

# Research Matters

National University of Ireland, Galway

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Cover Image: A Celtic inspired double-helix

Design by: Colin Derham  
3D Helix Modelling by: Simon Dalton



## Research Matters

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Innovating Our Past

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# VP Letter



**W**elcome to Research Matters where we highlight the success of a thriving research community at NUI Galway. Our strategy - to invest in research and the right people and be a research-led university - is paying off. We can confidently take our place among the top tier universities in the world. Our constant drive to demonstrate research excellence has led to increases in the volume and value of competitive awards from Irish funding agencies such as Science Foundation Ireland (SFI), the Health Research Board (HRB), the Environmental Protection Agency (EPA), the Irish Research Council (IRC) and Enterprise Ireland, as well as European Union and other non-Irish agencies. NUI Galway is deeply committed to performing research that has societal and economic value. An excellent example is the expansion of the digital archives of world-renowned Irish authors and theatres. We have also been very successful in deepening our relationship with existing industrial partners as well as in developing new partnerships with indigenous as well as multinational industries.

To complement its growing research strengths, NUI Galway is completing a highly ambitious project expanding its research-building infrastructure. We now have the top research and teaching buildings for engineering, Life Sciences and Arts & Humanities. Ongoing projects will soon add translational and clinical research facilities as well as human biology research and teaching facilities.

Although the global climate for funding is becoming more competitive, NUI Galway is confident that with its strong team of researchers, infrastructure and institutional commitment the university will continue its successful journey in research, enterprise and social impact."

**Professor Lokesh Joshi,**  
**Vice President of Research**

# From the Editor

**W**elcome to Issue Five of Research Matters. As new editor, I'm delighted to be given the opportunity to showcase all the varied research at NUI Galway. Having written extensively in the print media about a number of different projects here in the past, it has been an exciting prospect to look even closer at the university's research activities. Equipped with some prior knowledge of Galway's expertise, I decided the focus of this edition should be 'innovation'.

What I did not realise, however, was just where and how this innovation might be found at NUI Galway, particularly in research areas less associated with innovative techniques. That's why there is a very welcome emphasis on the arts and social sciences in the following pages. This is not to say, of course, that there hasn't been plenty of new thinking and unique research approaches in other disciplines, of which you will also find details of inside.

The cover image, which was designed exclusively for this issue, represents the innovation I have found at NUI Galway, and how that innovation very often creates links between our past, present and future.

John Holden,  
Editor

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Innovating Our Past



Global Water Cycle and Sea Surface Salinity



Whitaker Social Sciences Computing Hub



Youth Academy



Duddy memoirs





# Innovating Our Past

NUI Galway is set to create the world's largest ever digital theatre archive, for the Abbey Theatre in Dublin. The project is both ambitious in scope as well as providing a great opportunity for technological innovation.

The Abbey Theatre Digital Archive project will digitise the holdings of Ireland's national theatre, making more than a century's worth of material available to NUI Galway students and researchers.

The archive features material from hundreds of Irish writers, including the country's four Nobel prize winners for literature: Yeats, Shaw, Beckett and Heaney. The archive will be a full multimedia resource, providing access to photographs, videos, audio files, costume and set designs, stage management records, music scores, and much more. When completed in 2016, the digital archive will feature more than two million items and will be just over 50 terabytes in size (equivalent to about 18,000 DVDs or 12 million songs on an MP3 player). In scale and ambition, the project is both unprecedented and world-leading.

The Abbey Theatre is intrinsically linked to the foundation of the Irish state and to its development throughout the twentieth century. Its establishment in 1904 was based on an ethos of using art to overcome the many divisions that existed in Irish society, and the theatre has remained committed to that goal ever since. Its ability to provoke controversy was evident from the beginning, most famously in the riots that greeted the premiere production of Synge's *The Playboy of the Western World* in 1907. The debates that followed that event reverberated around the world and Synge's play has gone on to become a world classic – while provoking further protests in productions from the United States to Trinidad to Cold War Berlin.

As Ireland entered the revolutionary period,

the Abbey played a key role in the movement towards independence. Its international tours were perceived as offering cultural legitimacy to the claim of Irish independence, and many people associated with the Abbey were involved in nationalist movements. Indeed, a number of the Abbey players fought in the 1916 Easter Rising.

After independence, the Abbey played a key role in the development of Irish democracy. In 1925 it became the first state-subsidised theatre in the English-speaking world. The controversy that greeted the premiere of Sean O'Casey's *The Plough and the Stars* in 1926 was a key moment for the development of the new state; a crucial test of the nation's attitudes towards freedom of speech. The Abbey won that debate, and the country is richer for it: notably, theatre was the only art-form not subject to censorship during subsequent decades in Ireland.

In more recent years the Abbey has gone on to introduce leading playwrights to the world including Brian Friel, Tom Murphy, Marina Carr, Frank McGuinness and many others. It has continued to play a key role in Irish life.

The NUI Galway digitisation project is based at the university's new Arts, Humanities and Social Science Building, and is being managed by the James Hardiman Library. It is based on an awareness of the importance of the Abbey Theatre for the social, cultural and economic history of this country – not to mention its ongoing significance for Ireland and the international community as one of the key national theatres in the world.

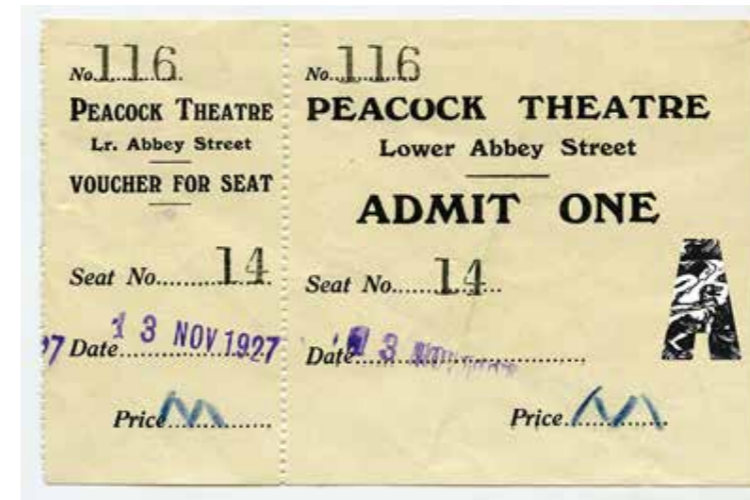
The digitisation project will be of significance in a number of important ways.

It will preserve the Abbey's collection for future generations. Much of the Abbey collection is in a very fragile state due to age or as a result of damage caused when the original theatre was burned down in 1951. Therefore, the digitisation project will protect and preserve this national treasure.

As a digital resource, the archive will allow researchers to search and access information at the click of a button. Given that many documents in the archive have never before been accessed by researchers, NUI Galway researchers will change what we know about Irish drama and, by extension, Irish society and its development since 1904. The history of Irish drama is largely understood to be the history of Irish plays – that is, of the written script prepared by dramatists. As a full multimedia resource, the digital archive will provide researchers with access to the full range of materials associated with theatre performance: not just the scripts but also the visual materials (costume, set, and lighting designs), sound materials (music scores, sound effects) and the supporting materials (adverts, press releases, reviews).

It will also make available new material about the productions – the work of important Irish actors such as Siobhan McKenna, Donal McCann, Liam Neeson, Gabriel Byrne, Colm Meaney and Fiona Shaw. In addition, it tells the story about what happened behind the scenes, giving a unique insight into board meetings, correspondence and much more.

