Dublin City University and Arizona State University

Transatlantic Higher Education Partnership

Project Highlights
2014-2015
## Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome</td>
<td>1</td>
</tr>
<tr>
<td>Celebrating a Transatlantic Higher Education Partnership</td>
<td>2</td>
</tr>
<tr>
<td>Smart Stadium Initiative/Smart Living</td>
<td>4</td>
</tr>
<tr>
<td>Smart Stadium: Multi-Modal Sensing and Analytics for Understanding Crowd Behaviour</td>
<td>5</td>
</tr>
<tr>
<td>Smart Stadium: Enhancing the Fan Experience by Understanding the Fan Journey</td>
<td>6</td>
</tr>
<tr>
<td>Smart Stadium: Understanding Human Motion Through Wearable Sensors</td>
<td>7</td>
</tr>
<tr>
<td>Smart Stadium: Ethics of Large Scale Technology Deployments</td>
<td>8</td>
</tr>
<tr>
<td>Smart Stadium: Quality Oriented Video Service Distribution to a Large Number of Heterogeneous Users</td>
<td>9</td>
</tr>
<tr>
<td>Early Detection for Risk of Diabetes and Cardiovascular Disease</td>
<td>10</td>
</tr>
<tr>
<td>International School of Biomedical Diagnostics</td>
<td>11</td>
</tr>
<tr>
<td>Development of Point-of-Care Programmable Diagnostic Tools</td>
<td>12</td>
</tr>
<tr>
<td>Age-friendly University Initiative</td>
<td>13</td>
</tr>
<tr>
<td>Nanofabrication - Advancing Surface Engineering Methodologies</td>
<td>14</td>
</tr>
<tr>
<td>New Diagnostic Approaches to Inform Lifestyle Management and Promote Healthy Ageing</td>
<td>15</td>
</tr>
<tr>
<td>Recruitment Narratives of Terrorist Groups</td>
<td>16</td>
</tr>
<tr>
<td>Working with Gifted Children</td>
<td>17</td>
</tr>
<tr>
<td>Nano-Coated Fiber Optics: New Reactor Technologies for Water Treatment</td>
<td>18</td>
</tr>
<tr>
<td>What Our Bodies Tell Us When We Sleep</td>
<td>19</td>
</tr>
<tr>
<td>Perceptions of Water</td>
<td>20</td>
</tr>
<tr>
<td>Connected Health Programmes for Rehabilitation</td>
<td>21</td>
</tr>
<tr>
<td>The Changing Landscape of Higher Education</td>
<td>22</td>
</tr>
<tr>
<td>Exchange &amp; Study Abroad Programmes</td>
<td>24</td>
</tr>
<tr>
<td>Entrepreneurship in Journalism</td>
<td>27</td>
</tr>
<tr>
<td>A Strategy for Delivering Innovation Together in Europe</td>
<td>28</td>
</tr>
</tbody>
</table>
Welcome – Fáilte

Dublin City University (DCU) and Arizona State University (ASU) have been collaborating since 2006, developing international cooperation in education, research and economic development, based on their shared values of innovation and entrepreneurship, technology-enhanced learning, research and discovery.

In September 2013, DCU President Brian MacCraith and ASU President Michael Crow signed the Transatlantic Higher Education Partnership. This partnership builds on the existing history of collaboration between DCU and ASU and promises to provide students with unique education and research experiences, while also having a positive impact on the economies and communities in Ireland and Arizona.

This book celebrates the achievements and highlights some of the significant research over the past two years of the Transatlantic Higher Education Partnership. It features a selection of collaborative projects which focus on issues of common concern in the areas of sustainability, health technology, digital learning and smart cities.

We hope to provide an insight into the ambitions and the enormous potential of the Transatlantic Higher Education Partnership in the years to come.

For more information on the Transatlantic Higher Education Partnership, visit the website: dcu.asu.edu
Celebrating a Transatlantic Higher Education Partnership

Dublin City University and Arizona State University

On behalf of DCU and ASU, it is our pleasure to invite you to learn more about the highlighted research projects carried out under our comprehensive Transatlantic Higher Education Partnership. This is a vibrant and multifaceted Partnership that has grown from strength to strength since its establishment in 2013, leveraging the assets of our respective researchers, institutes and communities. After a very active and successful two years, we are delighted that the Partnership is delivering significant, result-driven, collaborations and initiatives.

This publication provides an opportunity to highlight specific successes in areas including health technology, digital learning, smart cities and sustainability. We are proud and motivated by the progress of our institutional union and the commitment of our universities to sustaining the positive trajectory demonstrated to date.

We wish to convey our sincere thanks to all who have contributed positively and enthusiastically to the Partnership. The progress and achievements we reference would not be possible without your support, and we appreciate all you have done to make such tremendous strides over such a short period. We are genuinely excited to see what the future holds.

Sincerely,

Michael M. Crow
ASU President

Brian MacCraith
DCU President
We are pleased to share with you the exciting research collaborations we have undertaken during the first two years of the Transatlantic Higher Education Partnership.

In year one of our Partnership, successful workshops in both Arizona and Dublin brought together researchers across a variety of disciplines, with a particular focus on health. In year two we built on our collaboration to develop new projects in areas such as smart cities and journalism.

As we enter the third year of our Partnership, we look forward to expanding our collaboration further in areas such as information and communication technologies (ICT), sustainability, water, conflict resolution, journalism, age friendly initiatives and more. Our joint research portfolio also leverages our partnerships with industry including Ventana Medical Systems, Intel Ireland, Intel U.S. and others.

