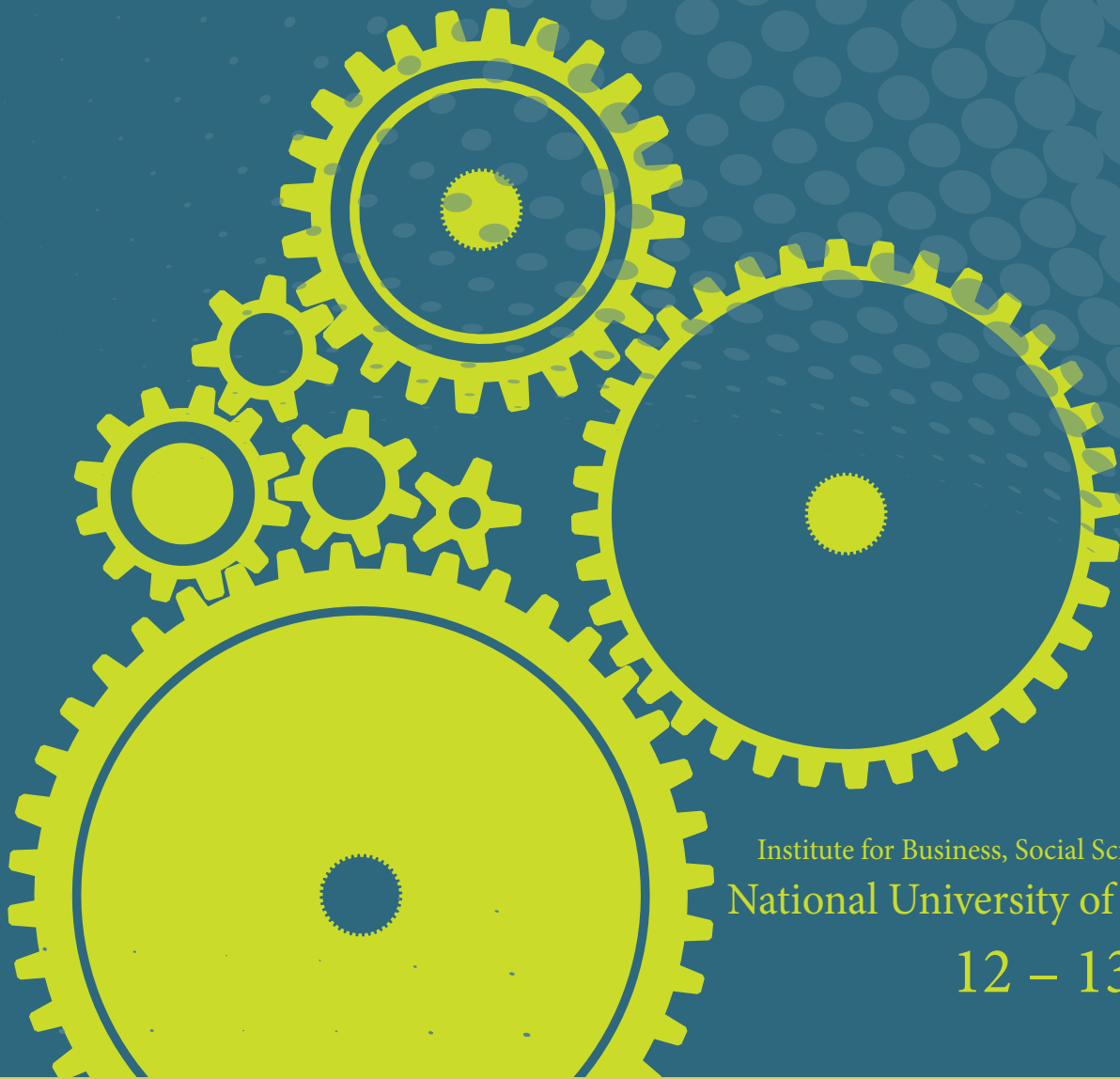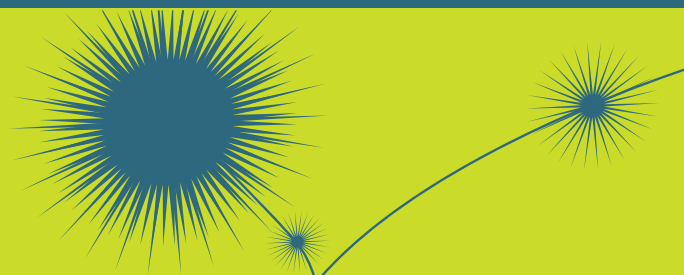# InterTradeIreland
All-Island Innovation Programme
2012 Annual Conference

