature of AMD, through the action of NLRP3, a mediator of "sterile" inflammation and react by secreting IL-18. IL-18 then inhibits unwanted blood vessel growth at the back of the eye by sending signals into Retinal Pigment Epithelial (RPE) cells and endothelial cells. IL-18 therefore represents a potential therapy for treating wet AMD.

Fig 2 Retinal Pigment Epithelial cells remain healthy and viable after treatment with IL-18.

→ We identified Interleukin-18 (IL-18), a natural component of our immune system, as a factor that can reduce unwanted new blood vessel growth

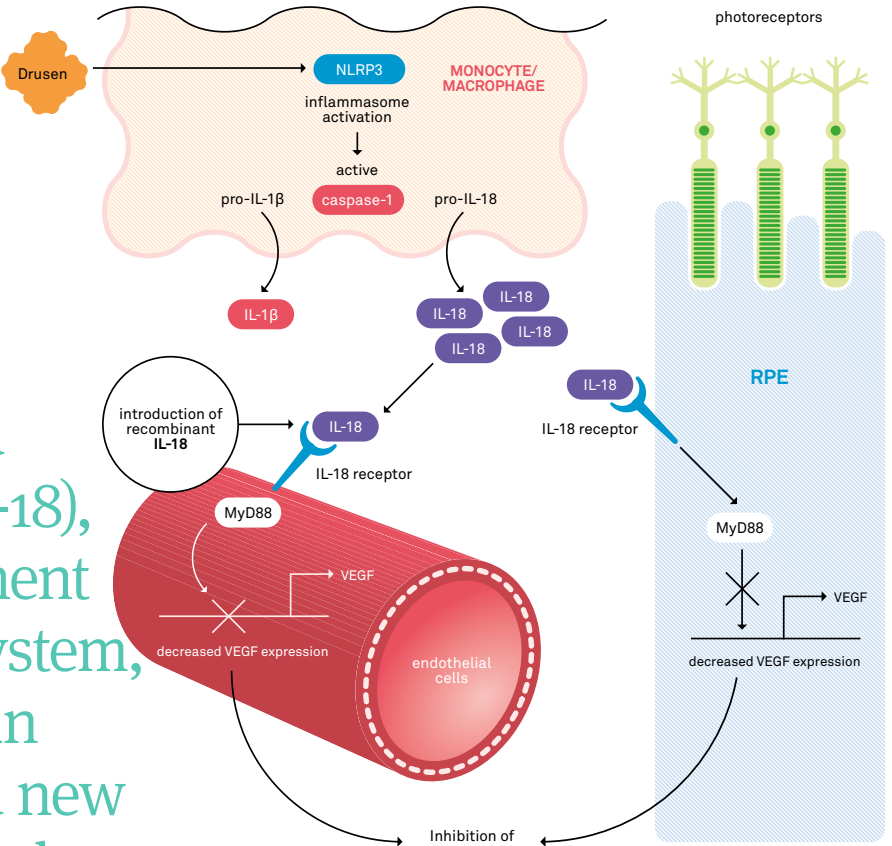
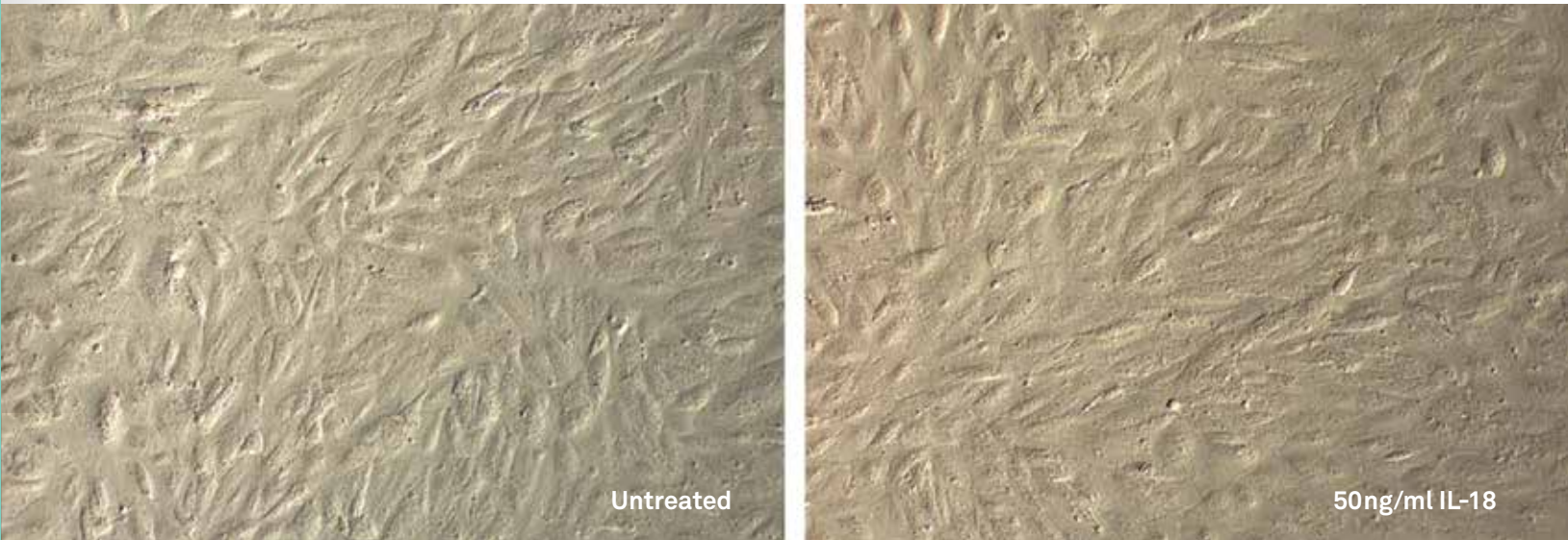


Fig 1

Fig 2



04 Valuing our Natural Ecosystems

Jane Stout

Biodiversity is the variety of life on earth. By ‘biodiversity’ we mean our massive number of species, our huge range of ecosystems, and the genetic variation which makes individuals of us all.

Biodiversity is fundamental to human life because healthy functioning ecosystems provide us with resources and services necessary for our existence. For example, without green plants fixing the sun’s energy into carbohydrates via photosynthesis, we would have neither oxygen to breathe nor food to eat. Without microorganisms breaking down dead organisms we would have no soil in which to grow our crops. And without pollinators there would be less food available for burgeoning human populations, diets would be vitamin-depleted, and consumers would have much less choice.

Evaluating Natural Capital – what price a tree?

Natural ecosystems are being damaged and destroyed by modern life, and the resources and services which comprise our natural capital are being lost. This loss has gone mostly unrecognised because natural ecosystems and their stocks and flows of natural capital are not properly valued. However momentum is now gaining for proper natural capital evaluation and its incorporation into public and private accounting systems.

In April of this year, I chaired the first Natural Capital Ireland conference. This highlighted some of the benefits and

challenges ahead. For example, certain resources and services are relatively straightforward to value – a tree can be cut down and sold as timber, thus having a marketable value. But it’s not so simple to determine all the other values that a tree provides in terms of carbon sequestration, water cycling, shelter and food for other organisms, and contribution to woodlands which provide recreational opportunities for us.

The Birds and the Bees

My research focuses particularly on pollination ecology. Pollination – the transfer of pollen between flowers by animals – is a vital service for crop production and also for maintaining wild plants, which produce the fruits and seeds, which provide food for a wide range of birds and other wildlife, which in turn provide other benefits to humans.

The pollination needed for crop production can be given an economic value. My team at the Trinity Centre for Biodiversity Research determined the value of wild insects to the pollination of oilseed rape crops in Ireland. We found that seed production was reduced by a third when pollinators were excluded – this corresponds to approximately €4 million in lost yield annually.

Oilseed rape cultivation has increased >300% in Ireland since 2008, meaning that our wild pollinators (including 101 species of bees, 180 species of hoverflies, and 28 species of butterflies)

are more important than ever. (Although managed honeybees can be brought in to supplement wild pollinators, I was involved with a pan-European project which determined that this is not necessarily a straightforward solution: there are not enough managed honeybee colonies to meet the demand for pollination driven by increases in insect-pollinated crop cultivation across Europe).

It’s harder to put an exact value on the pollination of wild plants. But work by my team is investigating how agricultural management and the surrounding landscape influence pollinators and their interactions with plants. We have established that wild plants in field margins, even in intensively managed agriculture, are important sources of forage for wild insects, and should be maintained.

Pollinators’ vital contribution to crop yield

Loss of habitat, disease, invasive species and pollution are driving bees and other pollinators into global decline. Ironically, it is often the very agricultural systems which benefit from pollination services which contribute to pollinator decline.

Our team’s natural capital evaluation for pollination puts focus on the vital contribution of pollinators for crop yield. Since our agricultural systems are dependent on pollinators, it’s incumbent on policy-makers to find a way to halt the decline.

Jane Stout received her BSc and PhD from the University of Southampton, UK. She joined Trinity’s School of Natural Sciences in 2001, and is now Associate Professor and Director of the Trinity Centre for Biodiversity Research. She has published >60 articles in peer-reviewed journals, led major research projects funded by SFI, EPA, IRC and others, and is a Trustee of the Bumblebee Conservation Trust. Her research is interdisciplinary, focusing on pollination ecology, particularly on drivers and consequences of bee decline.

Fig 1 Wild insect pollination is worth €4million per year to Irish oilseed rape farmers. (Dara Stanley)

Fig 2 Bombus terrestris Liffey Valley Park: Bumblebees are important pollinators of many crops and wild plants.

→ My team at the Trinity Centre for Biodiversity Research determined the value of wild insects to the pollination of oilseed rape crops in Ireland.

Fig 1



Fig 2



04 Targeting Early Alzheimer's Disease

Michael Rowan

Alzheimer's disease kills millions worldwide due to an irreversible decline in the function and viability of nerve cells. It is the most common neurodegenerative disorder and presents clinically with devastating symptoms of dementia. These symptoms are caused especially by disruption of the connections between neurons. Neurons have very limited capacity for repair or replacement and there is no known disease-modifying therapy, so the earlier an intervention is initiated the more likely the affected person will benefit. In order to intervene early we need better understanding of the disease and biomarkers.

Brain Plasticity and Disease

I lead a research group in the Trinity Institute of Neuroscience which uses physiological and pharmacological techniques to study persistent increases and decreases of the communication between nerve cells in the living brain. We focus on research questions like how do different forms of long-lasting plasticity in the brain networks contribute to the processes that underlie memory and learning, and how does sleep affect these processes?

A major focus of our research is how badly-folded proteins disturb brain plasticity, leading to disease. For Alzheimer's disease, we have implicated certain rogue aggregated forms of the protein amyloid in the disruption of plasticity of brain memory mechanisms. Measures of these amyloid aggregates reliably detect the onset of pathology so are important biomarkers of Alzheimer's. Our research is now focusing on developing better means of detecting and targeting these aggregates.

Targeting disruption by amyloid aggregates

We have discovered that drugs that target certain pathways in the brain can alter memory mechanisms that are affected early in the disease process. These drugs work by restoring forms of physiological plasticity that are disrupted by toxic amyloid. For example, the role of the main excitatory transmitter in the brain and its sites of action have been probed with selective activators and inhibitors at different sites to prevent or reverse disruption of plasticity. Similarly, the key involvement of modulatory chemical mediators, such as acetylcholine, has been elucidated and hence targeted with novel approaches in the disease models.

Another recent development was the finding that some of the same mechanisms that are involved in mediating prion diseases (like 'mad cow disease') play a critical role in causing the damaging effects of the aggregated amyloid. We are also pursuing the idea of using new antibodies as drugs to target these processes and to selectively and directly neutralize the disruptive aggregates in the brain.

We collaborate with academic and industrial partners who are interested in novel ways of developing potential disease-modifying therapies for early Alzheimer's disease.

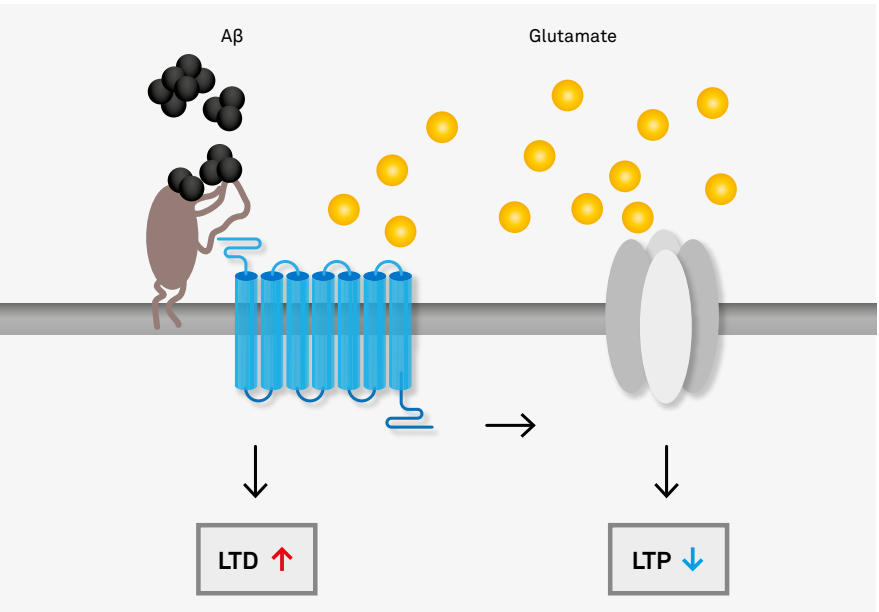


Fig 1

Michael Rowan received his BSc from UCD and PhD from Trinity and joined the School of Medicine as a lecturer in 1989. He is now Professor of Neuropharmacology and a principal investigator with the Trinity College Institute of Neuroscience (TCIN). He was awarded the Conway Medal by the Royal Academy of Medicine in Ireland and has published over 150 articles in peer-reviewed journals. His research focuses on neuronal plasticity in health and disease, especially models of Alzheimer's disease.

Fig 1 Amyloid (Aβ) disrupts brain plasticity (LTP, LTD) by targeting a novel prion protein co-receptor for glutamate

→ We focus on research questions like how do different forms of long-lasting plasticity in the brain networks contribute to the processes that underlie memory and learning, and how does sleep affect these processes?

04 *Dublin: the Making of a Capital City*
David Dickson

Dublin has been a city of European consequence for over three hundred years and pivotal in Irish history for over a thousand. At many moments between the 900s to the 1900s it was a bitterly contested place – perhaps no other European capital city apart from Prague has experienced such sharp discontinuities and reversals in its history.

In modern times, historians have researched the many components of our city’s past, including material culture and municipal governance, religion, high and popular culture, architecture, business and recreation. But the process of reconstructing Dublin’s evolution through the ages has been often difficult, subject to bias, and sometimes impossible.

Surviving History

The survival of evidence is uneven. To give some examples: thanks to the Wood Quay excavations, we know far more about everyday life in the Viking town than we do about social conditions several hundred years later in the wake of the Black Death, since the relevant archaeological horizons for that period were erased by later building activity. And after 1600, we have a wealth of sources dealing with the physical and mental worlds of Dublin’s elite citizens and the striking growth of prestigious neighbourhoods, but we have much less about life on the back street or in the workshop.

Intellectual fashion has also contributed to a skewed picture. Historians of the recent eras (i.e. since 1800) have been much more interested in looking at politics, literature and urban poverty than at the less dramatic but equally important processes of working life, business and family, the outsurge to the suburbs (thanks to successive revolutions in transport), and the shift from tenement-dominated city to owner-occupancy conurbation.