We would like to thank our vibrant research communities and researchers at both DCU and ASU who have helped to move these collaborations forward at a rapid pace. We look forward to the continued acceleration of the Partnership in the year ahead. In the following pages you will find overviews of a selection of our major collaborative research projects.

Sincerely,

Sethuraman “Panch” Panchanathan
ASU Senior Vice President
Office of Knowledge Enterprise Development

Alan Harvey
DCU Vice President for Research and Innovation
This initiative will use ASU’s Sun Devil Stadium renovation project and Ireland’s Croke Park Stadium as the venues for deploying pilot Internet of Things (IoT) technologies and demonstrating their capabilities.

Have you ever been to a game and wished you could view a touchdown or goal from a better angle?

Have you ever wondered what your friends in other parts of the stadium are saying about it?

How about ordering a hot dog or a team shirt from your seat?

Have you ever been sitting in traffic after a game and wondered which would be the quickest route home?

If only you had an app for that!

The technologies that will one day allow all of these are currently being developed by ASU and DCU teams in collaboration with Intel.

As venues managing several tens of thousands of people, they provide unique opportunities for exploring innovative projects through which large, medium and small companies can beta test and pilot new ideas and solutions for connecting the physical with the online world in ways that foster smarter living. It will also facilitate collaborations for start-up companies and entrepreneurs to realise their own ideas.

Ongoing research projects focus on enhanced fan experience via smart-stadium applications based on personalised, social-media enabled and context-aware data analytics and research on multi-modal sensing for understanding crowd density and behaviour. Intel is providing selective components of its IoT end-to-end architecture to facilitate the research and pilot deployments.

Evolving research projects that will contribute to this vision of smarter living, including next-generation telecommunications, ethics and policy related to smart stadia and wearable technology for sports are highlighted in the coming pages.
Smart Stadium: Multi-Modal Sensing and Analytics for Understanding Crowd Behaviour

Person detection and tracking, either within a single camera view or throughout a camera network, is mature technology that is already integrated into many commercial camera offerings. A truly intelligent surveillance system not only detects the presence of persons, but more importantly categorises their behaviour. However, most approaches are almost entirely supervised in nature, that is, they require significant numbers of example human-annotated video scenes showing the activity of interest. Security risks and emergency situations are rare occurrences and it is difficult to gather a sufficient variety of training data to build a robust and reliable monitoring system.

This research proposes that significant short-term advances can be made by focusing on the crowd, rather than solely on the individuals. Additionally, adopting a holistic approach by both coarsely quantifying the size of a crowd in a given location and by detecting and classifying significant deviations in normal crowd behaviour that potentially signal the occurrence of an unusual/abnormal or emergency event will result in short-term advances.

This project adopts a novel multi-modal approach to crowd behaviour analysis extending beyond cameras to integrate other useful sources of information available within a sensor-equipped smart stadium environment, specifically audio sensing and user-based localisation. The hypothesis is that “steady state” multi-sensory location-based crowd signatures can be learned (and continuously adapted) to allow abnormal events to be detected as outliers and subsequently classified.

Dr. Troy McDaniel
Assistant Research Professor
School of Computing, Informatics and Decision Systems Engineering
E: troy.mcdaniel@asu.edu
W: www.asu.edu

Dr. Suzanne Little
Senior Research Fellow
Insight Centre for Data Analytics
E: suzanne.little@dcu.ie
W: www.dcu.ie

Camera 30 : 12.30-15.30

Graph showing crowd density over time

3
4
5
6
7
8
9
10
11

Time (minutes)
Smart Stadium: Enhancing the Fan Experience by Understanding the Fan Journey

This collaborative project focuses on ways to enhance the fan experience at a stadium. The fan experience includes not only attendees’ interactions and activities within the stadium, but their entire ‘journey’, including preparation for the event, their travel to/from the stadium, and their presence on social media. To enrich an ‘experience’, it is useful to understand an attendee’s emotions, impulses, and behaviours that encompass this experience. Once these attributes are understood, an appropriate action can be taken to evoke or influence emotion toward enhancing an experience. Algorithms capable of extracting information indicative of emotions are being investigated, including facial expression recognition, location-based sensing, sentiment analysis and social media analysis.

Our emotions and moods play an important role in shaping our everyday experiences. Facial expressions convey a wealth of information about emotions. Facial expression recognition approaches are currently being investigated for deployment in smart stadia and environments to support engaging and unique applications that can recognise and respond to emotions such as games and interactive content.

This research effort encompasses other projects for enriching the fan experience including mobile apps for wait time estimation of concession stand, restroom lines and parking availability. Interactive games that involve entire sections of stadium goers and energy optimisation techniques to reduce costs are also in development.

This research proposes that facial expression recognition, sentiment analysis and social media analysis, in combination with other modalities, can be used to advance our understanding of the fan journey and experience. All of this moves towards enriching experiences for all stadium attendees.

Dr. Troy McDaniel
Assistant Research Professor
School of Computing, Informatics and Decision Systems Engineering
E: troy.mcdaniel@asu.edu
W: www.asu.edu

Dr. Kevin McGuinness
Postdoctoral Research Fellow
Insight Centre for Data Analytics
E: kevin.mcguinness@dcu.ie
W: www.dcu.ie
It is increasingly recognised that activity, exercise or more generally human movement, should form an integral part of most health interventions, (i.e. the promotion of higher intensity in daily activity or a requirement to perform a specific exercise movement as part of a rehabilitation programme). The desired outcome of any such intervention is to affect behavioural change in the target population. Behaviour change can only be enabled, however, by providing accurate, timely and appropriate feedback to the end user. Providing feedback on human motion presents a number of research challenges including:

- capturing biomechanically accurate motion outside a laboratory environment
- automatic classification and extraction of different actions within a movement sequence
- analysis and interpretation of motion data for each action
- communication of the analysis results
- suggesting modification/improvement back to the end user

The feedback to the end user depends upon a number of factors including the nature of the movement being measured, complexity of the action, user context and user experience. A further over-arching research challenge is that all of this should be accomplished in real-time (i.e. during a movement) or “near real-time” (i.e. immediately after a movement has been performed).