Exploiting Industry and University Research, Development and Innovation: Why it Matters

Institute for Business, Social Sciences and Public Policy
National University of Ireland, Galway

12 – 13 June 2012

InterTradeIreland
All-Island Innovation Programme

NUI Galway OÉ Gaillimh

UCD DUBLIN

Queen's University Belfast

UCC Coláiste na hOllscoile Corcaigh, Éire University College Cork, Ireland

Book of Abstracts

InterTradeIreland All-Island Innovation Programme 2012 Annual Conference

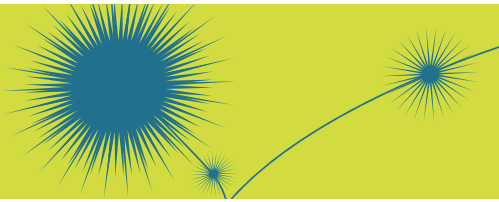## *Exploiting Industry and University Research, Development and Innovation: Why it Matters*

Institute for Business, Social Sciences and Public Policy National University of Ireland, Galway

Tuesday 12 and Wednesday 13 June 2012

This Conference is supported by InterTradeIreland as part of the All-Island Innovation Programme. The InterTradeIreland All-Island Innovation Programme aims to promote and encourage innovation across the island of Ireland. It brings international expertise in innovation to Queen's University Belfast, National University of Ireland, Galway, University College Dublin and University College Cork. Best international practice is shared with business leaders, academics, students, knowledge transfer professionals and policy makers in each region via innovation conferences, lectures, seminars and master classes. The events, which take place in Belfast, Dublin, Galway and Cork each year, are attended by over 1,000 business leaders, policy makers, academics and students from across the island of Ireland. The Programme is organised by InterTradeIreland, Queen's University Belfast, University College Dublin, the Institute for Business, Social Sciences and Public Policy at NUI Galway, and University College Cork.

For further information, please visit www.intertradeireland.com

InterTradeIreland All-Island Innovation Programme

Community of Researchers

The All Island Innovation Programme – Community of Researchers (AIIP-COR) is primarily an initiative to bring together academics and postgraduate students interested in innovation in Ireland.

Our aim is:
To create a virtual community to strengthen innovation studies research in Ireland and its contribution to strategy, practice and policy.

As a way of achieving this aim the Community of Researchers have generated a series of Research Briefing papers which can be downloaded from the InterTradeIreland website (www.intertradeireland.com):

- **AIIP Research Briefing 01:** Nola Hewitt-Dundas and Stephen Roper, *Creating Advantage in Peripheral Regions: The Role Of Publicly Funded R&D Centres*
- **AIIP Research Briefing 02:** Declan Jordan and Justin Doran, *Cross-Sectoral Differences in the Drivers of Innovation: Evidence from the Irish Community Innovation Survey*
- **AIIP Research Briefing 03:** Helena Lenihan, *Improving technology transfer and research commercialisation in the Irish food innovation system*
- **AIIP Research Briefing 04:** Majella Giblin and Paul Ryan, *Tight Clusters or loose networks? The Critical Role of Inward Foreign Direct Investment in Cluster Creation*
- **AIIP Research Briefing 05:** Meghann Drury, Kieran Conboy and Thomas Acton, *Understanding an Agile Software Development Team's Decision Making*

This is an exciting new initiative to establish a community of researchers in the area of innovation studies in Ireland. This is being supported by InterTradeIreland and we would like to invite you to become part of this community.