Reviewing the evidence: a meta-analysis

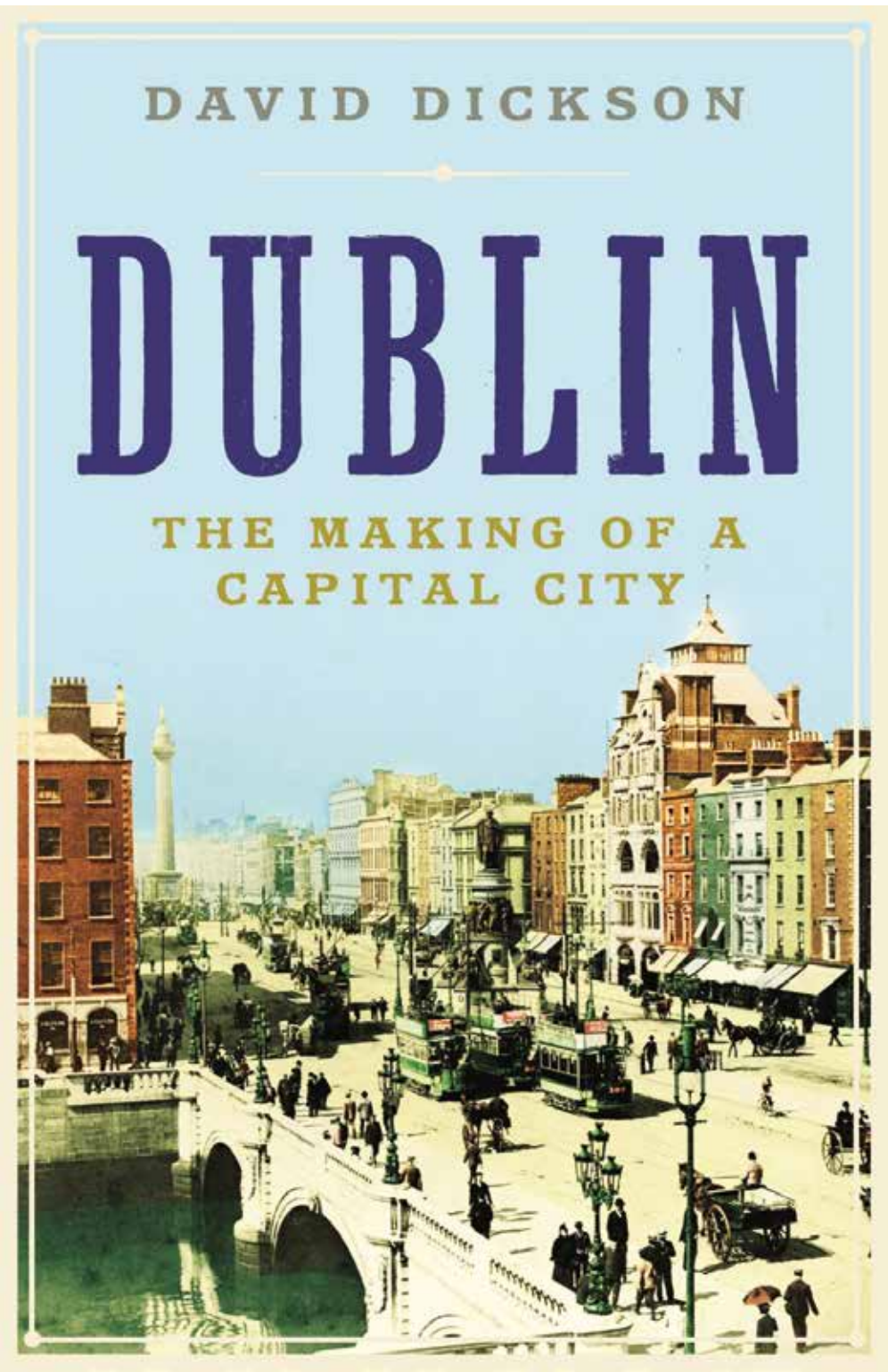
In *Dublin: The making of a capital city*, published in 2014, I provide the first meta-analysis of this vast but fragmented literature relating to Ireland’s primate city. The book surveys the whole history of urbanization at the Liffey mouth but concentrates on the four centuries since 1600, during which time Dublin became a large, and in some respects innovative, cosmopolitan city.

Taking the millennium-long view enabled me to identify some recurring themes: the strong correlation between the size of Dublin and the scale of central government activity in Ireland; the importance of the city in the shaping of Irish political culture, both hegemonic and subversive; and the cultural ambiguity and hybridity of its citizenry through most of its history. These themes are enduring and continue to shape the city today.

I end the book with some reflections on the discovery and recognition by Dublin Corporation of the city’s complex past, a past that, when examined closely, challenged the prevailing narratives as to the origins of modern Ireland. That conversion by official Dublin only occurred in the 1990s, but it proved a major turning point both in civic and national patronage of the more visible aspects of Dublin’s heritage. But even with this, large swathes of Dublin’s history remain remarkably unexplored compared to the comprehensive historiography available for other European capitals. My book has, I hope, helped to make those gaps in research more evident – so that we can now start to address them.

“The process of reconstructing Dublin’s evolution through the ages has often been difficult, subject to bias, and sometimes impossible.”

David Dickson received his BA and PhD from Trinity and has spent his working career in the Department of History. He is now Professor in Modern History, a member of the Royal Irish Academy, and a coordinator of the inter-disciplinary Dublin History Research Network [www.dublinhistoryresearch.ie]. Amongst his many publications is the award-winning monograph *Old world colony: Cork and South Munster 1630–1830* (2005). He is currently engaged in a comparative study of Irish urbanization in the long eighteenth century.



04 Materials with the Right Connections

John Boland

When we think of materials we think of objects with well-defined and distinguishing properties. Diamond for instance is a hard material that conducts heat but not electricity, silver is soft and conducts both. Around the world scientists and engineers are working to exploit the properties of these and other materials. Whether it's mobile communications, medical devices or next generation computation, technological advances are made possible by discovering materials with new and enabling properties.

But there's a problem: off-the-shelf materials like diamond or silver no longer have the capacity to deliver real innovation. So the search is on to identify new candidate materials. Whether by a combination of brute force synthesis and measurement or through the use of computer simulations to guide discovery, scientists around the world are leaving no stone unturned in their quest for new materials.

Researching nanoscale materials

I lead a team of researchers at the School of Chemistry developing a new approach to materials discovery. Rather than trying to find the optimum material for a

particular application, I've shown that nanoscale materials have a natural tendency to modify their properties in the presence of an external stimulus, for example an applied electric field or during light illumination. These new materials exhibit evolving behaviours rather than the fixed properties typical of conventional materials. However, my objective is not just to identify materials with tuneable and adaptive properties, but to create material systems that are actually capable of learning.

Our approach exploits random networks of nanoscale wires each between 10 and 20 microns in length but only a few hundred atoms wide (see **Fig 1**). The behaviour of any network is determined by the properties of the junction connections, in our case these are the crossing points between individual wires in the network. Crucially we have discovered that it is possible to engineer the composition of these junctions, so that they can be turned ON and OFF in response to the applied stimulus.

The first realisation of this phenomenon involved networks comprised of silver nanowires coated with a 3 nm-thick electrically insulating polymer coating (see **Fig 2**). Initially the entire network is

non-conducting but as voltage applied across the network is increased individual junctions switch ON and in this way the network conductivity can be continuously tuned over a wide range (see **Fig 3**). More recently we have shown that individual junctions can be switched to different ON levels so that even a single junction can demonstrate up to six-levels of memory.

Controlled conductivity and multiple memory levels are a big advance but our goal is to demonstrate true learning. Present day computers are powerful but lack the capacity to learn. Learning requires the ability to recognise the significance of correlated stimuli. Even a young child, who initially pays little attention to a bee, becomes alarmed at the sight or sound of a bee after having been stung. This learned response results from the simultaneous inputs of sight/sound and pain. We have developed network junctions that mimic this type of brain synapse operation that turn ON only in response to two or more simultaneously applied stimuli.

If successful, this research will not only lead to the fabrication of sentient materials, but possibly the development of a paradigm for computation that parallels with the operation of the human brain.

John Boland received a BSc degree in chemistry from UCD and a PhD from the California Institute of Technology. Previously he was on the research staff at IBM NY the J.J. Hermans Professor of Chemistry at the University of North Carolina at Chapel Hill. He joined the School of Chemistry in 2002 and served as the Director of the CRANN Nanoscience Institute (2005–2013). He is fellow of Trinity College (2008), the American Vacuum Society (2009) and the American Association for the Advancement of Science (2010). He was the recipient of the 11th ACSIN Nanoscience Prize (2011) and was recently awarded a prestigious ERC Advanced Grant (2013).



Fig 1

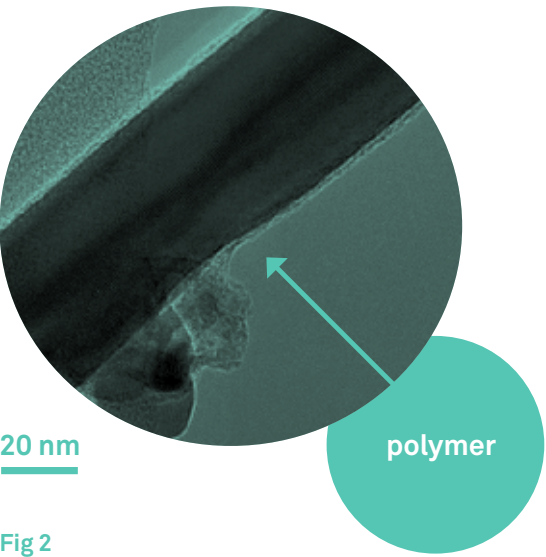


Fig 2

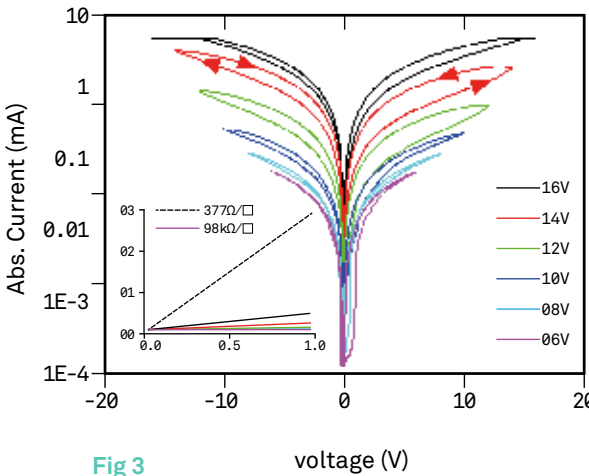


Fig 3

04 Energy Management Systems and Control – from Buildings to Cities
Biswajit Basu

Energy supply and energy sustainability are critical to socio-economic growth. Energy sustainability involves not only the supply of low-carbon power but also strategies for smart energy usage and conservation.

People often think of industry and transportation as the main culprits in energy guzzling, but these represent only about 25% and 1% of total electricity consumption respectively, whereas commercial and residential buildings consume an estimated 74% of electricity. According to recent EU Commission investigations, the building sector represents 40% of the European Union's total energy consumption.

‘Greening’ our buildings

The design of energy-efficient ‘green’ buildings is vital for cutting energy waste and achieving the emissions reduction targets set by governments.

Engineering methods for building design are undergoing substantial changes and improvements. But the challenge is not only to design new, energy-efficient structures, but to renovate existing buildings to reduce their environmental impact without compromising the health or comfort of the occupants. Increasing energy efficiency throughout the entire life-cycle of a building, and not just at its design stage, could drastically reduce global energy consumption. This is frequently a management issue as much as a design one.

Optimising energy-efficiency solutions

What’s required? We need to develop decision support tools which will provide information on a building’s energy consumption and thus help us implement the right solutions. My research, and my team’s, funded by the EU FP7 project UMBRELLA, aims to develop an innovative, web-based decision-support application to optimize the decision-making process for sustainable building retro-fitting. This involves the introduction of building integrated renewables (BIR) on the generation side, and measures to manage demand by reducing operational energy. Some examples of BIR are photovoltaics, micro

wind turbines, solar and solar thermal. Reduction in operational energy, for example, is achieved by use of climate adaptive heating-ventilation-air condition (HVAC), smart lighting and ventilation systems or actively controlled window blinds. The optimizing tool provides solutions leading to minimum capital expenditure and/or minimum operation and maintenance costs. The optimization process is guided by the user’s constraints and preferences and it’s performed on a multi-decision diagram (MDD) data structure. The outcome of the optimization process is a set of recommendations and interventions which meet the desired criteria for the specified building (Fig.1).

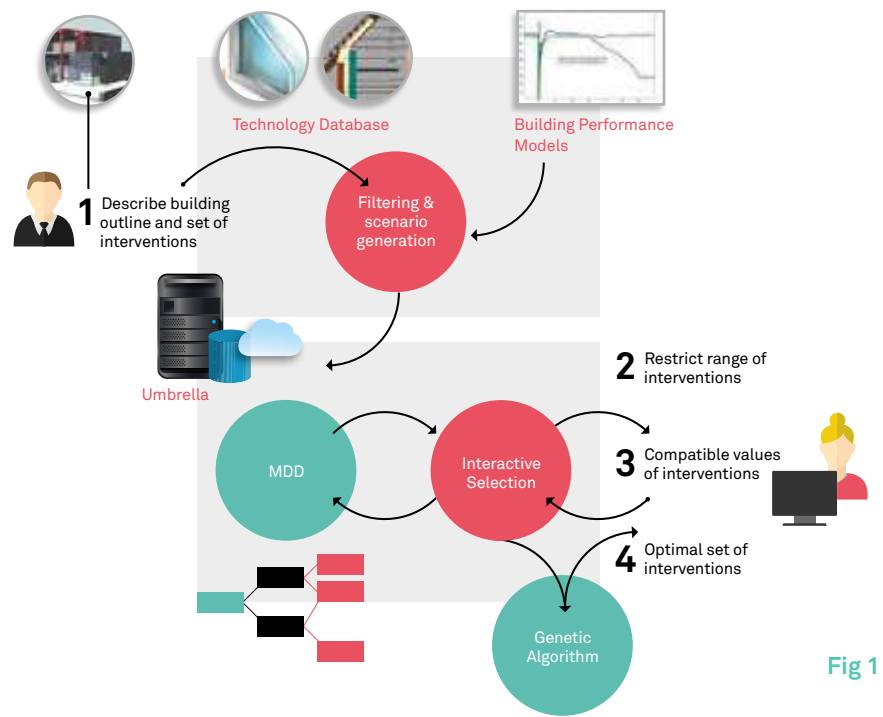


Fig 1

Biswajit Basu received his Masters and PhD from Indian Institute of Technology Kanpur and joined Trinity’s School of Engineering as a lecturer in 2002. He is now Professor in Civil, Structural and Environmental Engineering. He is the recipient of four best paper awards, has been awarded five EU-FP7 research grants on energy, and has published over a hundred articles in peer-reviewed journals. His research focuses on renewable energy generation (wind and wave), usage, management and control, with a special focus on dynamics of renewable energy systems.

Fig 1 Toolset for Energy Optimisation and Retrofit in Buildings

Fig 2 Energy Efficient Smart Cities

Under another EU-FP7 project, EINSTEIN, I’m engaged on creating a new innovative thermo-fluid dynamic simulation-based active building control system that includes algorithms to optimize the in-use energy performance. This has led to the idea of a ‘smart building’ that exploits real-time information to provide optimum energy efficiency solutions. I adopt an approach based on Model Predictive Control to take into account energy demand and use, thus minimizing the costs. The MPC control can be performed in real-time and can incorporate variable pricing and real-time electricity demand, thus shifting the demand towards ‘grid-friendly’ behaviour.

From Buildings to Cities

Once you’ve bought into the concept of a ‘smart building’, you can move towards considering blocks of smart buildings, and from there to the idea of energy-efficient ‘smart cities’. This is what we’re investigating under the EU FP7 project INDICATE (Fig. 2). With this project, we’re working towards the integration of Dynamic Simulation Modelling, Geographic Information Systems (GIS), 3D Urban CAD Modelling Tools, Sustainable Urban Indicators and algorithms for Demand Side Management and local balancing of energy use into a single software package.

End-users of the software will range from city managers, architects and master planners to utility companies and facilities managers of residential and

commercial complexes. The city and master planners will be able to assess the ‘green’ labelling of cities or new developments using the ‘INDICATOR’ tool. They will also be able to perform sensitivity analysis to investigate the impact of installing renewables/non-renewable energy generation systems or energy storage systems for which currently no comprehensive software tool exists. The utility companies can use the tariffing toolbox for aiding decisions on the variable tariffing of energy. Additionally, simulations confirm that facilities managers of commercial and industrial complex can reduce their energy cost by up to 30% by planning and scheduling activities, with very little additional investment or capital cost.

“Once you’ve bought into the concept of a ‘smart building’, you can move towards considering blocks of smart buildings, and from there to the idea of energy-efficient ‘smart cities’. This is what we’re investigating under the EU FP7 project INDICATE”

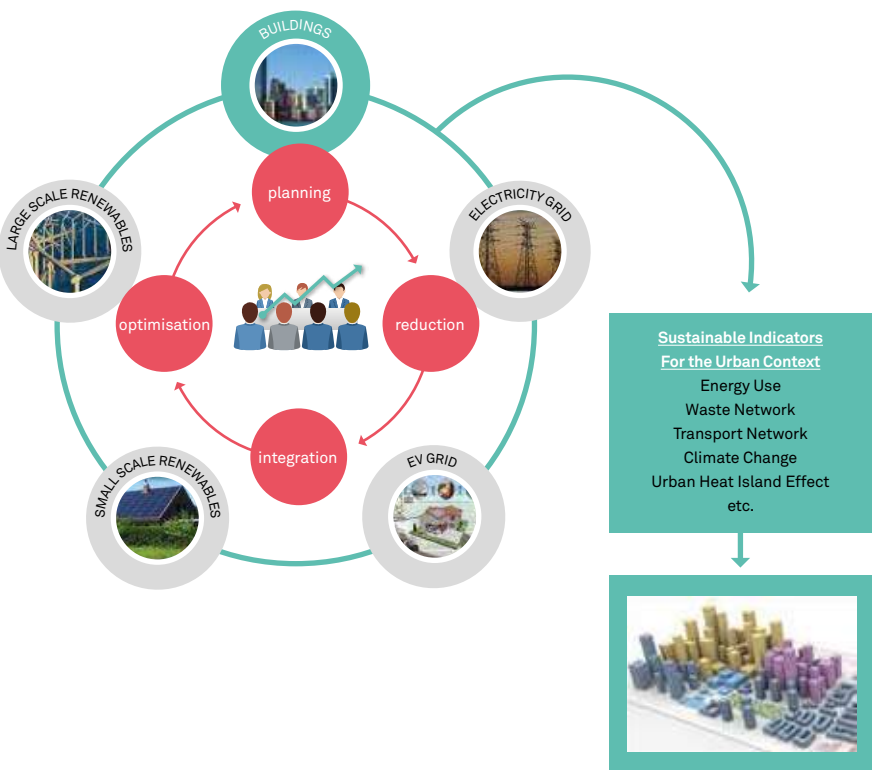


Fig 2

04 Ageing of People with Intellectual Disability

Mary McCarron

People with intellectual disability are living longer than ever before, in the developed world at least. This is a cause for celebration but it presents a challenge: we know little about the effect of ageing on this population group, in Ireland or in any country.