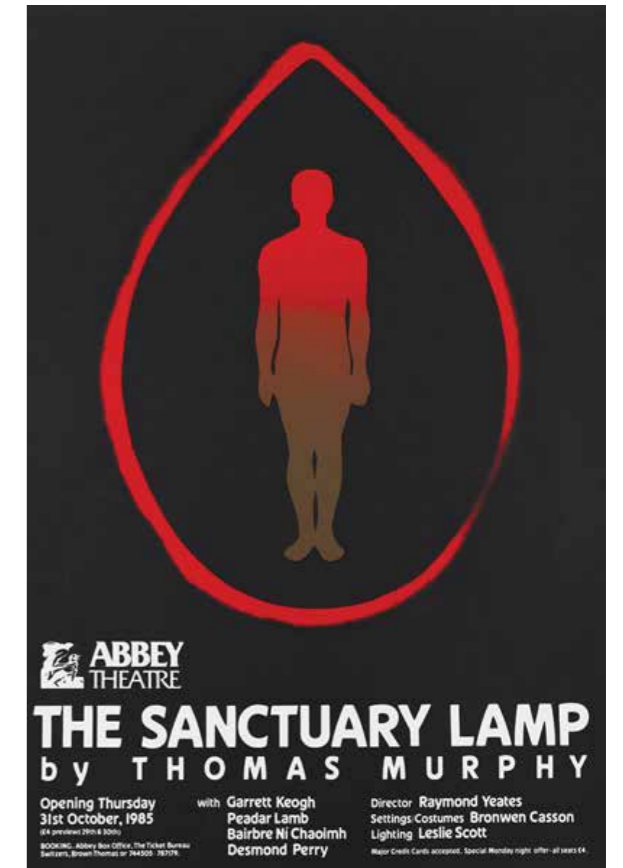
This major NUI Galway project highlights two of the most important features of contemporary Ireland: the richness of



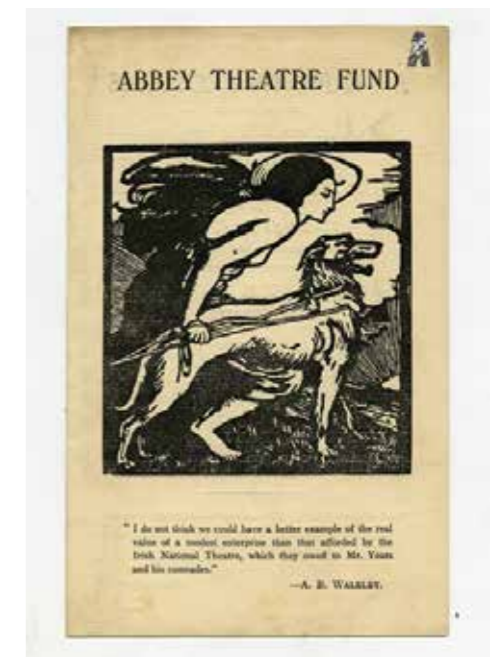
1927 Peacock Opening ticket

its cultural traditions and its capacity for technological innovation. The Abbey Theatre is one of the world's great national theatres, and Irish drama is one of the world's great national performance traditions. The archive will protect its legacy and make it available much more widely than ever before. It will be one of the biggest digital archives ever created in the humanities and will require the development of new interfaces. In so doing it will stimulate the development of new technologies and methodologies. The NUI Galway/Abbey Theatre archive project will protect a key part of Ireland's past and will stimulate exciting new research while adopting a trailblazing approach to digital technology.

By Patrick Lonergan  
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1985 poster for *The Sanctuary Lamp* at the Abbey Theatre written by Galway native Thomas Murphy



1921 Abbey Theatre Fund

# The Digital Enterprise Research Institute (DERI) continues to be a driving force of digital innovation in Europe.

## Hosting Big Data

The recent European Data Forum, hosted by the DERI in Croke Park, led to new innovations, invaluable networking opportunities and a greater understanding of the challenges currently facing 'big data'.

More than 300 scientists, entrepreneurs and government officials gathered in Croke Park on the 9th and 10th of April for the European Data Forum. The main order of business? To discuss the issues and challenges facing 'Big Data'. The two day conference included several interesting talks, tutorials, workshops and demonstrations. The event was a huge success and the old Gaelic football stadium was a buzz of ideas on Wednesday evening as the delegates headed back across Europe with new ideas on how to tackle their particular big data problems around the continent.

The forum was being held in Dublin as part of Ireland's presidency of the EU. Neelie Kroes, Vice President of the European Commission, in charge of the Digital Agenda, opened the proceedings with a video message where she said "data is a golden opportunity for all". She was followed shortly by Ireland's Minister for Justice, Equality and Defence, Alan Shatter who described big data as "the new frontier in innovation in Ireland" and talked up the importance of the data economy to job creation.

Alongside speakers and presentations taking place in the main hall there were sidetrack sessions, including various tutorials and case study presentations, as well as an exhibition space where delegates could interact with leading vendors, research groups and small and medium enterprises (SMEs) from all over Europe.

The first day included the awarding of the



First Plenary meeting of BIG at DFKI

inaugural European Data Innovator Award to Daimler for its linked knowledge systems in Mercedes Benz cars. The highlight for most, however, was a speech by the BBC Archivist Bill Thomson who compared the current state of 'big data' to leaking bathtubs on the TV show 'Breaking Bad' but said it had the potential to create a 'nice Matrix'. The second day was just as busy where an interesting panel on the power of open data caused much discussion amongst an energised audience of delegates.

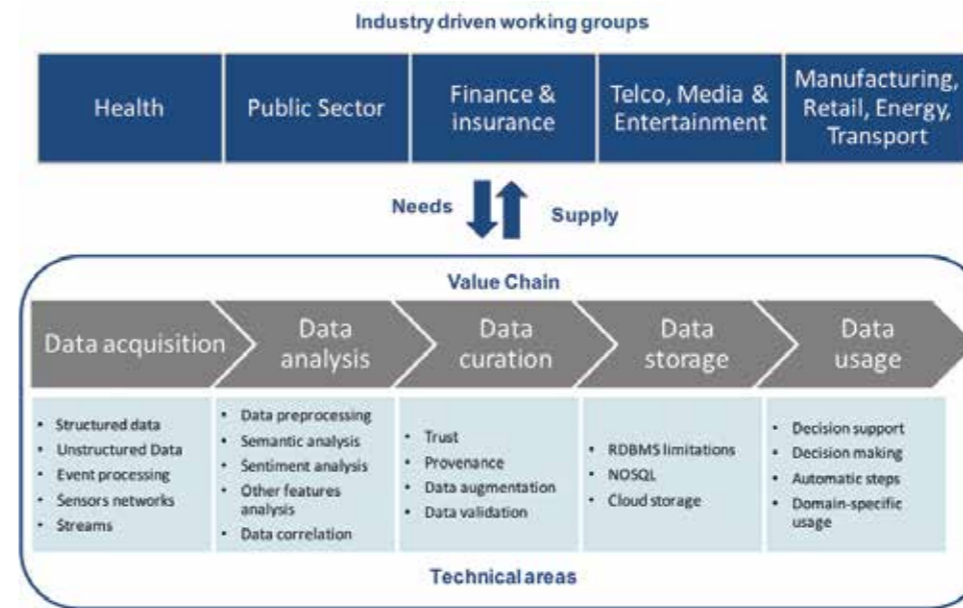
NUI Galway's DERI was the local host for the forum and managed the organisational side of things as well as providing quite a few of the presenters and speakers. DERI's Michael Hausenblas co-chaired the conference alongside Elena Simperl from the University of Southampton. Deirdre Lee, also of DERI, was the local chair. Science Foundation Ireland (SFI) was a sponsor of the event and their director general, Professor Mark Ferguson, gave a welcoming address to the conference.

Much credit must also go to DERI's team of volunteers who ran everything from registration to cloak rooms and social media coverage of the event. The entire conference was documented

on twitter over the two days under the hashtag #EDF\_13 and Storify summaries of the social media activity can be found at <http://www.dri.ie/edf2013-conversation>.

The forum received widespread media coverage, including features on RTÉ and siliconrepublic.com, both of which detailed the partnership project announced between DERI, the Digital Repository of Ireland (DRI) and RTÉ Archives. This project will employ big data and the semantic web to make hundreds of thousands of hours of audio and video content available at the touch of a button. The project will form part of INSIGHT, a new project announced by the government last month that will lead to the development of breakthrough data analytics technologies to make Ireland a global leader in this rapidly expanding area.

By Fergal Gallagher  
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Structure of BIG Project. Industry Drive Sectoral Forums & Technical Working Groups Across the Data Value Chain

## €3 million project to roadmap a 'Big Data' strategy for Europe

Researchers at the Digital Enterprise Research Institute (DERI) are leading Ireland's involvement in the Big Data Public Private Forum (BIG) project, a new €3 million EU project tasked with creating a clear strategy for big data in Europe.