ASU’s School of Computing, Informatics and Decision Systems Engineering and the Center for Cognitive Ubiquitous Computing (CUbiC) are collaborating with DCU’s Insight Centre for Data Analytics on this project. The main areas of research centre around utilising body worn sensors to infer human movement. In parallel with visual feedback, haptic feedback is used to infer multimodal movement correction.
The ethical and policy issues that relate to large-scale technology deployments have not been adequately explored to date. Using the Smart Stadium initiative as an example of a large-scale deployment, the ethical issues surrounding the idea of “living labs” trialling smart technologies with a view to utilising them in Smart Cities will be explored.

Gaining awareness of the ethical challenges and opportunities at an early stage of technology deployment facilitates the maximising of ethical opportunities whilst offering suggestions as to how to tackle ethical challenges. This will help ensure that these living labs can be developed in a responsible manner.

This project outlines the ethical issues associated with plans to develop Smart Stadia using Internet of Things Technologies (IoT). It also explores the ethical issues surrounding the idea of Smart Stadia as “living labs” trialling smart technologies. It includes both ethical and legal analysis, as well as empirical inquiry into current smart systems at the micro, meso and macro levels and a discussion of the possibility of using a stage-gate process of ethical milestones for implementing the Smart Stadium project.

The first output for this project will be a white paper, offering a broad overview of the ethical issues, legal concerns and social implications of the Smart Stadium project. This paper will identify the potential challenges and opportunities and explore social and cultural differences between Ireland and the U.S. in relation to ethical and legislative values.

This project is being undertaken by Dr. Fiachra O’Brolchain and Professor Bert Gordijn at DCU’s Institute of Ethics, and Jathan Sadowski and Professor David Guston at ASU.
Modern portable electronics support a wide range of multimedia applications that involve video. When many users with such devices congregate for events, e.g. sporting events in stadiums, the conventional wireless transmission strategies tend to get overwhelmed. As a result, many users experience only low-quality video services in such high-density scenarios. The goal of this collaborative project is to examine adaptive video distribution strategies for a high density of wireless users.

One of the key strategies under investigation is the offloading of portions of the video traffic from conventional cellular wireless networks to localised WiFi (IEEE 802.11)-based networks. Such WiFi networks can exploit relay base stations installed in a stadium as well as device-to-device (D2D) communication among users. In contrast to cellular wireless networks, WiFi networks offer higher transmission bit rates, albeit only over shorter distances.

Since distances among users are relatively short in scenarios with high-user densities, e.g. in packed stadiums, offloading from cellular to short-range high-transmission rate WiFi networks is a highly promising strategy. The short transmission range of the WiFi networks requires judicious local control of the video transmissions that adapts to local demands for video traffic transmissions as well as the specific video content and localised user distribution. This project explores centralised control via the emerging paradigm of software-defined networking (SDN) within the local networking domain with high user density, e.g. a stadium.
Early Detection for Risk of Diabetes and Cardiovascular Disease

Diabetes mellitus (DM) currently affects over nine per cent of the population in both the United States and European Union, constituting an enormous healthcare and socioeconomic burden. Type-2 DM (T2DM) accounts for over 90 per cent of newly diagnosed diabetes cases. Research is increasingly focused on validating novel circulatory biomarkers which may help to stratify individuals across the T2DM spectrum – from pre-diabetic individuals to more serious T2DM sufferers with underlying cardiovascular disease (CVD). This will enhance the clinical decision-making ability of health care professionals, allowing them to tailor appropriate intervention strategies for “at-risk” individuals to prevent, and even reverse, T2DM progression.

Arterial hardening or “vascular calcification” is an important risk factor for the increased CVD mortality in T2DM. It can cause premature ageing of arteries, damage to the heart ventricles, and rupture of fatty plaques within blood vessels, ultimately leading to heart attack. A series of regulatory proteins, namely osteoprotegrin (OPG), receptor-activator of nuclear factor kappa B ligand (RANKL), tumour necrosis factor-related apoptosis-inducing ligand (TRAIL), and bone morphogenetic protein-2 (BMP-2), are centrally involved in the arterial hardening process, and unsurprisingly are receiving considerable attention as predictive circulatory biomarkers of T2DM and CVD.

A strategic ASU-DCU research collaboration employing mass spectrometry immunoassay technology has recently demonstrated (May 2015) that these proteins potentially exhibit multiple post-translationally modified variants within circulation. This is information that could be harnessed to create multi-dimensional biomarker views of the T2DM syndrome.

Future work will focus on optimisation of assay sensitivity, definitive identification of the modified protein variants involved, and clinical studies to better understand their diagnostic relevance and exploitability.
Diagnostics are an increasingly important part of the healthcare and life sciences industries - both in the clinical and research realm. In fact, diagnostics are involved in more than 60 per cent of clinical decision-making, but account for only 2 per cent of overall health care spending in developed nations. Diagnostics influences every facet of healthcare including pharmaceutical and technology development, patient management, healthcare finance and healthcare policy.