Do people with intellectual disability suffer particular consequences to their health when ageing? Are they at greater risk of suffering dementia? How does ageing affect their ability to manage their day-to-day lives? What are their dietary and exercise requirements and how are these being met? How do they interact socially and link with their communities? The issues facing people with intellectual disability are similar to those facing the general ageing population, but their responses and needs may be different.

Collecting the data

Trinity leads the Irish Longitudinal Study on Ageing (TILDA), a ground-breaking research initiative which showcases multidisciplinary collaboration across departments and between institutes of higher education. TILDA has put Trinity at the forefront of global research into ageing. In 2008 with support from the Health Research Board and the Department of Health I created IDS-TILDA, a supplement to TILDA focused upon the ageing of people with intellectual disability.

We have now completed two waves of data collection, and have demonstrated that following a nationally representative sample of people with intellectual disability as they age is possible, using similar questions asked of the general ageing population. Many of our sample answered for themselves and we have enjoyed great support from their families and providers.

Findings so far

Among the findings from the first two waves of data collection:

- The majority of adults with an intellectual disability (ID) engage regularly in a range of social activities; however, usually with staff or peers.
- Adults with an ID rarely report concerns with growing older or not having enough money.
- Regardless of residential circumstances, adults with an ID in Ireland were not actively engaged with their communities.
- There were low rates of diagnosed hypertension and heart disease, despite increased risk factors, but higher rates than for the general population of doctor-diagnosed dementia, diabetes, emotional, nervous or psychological conditions, osteoporosis and poor self-rated eyesight.
- Smoking rates were low among younger participants but higher for older participants.
- 70–83% of participants have low levels of exercise.

— Over 75% of participants reported that they never wrote, texted, emailed or used social media tools such as Facebook to contact family or friends.

— Footpath design, surfaces and building entries posed the greatest access challenges for persons with a more severe ID, and street signage and feeling unsafe were difficulties for persons with mild/moderate ID.

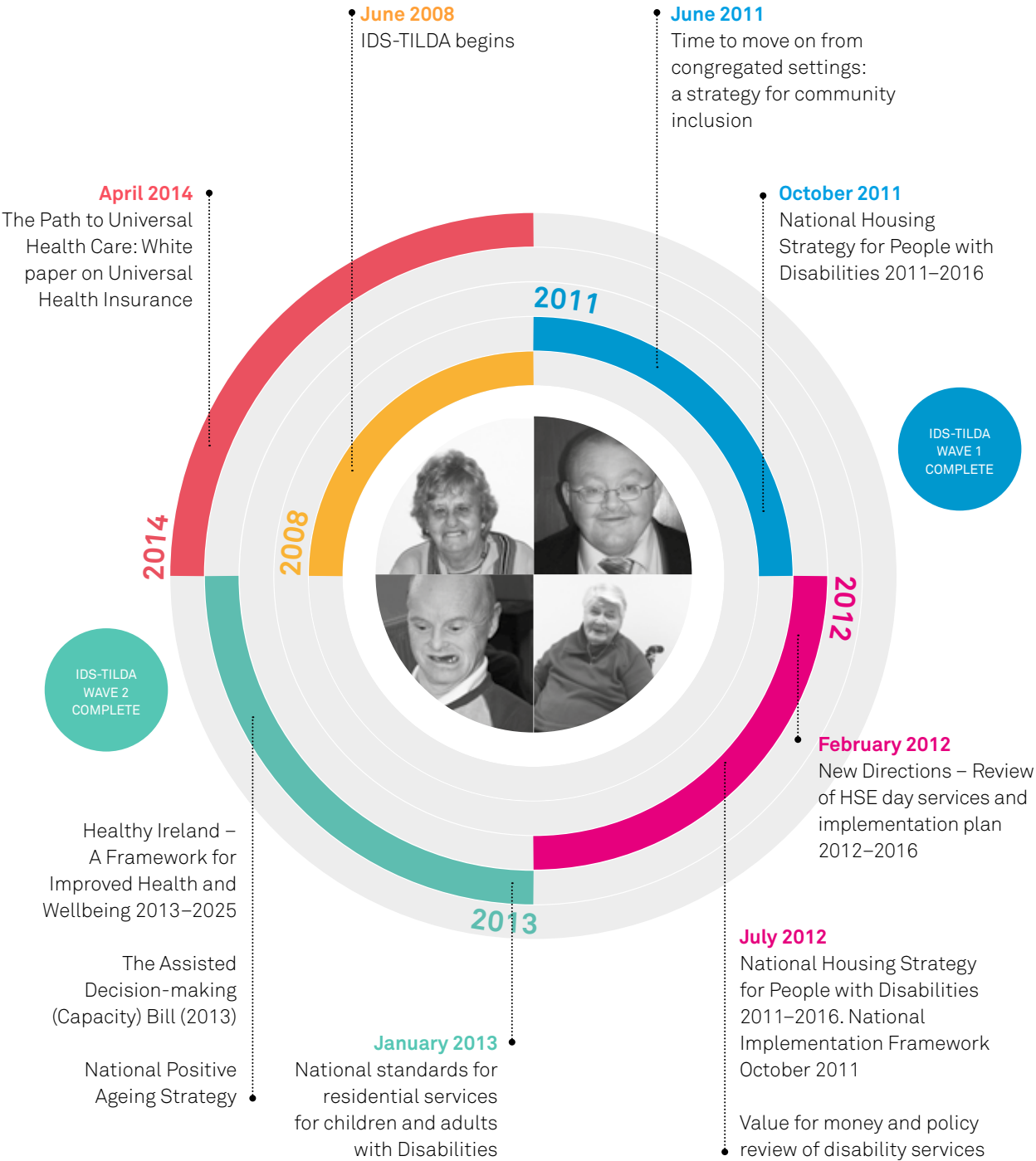
The PhD dissertations which I'm supervising are building upon this dataset and addressing issues such as osteoporosis, falls, mental health concerns, community participation, impact of changing residence, brain training, caregiver strain, loneliness, and medication use.

Influencing policy makers and services providers

Already the IDS-TILDA data on ageing over time is influencing local, national and international policy makers and services providers in planning and providing for the needs of this population group as they age. Our study will link social, family, daily living, and health-related data to inform policy responses. The challenges of austerity and the renewed effort in Ireland to move more people with intellectual disability out of congregated settings mean IDS-TILDA plays an additional important role in measuring how well quality of life, access, and equality for this population group is being maintained and advanced in Ireland.

Mary McCarron received her BSc from DCU and was the first PhD graduate from Trinity's School of Nursing and Midwifery in 2002, when she joined the School as a lecturer. Now Dean of the Faculty of Health Sciences and Professor of Ageing and Intellectual Disability, and a Fellow of the College, she is a principal investigator with EnGAGE, Trinity's Centre for Ageing and an international expert in the ageing of persons with intellectual disability. She has received prestigious awards for her innovative work in the design of specialist care homes for persons with mid- and end-stage dementia.

Fig 1 Positioning IDS-TILDA among the policy change affecting the field of intellectual disability in Ireland 2008 – 2013



04 Fighting Cancer and Coating Medical Implants: Multiple Uses for Supramolecular Structures

Thorri Gunnlaugsson

If art imitates life, then scientists imitate nature and nowhere more successfully than in ‘supramolecular’ chemistry, which involves synthesizing the natural spontaneous process of ‘self-assembly’ to create structures which, for over forty years, have been used to improve medicine and enhance our lives.

From self-assembly to supramolecular

Probably the most famous example of self-assembly in nature is the DNA double helix, the keeper of the genetic code, which is the result of two single stranded DNA molecules recognizing each other through complementarity and bonding.

This natural process (also accounting for the folding of enzymes and proteins) has long been studied by chemists and in the 1960s a breakthrough was made in using complementarity to synthesize ‘supramolecular’ structures.

Since then chemists have designed supramolecular structures to have, or to carry out, particular applications, ranging from the medical (monitoring patients’ health in critical care analysis, as contrast agents for medical imaging, as drug delivery systems), to finance and security (counterfeiting-prevention measures for currencies including the Euro), to entertainment (dyes for flat screen TVs and phones).

Supramolecular goes nano

Today, some of the most exciting potential applications for supramolecular chemistry involve using nanotechnology to develop novel structures.

My research team in the Trinity Biomedical Sciences Institute (TBSI) is at the forefront of combining supramolecular and nanotechnology research. Some of the projects we’re currently engaged on include:

Viewing broken bones: We’re looking at developing functional gold nanoparticles that are surface-modified to enable the imaging of cracks in bone structures, using novel two photon microscopic techniques or through magnetic resonance imaging (MRI).

Killing cancer cells: We’re developing luminescent sensors and imaging agent for use in physiology as well as in fighting cancer. These systems can be activated by light to give rise to systematic, or programmed, cell death.

Protecting medical implants from bacteria: We’re developing a luminescent material with gel properties, which can be used for coating medical implants to prevent the onset of bacterial growth.

Photo-electronic devices: Novel gels have also been developed with important macroscopic properties like elasticity and self-healing, while also being emissive. Potential applications include photo-electronic devices.

Science Foundation Ireland-funded

The recent award of a €3.1 million SFI Principle Investigator Award will be crucial in developing research endeavours for the next five years. Our research will be interdisciplinary – between CRANN and TBSI – and inter-institutional with other Irish and UK universities.

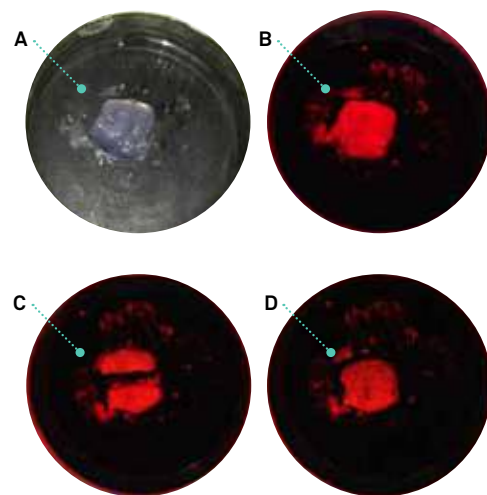


Fig 1

Thorri Gunnlaugsson was born in Iceland, and after a PhD from Queen’s University Belfast, worked as a postdoctoral fellow at the University of Durham in England. He was appointed Kinerton Lecturer in Medicinal Chemistry in Trinity College Dublin in October 1998. After Fellowship in 2003, he was made Professor of Chemistry in 2008, and became a Member of the Royal Irish Academy in 2011. He was awarded the Institute of Chemistry of Ireland (ICI) Annual Award for Chemistry for his contribution to the field in 2014. With 170 papers published, he has an H-index of 59 with ca. 14,500 citations to date.

Fig 1 A) Eu(III) gel formed using MeOH. B) Same gel under UV irradiation; the red emission arising from Eu(III). C) Gel after being cut in half. D) After ‘annealing’ the gel showing its self-healing.

Fig 2 Confocal fluorescent imaging of cancer cells.

→ ‘Supramolecular’ chemistry involves synthesizing the natural spontaneous process of ‘self-assembly’ to create structures which, for over forty years, have been used to improve medicine and enhance our lives

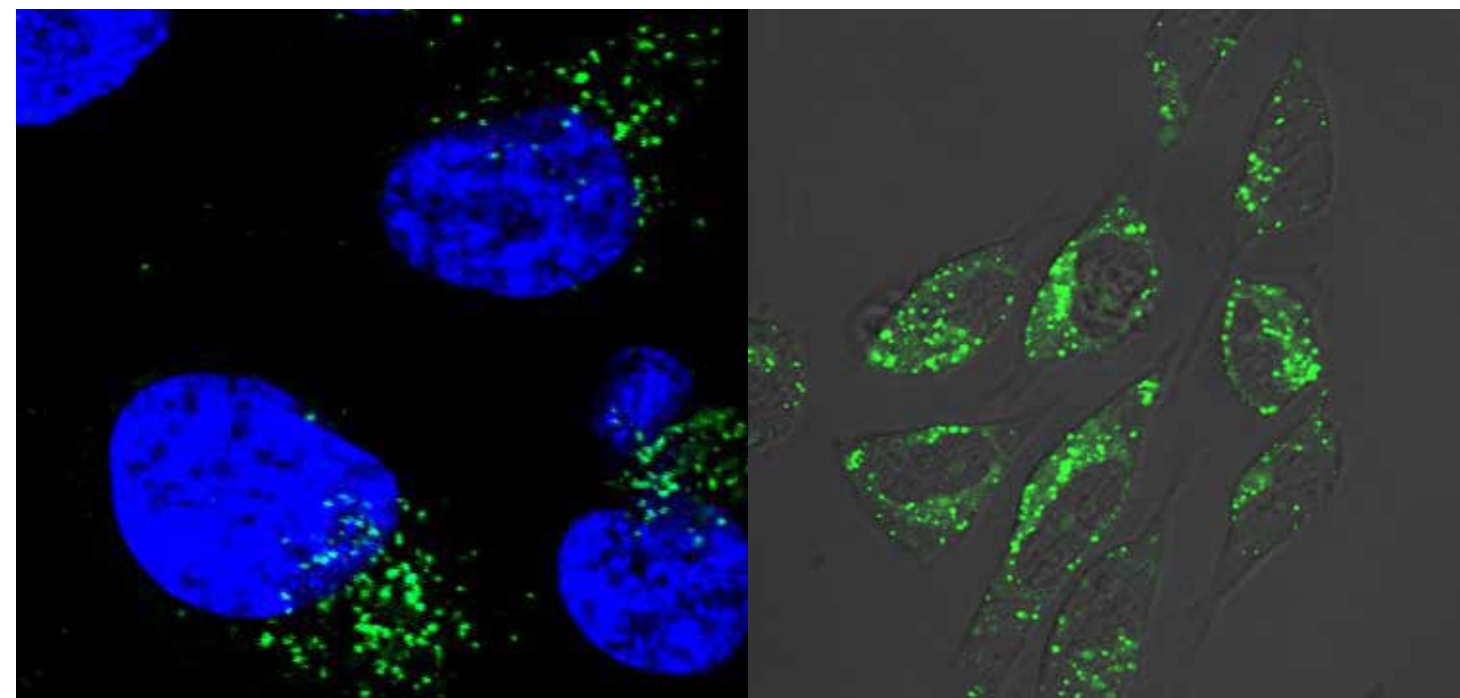


Fig 2

04 Beating Prostate Cancer

Laure Marignol

The world population is evolving – and the incidence of prostate cancer with it. The population is ageing rapidly – according to the World Health Organisation, by 2050, the proportion of those over sixty will have doubled from 11 percent in 2000 to 22 percent. And the population is getting fatter – worldwide obesity has nearly doubled since 1980. Half of men diagnosed with prostate cancer are aged sixty-five or older, while obese men have a higher risk of developing the disease, and when diagnosed, less chance of survival. Taken together, these projections highlight an upcoming prostate cancer “tsunami”.

Determining which patients are at risk of recurrence after radiation therapy

Following a prostate cancer diagnosis, approximately 50 percent of men will receive radiation therapy. Despite sophisticated treatment approaches, some patients will not be cured. Our ability to determine which patients are at greater risk of recurrence is currently inadequate, and at the same time novel treatment approaches are needed to prevent the tumour from evolving further in these men. My research aims to address both of these challenges.

The molecular mechanisms for the resistance of some prostate tumours to radiation therapy remains poorly understood. It’s likely a combination of factors: the tumour clinical features, intrinsic differences in the cell’s ability for survival following irradiation, the tumour micro-environment, and the cancer stem cell population.

My work focuses on a key feature of tumours that is known to reduce chances of cure: cancer cells have a tendency to lack oxygen, a phenomenon called “hypoxia”. I am identifying these cells by staining patient specimens for hypoxic markers, examining the changes in the physical properties of these cells that are relevant to molecular imaging techniques (MRI), and characterising the molecular mechanisms affected by hypoxia that can modify a cancer cell’s ability to survive exposure to radiation.

Designing new tests and medication

I believe that a patient’s genetic information can help design a new prognostic test. My main project, funded by the Irish Cancer Society, investigates novel genetic markers, called miRNAs, whose presence may be associated with a greater risk of prostate cancer recurring after radiotherapy. Owing to their availability in tissues and bodily fluids, miRNAs are ideal candidates for the development of novel biological tests.

My aim is to develop a non-invasive, reliable, miRNA-based pre-treatment prognostic test that will identify radiotherapy prostate cancer patients at risk of recurrence. I am generating a candidate list of miRNAs involved in the survival of prostate cancer cells to radiation exposure. Our approach has involved creating an isogenic model of radiation resistance through continuous fractionated radiation exposure, and the exploitation of the hypoxic nature of prostate tumours. This strategy has already identified several miRNAs, whose functional role to radioresistance is being characterized.

The successful development of this test is dependent on our ability to access patient specimens. The project also establishes the collection of tissue specimens from prostate cancer patients treated with radiation therapy. I have successfully implemented this process in a number of participating Dublin hospitals – the consent rate is high, with over 100 patients consenting in the past year.

The clinical implementation of this test will require an alternative, potentially more aggressive, treatment strategy. I believe that Notch inhibitors, a type of medication given to patients with cardiovascular or Alzheimer disease, could help boost the killing of cancer cells by radiation. I have established that the Notch pathway is responsive to hypoxia, androgen and radiation exposure in prostate cancer cells, and I have identified a possibly key Notch protein, with potential for chemical targetability.