The BIG project aims to provide a platform for industry, research, policy makers, and community initiatives to discuss the challenges of big data and the emerging data economy. The project is developing a requirements roadmap together with action plans for addressing these challenges at a European-level. The project will see eleven companies, research institutions and community initiatives from six European countries joining forces to tackle issues surrounding big data.

The volume of global data has exploded in recent years, with the International Data Corporation (IDC) estimating that total world data is doubling every two years. Harnessing the increasing volume in enterprises, governments and our everyday lives is a great opportunity, explains Professor Stefan Decker, Director of DERI at NUI Galway. "Big data offers opportunities to meet the challenges of our time," he says. "We are at a critical juncture where a concerted and collaborative effort is needed across Europe. Industry, government and academia must come together to put in place methods to deal with this data and maximise opportunities for Europe."

The US already has many early adopters

of big data who have embraced it as an enabler of innovation. In Europe we are starting to see business leverage its potential, but Dr. Edward Curry, DERI Scientific Lead in the BIG project, believes we need to accelerate its uptake.

The project will provide a major boost for technology adoption by identifying the key requirements within different industry sectors (energy, transport, public sector, finance, manufacturing, retail, etc.) and creating technology and strategy roadmaps. "We need to enable more European businesses to exploit the competitive edge that big data can provide," says Curry. "The roadmaps will help business communities understand the potential competitive advantages from big data technologies." The BIG project, together with other supporting actions from the European Commission, will contribute to the successful implementation of a big data economy.

"Within BIG, Ireland is at the heart of defining a big data strategy for Europe," adds Curry. "The strategy will be used as input for Horizon 2020, ensuring it will be sustained beyond the project duration."

The scheme will bring together major players within Europe. Along with NUI Galway, the consortium includes ATOS, Press Association, Siemens, AGT Group, Uni Innsbruck, University of Leipzig, DFKI, Exalead, Open Knowledge Foundation and STI International.



# Polymer Breakthrough Inspired by Trees and Ancient Celtic Arts

A new slow-motion method of controlling the synthesis of polymers, which takes inspiration from both trees and Celtic knots, opens up new possibilities in areas including medical devices, drug delivery, elastics and adhesives.

Scientists at NUI Galway's Network of Excellence for Functional Biomaterials (NFB) have just published their breakthrough polymerisation method in *Nature Communications*. The new polymerisation technique allows for the easy creation of new complex, multi-functional, branched compounds.

The research team was led by NFB's Dr Wenxin Wang. "The versatility of our synthesis process could allow us to tailor polymer properties such as structure, functionality, strength, size, density and degradation - with previously unimaginable ease," he says.

Researchers took inspiration from ancient arts, and used this new technique to build up 'Celtic Knots'. These materials have chains that only link to themselves in an interlaced pattern. In addition, the new technique can also create hyper-branching polymers, which branch and spread outwards, like trees.

Polymers are a broad class of natural and synthetic compounds, built up of many parts known as monomers, which connect together in fast growing chains. Until now, creating more complex branched polymers, known as dendrimers (from the Greek word "dendron" meaning "tree"), has been a labour intensive and time consuming process.

Now, for the first time, "dendritic" or tree like polymers have been synthesised in bulk, with

branch points after every few monomers of the build process. This allows a far higher degree of branching than previously obtainable, and opens up new possibilities for the use of polymers.

The new process developed by the team, in collaboration with Dr Julien Poly from the Institut de Science des Matériaux de Mulhouse, France, is called 'vinyl oligomer combination'. In effect the process allows a simple "one-pot" procedure that leads to easy up-scale of the process. The expectation is that these intricate woven and branched polymers will be cheap to produce and high in quality, as the technique is fully scalable.

Dr Wenxin Wang is trying to uncover therapies for diseases such as diabetic ulcers and Epidermolysis Bullosa, which causes chronic skin conditions: "We are currently investigating the use of these new materials for biomedical applications such as drug/gene delivery, cross linkable hydrogel materials and skin adhesives. However, in reality this synthesis method could be used for a wide range of materials outside the biomedical field."

The research, funded by Science Foundation Ireland (SFI), the Health Research Board (HRB), DEBRA Ireland and DEBRA Austria is published in *Nature Communications* journal.



# Enlightened Communications

Traditional research methods are vital in tracing information patterns from the 18th century, but new IT tools can make the process more efficient and beneficial.

The information age did not begin with the internet or mass media in the twentieth century. Tracing its origins leads back to the 18th century and the development of collective information systems for the exchange of knowledge.

The expansion of newspapers, gazettes, periodicals and published works contributed to this phenomenon, as did travelogues, histories and other sources. Participants in the Enlightenment Republic of Letters, above all, recognised the potential for different ways of conveying new information. An important technique of information gathering and dissemination used in the period has received little attention: the employment of questionnaires.

Questionnaires enabled scientists, scholars and historians to access detailed accounts of topics that engaged their interests – natural history, economic systems and productive trades, comparative government, social practice, religion and morality. The spread of questionnaires, in turn, required elaborate networks of contacts in distant locations on a global scale. If the information society may be defined as the creation, acquisition, selection, dissemination and manipulation of information for economic, political and cultural benefit, then 18th century questionnaires represent a clear example of the existence of an Enlightenment

information society. The anxiousness (almost a craving) exhibited by philosophers and literati for acquiring new information from distant places is not dissimilar to our own longing to be continuously informed.

The project on Enlightenment questionnaires, carried out by Dr. Ida Federica Pugliese, a Marie Curie post-doctoral Fellow in the Moore Institute at NUI Galway, will contribute to the debate over the applicability of the concept of the information age to 18th century society. By examining the acquisition, management and dissemination of information, establishment of networks and circulation of knowledge during this period, the cross-disciplinary project aims to give historical definition to ideas about information and knowledge that dominate in present society. Equally, it offers new insight into the historical development of collective capacities to create, manipulate and transmit knowledge. The project is rooted in historical research but also addresses current issues in literary studies, sociology and information studies. The research explores the fertile terrain of collaboration between social science and history. The frame of reference is both horizontal (across spaces) and vertical (across time).

The research will focus on four major figures: Denis Diderot, William Robertson,

Abbé Raynal and Thomas Jefferson. Diderot's questions about Siberia, Jefferson's questionnaire for exploration following the Louisiana purchase and Robertson and Raynal's efforts to secure information about colonial history will offer grounds to discuss the extension and limits of trans-European and transatlantic circulations of knowledge.

The project will use archival sources, printed texts as well as IT tools for tracking networks (Excel, Ucinet and Netdraw among other software) to explore these issues. The richness of the historical record will provide the foundation for theorisation on current society.

By Professor Daniel Carey  
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# Ryan Institute

The Ryan Institute's diverse research mission continues to break new ground in environmental, energy and marine investigation. Here is just a selection of their recent projects.

## Geography Students Support the Development of an Environmental Risk Plan for the Community of Lagos, Portugal.



In April, 43 second year geography students travelled to the Algarve for a week on a field trip training course entitled 'Environment Risk and Resilience in The Algarve, Portugal'. The aim of the course was to assist the Local Authority of the coastal community of Lagos to develop a risk plan to help identify and assess urban and environmental issues, including possible impacts of long-term climate change.

Prior to the field course, students were trained in developing a series of risk and resilience indicators for water, soil and air quality, blue flag criteria for marinas and beaches, evidence of coastal erosion, high water

marks, cliff stability and urbanisation of the shoreline. Societal aspects were also considered in terms of the impact of the urban built environment on the community.

"I was delighted to see how the students dedicated themselves to the tasks," explains Dr. Eugene Farrell from the School of Geography and Archaeology and the Ryan Institute. "Combining what they learned in the classroom about indicators of risk and resilience with field techniques, they created an assessment and critique which the local authority may use to inform their risk plan."

### What the students said:

"We really enjoyed working in the field instead of the lecture hall."

"Working in groups was also a useful learning experience and it meant we bonded and made new friends."