The International School of Biomedical Diagnostics (ISBD) brings together the expertise of ASU and DCU to offer a Master of Science in Biomedical Diagnostics. With this master’s degree, the two universities are pioneering the establishment of diagnostics as an independent discipline reflecting ASU and DCU’s shared values of innovation and entrepreneurship, technology-enhanced learning, research and discovery.

ISBD draws from assets of each institution. At DCU, it draws from the award-winning MSc. in Biomedical Diagnostics at the Biomedical Diagnostics Institute, and from its faculties of Science and Health, Engineering and Computing, and Business Schools.

At ASU, the programme draws from the Bodesign Institute, the College of Nursing and Health Innovation, the Sandra Day O’Connor College of Law, the College of Health Solutions, and the Ira A. Fulton Schools of Engineering.

Highlights of this programme include an applied project with industry partnerships and a “Current Perspectives in Diagnostics” course with visiting speakers from academic institutions, diagnostics companies and regulatory agencies providing an overview of their specialty.

The ISBD programme is designed to prepare students to take on roles of greater responsibility and impact within biomedical diagnostics and related healthcare fields. Graduates from the “Current Perspectives in Diagnostics” course are better prepared to transform healthcare.

Dr. George Runger
Chair
Department of Biomedical Informatics
E: george.runger@asu.edu
W: chs.asu.edu/isbd

Professor Richard O’Kennedy
Director and Professor
Applied Biochemistry Research Group
E: richard.okennedy@dcu.ie
W: www.bdi.ie
Development of Point-of-Care Programmable Diagnostic Tools

There is a clinical need for robust, rapid, point-of-care serologic assays for the detection of infectious diseases and cancer. This project leverages two existing and complementary technologies towards the development of a cost-efficient, robust and analytically flexible point-of-care device for serologic measurements of any target antigen viz. centrifugal microfluidic technology and programmable immunoassays.

The Ducree Lab at DCU established a centrifugal microfluidic platform for a wide range of applications, with technologies that allow an unprecedented level of process integration, programmability and automation encompassing on-board reagent management, sample preparation and detection. The Anderson Lab at ASU has established platforms for the rapid and flexible expression of target proteins for clinical immunoassays. The system is flexible for serologic (Ig) measurements to any antigen which can be expressed from cDNA (i.e. HIV, hepatitis, cancer proteins, etc.), only by switching the DNA used (no change in the microfluidic design or materials required).

Full automation of an Enzyme-Linked Immuno-Sorbent Assay (ELISA) for the detection of antibodies in whole blood has recently been demonstrated.* On this “Lab-on-a-Disc” (LoaD) platform, all unit operations were implemented by event-triggered rotational flow control. In order to avoid interference during absorbance measurement from the solid phase in this heterogeneous assay format, it is pivotal that the intermediate reaction product is eventually forwarded from the incubation chamber to a distinct optical measurement chamber.

By combining the programmable serological assay with the innovative event-triggered Lab-on-a-Disc, the researchers have created a unique and accurate laboratory device has been created that requires little user intervention, making it ideal for point-of-care healthcare delivery.

The Age-Friendly University Initiative highlights the role that universities can play in responding to the challenges and opportunities associated with the ageing demographic of the 21st century. In 2012, DCU, having established the concept and principles of an Age-Friendly University, joined with ASU and Strathclyde University in Scotland to become the world’s first officially designated Age-Friendly Universities (AFU). As AFUs, each university has set a strategic direction to promote an inclusive approach to healthy and active ageing through its research agenda, its enhancement of learning opportunities for people across the generations via innovative curriculum development, and its focus on innovation to address specific issues affecting older adults.

The principal focus of the body of work over the past year has been a restructuring of the AFU Working Group to an AFU Implementation Action Team with a multidisciplinary approach to implementing action and informing policy and research on ageing across the partner universities.

The inaugural international “Age-Friendly University Conference - Engaging Ageing: Universities as engines of active and healthy ageing” is taking place at DCU on November 2nd—3rd 2015. The agenda is based on DCU’s Ten Principles of an Age Friendly University and four sub-themes:

• Research and Innovation;
• Education and Outreach;
• Learner and Community Engagement;
• Work and Enterprise.

The conference not only seeks to engage in robust academic discourse on aspects of ageing but engage and actively participate with policy makers, non-governmental organisations and civic society. We are honoured to have Dr. Jane Barratt, General Secretary of the International Federation on Ageing as keynote speaker for the event.

For more information on the Age Friendly University and the conference, please visit: www.dcu.ie/agefriendly

Dr. Richard C. Knopf
Director
Osher Lifelong Learning Institute
E: richard.knopf@asu.edu
W: pcd.asu.edu
lifelonglearning.asu.edu
arizonaindicators.org

Ms. Christine O’Kelly,
Project Coordinator
Age-Friendly University Initiative
E: christine.okelly@dcu.ie
W: www.dcu.ie/agefriendly
As devices diminish in size, fall in price and decline in energy consumption the challenges for manufacturing increase. The ability to routinely fabricate devices with high-fidelity nanoscale structure enables us to realise modern integrated circuits, energy harvesting and storage devices, sensors, and medical components. Researchers at ASU and DCU have teamed up to further extend our nanofabrication capability and are working on next-generation surface removal processes (etch and deposition), for the precise engineering of surfaces and devices that will underpin the sustainable development of our economies.

The primary focus of the work is on the nanostructuring of silicon surfaces with the DCU team addressing fundamental issues in gaseous plasma-based processing, including plasma-surface interactions, process control and diagnostics, and plasma physics. The ASU team is addressing fundamental questions relating to the evolution of the structure topography on the surface as a function of process parameters and plasma condition.