Developing cancer control programmes

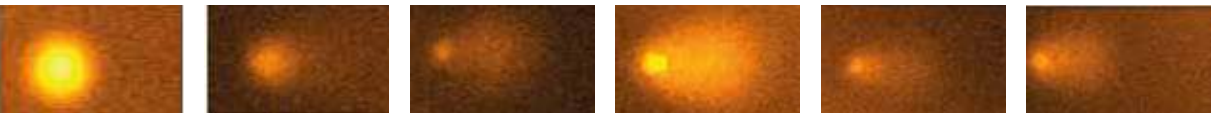
My research anticipates the prostate cancer tsunami, and helps with preparation and containment. Novel patient stratification and treatment strategies will improve treatment outcomes, and address the increase in toxicities, costs, and co-morbidities associated with managing what will likely be a much larger, older and more obese patient population.

Laure Marignol received a double BSc from the University of Montpellier (France) and the Fachhochschule Giessen (Germany), an MSc from University College London, and a PhD from Trinity. She joined the School of Medicine as a lecturer in 2008 and is now Assistant Professor in the Discipline of Radiation Therapy, and a principal investigator at the Institute of Molecular Medicine. The recipient of an Irish Cancer Society research grant, she has published over thirty articles in peer-reviewed journals.

Fig 1 Representative images of the single cell electrophoresis (Comet assay) of wild type and radiation resistant prostate cancer cells following irradiation (0-10Gy). The formation of a “comet” reflects the induction of DNA damage by radiation. The radiation resistant cell line shows reduced induction of DNA damage following irradiation, when compared to the wild type cells.

Fig 2 Generation of isogenic models of radioresistance in 22Rv1 and DU145 cell lines. Wild type cells were treated with fractionated 2-Gy radiation for up to 60Gy to generate the radioresistant sublines (RRDU145, DD22Rv1). Clonogenic survival to single radiation doses (2,4,6,8,10Gy) was measured using clonogenic assays in RR and WT (A) DU145 and (B) 22RV1 cells.

Wild Type



Radiation Resistant

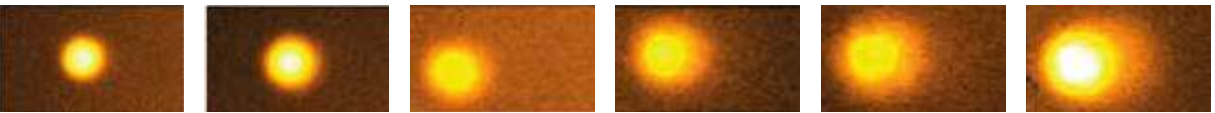


Fig 1

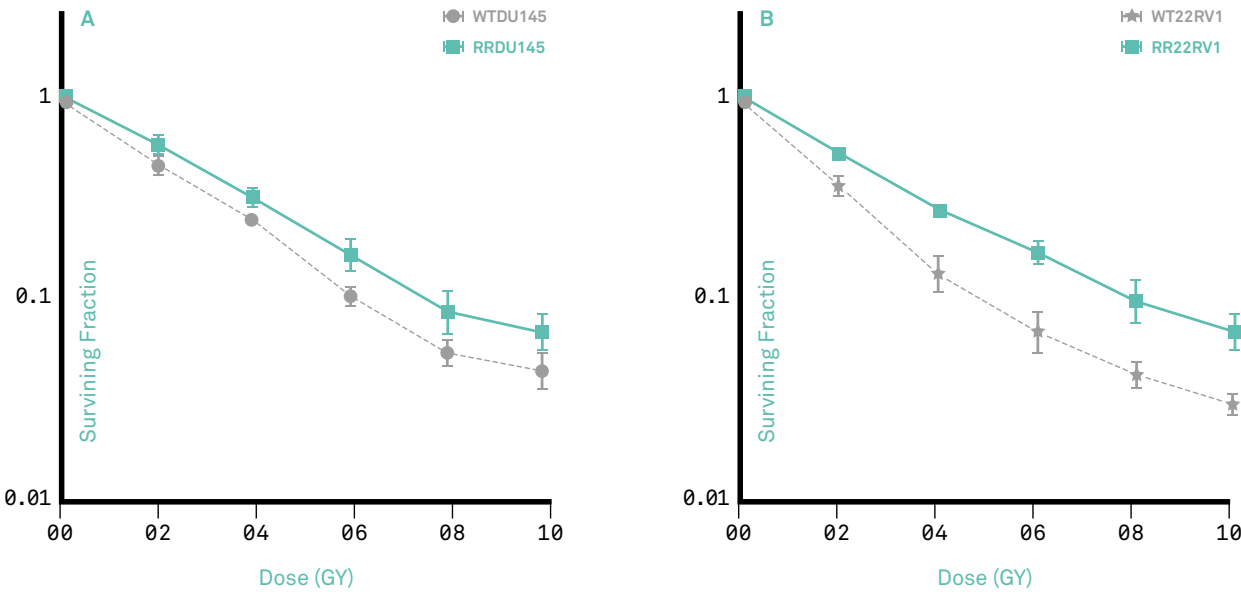


Fig 2

Innovation

November 2013 saw the launch of the College's new Innovation and Entrepreneurship Strategy which lays out the goals and actions needed over the next five years to further embed innovation and entrepreneurship into education and research. The strategy is underpinned by the planned significant expansion of the Trinity School of Business, which is to be housed in a new €70 million building, co-located with an Innovation and Entrepreneurship Hub.

The initial implementation phase of the strategy included the launch, in March 2014, of the new Office of Corporate Partnership and Knowledge Exchange as a single point of interaction for industry partners. Housing all the functions necessary to support research collaboration and commercialization, the Office serves as a direct pipeline enabling knowledge transfer to industry, and aims to support 160 start-up companies over the first three years through spin-outs, spin-ins, and support for student and graduate enterprises.

The Trinity Biomedical Sciences Institute (TBSI) published its first progress report in June 2014, and revealed that since opening in 2011, the Institute has created 119 jobs and partnered with 76 companies to carry out groundbreaking research into significant health challenges.

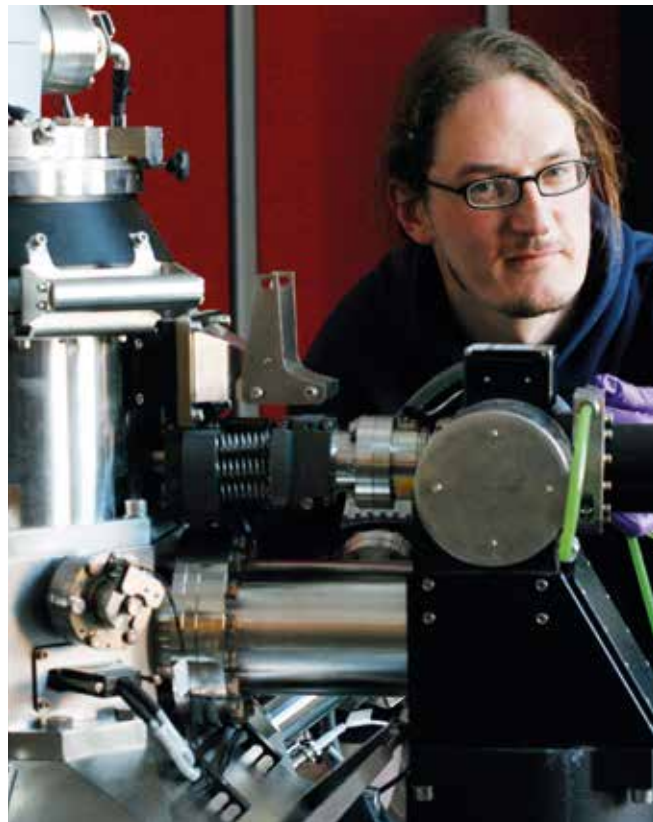
Staff Innovation

In April 2012 Cork schoolgirl, Joanne O'Riordan, addressed delegates at 'Girls in ICT Day', a flagship event of the International Telecommunication Union (ITU) at the United Nations in New York. Joanne, who was born without limbs due to a very rare condition, Total Amelia, challenged delegates to build her a robot. Assistant Professor Kevin Kelly in Trinity's School of Engineering took up the challenge, with his team. Thanks to a donation of €50,000 from the ITU, the team built a prototype humanoid, Robbie the Robot. Unveiled in March 2014, Robbie has a head, arms, torso and a single 'leg' which uses two wheels to move around; he can bend over to pick things up, blink, smile, and frown. Robbie was introduced to the secretary general of the United Nations' ICT agency, Dr Hamadoun I. Touré, at an event in Trinity, and the design team was awarded the 2014 Technological Innovation Award at the annual Engineers Ireland Excellence Awards.

Trinity's Green Data Centre won a 2014 National Tech Excellence Award for its success in enabling the College to become more energy efficient whilst continuing to grow and change with technology. The facility, which opened in March 2013, is already a benchmark for the design and construction of flexible, energy-efficient, high density data centres – it was shortlisted last year as a finalist in the 'Leadership in the Public Sector' category in the EMEA awards for Data Centres in London.

→ Thanks to a donation of €50,000 from the ITU, Professor Kevin Kelly's team built a prototype humanoid, Robbie the Robot.

RIGHT – School of Engineering design team member with Robbie the Robot



Energy efficiency is also central to a new system developed by Trinity computer scientists, together with IBM Dublin, that allows companies to reduce associated greenhouse gas emissions, drive down costs, and minimise network delays. All internet services today are based in the 'Cloud', which means that Twitter, Facebook or Google mail requests are dealt with by one of thousands of PC servers located at cloud-computing facilities around the world; the new system, dubbed 'Stratus', uses mathematical algorithms to effectively balance the load between these different facilities. Stratus allows a company to allocate importance to cost, greenhouse gas emissions and network delays – the algorithms then work out how to split the load to achieve the best result.

In July 2014 scientists at AMBER, the SFI-funded materials science centre based at Trinity, announced the discovery of a completely new material with potential to revolutionise IT, computer processes, and data storage. The AMBER research team, led by Professor Michael Coey from Trinity's School of Physics, has created a new alloy of manganese, ruthenium and gallium, known as MRG. MRG is a strange new magnet – internally it is powerfully magnetic, yet externally barely appears magnetic at all. This world-first material – technically known as a 'zero-moment half metal' – will initiate a completely new line of materials research and could have major implications

for the Big Data revolution. Potentially it could lead to huge, superfast memory for personal computers, and could also eliminate the potential of external magnetic forces to 'wipe' computer data.

Also in AMBER and the School of Physics, researchers made another world-first discovery when they found that by adding graphene to regular rubber bands, they could create wearable sensors. Together with researchers from the University of Surrey, the Trinity team led by Jonathan Coleman, Professor of Chemical Physics, infused rubber bands with graphene (a nano-material derived from pencil lead and 10,000 times smaller than the width of a human hair). Rubber doesn't normally conduct electricity, but adding graphene made the bands electrically conductive. Tests showed that stretching the bands strongly affected the electrical current, and as a result bands attached to clothing allow tiny movements, like breath and pulse, to be sensed. This discovery opens up possibilities of developing wearable sensors for use in health sciences (monitoring blood pressure, joint movement and respiration); in the automotive industry (developing sensitive airbags); in sports and physiotherapy; in medical device development and robotics; and as early warning systems for cot death in babies or sleep apnoea in adults.

LEFT – Jonathan Coleman, Professor of Chemical Physics who with colleagues infused rubber bands with graphene to create wearable sensors

TOP RIGHT – The SELFIT team members relax before giving their business pitch to potential investors at LaunchBox

RIGHT – Dean of Research, Prof Vinny Cahill, Director General of SFI and Chief Scientific Adviser to the Government, Prof Mark Ferguson and Director of the TBSI, Prof Luke O'Neill

Jonathan Coleman was one of two Trinity scientists chosen for the Thomson Reuters 2014 World's Most Influential Scientific Minds List, a compilation of the 3,000 most influential names in science. Luke O'Neill, Professor of Biochemistry in TBSI, joined Jonathan and only seven other Irish scientists on this illustrious list of the top 1% most cited scientists (between 2002 and 2012).

Trinity is leading a FP7-funded campaign, launched this year, to raise public awareness about the importance of investing in brain health through exercise, diet, social interaction and mental exercises. The project, *Hello Brain*, is co-ordinated by Dr Sabina Brennan, principal investigator at the Institute of Neuroscience and assistant director of Trinity's NEIL (Neuro-Enhancement for Independent Lives) Programme. The campaign, involving a website and app, translates complex scientific information into easy-to-understand, practical health and well-being information designed to encourage proactivity about brain health.

Two campus companies secured significant funding this year to scale up their operations. Adama Innovations Ltd, an early stage company focused on deploying nanotechnology to common manufacturing processes, secured €750,000 in seed-funding. Their first product is a nano-scale probe fabricated from diamond, used in atomic force microscopy, which images, measures, and manipulates matter at the nanoscale. Trinity spinout Swrve is a data analytics company dedicated to building lasting, personalized relationships with mobile app consumers. It currently employs fifty people, but after raising US\$10 million in a second round of funding from Silicon valley investors, will be recruiting further.

Student Innovation

Now in its second year, Trinity's student incubator, LaunchBox, has proven a successful accelerator programme for fledgling entrepreneurs. This August, eight more teams of budding entrepreneurs graduated from the programme with commercially viable businesses at various stages of development.

The teams of Trinity students (undergraduate and postgraduate) took up residence in the incubator, based in Regent's House above Front Arch, in June, equipped with early-stage business ideas. Under the guidance of the Trinity 'Angels' (a business network made up of alumni and friends of Trinity), the incubator offers an innovative combination of practice and education, involving mentoring, seed funding and access to the space and facilities needed to test out and launch new ventures. Before graduating, each team made a business pitch to potential investors and took part in a Q&A session.

One team, TouchTech Payments, formerly called Wave, signed a €50,000 investment agreement to develop a system that allows people to pay for products by tapping their mobile phones with their credit/debit cards. Business ideas incubated by the other teams included:

- using mobile phones to gain fashion insights from the immediate environment;
- developing a software management system for cataloguing laboratory chemicals;
- providing an intelligent system for homes that 'knows' when you need the lights on;
- personalising children's glasses frames at significantly reduced prices.

LaunchBox graduates from 2013 continue to secure funding and to create jobs with their ventures: social enterprise *FoodCloud* raised €70,000 and has secured a major deal with Tesco; the group/event management system *Hive* raised €50,000 seed funding from Enterprise Ireland and €100,000 from RTE's Dragon's Den; while *Artomatix*, which develops tools for automating digital media creation, secured €100,000 in venture funding.

It is successes such as these that have led to LaunchBox, still only in its second year, being classed a 'Top Challenger' by the University Business Incubator (UBI) Index. Among 800 global incubators assessed by UBI, LaunchBox was placed just outside the 'Top 25'.

The Innovation Academy (jointly run by Trinity, UCD and Queen's Belfast) continues to offer innovation and entrepreneurial training to postgraduates, encouraging them to consider the societal and economic impact of their research, and to convert their knowledge into products, services and policies. In January the Innovation Academy joined forces with the Science Gallery to deliver a 12-week Idea Translation Lab on the theme of 'strange weather'. The programme, modelled on the Harvard University Idea Translation Lab, saw thirty undergraduates, drawn from all faculties, producing group projects inspired by science, art, and design – these projects subsequently linked into the Science Gallery's July exhibition, STRANGE WEATHER.

Public Engagement

Trinity engages with the public through diverse activities. The College is committed to furthering public debate, welcoming visitors to its beautiful campus, and showcasing research through talks, exhibitions and events.

In June this year the Provost joined nineteen presidents of Irish higher education institutions for a landmark event to sign a 10-point 'Campus Engage Charter on Civic and Community Engagement'.

Partnering in national and international events

Many of Trinity's outreach activities are carried out in partnership with national and international organisations and festivals.

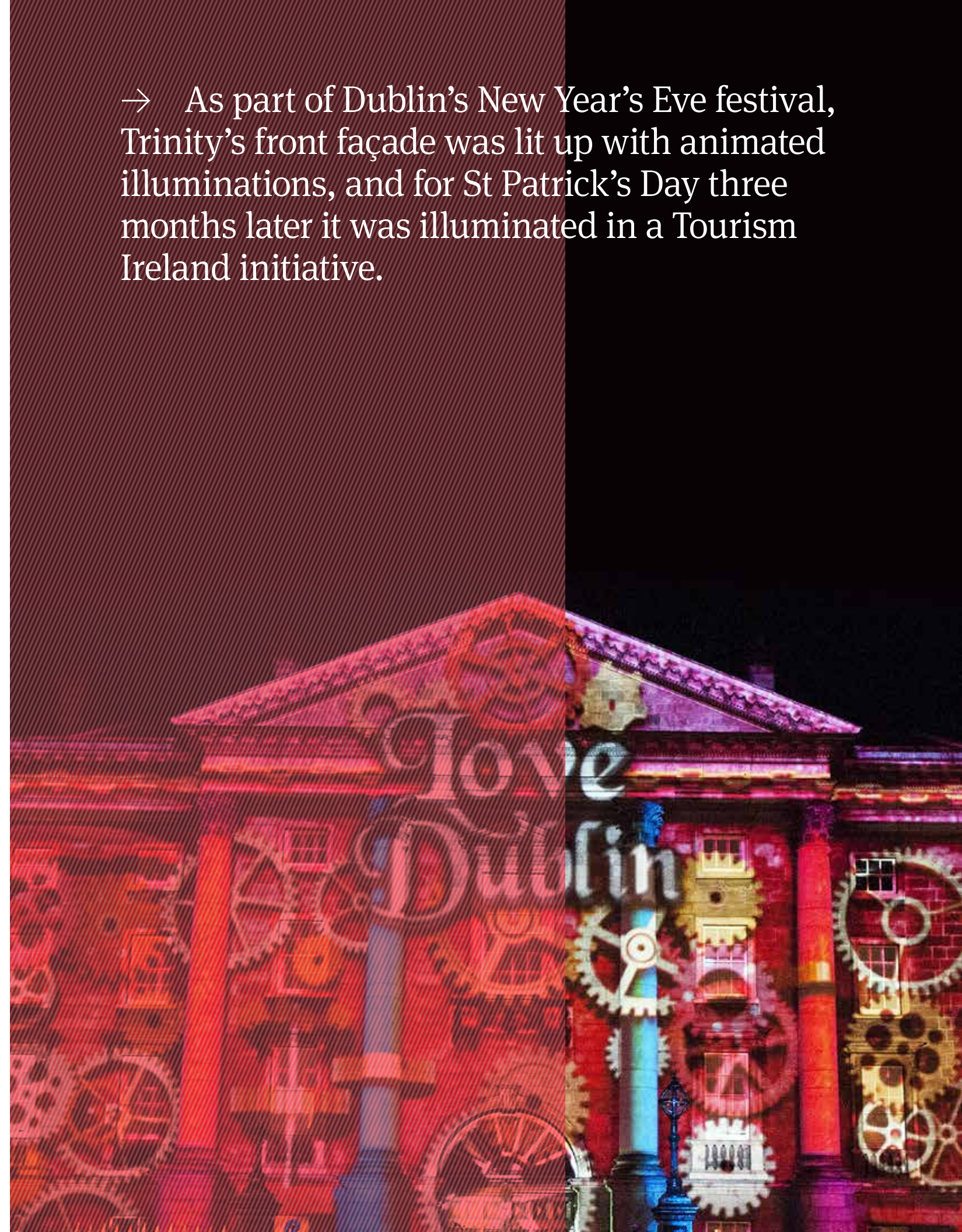
The College once again opened its doors for Culture Night in September and Open House Dublin in October inviting people to take guided tours and admire the interiors of Trinity buildings.