"Field work is a very good way of learning."

"Reports and presentations are also really good skills to work on".

"We appreciated that our CVs were enhanced with field research methods and professional skills."

Drs. Eugene Farrell, Kevin Lynch, Marie Mahon, Alma Clavin and postgraduate assistant, Michelle McKeown, travelled with the students on the field trip.

Dr. Eugene Farrell,  
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## Funding Award for Ryan Institute

Dr. Dagmar Stengel of the Ryan Institute and School of Natural Sciences, has received one of three major awards supporting Irish Marine Science through the SFI Investigator Programme. Dr. Stengel was awarded €244,782 to support her project on iodine in commercially valuable Irish seaweeds.

## Global Water Cycle and Sea Surface Salinity

Scientists have just returned from a research expedition to the Sub-Tropical North Atlantic Ocean, aboard the Spanish research vessel Sarmiento de Gamboa. Dr. Brian Ward and two PhD students, Graig Sutherland and Anneke ten Doeschate, were among the group exploring the essential role of the ocean in the global water cycle. One of the most critical issues in climate change is how the water cycle evolves in response to global warming.

The experiment was located in the North Atlantic Salinity Maximum, which has the highest salt concentration of any of the world's oceans. The objective was to determine the flux of freshwater from the ocean to the atmosphere by trying to better understand how small scale turbulence is responsible for this air-sea exchange. What is surprising is that these small-scale processes can affect large-scale patterns over the North Atlantic, and upper ocean turbulence is a critical process influencing climate.

Dr Ward's research group is the AirSea Laboratory, which is affiliated with the Ryan Institute and resides in the School of Physics. The main objective of the AirSea Laboratory is to study

the upper ocean and lower atmospheric processes, which are responsible for air-sea exchange. The ocean and atmosphere are a coupled system and therefore need to be studied in unison.

Studying the processes at the ocean surface requires specialised instrumentation, as most measurements 'miss' the upper few metres. The team used their custom-built Air-Sea Interaction Profiler (ASIP) to measure the salinity, temperature, and turbulence of the upper ten metres of the ocean with very fine detail. The torpedo-shaped device, which is deployed into the water to gather data autonomously, is the only one of its kind. The ability to make these unique measurements has resulted in international recognition for the AirSea Laboratory.

By Dr Brian Ward  
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## Research Supporting a Sustainable Green Farming Industry

Farm Waste to Energy was one of the Investigator Projects awarded by Science Foundation Ireland (SFI) in January 2013, to Dr. Xinmin Zhan, Ryan Institute and College of Engineering and Informatics. This project will study on-farm anaerobic co-digestion of the organic fraction of municipal solid waste and animal manures for the purposes of bioenergy production and resource recycling. "This project is going to address a number of relevant issues for using this type of technology in a real working-farm environment," says Dr. Zhan. "It is strategically important for Ireland as it addresses many critical challenges like energy security, biowaste disposal, greenhouse gas emissions and rural development."

Dr. Xinmin Zhan's research team is among the first to carry out co-digestion of animal manure and grass silage as a means of increasing biogas yields in livestock farming by conducting both laboratory- and pilot-scale studies. In a previous project, his research team was involved in the establishment of a national digestate standard. Farm Waste to Energy is the important next step in examining the technological applications for different agricultural settings. Pilot-scale research is fundamental to bridging the technology transfer gap in this area and Dr. Zhan's research team have successfully conducted a number of other pilot-scale projects in the related area of agricultural wastewater treatment.

By Dr Xinmin Zhan  
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# CHARMS

A new study identifies high levels of sexual problems among a heretofore under-researched group in Ireland - people with cardiovascular disease.

The Cardiac Health and Assessment of Relationships Management and Sexuality (CHARMS) study explores the sexual wellbeing and problems of people with heart disease in Ireland and seeks the views of patients and health professionals about how sexual issues are addressed in our health services.

Recently completed, CHARMS is a three year Health Research Board funded project. The pioneering study was made possible through the collaboration of the School of Psychology (Dr Molly Byrne, Principal Investigator) and the Department of General Practice (Professor Andrew Murphy) at NUI Galway, in conjunction with researchers from the Royal College of Surgeons in Ireland (RCSI)

and Linköping University, Sweden. Sexual problems are more commonly reported by people with cardiovascular disease than those without, and can negatively impact on quality of life and interpersonal relationships. Recent guidelines from the American Heart Association conclude that sexual counselling should form an important component of cardiac rehabilitation services. However we know little about the experience of Irish patients in relation to this aspect of their disease and how sexuality is addressed within health services

## The Hospital Staff's Perspective

In papers published in BMC Family Practice and the *European Journal of Cardiovascular Nursing* the CHARMS Study team also reported surveying 60 general practitioners and 61 hospital cardiac rehabilitation staff. Although health professionals generally acknowledged that sexuality in the context of cardiac health services is important, they reported that they rarely addressed the issue with patients, and found this aspect of care challenging due to lack of time, knowledge and training.

## The Focus Groups' Perspective

In another paper recently published in the *Journal of Cardiovascular Nursing*, the CHARMS study team reported the findings of focus groups conducted with patients and health professionals to explore the survey findings in more depth. Most significantly, the research reported a gap between the service that the professionals perceive they give (health professionals may raise the topic of returning to sexual activity in a non-explicit manner, for example, equating it with exercise) and that experienced by patients. Sexual assessment and counselling should be addressed more explicitly and patients should be empowered to seek individual assessment and counselling at a time that is appropriate for them.

By Dr Molly Byrne  
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The CHARMS Study website:  
<http://www.nuigalway.ie/psy/charms.html>

## The CHARMS Study findings

### The Patients' Perspective:

In a recently published paper in the *European Journal of Cardiovascular Nursing*, the CHARMS Study team report showed the results of a wide-reaching interview process which included input from 382 people with cardiac disease who had attended hospital rehabilitation. Sexual inactivity and sexual problems in this sample were significantly more prevalent compared to the general population. Nearly half of the people in the study reported that they had been sexually inactive in the previous year and for those who were sexually active, 46 per cent reported that they had experienced sexual problems since their cardiac event (primarily erectile dysfunction and lack of interest in sex).

Nearly a quarter of the sample said that sex had deteriorated for them since their cardiac event and over half of these indicated that it was a serious

problem for them. Most participants in the study said that sex had never been discussed with them by a health professional, and where discussions had taken place, satisfaction was generally low. Nearly half the sample said they would have liked some or more discussion of sexual issues within health services. However, patients in the study were reluctant themselves to raise the issue of sexual problems with a health professional. One of the primary barriers to discussing sexual problems was lack of private setting within the health service; for the majority cardiac rehabilitation is experienced as part of a group, with limited opportunities to address issues privately with a health professional.

# Independent Soles

## Wireless Insoles for Independent and Safe Elderly Living

Falls and the risk of falling have a high impact on the health and quality of life of the elderly. About one third of older people - even without having experienced a recent fall resulting in physical injury - develop a fear of falling, which leads to self-imposed restrictions in terms of mobility, reduced activity, depression and social isolation.

The Wireless Insole for Independent and Safe Elderly Living (WIISEL) project aims to develop WIISEL as an intelligent integrated prevention and alarm system to monitor fall risk in the elderly population.

WIISEL aims to increase awareness about fall risk in older people through a dual approach: continuous monitoring of gait during daily life and the development of a fall risk detection system based on this monitoring through the use of the system in daily life WIISEL.

The WIISEL system is being designed to continually monitor the user's gait by means of an intelligent shoe insole containing a series of pressure sensors and an accelerometer (electronic device that measures movement) embedded in a durable and comfortable fabric.

These sensors provide quantitative measurements of the spatial and temporal

characteristics of the path associated with the risk of a fall.

The data collected by the sensors within the insole are sent to a smartphone for pre-processing and the resultant data is forwarded to a remote server for further and more specific analysis.

By Patrick Hayes  
patrick.hayes@nuigalway.ie

### The WIISEL system will constitute:

A shoe insole, consisting of a 3D fabric containing pressure sensors, printed electrodes and an accelerometer for the measuring of the required gait parameters.