Uniquely this collaboration features the interaction between plasma chemistry and the surface chemistry. Surface chemistry becomes critical especially in terms of the modification of surface activity at the high density of edges and interfaces defined by the nanodimensions of the pattern.

This joint project leverages complementary world-class expertise in both universities and is a strategically important initiative as it has potentially significant impacts on a number of important industry sectors in both Arizona and Ireland, including semiconductor manufacturing, energy systems, and environmental technologies. Additionally, the initiative provides a great opportunity to establish synergies between large research infrastructures and initiatives in both universities, including the Flexible Electronics and Display Center at ASU and the National Centre for Plasma Science and Technology and the newly established Nano-Bio Analytical Research Facility at DCU.
Poor lifestyle choices such as inactivity and diet are rapidly becoming a global pandemic with a detrimental impact on many chronic illnesses such as cardiovascular disease (CVD), metabolic disorder, diabetes, alzheimers disease and cancer. Understanding their pathophysiology and etiology is important for the development of future therapeutic interventions, arrangement of clinical trials and to change our current perception of engaging with cost-effective measures such as lifestyle management.

The causes of age-related chronic illnesses, such as CVD, involve a complex interplay between many biological processes and are defined by non-modifiable and modifiable risk factors. These risk factors modify the static genome by processes known as epigenetic drift. The term epigenetics refers to stable patterns of gene expression that are not dependent on dynamic changes in coding DNA but are modified by age and environment over a person’s lifetime.

The focus of this programme is the study of changes in miRNA expression and function within the cardiovascular compartment, which occur with age and disease, which is pivotal to epigenetic regulation and processes.

The collaboration is working to develop a functional diagnostic index of cardiovascular competence by integrating the miRomic profiling expertise of Dr. Murphy’s group (DCU) and the 3’Life high through-put functional miRNA assay developed by Dr. Mangone’s Lab, (ASU). The fact that the initiation and progression of CVD is characterised by a lag time between onset and initial symptoms provides a window of opportunity for the implementation of intervention strategies to reduce the disease burden. This programme will endeavour to better inform primary, secondary and tertiary preventive strategies-promoting healthy ageing and optimising a person’s disease free years.

New Diagnostic Approaches to Inform Lifestyle Management and Promote Healthy Ageing
Social organisations must establish sustainability. Central mechanisms for social organisations to achieve sustainability include the recruitment of new members and retention of existing members. In the past, this was done largely in person and through public marketing campaigns using communications media (print and electronic).

The rapid growth and impact of the so-called ‘Islamic State’ (IS) illustrates characteristics of successful recruitment and retention strategies that are dependent on effective use of social media. This includes Twitter, Facebook, social networking sites, chat rooms and other electronically mediated forms of communication.

A central element of such efforts is the creation and dissemination of successful narratives regarding the motives of IS and the logic of opposing established government regimes. Such approaches highlight the role of “reputational violence”, a central focus of narratives created by IS. Reputational violence establishes the credibility of the new organisation as it attempts to become institutionalised and thus sustain itself.

Such narratives are used both within the group as well as between it and other groups. The goal of such narratives is to weaken and destabilise ties to existing governments and forms of legitimacy to generate support for the beliefs, mission and actions of a new regime.

Dr. Maura Conway (DCU) and Dr. Scott Decker (ASU) are studying the online recruitment and retention processes used by IS. This is done through monitoring and analysing recruitment strategies in social media. Specifically, they have examined online recruitment narratives to identify key themes, including reputational violence. They are comparing the results of these analyses to online recruitment strategies used by other groups involved in crime, particularly street gangs. IS illustrates the role of social media in 21st century conflicts.
DCU and ASU are proven leaders in the area of provision for gifted children. DCU is home to the Centre for Talented Youth (CTY Ireland) which provides fast-paced courses for high-ability children aged 6 to 16 in college-like subjects on Saturdays and during the summer. Last year some 5,000 students attended CTY Ireland including a number from overseas.

ASU hosts the Herberger Young Scholars Academy which is a full-time school for gifted children where students take accelerated courses in a highly engaging learning environment. The mission of the academy is to provide gifted young people with advanced educational opportunities commensurate with their abilities, strengths and interests. In the last year, representatives from both organisations have visited the respective programmes to learn more about each other and to share best practices.

Various collaborations have evolved from these visits with Dr. Kim Lansdowne, executive director of the Herberger Academy, becoming a member of the CTY Ireland academic advisory board. DCU and ASU are collaborating on research projects involving self-concept and social coping for the gifted child, cyberbullying and teacher attitudes towards gifted students. Plans are underway in the coming year for students from both institutions to have an opportunity to participate in study abroad programmes in Dublin and Arizona, either as part of Early University Entrance or through a fast-paced summer programme.

There is a need to better serve gifted children in the educational system and to provide them with the resources and expertise needed to allow them to fulfil their potential. This great partnership between two respected institutions goes a long way towards providing this desired outcome.
The presence of water-borne pollutants and their possible effects on living organisms has emerged as a serious environmental concern. There is an increasing need for cost- and energy-efficient clean technologies such as advanced oxidation processes for the removal and degradation of pollutants before they find their way into ground water wells, surface waters and drinking water. This new collaboration between ASU and DCU will advance the creation of an innovative and cost-effective new technology that will lead to innovation in water treatment processes.