World Space Week is a global event celebrating space exploration every October. In Trinity, the Department of Geography organised free talks, tours, and interactive exhibits – including 3D flight simulations over Mars, a comet-making workshop, and an audience with a NASA space scientist.

As part of Dublin's New Year's Eve festival, Trinity's front façade was lit up with animated illuminations, and for St Patrick's Day three months later it was illuminated in a Tourism Ireland initiative.

→ As part of Dublin's New Year's Eve festival, Trinity's front façade was lit up with animated illuminations, and for St Patrick's Day three months later it was illuminated in a Tourism Ireland initiative.

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





Soapbox Science is an annual public science communication event, held around the UK and Ireland, which transforms public spaces into arenas for debate and raises the profile of women in science. Soapbox Science joined forces with Trinity's Centre for Women in Science & Engineering Research Centre (WiSER) and the Trinity Equality Fund to persuade eleven of Ireland's leading women scientists to take to their soapboxes in Front Square in April and deliver dynamic 15-minute 'performances' about science and their research.

Over 6,000 people attended the World War 1 Roadshow in July, hosted by Trinity in partnership with RTÉ Radio 1 and the National Library of Ireland, as part of the Decades of Commemoration. The 'Family History Collections Day of World War 1 memorabilia' invited people to bring in family items, letters and mementos related to the war for digitisation and archiving by a team of experts. Other activities included pop-up talks and lectures, tours of the campus, and the 'Last Cricket Match of Peace'. The day concluded with the Provost, Dr Patrick Prendergast and Director General of RTÉ, Noel Curran delivering the closing address and the final bugle call of the 'Last Post', played by bandsmen of the Army School of Music in Trinity College Chapel.

Trinity and the Royal College of Surgeons in Ireland offered a unique opportunity to get up close and personal with the world of research at Discover Research Dublin in September 2014. Over fifty interactive events and demonstrations showcased what researchers really do and why research matters. Exploring abstract and practical questions through digital and traditional formats – interactive installations, apps, social media, debates, digital archives, tours, presentations, photography – Discover Research Dublin featured something for everyone, including 3D visualisations of the brain, the LEGO challenge to build abstract prototypes under time pressure, and experimental performances responding to Allen Ginsberg's *Howl*.

Public Lectures

Trinity hosts a range of public lectures, organised by its research institutes, centres, and schools. The 'Science of Happiness' was the theme for Trinity Week 2014 in April. Nancy Etcoff, director of the Program in Aesthetics and Well-Being at the Massachusetts General Hospital Department of Psychiatry, gave a keynote lecture entitled 'Let us smile each chance we get'. Also during Trinity Week was a Trinity EngAGE (Centre for Research on Ageing) University of the Third Age (U3A) and Age Action Open Forum, promoting healthy, active ageing for all citizens.

FAR LEFT – Frances Higgins and Lily O'Brien at Discover Research Dublin's Lego Challenge
LEFT – The Beatles in 12 Movements lecture series
BELOW TOP – The Family History Collections Day of World War 1 memorabilia in Trinity's Public Theatre

BELOW BOTTOM – DARTofPhysics researchers Dr Shane Bergin, School of Physics, Dr Jessamyn Fairfield, School of Chemistry and CRANN, Aoibhinn Ní Shúilleabháin, former researcher, School of Education, and Prof Colette Murphy, School of Education.

On 7th November 1963, the Beatles played two shows at the Adelphi Cinema in Dublin, their only live appearance in the Republic of Ireland. For the 50th anniversary of this event The Beatles in 12 Movements lecture series was organised by the School of English in conjunction with the Trinity Long Room Hub. Another School of English public lecture series, on Disability and Literature, organised in conjunction with Trinity's M.Sc. in Disability Studies kicked off with former Laureate na nÓg Siobhán Parkinson in January.

The following month, former President of Ireland and Chancellor of the university, Mary Robinson, and parliamentarians from Tunisia, Libya, Egypt and Yemen formed the panel at *Identities in Transition – Constitutional Peace Building*, organised by the Trinity International Development Initiative (TIDI) and the Association of European Parliamentarians with Africa (AWEPA).

Leading moral philosopher, Baroness Onora O'Neill, delivered the Long Room Hub's inaugural Edmund Burke Lecture in April, under the deceptively simple title: 'What Would Edmund Burke Think About Human Rights?' And for the second year running, the School of Social Sciences and Philosophy hosted a Henry Grattan lecture outside Ireland: Dr Peter Sutherland, UN Special Representative for International Migration, spoke about the challenges of EU migration at the Embassy of Ireland in London in June.

Exhibitions

The Science Gallery and the Long Room provide Trinity with world class spaces for innovative public exhibitions. The Science Gallery holds new exhibitions every two or three months, curated by Trinity staff or guest curators. Exhibitions during 2013/14 were *Grow Your Own*, *Fail Better*, *Fat*, and *Strange Weather*.

To coincide with International Children's Day and the birthday of Hans Christian Anderson (2nd April), the Long Room held an exhibition, *Bookmarks*, featuring 70 handmade books designed by Dublin children, inspired by works from the college library. This was the culmination of a three month project, organised by the Trinity Access Programmes (TAP) with three Dublin schools, involving story writing, illustration, bookbinding, and workshops with authors and artists.

Also in the Long Room, was *Emperor of the Irish: Brian Boru and the Battle of Clontarf, 1014* (April–Oct), an exhibition marking the 1000th anniversary of the Battle of Clontarf.

Trinity and the Royal Irish Academy of Music (RIAM), an Associated College of the university, presented the *RIAM Alumni Signature Series* in 2014 during which the talents of some of the RIAM's outstanding alumni were showcased in four concerts.



Beyond the campus

Trinity's activities extend beyond the campus. For eight weeks, in autumn 2013, commuters were treated to 12 thought-provoking images and statements about physics in DART trains and stations. *DARTofPhysics* was designed by researchers in the Schools of Education and Physics and in CRANN, Trinity's centre for nanotechnology. The comprehensive website supporting the campaign won a prize in the Realex Fire Web Awards.

And finally in April, 360,000 daily pedestrians in Times Square, New York were dazzled by Trinity scientist Dr Martin Barr's image of a lung cancer cell glowing on a giant HD screen. Dr Barr, adjunct Assistant Professor at Trinity's Institute of Molecular Medicine, was a winner in GE Healthcare Life Sciences Cell Imaging Competition.

The Student Experience

In Trinity, we pride ourselves on delivering what we call a 'T-shaped' education, providing both specialist expertise in the chosen programme of study (the vertical line of the T) and the opportunity to develop a range of more general skills (the horizontal line).

Such 'general skills' include presentation and social skills, leadership, team-work, networking, volunteering, fund-raising, event organising, and all the other skills necessary for career development, for a successful personal and professional life, and for contributing to a better world.

The 'Student Experience' – the wide range of extra- and co-curricular activities which the College encourages and enables – is integral to the T-shaped education and to the development of general skills. The College curriculum has long supported student involvement in clubs, societies and volunteering, but it's the energy and enthusiasm of the students themselves which, each year, provides the motivation for the myriad of initiatives and events which enhance life on, and off, campus.

The sheer range of activities that students participate in is probably best captured by the *Dean of Students' Roll of Honour*: this year over 740 students were recognised for volunteering activities that ranged from tutoring young children in the community to running clubs and societies, campaigning for justice, organising donations of medical supplies to developing countries and much, much more. Impact was made on large numbers of people, small groups, or in one case, on a single elderly person living in isolation.

→ The Trinity Orchestra gained much attention, nationally and internationally, for its covers of popular artists such as Daft Punk, Arcade Fire, Pink Floyd, Sigur Ros and Queen.

RIGHT – The Trinity Orchestra



TOP LEFT – Student volunteer in the Zoological museum

BELOW LEFT – Exam de-stress canine therapy' (otherwise known as the Puppy Room!)

BOTTOM LEFT – Dean of Students' Roll of Honour

BOTTOM RIGHT – Stephen Garry, TCDSU Welfare Officer, winner of Mental Health Campaign of the Year with 'TCDtalks' with James Barry, Youth Engagement Officer, Headstrong

→ This year over 740 students were recognised for volunteering activities that ranged from tutoring young children in the community to running clubs and societies, campaigning for justice, organising donations of medical supplies to developing countries and much, much more.

Our clubs and societies continue to thrive. With over forty productions a year, the DU Players is the most active amateur theatre group in Ireland and the UK. At the Irish Student Drama Awards, Fionn Foley was given Best Actor Award for his performance in a new play, written and directed by Paul Testar, *'While there may be Life in Our Blood'*.

The Trinity Orchestra gained much attention, nationally and internationally, for its covers of popular artists such as Daft Punk, Arcade Fire, Pink Floyd, Sigur Ros and Queen. It has also become a popular favourite on the 2014 festival scene, taking to the main stage at Forbidden Fruit and Electric Picnic.

2014 saw significant anniversaries for societies:

- The Entrepreneurial Society, the European Law Students' Association and Trinity Suas are all celebrating their first decade;
- The International Society and the Science Fiction Society are celebrating 30 years;
- The Psychological Society is 50 years old and the Law Society is 80 years old;
- The Modern Languages Society celebrates 90 years and the Chess Club 140 years.

At the Student Achievement Awards Ireland (SAAI) in May, Trinity students were nominated in seventeen categories out of a possible twenty-four, and took home seven awards, which was more than any other Irish higher education institute. The awards ceremony, attended by President Michael D Higgins, recognised the achievements of third-level students in Ireland for the benefit of their college, community, and country.

Among the Trinity awardees was SS Social Science student Mark Walsh as 'Class Representative of the Year' and SS Law and Business student Shauna Watson who was awarded Students' Union part-time Officer of the Year. The *University Times* took home 'Publication of the Year', with SF Psychology student Aisling Curtis winning 'Journalist of the Year'.

The Trinity Students' Union year-long welfare campaign, *TCDtalks*, was the winner of the 'Mental Health Campaign of the Year', awarded by the National Centre for Youth Mental Health, Headstrong.

'Irish Language campaign of the Year' went to An Cumann Gaelach – and two days later they won, for the second year in a row, 'Best Irish Language Student Society' at the Glór na nGael awards.

Also at the SAAI, SS Law student Jack Cantillon and 4th year Medicine student Claire Cullen received the prestigious 'Charity Event of the Year' for their work organising Jailbreak14. A Trinity team – Medical students Kyryll Chulak and Salim Sebaoui – were overall winners of Jailbreak14. They made it to Sydney without spending a penny, seeing off competition from a hundred other Trinity and NUI teams. Over €15,000 was raised for Amnesty International and the St Vincent de Paul.

Finally, the Students' Union welfare officer, Stephen Garry, organised Ireland's first ever 'exam de-stress canine therapy' (otherwise known as the Puppy Room!) helping Trinity students forget their exam troubles for an afternoon with the help of canine companions. Run in conjunction with Peata Ireland, over a dozen dogs visited campus to divert and de-stress students ahead of their exams.

A Trinity Education

Trinity has always been a university for all – open to students with ability and potential from all over the island, and increasingly from all over the world.

In recent years the student population has grown, becoming more diverse and international, and the character of teaching, learning and assessment has been transformed. Trinity recognises that the models of the past do not serve the requirements of the students of the 21st century, who want more flexible curricula and distinctive educational philosophies that will enable them to face increasingly unpredictable challenges and roles. This year Trinity opened its education offerings through a new feasibility study to diversify admissions and through a new engagement in online education. Such initiatives ensure that Trinity is at the forefront of the educational revolution, pioneering new pedagogical models and channelling the power of disruptive technologies.

→ Trinity recognises that the models of the past do not serve the requirements of the students of the 21st century, who want more flexible curricula and distinctive educational philosophies that will enable them to face increasingly unpredictable challenges and roles.



Admissions

How do we improve and diversify the way in which students in Ireland are admitted to third level? This is a national issue, the subject of wide and frequent debate. This year Trinity led the way with a major national feasibility study to test whether there is a fairer, better mechanism of admissions than reliance on 'the points race'.

Via this study, 22 students were admitted in September 2014 on three of Trinity's most popular courses (including Law), using a holistic admissions system that works successfully internationally. The process is completely anonymous, with no interviews or teacher references. It uses the Relative Performance Rank (RPR) to look at both the Leaving Certificate results and the context in which the results were achieved, in order to assess not only a candidate's proven academic ability but their potential and suitability for the course. The study is an attempt to inform national policy in the area, and has been hailed by the Dean of Admissions and Financial Aid at Harvard University, Dr William R. Fitzsimmons, as sending 'a powerful message that with hard work anything is possible, including admission to Trinity or to any university in the world.'

To address the decline in the numbers of students from Northern Ireland coming to Trinity – due to external admissions requirements – Trinity also announced the development

of a new admissions route for A-Level applicants which will be tested in the first instance in Northern Ireland. The aim is to triple the numbers of students admitted from Northern Ireland each year, so that 8% of the student body will be from Northern Ireland, thus reaffirming Trinity's historic mission as a university for the whole island, attracting students with ability and potential from all over.

The Trinity Access Programmes (TAP) continue to be a huge success in this their 21st year of operation. Through TAP, students from disadvantaged socio-economic backgrounds are admitted to the college through alternate means. TAP can be seen as a pioneer admissions scheme and the success of the students speaks for itself: recently in the local elections, two TAP alumni were elected as councillors in their constituencies, and another TAP alumnus was elected a scholar on Trinity Monday.

Higher education can and should be transformative for the life of each individual student – and this is of benefit to society in general. In Trinity we're proud of our commitment to open our world-class education to everyone with the ability and potential to benefit from it.

BELOW – 'Irish Lives in War and Revolution: Exploring Ireland's History 1912–1923', Trinity's first MOOC



Online Education

This year we launched the Online Education pilot, led by a new Associate Dean for Online Education, Professor Timothy Savage. Online education is key for engaging new markets, strengthening the Trinity community, and consolidating Trinity's position as a critical actor in global higher education. This exciting initiative aims to broaden access and provide an online student experience that is in line with the research-led Trinity education, based on academic rigour, and building upon the existing culture of scholarship, innovation and creativity.

The last year has seen the development and launch of the first ever fully online Trinity College postgraduate course, the Diploma in Applied Social Studies, which commenced in September 2014 with 38 students. The course has been designed to provide access for those who would not otherwise be able to experience the unique education which Trinity offers.

Additionally we have entered the exciting arena of MOOCs with the launch of 'Irish Lives in War and Revolution: Exploring Ireland's History 1912–1923' on the FutureLearn platform. This six-week free online course was developed by the team of Professor Ciaran Brady, Dr Anne Dolan and Dr Ciarán Wallace from the School of Histories and Humanities, in conjunction with the online education unit. Through innovative approaches, the course introduces global learners to the history of Ireland in one of its most tumultuous periods.

When the course opened for registration at the end of August, 10,000 signed up in the first few days. Almost 17,000 people had registered when the course started, over half of them from outside Ireland. This indicates the huge global appetite for Trinity's research and teaching.

Interviews with new Professors and the new Librarian and College Archivist

01 Christopher Morash

02 Siobhán Garrigan

03 Trevor Spratt

04 Yvonne Buckley

05 Helen Shenton



→ “It’s a narrative arc — back in 1985 I was in the first ever cohort of students to take the M.Phil in Irish Writing, and next year I’ll be taking over as Director of the course.”

Christopher Morash is talking about the *commodius vicus* which brought him from Canada to Trinity as a postgraduate student and a generation later returns him to the College as inaugural Seamus Heaney Professor of Irish Writing.

The endowment of new chairs is a rare occurrence, particularly in the arts. This one came about through philanthropists, chiefly Mark Pigott, former CEO of Paccar, and Heaney was present when the new chair in his honour was announced in December 2012. The School of English is one of Trinity’s flagship schools – it was placed twenty-fifth in the world in the most recent QS rankings – but, perhaps surprisingly, the new chair is the first in Irish writing specifically. It gives, says Morash “focus to a lot of activity in the department”.