Pressure sensors are powered by a battery with transmission of data to the smartphone taking place via Bluetooth.

A smartphone will process and store initial data with further periodic downloads to a remote server.

The smartphone is equipped with a built-in accelerometer which can be used to detect falls.

Smartphone allows for the interaction between the system and the user through WIISEL selected functions.

Medical personnel will make periodic assessment of data on the remote server.



## Whitaker Social Sciences Computing Hub

The Whitaker Institute continues to lead the field in global business and social science research.



Picture (left): Dr. Srinivas Raghavendra, Associate Director, Whitaker Institute, NUI Galway, Mr. Dinko Laptev, Client Development Associate, S&P Capital IQ, London, Dr. James Browne, President NUI Galway, Dr Laurentiu Vasiliu, Peracton CEO, Dr. James Cunningham, Director, Whitaker Institute, NUI Galway.

The Social Sciences Computing Hub was formally launched on the 25th of March 2013 by NUI Galway President, Dr. Jim Browne. The Hub is a unique facility that will serve both as a repository of diverse quantitative and qualitative social science databases, and as a computing resource that can be used by researchers across the university.

This cross-disciplinary initiative will contribute to our mission to establish NUI Galway at the forefront of global business and social science research with scientific rigour to inform public policy. At the launch event, Dr. Brown described the concept of the hub as “far-sighted” and said that the timing of this initiative is perfect as it is in line with national trends in data investment.

The hub will be a one-stop facility for access to diverse data, visualisation and computational resources for research clusters across various social science research institutes. The architecture of the hub will be set up to provide remote access to university users, both within and off campus.

With funding support from the Registrar’s Strategic Fund 2012 and the Irish Social Science Platform (PRTL 4) the first phase of the Hub, “Advanced Business Analytics Laboratory”, has already begun its operations with industrial partners Standard & Poor (S&P) providing diverse business and finance data through their CapitalIQ platform and PERACTON, which provides expertise in training students using their MAARS platform. The Lab has also

initiated a four-week training programme on “Advanced Portfolio Management Training” for 24 students from the Masters in International Finance and the undergraduate students from Commerce, Arts and Financial Mathematics and Economics. The training programme is conducted by PERACTON and focuses on areas such as portfolio optimisation, back-testing methods and high-frequency/ high-speed trading techniques.

For further information please visit our website at [www.whitakerinstitute.ie](http://www.whitakerinstitute.ie)

## Gone Researchin’

Summer research projects offer vital skills training and a major head start for undergraduates at NUI Galway.

Starting out in research can be a daunting task for any undergraduate student, particularly those who decide to undertake a summer research project. Often, they can find themselves thrown into the hustle and bustle of a busy research team without the cocoon of formally structured modules and tutorials to guide them.

In these foreign environments, a new language is spoken - acronyms abound - and they are soon acutely aware of the ‘holy grail’ that is statistical significance.

However, these students will soon realise that they are getting hands-on experience of research which will provide them with many transferable skills to aid them in their future studies and work but importantly the experience may inspire them to consider a research-based career.

During the summer of 2013, over 300 undergraduate students are expected to avail of this valuable opportunity with a wide range of projects being on offer across each of the five Colleges. The University Research Support Fund enables the Colleges to support a number of these undergraduate summer projects which, together with the support of individual

supervisors and external funders, ensures that there are more scholarships awarded than ever before. The increasing popularity of the scheme has resulted in growing numbers of students and supervisors applying and securing external funding in support of these projects. In addition, a range of charities, scientific and research organisations hold annual competitions with the HRB Summer Student Scholarships and The Wellcome Trust, Biomedical Vacation Scholarship schemes provide a large number of these externally secured scholarships.

By Dr Ailish Murray – formerly of the NUI Galway College of Medicine, Nursing and Health Sciences.

22-year-old NUI Galway medical student Alan Jacobsen shares his views on his summer research experience into Chronic Lymphocytic Leukaemia and Multiple Myeloma.

“I was clueless as to what I was about to embark on when I entered Professor Corrado Santocanale’s lab in the National Centre for Biomedical Engineering Science (NCBES) for the first time two summers ago.”

It is well accepted that as an undergraduate student, you will rarely have either the experience in research techniques or sufficient knowledge of your subject to generate novel, unique and realistic hypotheses or experimental plans. Your supervisors will give you a project title and you are shown the methods to complete it.

“While summer projects for medical students typically come in two flavours - primarily lab based or data analysis/review based - some will incorporate both.

However, no matter what format the project

takes, above all else, you will learn a new way of thinking.

You learn to look at a problem that needs answering in a different way. By using the tools available, you can formulate a method to solve that problem. When that method fails (as it invariably does), you critically assess the approach and formulate a new plan. This fails again and again until (hopefully!) finally you get it right. This aspect of research helps develop your patience and critical reasoning, both of which are key features of the doctor you are training to be.”



## In Brief

### Re-election for Professor Ryder to Chair of Humanities to HERA.

Professor Sean Ryder, Chair of English and Acting Director of the Moore Institute, has been re-elected to a three-year term as chair of Humanities in the European Research Area (HERA), a consortium of humanities-funding research councils from 21 European countries, plus the European Science Foundation. Since 2008 HERA has funded major transnational research programmes on the themes of Cultural Dynamics, Creativity and Innovation, and Cultural Encounters. The consortium is currently planning a new research programme to be launched in 2014, and is advising the European Commission on policy for humanities research in Horizon 2020. Professor Ryder is a member of the Irish Research Council.

### NFB Research on the cover of ACS Chemical Neuroscience

Congratulations to Ben Newland and Maciek Doczyk from the Network of Excellence for Functional Biomaterials (NFB) for making the cover of ACS (American Chemical Society) Chemical Neuroscience April's issue. Newland's paper describes his efforts to make a synthetic agent that can deliver DNA to neuronal cells without the need of a virus. His work shows that an entirely new structure of polymer, consisting of single chains wrapped upon themselves in a "knot" structure, allows efficient delivery of DNA to neuronal cells. Specifically, using the knot polymer, he delivered the glial cell-line derived neurotrophic factor (GDNF) encoding gene to inhibitory astrocytes. Astrocytes are one of the most abundant cell types of the Central Nervous System (CNS) and, upon injury, they can become inhibitory to the growth of surrounding neurons.

Delivery of the GDNF encoding gene allowed a more permissive environment for greater neurite outgrowth from dorsal root ganglia ( $\beta$ III tubulin immunostained green) when seeded on a bed of astrocytes (DAPI nuclear counter-stained blue). This study therefore proves the concept that non-viral gene delivery techniques hold the potential to modulate the cellular response to injury, allowing the re-growth of neurites (axons) in a previously inhibitory environment.

### Santocanale lab make the cover of Journal 'Cell Cycle'

Well done to Professor Corrado Santocanale and his colleagues from the National Centre for Biomedical Engineering Science (NCBES) for their recent paper entitled: "Cdc7-dependent and independent phosphorylation of Claspin in the induction of the DNA replication checkpoint" in the journal Cell Cycle. In the study they used "small-molecule inhibitors of Cdc7 kinase to further understand the relationship between Cdc7, Claspin and Chk1 activation and demonstrated that inhibition of Cdc7 kinase delays HU-induced phosphorylation of Chk1 but does not affect the maintenance of the replication checkpoint once it is established. They found that while chromatin association of Claspin is not affected by Cdc7 inhibition, Claspin phosphorylation is attenuated following HU treatment, which may be responsible for the altered kinetics of HU-induced Chk1 phosphorylation." This work was chosen for the cover of the May 2013 edition.

### First Place for NUIG Psychology Masters student

Ms. Orla Richardson, currently completing a Masters in Health Psychology degree in NUI Galway School of Psychology, was awarded first place in the postgraduate research category for her presentation at the 35th PSI-NIBPS Annual Student Congress, held this year in Dun Laoghaire Institute of Art, Design and Technology (IADT).