Membership
The Community is open to academics throughout the world interested in innovation studies however the explicit focus is on innovation in Ireland.

What we define by 'innovation studies'
Innovation studies is defined broadly and includes areas such as knowledge transfer, R&D investment, technology adoption, product and service innovation, organisational and managerial innovation, high performance work teams, social networks, public sector investment in innovation, research and technological development policy and regional and national innovation systems.

Benefits of Membership
- Network of peers involved in research on innovation in Ireland,
- Enhanced knowledge of research on innovation in Ireland that is being (and has been) undertaken by academics,
- A forum for the sharing and dissemination of research therefore avoiding wasteful duplication of research effort, and the more effective targeting of future research efforts,
- Pooling of knowledge on data sources, research philosophy and methodologies – this may include the distribution of data and other material for collective use by members of the Community,
- An information channel on current funding opportunities and the formation of networks of excellence in bidding for research support.
- Sharing of teaching resources and potential to collaborate on teaching and research supervision,
- Critical mass of expertise in innovation studies, greater exposure to an international audience and collaborative opportunities with leading international academics.

Research Student Engagement
The Innovation Community of Researchers encourages research students to take full advantage of this initiative. Indeed, one of its primary aims is to engage with and nurture emerging researchers in the area of innovation studies. The benefits to the Research student community include:
- Providing awareness and access to leading academics in innovation studies, both at interdisciplinary and inter-institutional levels,
- Access to recent research papers in advance of publication in academic journals,
- Links to international networks,
- Training in research skills through the Annual Innovation conference,
- Awareness of post-doctoral research opportunities,
- Information on conferences and opportunities to present doctoral research.
- Is there a membership fee?
- As the Innovation Community of Researchers has been established as a virtual community with support from InterTradeIreland there is no cost to joining.

How to join
If you are interested in joining or would like to discuss this initiative in more detail then please feel free to contact Professor Nola Hewitt-Dundas (Queen's University Belfast, nm.hewitt@qub.ac.uk)

We look forward to welcoming you to the Community!

Table of Contents   Page

Theme 1: Entrepreneurial Education and Scholarship

Theme 2: Innovation Within and Outside Firms

Theme 3: Product and Service Innovation, and SMEs

Theme 4: Innovation: Future Issues

Theme 5: Innovation Strategy and Management

Theme 6: Academic Entrepreneurship and Knowledge Transfer

Foreword

Innovation has become commonly used and accepted word in business and society. It has now taken on a significance for all strands of our society on island of Ireland. Innovation is a critical element of a vibrant economy and society. Despite the current recession, innovative capacity has been evident across business and society on the island. Innovation can be viewed in narrow terms as relating to firms and measured by expenditure on research development. Innovation, however, is much more than financial investments in developing products, services and processes. It is about an open, individual and collective mindset among people in different organisational settings, and the creation of environments for experimentation and creativity that have individual, economic, social and public good outcomes. The continuous challenge we face is how best to exploiting industry and university research development and innovation.

Industry and university research commercialisation is significant and important as it impacts on societies and citizens. We ultimately are the beneficiaries when ideas from universities translate into products or service some in mission critical areas such in the areas of health, environment and security. Some of these ideas emanate from the experience of participating and being in a third level environment – the appropriation of new knowledge, experience and the social aspects of curiosity and the exchange of ideas. While others come from public investment in research and support from many stakeholders in commercializing research that is deliberate and focused on specific needs. Irish researchers are now better placed to be technology leaders and to collaborative with a variety of industry stakeholders in exploring and ultimately exploiting new knowledge. This requires continuous and stable research investment in science, engineering and technology as well as business, social sciences and humanities.