As a Canadian graduate, Morash decided on postgraduate study in Ireland because “I was interested – why was it so many great writers had come from a small place that’s geographically isolated?” He arrived in September in time for the Dublin Theatre Festival and was hooked. He still finds in Ireland “a cultural density in the way in which literature and history and the wider culture are so enmeshed” and gives as an example of this the death of Seamus Heaney: “The country

stopped. In Canada and the States – there are really good writers but the connection with them is more attenuated.”

After the M.Phil, Morash stayed in Trinity to do a PhD on Famine literature, later published as *Writing the Irish Famine* (1995). He’s interested in how “literature can accommodate the big ethical questions. How do you pay adequate acknowledgement to suffering on that scale, to a million people dying? In Famine novels, you see the form collapsing because the novel is supposed to deal with a functioning society.”

He was hired by NUI Maynooth “literally within a month of finishing my PhD. I was lucky – I came in just as they were building up the department. When I started working in Maynooth there was no HR office – within a decade it was a much larger operation.”

He greatly enjoyed this greenfield experience: “There was a real opportunity to get involved in academic council and shape things”. The initiative he’s most proud of is founding the Centre for Media Studies in 2003. “In the beginning there was just myself and a secretary. How do you design a syllabus? It was a phenomenal experience.”



After twenty-three years in Maynooth – where he was appointed Professor of English in 2007 – he knew it was time for a change and is delighted to be returning to Trinity: “When I’m writing, if I have an imaginary reader, it’s still [my PhD supervisor], Terence Brown – his rigour, the way he never let you forget about the validity of people’s beliefs different from your own. Trinity’s core pedagogical teaching is something very close to me. And of course the Library – if a book exists, it’s there!”

While his interests are wide-ranging – he has written a history of media in Ireland – theatre is something he “always comes back to”. His latest book is *Mapping Irish Theatre: theories of space and place* (2013), and his next will be on Yeats and theatre.

He is continually energized by teaching and feels that now is a particularly transformative period. “The informational landscape has changed – for instance even ten years ago you wouldn’t be working with journals with undergraduates, because access would be too awkward; but now JSTOR is easier to use than books. And with primary sources digitised – you can expose undergraduates to the original handwritten manuscript.”

At the same time, he can see the danger with students ‘born digital’ – “To many, research means googling, and they might not have the same discrimination in terms of what constitutes real information. The whole question of originality and intellectual property has become much more problematic.”

But he rejects any idea that today’s students are less well-read in literature: “It varies as much as it always did. I’m always amazed at stuff students have read.” For certain modules, he likes to get students to nominate the texts: “For the seminar on the Irish City, they chose Paula Meehan and Paul Durcan. Pedagogically, it works – they have an investment with what they’re studying because they chose it.” He has three children himself – the eldest has just graduated from Maynooth – and seeing them go through their different educational stages has “usefully challenged” his sense of what it means to be a student today.

To relax after hours, he goes to the theatre. Sounds like what he does for a living? “Yes, it’s a privilege to do this – to work with literature. It’s something most of the population does for pleasure, and I get paid to do it.”

→ Siobhán Garrigan almost didn't apply for the Loyola Chair of Catholic Theology: "I saw it advertised but didn't even click it open, because I thought my work wouldn't count as 'Catholic' theology. But then friends insisted it was perfect for me so finally I opened it and read 'emphasis on social justice and contemporary issues, etc.' ... I only just met the deadline!"

The arrival of the Loyola Institute in Trinity in 2012 was historic given Trinity's origins as a Protestant Tudor university, so it seems right that the incumbent of Trinity's first ever chair of Catholic Theology should also be an historic appointment: a feminist ecumenical theologian.

The Loyola Institute is dedicated 'to education and research in theology in the Catholic tradition'. The phraseology is important because, as Garrigan points out: "if you say 'Catholic theology' people think of the Catholic Church – but there's a whole intellectual tradition, long and rich, that has happened alongside, and sometimes without, the church, and quite often in a critical mode."

The Institute engages particularly with teaching on social justice and inter-religious dialogue. You can see why they wanted Garrigan, an unusual academic with an unusual career trajectory combining research with a wealth of practical experience.

Born in Liverpool to a Galway mother and Liverpool-Irish trad musician father, she was the first girl from her school to go to Oxford, where she studied theology. She found it difficult: "Oxford in the 1980s – they're not good with Catholics in theology, or women in theology, or Irish people generally.

I did well, but I found the academic side of the culture quite brutal, to be honest. The last thing I wanted when I graduated was more study. I thought it wasn't for me."

What helped change her mind was a fellowship at Union Theological Seminary in New York. "I was working in London with homeless people when I saw it advertised. It was the most transformative year of my life. I met feminist and Black theologians who showed me that what I experienced at Oxford was not my fault. They revived my sense of how theology is relevant in the world."

She still didn't jump into a PhD though. Back in England, she was appointed as the first director of the second Emmaus Community in the UK. "Emmaus is for displaced or destitute people. It recognises that as well as housing, people need meaningful work and companionship, a genuine home. In Coventry we found an old vicarage where everyone could live, work, and eat together."

In practise she found this "brilliant, but exhausting – the problem was being on call seven days a week. I'm not that big an extrovert!" After three years, she moved to Westport, and began a PhD with the Milltown Institute in Dublin on sacramental theology.



She also started teaching in the Galway-Mayo Institute of Technology but by the time she obtained her PhD in 2001, the theology course had been pulled, and "there were very few jobs for feminist theologians or ecumenical worship leaders in Ireland. I couldn't even get a job teaching in my local high school!"

On her 26th job application she struck gold. "Yale was looking for what they called 'Dean of Chapel', which is both a hands-on job and a scholarly job. They needed someone to run a daily ecumenical worship project for forty-four different denominations."

The first thing she did as Dean of Chapel was remove the pews from the church: "It was all long New England rows facing a great big pulpit, but Quakers for instance pray in a silent circle. So we needed flexible seating for people to position as they wished, so as to invite others into their practices."

Being parachuted to one of the world's top universities was career-transforming. "At Yale, you've got to pass a tenure review every two or three years. Whatever else you do, you have to publish. That formed habits in me. For example, my last big project, on the role of worship in sectarianism in Ireland, might never have got off the ground in a less research-oriented university."

After eight years, she wanted to be nearer family and friends, so took a job at the University of Exeter, always hoping for the opportunity to get back to Ireland. Now, six months into her new job, she is hugely enthusiastic about the Loyola Institute, Trinity, and Dublin.

"The whole Loyola project aims to make accessible to people a body of literature and knowledge about questions of community and companionship that should have been available to people and hasn't been."

Key to fulfilling Loyola's mission is "really good interdisciplinary connections" (one of the reasons why the Institute chose to come to Trinity). "I'd like to see us really engaging with people across the campus – co-hosting art and performance events, working with the Science Gallery and with the full range of disciplines. I'm hugely interested in having our mission enhanced by the study of biology, disease and evolution, for instance, as well as by the arts."

She still has her roots in Mayo, where she returns at weekends. During the week she lives in Dublin. "I love it! I work long days – but afterwards, to be able to get on the bike and go hear traditional music in a pub... at 10.30pm in Exeter I'd be going to bed!"

09

Professor Trevor SprattAIB Professor in Childhood Research /
Director of the Children's Research Centre

→ “People may not conceptualise themselves as doing children’s research but if they’re involved in medicine or law or psychiatry or addiction studies... there’s a common denominator of childhood adversity as an antecedent in all types of outcomes. So one of my goals is to get people to consider childhood — that’s a new way to engage with research they’re already doing.”

Trevor Spratt, newly appointed Director of the Children's Research Centre in Trinity, is talking about the centrality of childhood to all kinds of disciplines, and as regards his own research into childhood adversity, he's stressing the importance of “crossing professional and subject-area barriers” because children's lives and upbringing are “about education, psychology, physiology and we need to work with people in all these areas.”

So he's delighted to have come to such a strongly interdisciplinary environment as Trinity, and to a Centre which is designed to “go across the university”. The Children's Research Centre has two sponsoring Schools – Psychology and Social Work & Social Policy – but as Spratt says: “We see our province as anyone working with or for children – whether in literature, education, law, medicine. One of the joys of Trinity is that you can have a conversation with anyone about their research.”

He comes from a social work background and his experience was initially practical rather than academic. As an undergraduate in the New University of Ulster in Coleraine in the late 1970s, he studied sociology and social anthropology, because “at eighteen, if I was interested in anything other than football, I was interested in people”. After graduating he “spent time in a kibbutz in Israel, travelled a bit, and worked variously as a theatre orderly, a store man, an education welfare officer” before doing a Masters in Applied Social Studies in Oxford. He

then returned to Belfast, where he's from, to work as a social worker, focusing on “children who had been maltreated or were in difficult life circumstances.”

This was at the height of the Troubles – in Belfast then, he says, “social workers and GPs were the only neutral people – you could go into any community because it was recognised that you were there to help people. You were able to move through society in a way which wasn't possible for the general population.”

After ten years' social work experience, he applied for and was accepted to the University of Ulster as a lecturer in social work. “It was possible at that time to get a university post based on professional experience.” He quickly discovered an appetite for research. As a social worker he had started questioning the way in which he and his colleagues took decisions on crucial matters “like whether a child is taken into State care or left in a vulnerable position”, and the interface between policy and practice became the basis for his initial research.

From the University of Ulster, he moved to Queen's University Belfast where he built his research interests, becoming particularly focused on the effects of “cumulative adversities” experienced in childhood, such as having a parent in prison or with poor mental health, or exposure to domestic violence – “combinations of adversities tend to be predictive of poor



outcomes. So how can we define them, identify them, and use this information to predict where to best put our money in preventive interventions?”

His research is international: “Of course there are cultural differences in the way that societies respond to children's circumstances – in Israel for instance residential care for children is highly regarded, which it isn't in Ireland or the UK – but children's needs remain the same and what damages them remains the same, so we've started developing evidence-based practices that travel.” He has advised the government in Northern Ireland on family and social protection, and worked with the Swiss government and UNICEF as well as collaborating with universities in Europe.

“Within the last ten years, a healthy market for advice on policy has developed”. As ever, economics is a great motivator: “Children with damaged early lives are known to cost the State a great deal of money in terms of services to them as adults and low tax production.”

After thirteen years in Queen's his research had left the boundaries of social work and he was looking for a place to develop his research “on a childhood-basis rather than a professional social work-basis”. Trinity's Children's Research Centre provides that environment.

Personally, he's excited about changing cities and environment: “My daughter is in university so we don't face problems of finding a school or settling her in.” It's early days yet, but he's an active hill walker and is looking forward to hiking in the Dublin and Wicklow mountains.

And professionally he's excited about what Trinity can offer: “here, you find strengths in odd places. For instance, my colleagues working in TILDA [the longitudinal study on Ageing] have discovered that when looking at older people experiencing challenges, you find antecedents in childhood adversity. Researchers are starting to talk of health outcomes in old age as long-delayed developmental outcomes from childhood.”

He's looking forward to starting a forum for children's research – “bringing people around a table to present their work to each other as a stimulus to thinking in terms of multi-disciplinary grant applications”.

At the moment, he says, childhood research tends not to get the funding it deserves internationally: “I wish more was put into children and growing up because they are our future. Society operates by investing in the next generation and that shouldn't only be through encouraging technology and innovation but through doing solid things in relation to improving children's lives in the present, so that they may become healthy and happy adults.”

→ “Ireland is an isolated island off the edge of Europe – so bringing in non-indigenous species, animal and plant, can upset our ecosystems. Freedom of movement of goods and people throughout the EU brings increased risks of new organisms making their way to Ireland and establishing here.”

Yvonne Buckley, Trinity's new chair of Zoology, has a novel take on the EU's four famous freedoms (of people, goods, services and capital). Plants are tradable goods but of course they're also living organisms which influence the environment they're placed in – moving them round requires more consideration than, say, books, clothes or chocolate.

Buckley's research looks at “the effect of weeds and invasive plants on ecosystem services. How do invasive plants affect native biodiversity in ways that might damage pollination or water quality services that we get from the natural world?”

It is research that requires “weighing up of the benefits and the costs”. Travel, trade, and tourism are vital economically and are intrinsic to the way we live now but they have led to “a massive increase of the pathways by which non-native animals and plants enter countries.”

So what do you do? “You look at models of management” says Buckley, “You ask stakeholders and managers what they actually want. You look at the costs, which can be economic, or health and environmental. I'm particularly interested in models of management – so if we have ten different models for controlling an invasive plant species, should we go for the cheapest one? Or the one that reduces the population the most?”

You do not, as she makes clear, take decisions in isolation. Responsible zoologists develop an awareness not only of environmental needs, but also of economic, nutritional and societal ones.

Such awareness seems to come naturally to Buckley, perhaps because Zoology was “cross-disciplinary from the start” – back in the 19th century, Trinity's first chair of Zoology, E.P. Wright, was also Professor of Botany, and today, Buckley's research is fully interdisciplinary: “I work between plant sciences and zoology, and have links with geography through landscape ecology, also to social geography and economics because I work on societal problems where an understanding of the science can help.”

Six months into her new post she is delighted with Trinity's interdisciplinarity: “I'm theme champion for the College's ‘sustainable environment’ theme, which means I'm working with engineers, chemists, ecologists and social geographers across the university, focusing on challenges like food security and how to maintain energy sources without destroying biodiversity.”



Buckley comes to Trinity after nine years at the University of Queensland in Brisbane, Australia, where she retains an honorary professorship. Her third level education was in England – in Oxford as a biology undergraduate and in Imperial College London for her PhD – but she was born and brought up in Cork, near Mallow: “My dad was the local engineer but we grew up with lots of animals – ducks, geese, chickens, donkeys, dogs, cats... that may be where my interest in zoology started.” She loved Brisbane but the Trinity position was “a once-in-a-lifetime opportunity – a job that I loved, in an excellent university, in a country where my family are.”

She has been very much impressed with the “energy and enthusiasm of the department – researchers here are certainly punching above their weight”. Dublin is “like a new city, because as a Cork schoolgirl I really wouldn't have visited here much” but it's one she and her family are enjoying. “We arrived in winter and my son wanted to know why there are no bugs in Ireland and why all the trees look like scarecrows – in Queensland it's subtropical so trees don't lose leaves all at once.” (Such are the pertinent questions of zoologists' sons!)

In her new role, Buckley is looking forward to contributing to E3, Trinity's new Energy, Engineering and Environment Institute. She's excited by the opportunity E3 offers for trans-disciplinary work.

Transdisciplinarity is where science and society interface: “It's about engaging with policy-makers and industry – working with them from the start of a research project to co-define the problem, and continuing to engage throughout the process.”

This way of working has “gained a lot of ground over the last decade” but it can be difficult: “It's not the way, as scientists, that we're used to working. Previously, we would have provided our solution as a piece of the puzzle. But unfortunately if you don't know what the rest of the puzzle looks like, you can't design a piece that fits – it might be a triangle in a circle-shaped hole.”

She is keen to use approaches developed during her time in Australia to engage with policy-makers here in Ireland: “We held workshops defining research questions – it was a way to ask decision makers what they needed to know, and for them to understand what makes an interesting question for us – because it's not about treating us as consultants. It's about working together to do interesting new science that confronts societal challenges.”

09 Helen Shenton Librarian and College Archivist

→ “We’ve got to define what’s the next level for a 21st century research library, and what’s the next level for a 21st century visitor experience of world heritage items uniquely held in a university.”

Helen Shenton, newly-appointed Librarian and College Archivist – and the first female to this position in Trinity’s 420 year history – is “horizon scanning”. Libraries, she says, are “always a moving target. Just in the last few years we’ve seen MOOCs, digital humanities, big data... but you always have to be thinking to the next level: how might user behaviours change? How might learning styles change? Or research methodologies? We’ll never get to the end; that’s what makes it so fascinating.”

To the generic challenges now faced by all university libraries – digitisation, physical and electronic preservation and storage – Trinity Library brings its own particular challenges and opportunities: it houses unique medieval and contemporary manuscripts and collections; the Long Room and Book of Kells make it a visitor attraction, and it’s one of the six UK copyright, or legal deposit, libraries, which means it can get a copy of every book, pamphlet and periodical published in the UK.

Talking to Helen Shenton, you begin to get an idea of the scale of what’s involved. She took up her post in June, a few weeks early, in order to contribute to the new Strategic Plan. She lists her priorities:

“We need an integrated space strategy. That’s about reimagining how we’re going to use these spaces – the Ussher, the Berkeley, the Lecky, the Long Room – to reflect the different ways that people now study and learn and research. That includes critical backroom activities like physical storage.

“Then we need an integrated virtual version to reflect the digital shift – virtual space for virtual collections. This includes activating the physical collections – activating access to the collections is a catalyst for scholarship; we release the ‘latent kinetic energy’ within the collections. Digitisation is one mechanism, but so is retrospective cataloguing and metadata creation, and it all needs to be tied into the research themes coming out of the university.

“Then Trinity is hosting e-depositIreland for on-line Irish government publications and this means developing our collaborative role with other Irish libraries.

“To achieve our aims we need to do everything from investing in people to the visitor experience. Of our 600,000 visitors, how do we give them an experience whereby the iconic item, the Book of Kells, is the climax of the exhibition? I see the visitor experience as not only contributing to Trinity, but as a hook for fundraising, because a lot of what we need to do – like creating new storage space – are big ticket items.”