The presentation outlined Ms. Richardson's ongoing research programme which is investigating the effect of an online programme of Acceptance and Commitment Therapy (ACT) as an intervention for people newly diagnosed with Type 2 Diabetes Mellitus (T2DM). According to the World Health Organisation (WHO), T2DM is a rising global epidemic. Sufferers of the illness experience a huge lifestyle change, including diet, exercise and medication, which can be very difficult to manage. The prospective intervention, Acceptance and Commitment Therapy (ACT), has already proven beneficial for behaviour management across a wide range of areas of application including chronic pain, smoking cessation and stress. The online version of ACT used in this research focuses on providing participants with the psychological tools needed to cope with difficult thoughts and feelings around diabetes management. The programme is delivered over four sessions through the medium of animations and related activities and is designed to be accessible to people with T2DM who have web/computer access and a fluent level of English. GPs, friends and family are encouraged to refer interested individuals to participate.



### NUI Galway hosts 4th International Nursing and Midwifery Conference: Building and Promoting Excellence in Practice

The fourth international conference, *Building and Promoting Excellence in Practice* organised by the School of Nursing and Midwifery NUI Galway in partnership with Galway University hospitals and the Nursing Midwifery and Planning Development Units West (NMPDU), was held on the 15th and 16th of April 2013. The conference which covers topics relevant to the fields of chronic illness, mental health, older people, maternity care, women's health, and teaching and learning in practice, attracted over 200 delegates from Ireland, the UK, Israel and the USA bringing together leaders in the field of nursing and midwifery who shared their experiences of clinical care and research.

This year's keynote speaker was Dr. Julie Barroso, distinguished Professor at the Duke University School of Nursing, in North Carolina. Her research focuses on qualitative research methodology and chronic illness and she has written prolifically on these topics. She spoke about her expertise on synthesizing qualitative research and hosted a special qualitative workshop. The conference also featured a keynote discussion led by Dr. David Tovey, Editor-in-Chief of The Cochrane Library and from Captain John Flanagan, Instructor Pilot and member of the International Society of Air Safety Investigators, who spoke about the importance of Team Management and Risk Assessment.

### NFB signs four Memorandums of Collaboration with Indian Institutes of National Importance

Ireland-India research relations have been further strengthened by the signing of agreements between the Network of Excellence for Functional Biomaterials (NFB) at NUI Galway and four Indian institutions. Memorandums of Collaboration (MOC) have been agreed between NFB and the institutes, all four of which are instrumental in supporting the medical device and biotechnology sectors in India.

It will now collaborate with colleagues in: The Materials Research Centre at the Indian Institute of Science, Bangalore; the Indian Institute of Technology, Kanpur; the Indian Institute of Technology, New Delhi; and the Sree Chitra Tirunal Institute of Medical Science and Technology, Trivandrum.

The four are part of the 'Institutes of National Importance' (INI), a status conferred by an act of Indian parliament to higher education institutes which 'serve as pivotal players in developing highly skilled personnel within the specified region of the country/state'. INI's receive special funding and recognition and the Indian government has awarded this status to just 39 institutions.

The MOC recognises the benefits of increased cooperation and communication within the international community of public health research and will establish a relationship which will encourage such cooperation. "The agreement with key Institutes in India will facilitate the establishment of student and faculty exchanges, research collaboration and the co-development of biomaterials and tissue engineering related projects, says Professor Abhay Pandit, Director of NFB at NUI Galway. "A strong emphasis will be placed on translational activities and the commercial exploitation of the developing technologies.



# Youth Academy

In 2012, NUI Galway established the Youth Academy which aims to inspire entry to the university by introducing children and their families to university life. The Youth Academy works with high ability 4th and 5th class primary school students to support their learning and academic development and works in partnership with primary schools across Galway city and county.

Since April 2012 more than 300 children from across Galway County have graduated from a range of Saturday morning courses delivered by NUI Galway lecturers and PhD students in a range of subjects across the disciplines, with additional support from volunteer classroom assistants. They include: Philosophical Discovery; Psychology- who we are, how we think and what we do; Information Technology; Physics; English; Irish History; Mandarin; Science Exploration; Italian Language and Culture; and Engineering. The Youth Academy runs for a seven week period on Saturday mornings from 10am-12.30pm. On the final day of the Youth Academy a graduation ceremony takes place where students receive certificates of participation and their families and friends are invited on campus to share in the celebrations.

The Youth Academy gives the next generation of bright young researchers the opportunity to discover new and exciting subjects outside of the primary school curriculum. They are allowed to explore these in a fun and safe environment at NUI Galway. One teacher commented "As a result [of the Youth Academy] the students and their classmates are regularly discussing what courses they want to study at third level". The Youth Academy enables NUI Galway to showcase the courses, expertise and facilities they have to offer to potential students while dispelling many of the myths people might have about University. As stated by a Youth Academy parent "[Youth Academy] opened my son's eyes to college life. His first question to me was if he needed to wear a suit and tie to college".

The Youth Academy was founded by



Student Caoimhe Cahill with NUI Galway President Dr Jim Browne at the Youth Academy Graduation.

three NUI Galway colleagues, Mary Dempsey (College of Engineering and Informatics), Dr. Caroline Heary (School of Psychology), and Lorraine McIlrath (Community Knowledge Initiative) and supported by the Vice President for Innovation and Performance at NUI Galway, Professor Chris Curtin.

For further information about the Youth Academy contact Geraldine Marley, the Youth Academy Coordinator, at: [youthacademy@nuigalway.ie](mailto:youthacademy@nuigalway.ie)



Youth Academy at NUI Galway



# NUI Galway Biomedical Engineering student wins three national and international awards

Stefaan Verbruggen, a PhD student in Biomedical Engineering under the supervision of Dr. Laoise McNamara, has developed advanced computational fluid-structure interaction models that predict the complex mechanical behaviour of bone cells under different loading environments. These research studies have recently been recognised with three national and international awards.

Stefaan was the 2013 winner of the Engineers Ireland Biomedical Research Medal. This prestigious medal is awarded annually to a PhD student deemed to be making a significant contribution to the field of biomedical engineering research in Ireland. This national competition is sponsored by Boston Scientific and awarded by Engineers Ireland, the representative body for all sectors of engineering since 1835. Stefaan's winning paper, presented at the 19th Annual Conference of the Bioengineering Section of the Royal Academy of Medicine in Ireland, was entitled "Computational Investigation of the Multi-Physics Environment of Osteocytes".

Stefaan was also awarded the prize for Best Presentation at the 21st Annual Symposium on Computational Methods in Orthopaedic Biomechanics in San Antonio, Texas, USA. He was selected as the winner from more than 20 international applicants based on his submitted paper and podium presentation, entitled "An FSI Analysis of the Multi-Physics Environment of Osteocytes."

Finally, Stefaan was recently announced as the winner of the first prize Mimics Innovation Award for "Engineering on Anatomy Orthopaedic Applications", at the

11th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering in Salt Lake City, Utah, USA. This prize is awarded for top-level research and innovation in computer-aided engineering, and Stefaan was selected for his paper published in the Journal of the Royal Society Interface entitled "Strain amplification in bone mechanobiology: a computational investigation of the in vivo mechanics of osteocytes".

Stefaan is currently in the third year of his PhD research and is funded by an Irish Research Council (IRC) scholarship. The research is also supported by the European Research Council (ERC) and the Irish Centre for High End Computing (ICHEC). The award is an acknowledgement of the internationally leading research being performed by Stefaan and Dr. McNamara's research group in the Discipline of Biomedical Engineering.



Stefaan Verbruggen

## Social Gerontology

The Irish Centre for Social Gerontology (ICSG) is fast becoming an internationally recognised centre of excellence in the field of research on ageing. 2013 has proven to be another successful year for the centre and the positive impact of its work in society

### €1.5 Million grant for Project Lifecourse

Project Lifecourse - which encompasses the ICSG, the Child and Family Research Centre and the Centre for Disability Law and Policy - has been awarded a €1.5 million grant from Atlantic Philanthropies, a limited life foundation. The purpose of this award is to improve outcomes for vulnerable populations by supporting the development and application of integrated models of service provision planned and delivered across the life course.