ASU has been working on a small-systems drinking water treatment project funded by the U.S. Environmental Protection Agency towards innovative photocatalysis reactors (UV/TiO₂ advanced oxidation process). A large opportunity exists for enhancing the efficiency of the catalyst. The Water Institute at DCU has also developed a series of new modified TiO₂ catalysts that function in both the UV and visible regions of the solar spectrum. The shortcoming of all of these new catalysts is that they have to be applied as a slurry, which is neither practical nor viable in drinking water treatment.

ASU is developing a UV-LED/fibre optic reactor to utilise fibre optics both for UV light delivery and as a substrate for a fixed-film catalyst (the catalyst is bound to the fibre optic). It is now envisaged that such a fibre optic reactor could be easily deployed into existing drinking water treatment facilities. The team will integrate visible light photocatalysts from DCU onto fibre optics from ASU, and characterise their performance to oxidise pollutants in water.

Significantly contributing to this collaborative project is the PhD work of Ms. Heather Stancl, on Prof. Westerhoff’s team at ASU and also the input from Dr. Anne Morrissey and her team who are part of the DCU Water Institute.
Periodicities (i.e. repeating patterns) can be observed in many human behaviours - most notably circadian patterns (physical, mental and behavioural changes responding to light and darkness in a person’s environment). The strength of these periodicities may capture untapped patterns that incorporate sleep, sedentary and more active behaviours into a single metric indicative of better health. Wearable sensors can be used to characterise daily, weekly and annual patterns of sleep and physical activity that extend beyond traditional ways of measuring physical activity and sleep.

This ASU-DCU collaboration combines expertise in wearable sensing, behavioural science and data analytics to better understand long-term patterns in lifestyle behaviours and their impact on health. This work is carried out using unobtrusive wearable sensors that are ubiquitous in society.

In the first phase*, accelerometry data from the wrists of U.S. veterans aged 35-65 were collected continuously for up to 10 weeks, 24/7. This generated “periodograms”, visualisations of the strength of regular cycles emergent in the data and resulted in a determination of changes over time in these cycles. Most notably the cycle repeated every 24 hours (i.e. indicative of a 24 hour circadian cycle) and perturbations in this cycle could be detected over the course of days and weeks.

Ongoing work expands the current sample to a larger group of U.S. veterans and to determine whether the consistency in the observed patterns are related to cardiometabolic risk biomarkers (i.e. blood glucose, blood pressure, obesity). Future directions include examining longer-term data for seasonal/annual patterns and determining whether periodicity strength is responsive to lifestyle intervention.

Last year, water issues suddenly and unexpectedly, erupted in Ireland as a major political and social issue. Specifically, the responsibility of managing all forms and uses of water in Ireland has been shifted from local government to a new entity - Irish Water. Public debate has been furious, and activism against the changes has been obvious and often intense. By comparison, water rights and access have long been major environmental, economic, political and social concerns in the arid setting of Phoenix and Arizona. Building from a long-term social science study of water concerns, issues and rights based at ASU (the Global Ethnohydrology Study), the Water Institute at DCU is leading an Irish extension and application of the project designed to better understand the social and cultural dimensions of these emerging Irish concerns around water.

In this highly dynamic context, focus groups and interviews with activists and the wider public in Galway and Dublin are being conducted. This collaboration provides a unique opportunity to compare political and sustainability value associations with water and its stakeholders. Comparisons will also be made internationally between countries and regions of plentiful and scarce water supplies.

Globally, water is an increasingly scarce and contested resource. An improved understanding of how and why various societal groups are willing to share, conserve and pay for water is of vital importance to everyone.
In conjunction with its successful MedEx Wellness Programme, DCU has signed on to launch an ASU Project HoneyBee observational clinical trial.

Inspired by the honeybee, nature’s best collector and communicator of information, Project HoneyBee seeks to validate wearable sensor data in order to improve patient outcomes. Since its inception, the initiative has partnered with the health systems in Maricopa County, creating a living laboratory for evaluating the clinical utility of wearable devices to improve health outcomes.

MedEx is a chronic illness rehabilitation programme that offers medically designed and supervised exercise classes to patients with diverse chronic illnesses.

As part of the HoneyBee collaboration, medical director, Dr. Noel McCaffrey, will incorporate methods from Mayo Clinic physician and ASU professor James Levine’s feasibility study for physical monitoring of diabetes patients into MedEx’s Diabetes Health Steps programme.

Project HoneyBee’s seven Year 1 observational clinical trials currently test over eleven different devices for particular physiological parameters. Each trial has 25 to 50 patients. The overarching goal is to help shift health practitioners’ focus to cost-effective and outcome-effective prevention and early intervention strategies. A critical element of these studies is validating data from low-cost consumer wearable technologies for applications in clinical settings. Nine trials in Year 2 trials will begin September 2015.

One of the key differences between HoneyBee observational clinical trials in Arizona versus the trial in Dublin will be the context within which the devices are being tested, as well as the health care providers engaged in the study. In Dublin, undergraduate exercise science students will be embedded in the trial; in Arizona, doctoral nurse practitioners serve as research fellows.

This trial aims to identify the factors that influence the suitability of an activity monitor for use in the MedEx population. Two monitors will be selected and participants will be asked to wear each monitor for one week. Participants will also be asked to wear an ActiGraph accelerometer simultaneously to determine the validity of the devices.
Both ASU and DCU are committed to (re)designing education for the future. DCU and ASU already provide students with a strong future-focused curriculum and rich digital learning experience for the 21st century. In this respect both universities can play a leading role in shaping the future of higher education and expanding access to lifelong learning consistent with the mission of transforming lives and societies.