The skills involved in achieving all this are multi-faceted – from coordination to preservation to curating to fundraising – but Helen Shenton’s experience is particularly varied, and ranges from specialist book binding to Harvard University, via the Victoria and Albert Museum and the British Library.

Originally from Staffordshire, she read English literature at University College London and then went and worked in Australia, travelling back overland from Indonesia to India. Returning to London she began training in book binding and conservation and was taken on as assistant to Roger Powell in his Hampshire studios.

Powell was an iconic figure who in 1953 had rebound the Book of Kells and the Book of Durrow (also in Trinity). “I was his last assistant. He was 86 and I was 22. He described his assistants as “fourth generation Arts and Crafts” because he had a direct working lineage to William Morris.” Working with Powell meant that she came to Trinity Library “30-odd years ago to learn a particular technique in the conservation studios.”

After three years with Powell she was taken on by London’s Victoria and Albert Museum, initially for conservation of their two million books but by the end of her fourteen year stint she was also in charge of paper, photographs, textiles and paintings conservation.



Moving to the British Library in 1998, she was deputy director and head of collection care which meant being responsible for “the care, storage, preservation and security of 150 million items”. She calls this “looking after the national memory”. In this capacity, she brought in digital preservation. “When I started at the British Library, the average lifecycle for a website was 35 days. After 9/11 the web was such a place of outpouring but who was capturing it? There was a black hole in the memory. I was looking at it from the point of view of historians in thirty years’ time.”

As well as digital preservation, she also championed the physical: “We created an amazing high density, high bay, fully automated, low oxygen storage for 272km of stock. It was a new build in Yorkshire.”

After twelve years in the British Library, “Harvard came calling”. There are 73 libraries in Harvard and there was a major reform underway in the university. “The president’s thesis was ‘one Harvard’ and the prototype for that was ‘one Harvard library’. I was appointed executive director – it was about consolidating and collectively designing the whole library ecosystem for what could be done better. It was a huge task – in just three years, we’d created a new organization of 400 people.”

So now to Trinity, which she sees as “a culmination of all the different things I’ve done: there’s the cultural heritage side, the national library side, and the university side.”

Just a few months into the job, she loves Trinity – “I’m really enjoying the buildings across the campus and I love how it’s its own community, just a layer of bricks away from being right in the middle of the city” – and she’s also loving Dublin. “I walk to work through Georgian Dublin. What I learnt from living in Boston, is that I love living by the coast. I’ve already been to Seapoint – swimming in the shadow of a Martello Tower, that’s Dublin.”

How difficult will it be to achieve her goals for Trinity library in an endowment climate significantly less rich than Harvard’s? “Well, in the downturn, Harvard also lost endowment – some 15 percent – so it’s relative. But yes, the library here has lost a quarter of its staff, and if you compare our staffing numbers to libraries in comparably ranked North American universities, or to the other legal deposit libraries in the UK, we’re right down. I’m full of admiration for how well colleagues have done given the tough economic climate. Now it’s about investing in staff development and aligning the library across all the Schools and departments: it’s critical to have the library as the beating heart of the university.”

Trinity Growing Globally

Trinity College Dublin was one of only four colleges outside the USA to be profiled by *The Princeton Review Best 379 Colleges* (edition 2015), where it was particularly commended for undergraduate education. Trinity was also one of only three Irish/UK universities to feature in the prestigious *Fiske Guide to Colleges 2015*. This leading guide spotlights just 300 universities, mostly in the US – Trinity was highlighted as a 'Best Buy' public college.

This recognition of Trinity by respected US college guides is an endorsement of our Global Relations Strategy and an indication of Trinity's growing international presence. Since the launch of the Global Relations Strategy Trinity has seen a 19% increase in non-EU student numbers, increasing from 1,224 in 2011/12 to 1,465 in 2013/14. The past year has seen increased recognition of Trinity in key regions and countries around the world, the continued development of worldwide teaching and research collaborations, further cultivation of Trinity's global alumni network and the integration of international experiences for all the College community.

On 30th June 2014 Professor Jane Ohlmeyer handed over to Professor Juliette Hussey who took up the role of Vice-President for Global Relations. Professor Hussey has extensive overseas experience, including her role as academic director of the Trinity-Singapore Institute of Technology programmes and her recent term as Associate Vice-President for Global Relations.

Building on the success, since 2012, of the one-year programmes in physiotherapy and occupational therapy – mainly delivered in collaboration with Singapore Institute of Technology (SIT) – programmes in Diagnostic Radiography and Radiation Therapy commenced in September 2014, also with SIT.

Trinity continues to build partnerships that enhance the university's international profile and reputation. Since September 2013 memoranda of understanding have been signed with leading universities across a number of regions including Australia, Brazil, China, India, Kazakhstan, Malaysia, Mexico, Sri Lanka, Turkey and Taiwan. These agreements aim to promote academic partnerships in various fields and further develop existing collaborations between Trinity and partner institutions.

The university is beginning to leverage its significant potential in the Chinese market and this has been consolidated by the development of a Chinese language web site (www.trinitychina.ie) and key social media platforms including WeChat, Weibo, Renren and YouKu. These Chinese language outlets aim to build Trinity's profile in China as a leading provider of high quality, internationally recognised education.

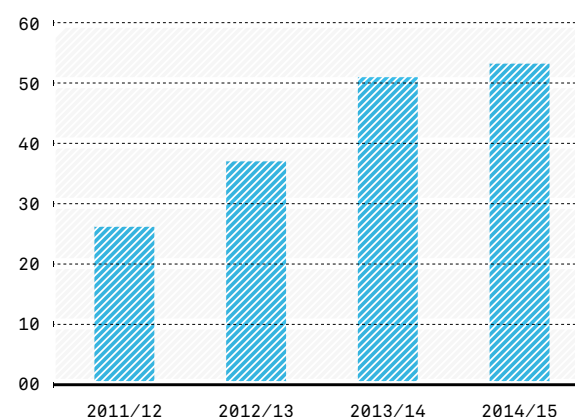
All Trinity students are encouraged to spend time abroad to gain greater international experience. Each year over 250 students travel abroad on Erasmus and the number of students availing of non-EU international exchange opportunities continues to increase year-on-year. Trinity has also seen an increase in Erasmus students walking through Front Arch from 357 in 2012/13 to 416 in 2013/14.

→ The Global Room, which opened last November, is intrinsic to the multi-cultural campus. The Room features plasma screens with access to over 300 global television channels.



→ Ensuring that our campus is inclusive and truly cosmopolitan is a priority. Working with student societies, a number of international campus events were organised this year to embrace and promote multiculturalism.

Students on non-EU Exchange



In addition, approximately 40% of students in the Faculty of Health Sciences took up overseas electives to countries including Belize, Canada, Cuba, Cambodia, India, Kenya, Malawi, Malaysia, Nigeria, Peru, Singapore, Taiwan, Trinidad and Tobago, USA, Zambia, and many more. Another priority for Global Relations is the development of international internship programmes. International work experience is key to educating global citizens who will contribute in a globalised economy. This year the pilot programme succeeded in placing 19 students in internships within organisations in Ireland which have international spheres of activity. A new pilot internship in Mumbai will be expanded over the coming years and the Global Relations Office, working closely with the Careers Advisory Service, will continue to grow its international internship scheme year-on-year.

PREV PAGE – Trinity College Global Room

FAR LEFT – Celebrating the Chinese New Year

LEFT – Singapore Institute of Technology Graduates

BELOW – Vice-President for Global Relations, Prof Juliette Hussey

International Campus

Ensuring that our campus is inclusive and truly cosmopolitan is a priority. Working with student societies, a number of international campus events were organised this year to embrace and promote multiculturalism. These include the Indian festivals of Diwali and Holi, the Chinese New Year, and the North American holiday of Thanksgiving.

The Global Room, which opened last November, is intrinsic to the multi-cultural campus. Staffed by a team of student ambassadors, the Room features plasma screens with access to over 300 global television channels, a resource library with international reading materials, and state-of-the-art conference and seminar facilities for internationally-themed events. In its first year of operations the Global Room facilitated over 300 such events. A blog (www.tcdglobal.wordpress.com), run by the student ambassadors, reflects the Trinity student experience for prospective international students and has had over 8500 hits since its establishment in January 2014.

Under the Science Without Borders initiative (*Ciência sem Fronteiras*), the Brazilian government aims to send 100,000 Brazilian scientists abroad over the course of four years. Trinity welcomed the first cohort of such students in 2013, and a further hundred students in September 2014.

The past year has seen a number of high-profile international visits to the campus, highlighting the importance of global academic links. One of India's elite colleges for arts education, Lady Shri Ram (LSR) College for Women at the University of Delhi, sent a debating team in October to compete against Trinity's Historical Society, the oldest debating society in the world. Debating the motion "This House Wonders What the British Have Ever Done for Us", the LSR team narrowly defeated their Trinity rivals.

Trinity hosted a group of secondary school students from Beijing No. 4 High School. The visit was arranged in conjunction with the Department of Education and Skills. At the School's invitation, the Provost made a return visit while in Beijing in mid-October. Students from the Mallya Aditi International School in Bangalore joined Dublin-based teenagers for an intensive summer innovation workshop in Trinity's Science Gallery. From this successful engagement, plans for an innovation workshop in Bangalore have emerged.

The college's six Global Officers, working across ten Schools, are striving to develop Trinity's growing international alumni community as well as embedding an international focus into the fabric of the university. The Officers are actively exploring new ways to tap into Trinity's networks, reconnect with alumni, and showcase the Schools' outreach activities.

Benefactions — Making a Difference

In 2013 the College honoured those whose cumulative philanthropic giving has had such a transformational effect on Trinity since 1592 – we inscribed the names of these ‘Benefactors through the Centuries’ on the Benefactors’ Wall in the Dining Room.

In the past year we have added a further seven names to the seventy originally inscribed. We will continue to honour our exceptional donors without whom we could not achieve our mission and make lasting impact on Ireland and the world.

Our supporters are inspired by the great research and teaching here in Trinity. This year, again, they have supported and enabled a range of activities and initiatives across the College and across disciplines.

Biomedical Research

Biomedical research is one of Trinity’s great strengths. This year we developed significantly thanks to the generous support of JP McManus PRO-AM, Iris O’Brien Foundation, Merck Serono, Elan Corporation, Novartis, Fannin, Bayer-Schering, Waters Corporation Ireland and Munster Rugby.

These donors enabled the establishment of the Academic Unit of Neurology within the School of Medicine, with close links to Trinity’s Institute of Neuroscience and (as part of the ENCALS Consortium) to national centres of neuro-degeneration in the UK, Canada, Germany, Belgium and Italy.

→ Biomedical research is one of Trinity’s great strengths. This year we developed significantly thanks to the generous support of our benefactors.





Professor Orla Hardiman was appointed first Professor of Neurology. An expert in motor neurone disease research, she now has 27 people working in the unit's active multidisciplinary programmes (in fronto-temporal dementia, young onset neurodegeneration, epilepsy, motor neurone disease and multiple sclerosis). Professor Hardiman has also tasked herself with establishing a strong clinician-scientist programme to allow young doctors to pursue a research career along with their clinical practice.

Epilepsy is one of the four main themes of the Academic Unit of Neurology. It's among the most common chronic neurological disorders of young people and the second most common across all ages, after stroke. Trinity graduate, Dr John Kirker (1922–2011) was a pioneering epileptologist who was consultant neurologist in Sir Patrick Dunn and Beaumont Hospitals, and a founder of the Irish Epilepsy Association (now Brainwave). A devoted alumnus of the college, Dr Kirker left a bequest to fund an annual Trinity lecture in epilepsy.

In the priority research areas of cancer and ageing, we are growing our relationship with AbbVie, a biotech company concentrating on sustainable healthcare who have made numerous gifts in this area.

Business

Just under €9 million has now been raised for the new Trinity School of Business. To date, over 25 Irish and international business people, as well as three international companies, are supporting the School.

Science

In June, ESB and Bank of Ireland became the latest members of the Science Gallery Science Circle, joining Deloitte, ICON, Google, NTR Foundation and Pfizer.

Trinity is also embarking on a three year partnership with Google to develop a new project aimed at transforming computer science and STEM capacity in Irish schools. This major investment is an opportunity to influence significant change in Irish education. Google is a long-term supporter of educational innovation in Ireland through its support of the Trinity Access 21 initiative, which is pioneering new educational models of 21st century learning.

LEFT – Prof Orla Hardiman, first Professor of Neurology

BELOW TOP – Karen Holland at the *Pen & Palette* book launch – National Institute for Intellectual Disability.

BELOW BOTTOM – Susie Bioletti, Head of Conservation with Peter Keegan, Country Executive for Ireland at Bank of America Merrill Lynch

Humanities

Through its art conservation project, Bank of America Merrill Lynch has granted substantial funding to Trinity College Dublin Library to conserve, research and digitise four early Irish manuscripts. The manuscripts will be made available via the Library's digital collections and exhibited alongside the Book of Kells, the Book of Durrow and the Book of Armagh.

The departments of Geography, History and Computer Science are collaborating to digitise the unique Fagel Map collection. The initial phase has been funded philanthropically by a donor who wishes to remain anonymous, with preparation underway for a major EU funding bid later in 2014.

The Inaugural Edmund Burke Lecture was given by Baroness O'Neill on 22nd April as part of the President of Ireland's ethics initiative. The Lecture will be annual and is endowed by the Fallon Family in memory of alumnus Padraic Fallon.

Pen & Palette: a selection of poetry and paintings by students of the National Institute for Intellectual Disability (NIID), Trinity College Dublin was formally launched in the Old Library on 26th June. It was published as part of the Margaret McLoughlin Art Project, which is funded by the McLoughlin family in memory of their daughter and sister, Margaret. The McLoughlin family are key donors to the NIID's Expressive Arts Programme.



The Student Experience

Eric Kinsella, an engineering alumnus and his wife Barbara, have made a magnificent gift to create three floors of 24-hour library study space for use throughout the year in the Ussher Library. The new area will amount to 1189.69sq metres and accommodate 600 students. The overnight study area will be named 'Kinsella Hall' in honour of Eric Kinsella's father.

Graduate Dr Eileen O'Reilly and her husband Dr Ghassan Abou-Alfa, both top cancer experts in Memorial Sloan-Kettering Cancer Center in New York, have established a fund for an exchange programme between Trinity College Dublin and the American University of Beirut (AUB). This important initiative will enable students from both institutions to experience different cultures.

Access Programme

AIB is partnering with the Trinity Access Programmes (TAP) in the development of a major national initiative – College Awareness Week – which will be led by TAP working with key stakeholders including the HEA, IUA, NAPD and IBEC. The aim of this initiative is to galvanise forces across Ireland in an effort to increase the number of children and adults from low income groups taking up college places.

Alumni Support

An updated strategy for alumni engagement was put in place for 2013–14 with support from alumni coming through a variety of programmes.

Alumni donations to the College have increased – now over 10% of our alumni have made a gift in the past decade and the revamped Alumni Appeal has resulted in over 30% of alumni contacted pledging a gift to the College via the phone campaign.

Alumni volunteering is more widespread – the Trinity Global Graduate Forum provided a forum for many alumni from around the world, renowned and respected in their field of expertise, to come back to campus to provide valuable input into the College's Strategic Plan; the Gradlink Mentoring programme saw more students than ever connecting with alumni for careers advice.

The College recognises and greatly appreciates the support of all alumni, in whatever way they can.

The Trinity Visitor Experience

Welcoming the public

The Book of Kells and Trinity College feature on all the lists of Ireland's top 10 visitor attractions (no.2 on TripAdvisor, no.5 on Fáilte Ireland). Last year almost 600,000 people paid to see the Book of Kells.

Since 2008, Trinity has hosted another leading visitor attraction, the Science Gallery (with entrances on Pearse Street and through the campus). The Science Gallery presents science and technology through innovative, inspiring exhibitions – it is both pedagogical and highly entertaining. In 2013/14 over 383,000 people visited the Science Gallery for four shows [*Grow your Own...*, *Fail Better*, *Fat: it's Delicious* and *Strange Weather*] which showcased different science disciplines and were curated by both Trinity staff and outside curators.

And in 2013 Trinity launched a third major visitor experience when it introduced guided tours in the Zoological Museum. The museum's wonderful collection has 25,000 specimens from Ireland and abroad, including extinct and endangered species like Ireland's last Great Auk. Six thousand people from 17 countries visited in 2014, a twofold increase on the previous year. Among the notable visitors were Sir Terry Pratchett, primatologist Jane Goodall, the Make-a-Wish Foundation, and a BBC Natural History film team.

Trinity has introduced a number of initiatives to accommodate the ever growing numbers of visitors to campus, and to develop and improve their experience. At the Nassau Street entrance to the College, a digital information screen promoting Trinity attractions and events has been installed, and around the campus new signage has been put in place to guide visitors to the key attractions, as well as to Trinity Tours, the Gift Shop, and where to Eat, Drink and Stay.

Trinity's campus is an oasis in the middle of the busy city. The Arts Café outdoor terrace has recently been improved with foliage and canopies, making it a more attractive place to sit.

For the peak tourist season, June to August, four full-time and four part-time Trinity student ambassadors promoted activities, providing a warm welcome to visitors and distributing the *Experience Trinity* leaflet, which provides information on student life as well as on visitor attractions and facilities.

Finally, among the hundreds of thousands of annual visitors to Trinity are many alumni, who return to experience their alma mater anew. Alumni are now receiving special care and attention when they visit: alumni can now avail of a 10 percent discount to stay in rooms on campus and 10 percent off all items purchased in the Library Shop.

→ The Science Gallery presents science and technology through innovative, inspiring exhibitions – it is both pedagogical and highly entertaining.