The response for our call of papers for this year's conference was overwhelming and this book of abstracts illustrates the vibrancy of research activity across the island focused on innovation and entrepreneurship. The Community of Researchers provides a focal point for the sharing of research developments with the briefing papers providing broader accessibility to rigorous and cutting edge research.

I wish to acknowledge the ongoing support of InterTradeIreland for the All-Island Innovation Programme and for the hosting of this conference on *Exploiting Industry and University Research, Development and Innovation: Why it Matters*. Furthermore, I want to thank colleagues in Queen University Belfast, University College Dublin and University College Cork for their support in developing this year's conference and to all our speakers. Finally, I wish to thank our Dissemination and Engagement Officer Valerie Parker for her support in organising the conference.

Dr. James Cunningham
Director
Institute for Business, Social Sciences and Public Policy
National University of Ireland, Galway

InterTradeIreland All-Island Innovation Programme 2012 Annual Conference

Exploiting Industry and University Research, Development and Innovation: Why it Matters

**Institute for Business, Social Sciences and Public Policy
National University of Ireland, Galway**

Tuesday 12 and Wednesday 13 June 2012

Day 1, Tuesday 12 June – Schedule

8.45am **Registration (Tea / Coffee)**

9.30am ***Conference Opening and Welcome Address***
Dr. James Cunningham, Director, Institute for Business, Social Sciences and Public Policy, NUI Galway

9.45am ***Keynote Address – Research on Academic Entrepreneurship: Lessons Learnt***
Professor Donald Siegel, *University at Albany, State University of New York*

11.00am **Tea / Coffee**

11.15am ***Parallel Session 1***

Theme1: Entrepreneurial Education and Scholarship

- **Gabriel Costello and Brian Donnellan**, "Advancing Innovation through Engaged Scholarship: The Innovation Value Institute"
- **Roisin Mc Glone**, "Entrepreneurship education for non-business learners!"
- **Joe Bogue and Brian O'Flaherty**, "Student Enterprise as a University Innovation Intermediation Resource – A Comparative Study"
- **Doireann O'Connor**, "What is going on in Ireland's Higher Education Sector: Are we educating for Innovation?"

Theme 2: Innovation within and outside Firms

- **Garry Lohan**, "Decision Making that Influences Operating Environments: An Example from Decision Making in Agile Systems Development Teams"
- **Fearghal McHugh and Thomas Acton**, "The impact of organisational culture on agile decision-making: an industry-academia partnership"
- **Christopher Duke**, "Entrepreneurial Behaviour and the Diffusion of Innovations: Insights from Cultural Evolutionary Theory"
- **Niamh O Riordan, Thomas Acton, Kieran Conboy and Willie Golden**, "Decision-Making In Agile Software Development Teams: Solving the Optimal Timing Problem"

1.00pm **Lunch (Friar's Restaurant)**

2.00pm   *Parallel Session 2*

Theme 3: Product and Service Innovation, and SMEs

- **Pat Daly and Jim Walsh**, "University–Industry Research in the development of the Growth Mapping Process in the entrepreneurial SME: An Irish solution to an international problem?"
- **Sinead Mitchell, Ardawn Lalui and Denis Kearney**, "The FutureSME Framework for Transformation"
- **Jamie Power and Patrick Lynch**, "Towards Developing a Research Roadmap for Service Innovation in Ireland"
- **Linda Ryan**, "Bridging the gap between research and industry in Product Service System development"

Theme 4: Innovation: Future Issues

- **Seamus Grimes**, "Innovation in China: implications for European policymakers"
- **Lawrence Dooley, Eileen Reedy and Breda Kenny**, "Collaborative Innovation in Ireland: Have we embraced the fifth generation model?"
- **Thomas Acton, Chris Coughlan and Martin Hughes**, "A partnership in the cloud: an industry-academia approach to innovative collaboration in pedagogy"