With over 4,000 students and 125 faculty, the DCU Institute of Education holds the greatest concentration of expertise in education on the island of Ireland. ASU’s Mary Lou Fulton Teachers College, with over 180 faculty and 6,000 students in campus and online programmes, is globally recognised as a leading innovator in teacher and leadership preparation.

Through collaboration both partners draw on the affordances of 21st century technologies, to promote education that is future-focused, research-led and capable of addressing the global and local challenges that face us.

The institute is committed to promoting excellence in teaching and learning across teacher education and education more generally. This research-intensive institute believes in the importance of generating new knowledge about policy and practice in education and in using that knowledge to promote social justice, democratic education, intercultural engagement and critical global citizenship. The transformative potential of education and ability of graduates to make a difference is also a strong belief of the institute.

The Institute’s programmes are characterised by innovative and student-centred pedagogies that exploit the potential of new learning platforms and digital technologies and promote critical thinking and enquiry-based learning in the context of values-based education. The institute offers a range of programmes for prospective teachers and educators across a number of settings, including early childhood (0-6 years), primary (4-12 years), post-primary (12-18 years) and further education. In addition, it offers a diverse and extensive range of post-graduate programmes, both taught and research-based, at master’s and doctoral level.

Faculty of the institute engage in ongoing research across key priority areas in education such as STEM education, assessment and evaluation, literacy, special and inclusive education, social justice education, arts education, digital learning and global citizenship.

www.dcu.ie/institute_of_education
ASU’s Mary Lou Fulton Teachers College generates knowledge, mobilises people and takes action to improve education.

The Teachers College operates and acts according to four core values:

• Pursue excellence at scale to achieve impact
• Exercise leadership through innovation
• Champion diversity of people and ideas
• Share responsibility for the health of communities

Our faculty create knowledge by drawing from a wide range of academic disciplines such as cognitive science, sociology and psychology to gain insight into important questions about student experience and outcomes. How do children learn? How do different pedagogical approaches function with students of different learning styles and in varying socio-cultural contexts? How do specific educational policies affect student outcomes and teacher performance? What do we know about effective teaching and how can we apply that knowledge at scale in K-12 education?

Through The Teachers College’s bachelor’s, master’s and doctoral programmes, student teachers are prepared and mobilised to improve student experience and outcomes. In addition to preparing teachers who will thrive and remain in the teaching profession, these academic programmes prepare and support leaders, including school principals, policymakers and executive decision makers. The Teacher College’s PhD. graduates join the faculties of elite research institutions, where their work adds to the global knowledge base about education. This leads to a global mobilisation of people by innovating new ways to exchange knowledge and best practices with an international community of scholars, educators, administrators and policymakers.

Three highlights are: The Center for Games and Impact, which investigates, innovates and cultivates game-infused solutions to society’s biggest challenges; Sustainable Science Education for Teachers, which empowers kindergarten to eighth grade teachers with an understanding of how science, technology, design and effective governance can create a sustainable society; and the Center for the Art and Science of Teaching (CAST), which will foreground teaching as the subject of a rich body of scientific evidence and will scale understandings about teaching to enhance teacher education.

Areas for collaboration include:
• Exploring the potential of new technologies in education / teacher education
• Learning from different models and practices in early childhood education
• Sharing of practice and research in effective pedagogies in teacher education, further education and training
• Developing shared approaches to inclusive education
• Engaging in comparative studies which explore systemic challenges in education in Ireland and in Arizona
• Developing joint research projects focused on priority areas in education such as literacy, assessment and evaluation, cyber bullying and intergenerational learning

education.asu.edu
gamesandimpact.org
sustainabilityscienceeducation.asu.edu

E: mari.koerner@asu.edu
W: education.asu.edu

E: maeve.fitzpatrick@dcu.ie
W: www.dcu.ie/institute_of_education
Students are the lifeblood of any university and will become the lifeblood of other organisations when they join the workforce or move on to the next stage of their careers. We live in a globally engaged world where oceans, land masses and time-zones are no obstacle for communication between individuals. Companies are multinational and working on projects across time-zones is the norm.

As progressive universities, both DCU and ASU are committed to developing globally engaged students. To give our students the best chances in the workforce, we need to give them experiences that will help them integrate into these ways of thinking. This is done through our internationally linked graduate and undergraduate programs and also through our international research collaborations.

DCU and ASU both offer students the opportunity to study at other international locations for a semester or longer. Since 2006, an exchange programme between these two universities has existed. Here’s what some of the exchange students have to say:

I spent an academic year at Arizona State University. I can safely say that it was the best year of my entire life. The contacts that I made from my trip will greatly benefit me for the future. The old saying of “In America it’s not about what you know, it’s who you know”, is a very accurate portrayal of the country. I have gotten some fantastic contacts as a result of my exchange. Whether I go to LA, Miami, Boston, New York or Chicago I know that I will have a place to stay and good employment contacts.”

- Gavin O’Connell, Dublin City University
The ASU Study Abroad Office is committed to enriching the academic experience at ASU by affording students the opportunity to develop the intercultural competence, transnational understanding and leadership skills required to face global challenges. Our vision is to guide student development through international experiences for lifelong global engagement and impact. The exchange between ASU and DCU epitomises the ASU Study Abroad Office’s commitment and vision to student experiential learning.