### Visiting Fellow at the Irish Centre for Social Gerontology

The ICSG welcomes Professor Mark Skinner, Trent University, Ontario, Canada, to NUI Galway in June 2013 as part of the Centre's Rural Ageing Observatory visiting fellowship programme. During his visit he will deliver a lecture on 'The Transformative Role of Voluntarism in Ageing Resource Communities'. Professor Skinner is a noted health, rural and social geographer. His primary research interests are ageing communities, health care and voluntarism, with particular focus on rural people and places. Featuring community-based research in Canada and internationally, his work contributes to the fields of rural ageing, rural health, social gerontology, health and social care and the voluntary sector.

### Changing Generations: Findings from New Research on Intergenerational Relations in Ireland

The results of Changing Generations – a collaborative research project undertaken between 2011 and 2013 by the ICSG at NUI Galway and the Social Policy and Ageing Research Centre in Trinity College Dublin – was launched by Irish Times columnist Róisín Ingle in Dublin on Wednesday April 17th 2013.

Changing Generations addresses important issues concerning the relationships between different generations in Ireland. The research is situated in the current economic context. Cutting-edge qualitative research methods examine not only how people of different generations live together, but also how 'ordinary' people perceive the social policies that support individuals at different stages of the life course. In addition to 100 in-depth interviews with 'ordinary' people, the research team interviewed 20 leaders from private, public and civil society sectors.

Further information about Changing Generations is available at: <http://www.icsg.ie>

#### The results of *Changing Generations*

Evidence from both sets of interviews points to three key findings:

1. Intergenerational solidarity remains very strong in Ireland.
2. Intergenerational solidarity within families is helping people in Ireland to survive the recession.
3. Socio-economic inequality, not intergenerational difference, is a more significant cleavage between groups living in Ireland today.

Reflecting on these findings the report's authors – who include Professor Thomas Scharf and Dr Gemma Carney of ICSG – recommend that commentators should think twice before making a case for actual or impending conflict between the generations.



NUIG Professor Thomas Scharf, TCD Professor Virpi Timonen, author, Róisín Ingle, Dr Catherine Conlon, NUIG Gemma Carney



## NUI Galway researchers organise major international conference on cannabinoids

The 6th European Workshop on Cannabinoid Research took place at Trinity College Dublin from Thursday 18th to Saturday 20th April 2013. The conference was organised by the British Pharmacological Society (BPS) together with Irish cannabinoid researchers and was the largest and most high profile scientific conference on cannabis and cannabinoids ever held in this country.

The organising committee comprised Dr. David Finn as Chair (Lecturer in Pharmacology and Therapeutics and leader of the Galway Neuroscience Centre and co-director of the Centre for Pain Research NCBES) and Dr. Michelle Roche (Physiology, NCBES Galway Neuroscience Centre and Centre for Pain Research) together with colleagues from University College Cork, Trinity College Dublin and University College Dublin.

This conference is the leading forum in Europe for the presentation and discussion of novel findings in the area of cannabis and cannabinoid research. Cannabinoids are the biologically active constituents of the cannabis plant or synthetic drugs with similar effects. Cannabinoids bind to receptors throughout the body to exert their effects which can be wide-ranging. Indeed, the body itself produces its own cannabinoids, so-called endo-cannabinoids, which are now understood to play very important roles in health and disease processes. In recent years there has been considerable interest in the area of cannabis and cannabinoids for the treatment of a number of conditions including multiple sclerosis, chronic pain, psychiatric disorders and obesity. A keynote lecture was delivered by Professor Raphael Mechoulam of the Hebrew University of Jerusalem, Israel. Professor Mechoulam is regarded by many as the founding father of modern scientific research into cannabinoids,

having identified delta-9-tetrahydrocannabinol as the main psychoactive constituent within the cannabis plant in the mid 20th century.

“We were delighted to be able to welcome some of the world’s leading cannabinoid researchers to Ireland for what was a very exciting and important conference, at a time when the potential benefits and harms of cannabis and cannabinoids continue to be hotly debated here in Ireland and overseas,” stated Dr David Finn, chair of the organising committee. “Our understanding of the body’s own cannabinoid system has grown enormously – it is clear now that it plays a key role in health and wellbeing and represents a promising therapeutic target for a range of diseases and disorders.”

In addition to BPS, the conference received support and sponsorship from Science Foundation Ireland, The Irish Research Council, The Royal Academy of Medicine in Ireland, Fáilte Ireland, The International Society for Neurochemistry, industry sources and NUI Galway’s Centre for Pain Research.

By Dr David Finn  
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## Duddy memoirs

One of the most important private archives of the Northern Ireland conflict was donated to NUI Galway in 2009 by Brendan Duddy, the man who acted as secret intermediary between the British Government and the IRA leadership for more than two decades. Dr Niall O Dochartaigh, who organised the deposit of the archive, describes how this unique collection came to Galway.

In 1997 Brendan Duddy phoned me at my workplace in the University of Ulster’s International Conflict Research Centre in Derry. He told me he was impressed with a book I had just published on the escalation of the Troubles in Derry and asked me to call to his house. I had no idea who he was. Almost four hours later, during which time he spoke to me in urgent and impassioned tones, I still had no idea who he was. He seemed to have some kind of intense personal investment in the peace process whose nature was not at all clear to me and something was holding him back from talking openly. The encounter stuck with me but shortly afterwards I got a job as a lecturer in politics in Galway and left Derry for good. There was no opportunity to inquire further. When I began in 2003 to do some research on Bloody Sunday, an old friend and NUI Galway graduate, Garbhan Downey, suggested I contact Brendan Duddy. He told me cryptically that Duddy ‘had a story to tell’. When I phoned Duddy he agreed immediately to meet me again.

“The tension between his desire to tell his story and the secrecy and silence that he had been committed to for a lifetime shaped our conversations. His almost physical resistance to speaking about topics on which he had maintained secrecy for so long co-existed with an energy and a capacity for exposition that was inexhaustible.

Our conversations would continue well into the evening, in the book-lined office, in the kitchen as we waited for the kettle to boil, in the hallway. In a way I was reliving the experiences of the British and Republican interlocutors with whom he would speak for hours on end. Recalling his conversations with the senior MI6 agents he dealt with he told me “...in one four hour dialogue with anybody you want to mention, Michael [Oatley], Rob [Browning], any of them, there would be half a sentence that mattered and you trained yourself to listen for that half sentence . . . and it was that half sentence which made the difference, either way.”

“It was two years before he allowed me to start recording these interviews and even longer before he began to talk about sensitive issues, such as the hunger strikes.

“And then, during a conversation in his office in 2008, he paused to lean over and slide back one of the cabinet doors that were built in below the bookshelves. He explained to me for the first time that throughout the twenty years of his work as an intermediary he had held on to documents. His archive included diaries of the 1975 talks, of the 1981 hunger strike negotiations and of the 1993 contacts. He asked me what I thought he should do with them and I spoke in general terms about the possibilities for lodging them in an archive. Around a year later he told me that he would like to deposit the

papers in Galway. The librarian John Cox, the University Foundation and Louis de Paor at the Centre for Irish Studies provided resources for cataloguing the papers. Archivists Kieran Hoare and Vera Orschel set about the task, building on the extensive work already done by Duddy’s son-in-law Eamonn Downey. In 2011 the university celebrated the donation of the papers with a public launch for the Duddy family and a symposium on Negotiating Peace.

“Duddy’s role was that of an active facilitator and mediator. His papers provide an insight into the relationship between the British state and the Provisional Republican movement from the unique perspective of an individual located at the grinding intersection between the two. They will be a key resource for scholars of mediation and conflict for many years to come.”

The Duddy papers are open to researchers. Selected documents are online: <http://archives.library.nuigalway.ie/duddy/web/>

Dr Ó Dochartaigh has published extensively on this topic and several of his articles are freely available online: <http://nialldoc.wordpress.com/bcn/>





# Putting Your Best Foot Forward

With the rising prevalence of diabetes in Ireland and globally, clinicians are not only concerned with treating the condition itself but are also forced to tackle many of the complications that arise as a result. One particularly unpleasant complication is the so-called “diabetic foot”. This results from a loss of sensation in the foot with or without impaired circulation.