3.45pm   *Parallel Session 3*

Theme 5: Innovation Strategy and Management

- **Paul Anglim, Sandra Ganly, Alma McCarthy, Pat Morgan and Mark Bruzzi**, "Analysis of a recruitment strategy for the formation of cross-functional multidisciplinary teams"
- **Anne Marie Ivers**, "Does a network influence the market orientation capability of Irish Academic Spin out Companies"
- **Archie McIntosh**, "How to get something for nothing - Innovation Management in the Development of Nanotechnology in Ireland"
- **Frank Murray**, "The development of an engineering Knowledge Framework for improved project outcomes"
- **Paidi O'Reilly, David Sammon and Kieran Murphy**, "Designing a Modelling Tool to Support Practitioners in the Design of Effective Innovation Strategies"

Theme 6: Academic Entrepreneurship and Knowledge Transfer

- **Aimee Brennan, Michael Nugent and Linda Reidy**, "Bridging the gap towards effective knowledge transfer between Institutes of Technology and industry"
- **Declan Jordan and Jane Bourke**, "Determinants of basic and applied research outputs from funded research: evidence from a survey of Irish academic researchers"
- **Nola Hewitt-Dundas**, "Research Intensity and Knowledge Transfer Activity: An Insight to the UK University Sector"
- **Diane Boehm, Teresa Hogan and Brian Harney**, "Academic Researchers as boundary spanners in Science to Business (S2B) Knowledge Transfer: A Stakeholder Analysis of Ireland and Germany"

5.30pm   **End of Day 1**

InterTradeIreland All-Island Innovation Programme 2012 Annual Conference

Exploiting Industry and University Research, Development and Innovation: Why it Matters

**Institute for Business, Social Sciences and Public Policy
National University of Ireland, Galway**

Tuesday 12 and Wednesday 13 June 2012

Day 2, Wednesday 13 June – Schedule

10.00am   **Registration (Tea / Coffee)**

10.30am   *Conference Opening and Welcome Address*
Professor Chris Curtin, Vice-President for Innovation and Performance, NUI Galway
Aidan Gough, Strategy and Policy Director, InterTradeIreland

11.00am   *Keynote Address – Economic Growth and Academic Entrepreneurship: Lessons and Implications for Industry, Academia and Policymakers*
Professor Donald Siegel, University at Albany, State University of New York

12.15pm   *Open Innovation: The Legal Implications*
Patricia McGovern, Head of the Intellectual Property Department, DFMG Solicitors

1.00pm   **Lunch and Networking (Friar's Restaurant)**

2.15pm   *Engagement: The Higher Education Landscape Now and the Future*
Dr. Eucharia Meehan, Head of Research Programmes and Capital Programmes, Higher Education Authority

3.00pm   *Interactive Panel Discussion – Industry-University Research, Development and Innovation: Experiences and Insights*

Panel Chair: Michael McAleer, Editor, Innovation Magazine, The Irish Times

Panellists:
- **Brendan Cremen**, Director of Enterprise and Commercialisation,
- University College Dublin
- **Professor Lokesh Joshi**, SFI Stokes Professor of Glycosciences, National University of Ireland, Galway
- **Dr. John McKeon**, Co-Founder and Chief Executive Officer, Allergy
- Standards Ltd.
- **Dr. Paul Brewster**, Chief Technical Officer, Pure Marine Gen Ltd.

4.00pm   *Conference Closing Address*
Dr. James Cunningham, Director, Institute for Business, Social Sciences and Public Policy, National University of Ireland, Galway.