ASU students who study at DCU are mainly justice studies or criminal justice and criminology majors. However, other majors include biochemistry, political science, psychology, sustainability, nutrition and business. While studying at DCU, ASU students are able to enroll in courses at DCU’s Faculty of Humanities and typically stay for one semester (either fall or spring). In contrast, all DCU students come to ASU for the full academic year and are typically students from DCU’s cutting-edge School of Law & Government. DCU students take advantage of the U.S. perspective while studying at ASU, as they often enroll in ASU classes such as “Death Penalty in the U.S.,” “National Security, Intelligence, and Terrorism”, “Business, Law and Society”, and “Law, Culture and Community”, to name a few. DCU exchange students can enroll in any ASU class in which they have applicable prerequisites. Outside of the classroom, DCU students can take part in Sun Devil traditions such as wearing their Maroon and Gold with pride, hiking “A” Mountain, or participating in the ASU Homecoming parade.

With more than 80,000 undergraduate and graduate students, ASU is one of the largest universities in the U.S. ASU is consistently one of the top-ranked public research universities in the country, offering academic programmes and majors led by expert faculty and top researchers in first-class facilities.

There are not enough words to describe how amazing my experience was at DCU. I immediately fell in love with the school and made it my new home. My roommates I was assigned to live with turned out to be one of the best things to ever happen to me. I was lucky to be a part of the CIEE programme because I had the best group to enjoy Ireland with - the most fun leaders and the greatest friends. It was the best time of my life; I wish I could do it again.”

- Jessie Evers, Arizona State University
Since the establishment of a student exchange agreement in 2006, DCU and ASU have enjoyed a fruitful partnership which has seen almost 50 students exchanged. These students have typically been humanities students focusing on international relations and political science. In all cases, returning students have reported their experience abroad as “life-changing” and “unforgettable”. It is DCU’s intention to send our high-calibre students to ASU to attain the level of academic and personal excellence required to take their place on the global stage. In return, we offer ASU students the same level of academic excellence and dedication that has earned DCU its “University of Enterprise” status. The strong commitment to the Student Exchange Programme that exists between both institutions has been fundamental to its resounding success.

DCU’s vibrant Student Union ensures the student population is well served with a myriad of clubs, societies and social events, all of which are available to be enjoyed by ASU students. All students are actively encouraged to participate in any of the wide range of sporting and social organisations which have been established to cater to all tastes. By comparison, DCU returning students have reported similar opportunities for self expression and enjoyment at ASU and in some cases these returning students have set up clubs specifically as a result of their involvement in a similar one at ASU.

**Study Abroad Programme at DCU**

Sometimes, an exchange arrangement may not be a viable option for ASU students to study at DCU. In this event, approved students may register at DCU through the Study Abroad Programme. Students may apply directly to DCU (with the assistance of their study abroad coordinator at ASU) or through a third party provider such as CIEE (www.ciee.org), a non-profit, non-governmental organisation dedicated to the provision of relevant international education.

Studying abroad gives students a chance to broaden their horizons and gain unique experiences which will give their resumes the edge required in the future. On a personal level, students mature, develop new skill sets and meet their peers from around the world.

Students can choose from four areas of study (streams) in DCU: Science and Health, Engineering and Computing, Global Business, or Humanities and Social Sciences. The beauty of the programme is the flexibility provided. Students may choose modules/classes outside of their streams if they wish to experience an alternative discipline within a university setting.
Entrepreneurial journalism is increasingly becoming a central component of undergraduate and postgraduate teaching of journalism on both sides of the Atlantic. The Walter Cronkite School of Journalism and Mass Communication at ASU has been one of the pioneering institutions in bringing a culture of entrepreneurship into journalism education.

Through a shared vision, ASU and DCU are actively developing a number of collaborative projects in this space. Most recently, ASU staff have assisted in the introduction of a new “Entrepreneurial Journalism” module as part of the BA Journalism curriculum at DCU, and in 2015/16 will deliver a number of online talks in their specialist areas as part of this module. In addition, arising from Professor Rafter’s participation as a Fellow at ASU’s Scripps Howard Journalism Entrepreneurship Institute, a special issue of the academic journal, “Journalism Practice” is currently being prepared to examine entrepreneurialism in journalism practice and education.

Professors Rafter and Gillmor have already worked together in organising a joint ASU-DCU conference involving the participation of a range of leading international media figures in Dublin in September 2013. They are currently developing a joint research project on digital media start-ups, which they plan to publish in 2016.
The success to date of the DCU ASU Transatlantic Partnership is derived from excellent working relationships that have developed over a considerable time between ASU and DCU researchers and the benefits of their collaborative research projects along with shared knowledge are now evident.

The Partnership is also focussed on exploiting its joint expertise to coordinate and partner in specific EU projects that are strategically matched to its research capabilities. In healthcare research, for example, Biodesign Europe leverages the research infrastructure capacity and expertise of ASU Biodesign Institute’s eleven and DCU’s five health-focused research centres. As a result, a combined team of over 400 researchers are actively collaborating to address some of the most important challenges in 21st century healthcare, such as chronic disease management, personalised and stratified medicine and sustainable healthcare delivery.

Over the past two years DCU and ASU teams with complementary skills have been developed which will prove to be an asset when invited to join developing or existing consortia for upcoming H2020 calls. The commitment to foster these team relationships is firstly evident in the catalyst fund that has been jointly established to initiate collaborative projects between the teams to date. This will also leverage significant external funding on both sides of the Atlantic. Secondly, the partnership has a full-time transatlantic coordinator constantly developing connections between the two universities that are targeted to match identified challenges. A full-time funding coordinator is also dedicated to working with the partnership to identify suitable projects in H2020 that match the expertise and capabilities of both partners. This ensures a coordinated approach in developing proposals in answer to specific H2020 calls where the partnership can deliver true innovation and value.

A Strategy for Delivering Innovation Together in Europe
For more information on the DCU ASU Partnership please visit dcu.asu.edu