ABOVE – Johnny Giles, David Went, John Laver, Lelia Doolan and Jane Goodall, Honorary Degree recipients with Provost Dr Patrick Prendergast and Chancellor of the University, Mary Robinson

This year saw German Chancellor, Angela Merkel, visit Trinity in a joint event organised by the Provost and The Philosophical Society (The Phil) on 7th March 2014.

BOTTOM LEFT – Vice-Provost Prof Linda Hogan with German Chancellor Angela Merkel and Taoiseach Enda Kenny

BELOW TOP – Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand with the Provost and Professor of Systematic Botany, John Parnell

BELOW BOTTOM – Volunteer talks to visitors at the Zoological museum

Welcoming dignitaries

This year saw German Chancellor, Angela Merkel, visit Trinity in a joint event organised by the Provost and The Philosophical Society (The Phil) on 7th March 2014. The Chancellor addressed staff and students before participating in Q&A. Two months later Trinity welcomed delegates from the Baden-Badener Unternehmer Gespräche (BBUG), the German think-tank focused on furthering the personal development of the next generation's executive leaders.

Other high-ranking visits included Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand who visited the Botany Department and opened its new garden in September; Nguyen Chi Dung, Vietnamese vice-minister for planning and investment, who was in Trinity in July; and Dr Margaret Chan, DG of the World Health Organisation, who was presented, in June, with the Second Edition of the EquiFrame Manual, which aims at assessing and guiding health and welfare policies to ensure that the human rights of vulnerable, marginalised groups are well addressed. EquiFrame was developed by Trinity's Centre for Global Health together with Ahfad University for Women in Sudan and the NGO Handicap International.

The global relations strategy continued to thrive in 2013/14 with numerous academic visitors, including from Goldsmiths University of London in September 2013 for the launch of the Masters in Creative & Cultural Entrepreneurship; the University of Massachusetts Medical School in October 2013; a delegation of Brazilian Rectors in May 2014 seeking to establish student exchange agreements; and the Provost hosted a lunch for Rectors of Estonian Universities who were on a study visit to Ireland. Other academic delegations welcomed to Trinity came from China, India and the US. Student delegations who visited included the debating team from Lady Shri Ram College in India who took on, and beat, The College Historical Society (The Hist) debaters in October 2013, and Notre Dame students in August 2014.

Trinity conferred honorary degrees on footballer Johnny Giles, producer and director Lelia Doolan, phonetics expert John Laver, banker David Went, and primatologist Jane Goodall; as well as lawyer and founder of the Irish Hospice Foundation Mary Redmond, engineers Craig Barrett and Atsuo Fukuda, and writer Amos Oz.



Trinity Global Graduate Forum

KINGSLEY AIKINS explains why he put in so much time last year pro bono into making the Trinity Global Graduate Forum a success

“I want to see Trinity in the top 50 universities in the world. It’s cognitive dissonance: I bought that product so I want it to look good!”

Kingsley Aikins, founder and CEO of Diaspora Matters, former head of the Ireland Funds, Trinity graduate and networker extraordinaire, is explaining why he put so much time last year pro bono into making the Trinity Global Graduate Forum a success:

“I’m just a big fan of giving back. I think, having benefitted from a Trinity education, you have a certain responsibility. And I just think, generally, that you owe a debt to the generation coming through, however you pay that – whether it’s through engaging with the boy scouts, the GAA, or your university...”

Such altruism doesn’t, of course, exclude self-interest (hence cognitive dissonance). Strong alumni networks are, as Aikins points out, useful not only for the College but for individual graduates developing their careers. He has built his own career on networking, and today, his consultancy company, Diaspora Matters, advises governments from Israel to Bosnia on how to get input from successful emigrants. When we meet, he is just coming from writing a desk report for Palestine: “I’m asking ‘who is Palestine’s Chuck Feeney?’ and I’m advising that just twenty people in the Palestine diaspora could change the future of the country.”

“I want to see Trinity in the top 50 universities in the world. It’s cognitive dissonance: I bought that product so I want it to look good!”





He is one of the people behind the Gathering, an idea he got from his involvement with a similar initiative, the Homecoming, in Scotland. He says his diaspora model comes from Ivy League colleges in America: “I was fifteen years working in the US and I watched how places like Harvard use alumni, build networks. I visited Dartmouth College, where 70 per cent of the alumni give back.” During his time with the Ireland Funds – an Irish-American philanthropic organisation which has donated millions to projects in Ireland north and south – he “copied the Harvard model”, encouraging the sense of connection people feel to an institution or a place.

Actually, his instinct for networking and relationship-building seems innate. Long before he moved to America, he was posted in 1985 to Australia by the Irish Export Board (forerunners of Enterprise Ireland). There he founded the Lansdowne Club, which became the leading Irish business network in Sydney. He contacted Tony O'Reilly, then CEO of Heinz, to ask him to be patron of the Club and that began a long, fruitful relationship.

Aikins played rugby for Trinity, and was a knight of the Campanile for rugby, so he had that sport in common with O'Reilly. “I watched how O'Reilly used rugby globally. And – something I haven't heard said – he only ever invested in countries where he had played rugby. In New Zealand, and Australia and South Africa, the heads of his companies were guys who had played in the All Blacks, the Springboks...I learnt a lot from observing how he networked.”

As he “wandered the globe”, Aikins developed the habit of “keeping an eye out for Trinity people” and he donated to the college “at a modest level. I don't have a ton of cash to throw at it”. When he returned to Ireland in 2006, he re-engaged with the Trinity rugby club, with which he's still involved. He helps fundraise – “it takes €230,000 annually to run the rugby club...we get a €4,000 grant...” and he's involved in mentoring the young players, not on the pitch, but career-wise – “I help them with decision-making, career development, and I provide introductions to useful people.”

→ In the event, the Forum was a great success, with over a hundred alumni flying in from round the world to discuss issues relating to the college, including financing, capital development, technology, identity and reputation.

Last year, in 2013, he was president of the Trinity Business Alumni (TBA), a global association of Trinity graduates, from all disciplines and professions, who are engaged in business activities. They manage the prestigious Trinity Business Student of the Year Awards. The position of president changes annually. For his tenure, Aikins started thinking: “If I'm president for a year, what would be the best thing I could do? So I went to Jane [Ohlmeyer, then Vice-President for Global Relations] and suggested holding a graduate forum, inviting high achieving alumni.”

In the run up to the Trinity Global Graduate Forum, held 8th November 2013, Aikins attended “over thirty meetings in the College. It was a lot of work”. He was involved in trying to identify where in the world Trinity's top graduates were located, a process he found fascinating. He learnt that there are “a ton of high achievers in London and New York and increasing numbers in China, but there are also gaps – just one in South America and six in Australia! But it's very interesting to learn that, for instance, the guy running Spar in Europe is a Trinity graduate.”

In the event, the Forum was a great success, with over a hundred alumni flying in from round the world to discuss issues relating to the college, including financing, capital

development, technology, identity and reputation. The quality of ideas from such experts in their fields was naturally strong, although Aikins believes “the real value was having people engaged and networking”.

The forum may go some way to breaking the paradox that Ireland “is in the top five countries in the world for diaspora engagement” and yet when it comes to engaging with alumni, Irish universities aren't even in the top 100. This is a bizarre disconnect, particularly when you consider that Aikins' diaspora model was drawn from universities. He sees the Global Graduate Forum as “part of a long-term hearts and minds thing”, which will ideally build an Ivy League-style relationship with alumni.

Meanwhile, he's a big fan of Trinity's global relations strategy, particularly the focus on staff and students researching and working abroad: “I'm a big fan of emigration – I think people should be forced to emigrate. When the Celtic Tiger was at its height, 40,000 people a year were still leaving – we're an island off an island, that's why, so go away, learn a language, learn other ways of doing things. I like Trinity's emphasis on educating 'global citizens'”

Sport at Trinity — Raising our Game

Trinity sports facilities are a hub of exciting activity with just over 10,000 students participating in sport and recreation, each one visiting the Sports Centre on average 24 times a year.

The Sports Department facilitates around 50,000 student bookings and hosts about 400 student-run events. Recreational activity is at an all-time high with participation increasing in the Campus 5k running race, 'Operation Transformation' healthy lifestyle events, Fitness Classes and other student events.

Trinity also supports the development of talented student athletes, who compete nationally and internationally. The Commonwealth Games, All Star Hurler, World University Championships – these are just some of the honours achieved by students during 2013/14.

→ To support our Strategy for Sport, we have recently invested in our sporting infrastructure, with upgrades of the rugby pitch surface in College Park, a new tennis court surface in Botany Bay, and an international-standard water-based hockey pitch and new GAA pitch surface at Santry sports grounds.



TOP – The Annual Trinity Regatta at Islandbridge

LEFT – Danny Sutcliffe, National All Star Hurling Award winner with the Provost, Dr Patrick Prendergast

BOTTOM LEFT – Prakash Vijayanath and Victoria Mullin, Commonwealth Games participants with Michelle Tanner, Head of Sport and Recreation

BOTTOM RIGHT – Hockey Colours match

→ Recreational activity is at an all-time high with participation increasing in the Campus 5k running race, ‘Operation Transformation’ healthy lifestyle events, Fitness Classes and other student events.

In 2013/14, the Trinity Sports Scholarship Programme recognised the achievements and potential of eighteen high-performing students, across thirteen sports, including the No.1 South African Badminton Player, Prakash Vijayanath. This year there was a significant number of notable performances by Sports Scholarship recipients including:

- Maria O’Sullivan (4th year Molecular Medicine), who won the intervarsity titles in cross country, 5000m and 3000m;
- Tom Brennan (4th year Medicine) set a new Irish record in the K1 200m at the World U23 Championships;
- Avril Dooley-O’Carroll (2nd year Engineering with Management) was selected for the Irish U21 Women’s Hockey Squad;
- Victoria Mullin (2nd year PhD Genetics), Air Pistol, and Prakash Vijayanath (1st year Computer Science and Business), Badminton, were selected for England and South Africa respectively to compete in the XX Commonwealth Games in Glasgow this summer.

In addition, Danny Sutcliffe (3rd year Business, Economics and Social Sciences) and DU GAA player was announced in the All Star Hurling team for 2013 thanks to the key role he played in Dublin’s historic Leinster Championship victory in 2013, following on from the team’s promotion to Division 1 of the National League earlier in the year.

There was an exciting addition to the sporting calendar this year with the inception of the Trinity Sports Awards, organised as part of the traditional DUCAC Sporting Commons. The new awards are a fitting tribute to the contribution of students and volunteers who make sport such a vital part of the Trinity offer. The list of winners on the night included 3rd year PhD student and captain of the DU Trampoline Club, Aileen Ni Choilean (Student Club Administrator of the Year), DU Harriers & Athletics Ladies Cross Country Team (Team of the Year), Elvy da Costa from DU

Squash Club (Coach of the Year). Trevor West, former professor of mathematics, senator, junior dean and active promoter of sport in Trinity, was posthumously awarded the Contribution to Sport at Trinity Award, accepted on the night by his brother John West. The inaugural Trinity Sportsperson of the Year was awarded to Victoria Mullin and all the presentations were made by Irish rugby international, Jamie Heaslip.

Six students were awarded Pinks, a recognition by the DUCAC Captains Committee of reaching high standards in their respective sports: Aisling Smith (Kayak), Sam Mehigan (Ultimate Frisbee), Ciaran O’Neill (Trampoline), Rebecca Woods (Athletics), Brian Du Toit and Patrick Lavelle (Rugby).

The Annual Trinity Regatta at Islandbridge (19th April) was another sporting success in this year’s College calendar, bolstered further by the coming together of Boat Club Alumni from as far as Australia, USA and Canada. A total of 136 races were safely organised, marshalled and umpired by the student-led Committee, attracting 23 clubs from Ireland and the UK.

It was another busy year for DU clubs and intervarsity winners included the Boat Club, Ladies Boat Club, Fencing, Squash, Harriers & Athletics and Orienteering. Club members from Cycling, Orienteering and Ladies Boat Club have been selected this summer to represent Ireland at World University Championships.

To support our Strategy for Sport, we have recently invested in our sporting infrastructure, with upgrades of the rugby pitch surface in College Park, a new tennis court surface in Botany Bay, and an international-standard water-based hockey pitch and new GAA pitch surface at Santry sports grounds. A number of other developments are at planning stage.

For more information on sport visit www.tcd.ie/sport and/or follow us on Facebook Trinity College Dublin Sport.



Financial Elements

1. Audited Financial Statements

The Funding Statements for the year ended 30 September 2013 were approved by the Board on 22 January 2014. These Statements were prepared in accordance with the agreed harmonisation policy adopted by all Irish universities, the format of which was approved by the Higher Education Authority in October 2013. The College’s external auditors, KPMG, identified no material control weaknesses and issued an unqualified audit opinion on the Funding Statements.

2. Results of Operations

The College reported a net surplus on core funded activity of €0.1m (2011/12: €0.1m) for the year ended 30 September 2013. However this was only achieved after a planned transfer of resources of €3.7m previously retained for strategic purposes.

Total revenue for the year amounted to €267.9m (2011/12: €272.3m). This was made up of State Grant €55.2m (2011 /12: €64.7m); Student Fees €116.2m (2011 /12: €114.1m), Other Income, mainly from ancillary activities €31.5m (2011 /12: €28.4m), and Research Grants and Projects €65m (2011/12 €65.1) that delivered a contribution of €14m (included in Other Income) to support indirect costs.

Total Expenditure amounted to €267.8m (2011 /12: €272.2m) and was primarily made up of Academic Faculties €118.1m (2011 /12: €120.7m); Academic and Other Services €18.3m (2011 /12: €18.9m), Premises €27m (2011 /12: €27.4m) and Research Grants and Projects €65m (2011/12: €65m).

Research activity increased by approximately 88% in 2012/13. The value of new awards entered into in the year amounted to €126m, with new awards from SFI (€82.4m) and the EU (€21.4m) in particular, reporting strong growth on the previous year.

The outlook for research funding remains relatively uncertain. While it is difficult to predict the effect the Exchequer’s continuing efforts to reduce the national deficit will have on State Funding Agencies’ budgets, the budget for

the EU’s Horizon 2020 programme has now been agreed at c. €80bn. Based on this and the latest available information from National Funding Agencies, current projections are that research income to Trinity from the EU may rise to c. €72m over the next 3 – 4 years. This positive outlook is dependent on Trinity meeting the challenging targets set by the Research Diversification Strategies (which includes an emphasis on EU, industry and US funding), as well as continued success in the SFI Centres Programme.

3. Net Assets

The total net assets of the College reduced during the year by €18.6m to €678m at 30 September 2013 primarily due to a reduction in cash balances.

4. Financial Strategy

To date, Trinity has managed its finances very effectively and, having successfully invested over €200m in capital and IT infrastructure projects since 2009, has no accumulated recurrent deficit. For the future, it is clear that our approved income generation strategies (eg: Internationalisation, Online and Commercialisation) and cost management strategies must deliver, however they are currently at an early stage of implementation.

The continued, appropriate stewardship of our resources through maintaining a tight budgetary resource allocation and control environment is key, as this will be essential to our long term success and financial health. A new Strategic Plan (2014-19) has set objectives and actions that are consistent with the resources available to us. The College must continue to generate sustainable funding sources and press for a fit for purpose remuneration framework and operational flexibility mirroring that experienced by our international peers to enable it to continue to compete on the international stage in the medium to long term.

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Income and Expenditure Account
Year ended 30 September 2013

Income	2013 (€'000)	Restated 2012 (€'000)
State Grants	55,176	64,696
Student Fees*	116,198	114,052
UG EU	69.50	68.40
UG Non EU	17.30	16.10
PG EU	22.30	22.70
PG Non EU	5.60	5.30
Other	1.50	1.60
Other Income	31,544	28,427
	202,918	207,175
Research Grants and Projects	65,002	65,170
Total	267,920	272,345
Expenditure		
Academic Faculties	118,060	120,725
Academic and Other Services	18,334	18,949
Premises	27,020	27,369
Amount Allocated for Capital Purposes	500	500
Central Administration and Services	13,525	14,565
General Educational Expenditure	10,213	9,844
Student Services	5,381	5,167
Miscellaneous Expenditure	9,780	9,923
Academic and Related Services	202,813	207,042
Research Grants and Projects	65,002	65,170
Total	267,815	272,212
Surplus on Activities before Amortisation of Capital Reserves and Grants, Ancillary Services and Depreciation of Fixed Assets	105	133
(Deficit)/Surplus on Ancillary Services	(6,982)	2,653
Depreciation of Fixed Assets	(30,478)	(27,662)
General Reserve Transfer	37,460	25,009
Net surplus for year	105	133

Balance Sheet
At 30 September 2013

Fixed Assets	2013 (€'000)	2012 (€'000)
Tangible assets	765,342	774,105
Investment properties	42,517	43,930
	807,859	818,035
Current Assets		
Bank and cash balances	164,133	183,618
Debtors and prepayments	54,137	40,914
Stocks	436	457
	218,706	224,989
Current Liabilities		
Creditors and accrued expenditure	(214,316)	(212,308)
Bank balances	(214)	(307)
	(214,530)	(212,615)
Net Current Assets	4,176	12,374
Long Term Liabilities		
Creditors due after one year	(134,132)	(133,869)
	677,903	696,540
Represented By:		
General reserve	677,413	696,155
Revenue reserve	490	385
	677,903	696,540

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**TRINITY
COLLEGE
DUBLIN**

TRINITY COLLEGE DUBLIN

A 420 years old University in
the heart of Dublin City Centre