What begins as a minor injury can lead to a non-healing foot ulcer and (in a minority of patients) tissue destruction and amputation. The term “protective sensation” describes that ability (taken for granted by most of us) to feel the stone in your shoe. When this is lost in patients with diabetic neuropathy other means of protecting the foot (such as daily inspection and early attention to minor injury) must be deployed.

For Dr. Sean Dinneen, Consultant Endocrinologist with the Galway Roscommon University Hospital Group, and Senior Lecturer in the School of Medicine at NUI Galway, managing this chronic condition is of particular interest. “Individuals with diabetes and peripheral neuropathy are at risk of developing foot ulcers. It’s important for us to assess this risk in order to manage it,” he says.

Dr. Dinneen is working with a team of researchers from Electrical & Electronic Engineering including academic staff members Dr. Martin Glavin and Dr. Edward Jones, and post-doctoral researcher Dr. Brian McGinley, in the development of electronics technology to help manage the risk of ulceration, thus allowing for the possibility of corrective action and ensuring a better outcome for the patient. This approach to the problem won recognition when Dr. Dinneen was named runner-up in the Cleveland Clinic/Enterprise Ireland Clinical Innovation Awards. The Cleveland Clinic, located in Cleveland, Ohio, is regarded as one of the top hospitals in the US, and has an impressive track record in the development

and deployment of innovative technology solutions to a range of medical problems. The Clinical Innovation Awards scheme aims to identify medical technologies that have a significant innovative element and strong commercialisation potential.

Dr. Dinneen was presented with his award at the annual awards dinner of the Irish Medical Devices Association. The team is continuing to develop the technology and the business case to drive it towards the marketplace. Enterprise Ireland is providing additional support to facilitate this.

“Obviously it’s a very long road from prototype to patient, but recognition of the clinical and commercial value of our technology by the Cleveland Clinic and Enterprise Ireland gives us some measure of confidence that our approach is on the right track, and demonstrates the potential benefits to be gained through synergy between complementary clinical and engineering expertise,” says Dr Dinneen.

“There’s potential here not only to ensure better outcomes for diabetic patients, but also to provide economic benefits through technology commercialisation.”

By Dr Edward Jones  
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Example of Diabetic Feet

# The power and potential impacts of Marine Renewable Energy

A major €3 million EU research project investigating various aspects of tidal, wave and offshore wind energy was presented at a conference in April at NUI Galway. Running since 2009, the MAREN (Marine Renewable Energy - Energy Extraction and Hydro-Environmental Aspects) project focused on the energy extraction potential of the Atlantic Area coastal waters.

Here in Ireland, we are poised to develop potentially one of the most significant long-term energy resources on the planet. A fully-developed marine renewable energy industry in Ireland could lead to up 70,000 jobs.” Says Professor Michael Hartnett, Conference Chair and member of the Ryan Institute and College of Engineering and Informatics. He adds “The Atlantic Ocean has huge potential in terms of energy, and pan-European projects like MAREN are vital to assess and predict how we can best harness this natural resource. In NUI Galway we have some of the most advanced modelling software tools, which allow us to quantify marine energy resources from the installations of large scale tide and wave farms.”

The MAREN project team, which includes partners from Ireland, UK, France, Spain and Portugal, reported a number of important outputs from the project. They have made significant advances on how to assess the likely environmental impacts – such as flooding and the ability of waters to disperse pollutants - of energy conversion farms on coastal zones. They also worked on developing models that could incorporate the effect of energy convertor devices on the wave or tidal resource.

Prof. Hartnett explains: “Wave and tidal generation units and the associated conversion devices are not small pieces of equipment, and it is important that accurate models are available to identify how the placement of these units would affect local current regimes, and the quantity and quality of the wave or tidal resource itself. Once in



place, a device may change the immediate area so dramatically that what may at first appear to be an ideal site may not be appropriate at all. Our models factor in the shape and design of the energy conversion device when calculating potential energy outputs.”

The MAREN project is funded under the EU Atlantic Area Transnational Programme. The proceedings of the conference will be published in a Special Issue of the Journal Computers and Geosciences.

By Professor Michael Hartnett  
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Mr Ciaran Cannon, Minister of State for Training and Skills, officially opened the event and is pictured here with (left) NUI Galway’s Professor Michael Hartnett and (right) President of NUI Galway, Dr Jim Browne. Photo by Aengus McMahon



## New Publications

### *The Handbook of the Economics and Political Economy of Transition* – Edited by Dr Gerard Turley & Prof Paul Hare, Publisher: Routledge 2013.

Economics lecturer Dr Gerard Turley is coeditor of a new book examining how countries have transitioned from socialism to capitalism (with co-editor Professor Paul Hare of Heriot-Watt University, Edinburgh). As part of the Routledge International Handbooks series, the Handbook of the Economics and Political Economy of Transition takes in over 30 transition countries, from the former socialist countries of the USSR and the satellite states of Central and Eastern Europe, to the Asian countries of China, Vietnam and others.

The editors commissioned a team of leading experts from around the world, not just from the former socialist countries of China, Czech Republic, Hungary, Poland, Russia, Serbia and Slovenia but also academics in Australia, Canada, France, Israel, Italy, UK, US and Ireland. Contributors included former deputy prime ministers and finance ministers, special advisors to prime ministers, policy advisors to governments and international organisations (such as the United Nations,

International Monetary Fund, World Bank, European Bank for Reconstruction and Development, Organisation for Economic Co-operation and Development) and chief international negotiators (with, for example, the European Commission and the World Trade Organisation).

Topics in the handbook include the socialist system and central planning, the collapse of the Soviet Union, the re-emergence of China, economic reforms and institutions, enterprise restructuring and privatisation, performance and growth, trade and integration, the 2008/09 financial crisis, and people and transition.

A staff member of the Whitaker Institute and the J.E. Cairnes School of Business and Economics, Gerard Turley's previous publications in this area include *Transition Taxation and the State* and *Transition Economics: Two Decades On* (co-authored with Dr. Peter Luke of London South Bank University).

### *Transformers and Inductors for Power Electronics: Theory, Design and Applications* Professor Ger Hurley & W.H. Wölfle, Publisher: Wiley 2013

This complete reference for students and professional engineers working in fields using power supplies and energy conversion systems is a must for those who need to improve their understanding of a dynamic area that has changed rapidly in recent years.

Written by NUI Galway Professor Ger Hurley with W.H. Wölfle of Convertec Ltd, the book looks at the enabling technology for renewable energy systems and automotive systems.

Renewable energies - like wind and solar power - require new demands from transformers in terms of energy conversion for the electrical grid. A wide range of applications of modern power conversion systems is provided in the book as well as meticulous guidelines and methodologies for designers (design examples are used that have come from tried-and-tested working field examples).

Professor Hurley is a Fellow of Engineers Ireland and professor of Electrical Engineering at NUI Galway. He is also the founder/director of the Power Electronics Research Centre at NUI Galway and a Fellow of the Institute of Electronic and Electrical Engineering.

### *Methods of Sustainability Research in the Social Sciences* Edited by Dr Frances Fahy and Dr Henrike Rau, Publisher: Sage Publications 2013

Recent efforts to exploit Ireland's natural resources have faced strong local opposition; the Corrib Gas project, the proposed fish farm in Galway Bay and plans for wind farms and 'fracking'. *Methods of Sustainability Research in the Social Sciences*, a new book edited by Dr Frances Fahy and Dr Henrike Rau, both social scientists with the Ryan Institute, offers fresh insights into these disputes.

"Local communities increasingly question developments that ignore their interests and threaten their living environment," says Dr Henrike Rau, lecturer in environmental sociology. "Interdisciplinary sustainability research can reveal the nature of these conflicts."

Dr Fahy and Dr Rau assembled social and natural

scientists from Ireland and Europe to create an innovative guide to interdisciplinary sustainability research for students, academics and practitioners. The book responds to increased interest in sustainability-related courses at NUI Galway such as Environmental Planning, Sustainable Development in Ireland, Geographies of Sustainable Consumption and Sociology of the Environment.

Speaking at the recent book launch, Professor Colin Brown, Director of the Ryan Institute said, "sustainability research has gained momentum in both the natural and social sciences. This book by Doctors Fahy and Rau is making an important contribution to this emerging field of research."