InterTradeIreland All-Island Innovation Programme 2012 Annual Conference

Exploiting Industry and University Research,
Development and Innovation: Why it Matters

Institute for Business, Social Sciences and Public Policy
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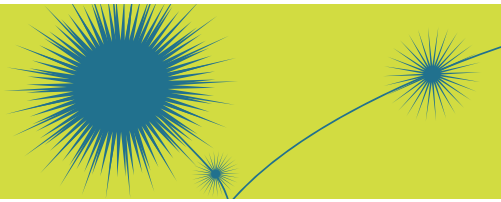
Tuesday 12 and Wednesday 13 June 2012

Speakers Bios

Keynote Speaker

Professor Donald Siegel, University at Albany, SUNY

Professor Donald Siegel is Dean of the School of Business and Professor of Management at the University at Albany, State University of New York, USA. Prof. Siegel also serves as President of the Technology Transfer Society, a non-profit organization devoted to the interdisciplinary scholarly analysis of entrepreneurship and technology transfer from universities and federal laboratories to firms. He received his bachelor's degree in economics and his master's and doctoral degrees in business economics from Columbia University. After receiving his Ph.D., he was an Alfred P. Sloan Foundation post-doctoral fellow at the National Bureau of Economic Research, under the supervision of the late Zvi Griliches at Harvard. He has taught at SUNY-Stony Brook, Arizona State University, the University of Nottingham, RPI, where he was Chair of the Economics Department, and the University of California-Riverside, where he served as Associate Dean for Graduate Studies. Prof. Siegel is an editor of Academy of Management Perspectives and the Journal of Technology Transfer, an associate editor of the Journal of Productivity Analysis, and serves on the editorial boards of Academy of Management Learning & Education, Journal of Management Studies, Journal of Business Venturing, Corporate Governance: An International Review, and Strategic Entrepreneurship Journal. He has also co-edited 30 special issues of leading journals in economics, management, and finance.

Prof. Siegel was recently ranked Number 2 in the world for academic research on university entrepreneurship and Number 760 in the world among academic economists. He has published 96 articles and 6 books on issues relating to university technology transfer and entrepreneurship, the effects of corporate governance on economic performance, productivity analysis, and corporate and environmental social responsibility

in such leading journals in economics, finance, and management as the American Economic Review, Economic Journal, The Review of Economics and Statistics, Journal of Law and Economics, Journal of Financial Economics, Brookings Papers on Economic Activity, Research Policy, Academy of Management Review, Academy of Management Journal, Academy of Management Perspectives, Academy of Management Learning & Education, Strategic Management Journal, Journal of Business Venturing, Journal of International Business Studies, Journal of Management Studies, and Journal of Management. His most recent books are Innovation, Entrepreneurship, and Technological Change (Oxford University Press) and the Oxford Handbook of Corporate Social Responsibility (Oxford University Press). He is currently co-editing the Handbook of University Technology Transfer (University of Chicago Press) and the Oxford Handbook of Corporate Governance (Oxford University Press).

Prof. Siegel has received grants or fellowships from the Alfred P. Sloan Foundation, NSF, Kauffman Foundation, NBER, American Statistical Association, W. E. Upjohn Institute for Employment Research, and the U.S. Department of Labor. He has also served as a consultant or advisor to the United Nations, the National Research Council, the Council on Competitiveness, the U.K., Italian, and Swedish governments, the U.S. Department of Justice, the U.S. Environmental Protection Agency, Chase Manhattan, the Securities Industry Association, Morgan Stanley, Goldman Sachs & Co, Deloitte and Touche, and the National Association of Manufacturers. Professor Siegel was a member of the Advisory Committee to the Secretary of Commerce on "Measuring Innovation in the 21st Century Economy" and a member of Governor David Patterson's Small Business Task Force. He is co-chair of the National Research Council Committee on "Best Practice in National Innovation Programs for Flexible Electronics" and an advisor to the National Research Council on the Small Business Innovation Research (SBIR) Program. Prof. Siegel recently testified before the House Committee on Science, Space, and Technology regarding re-authorization of the SBIR program.

Dr. Paul Brewster, Pure Marine Gen Ltd.

Dr. Paul Brewster is a Chartered Engineer with over fifteen years of experience on offshore renewable energy projects, technology development and research. Paul is co-founder of Pure Marine, where he leads the company's Engineering team on a range of projects that address the major challenge facing the growing marine energy industry – how to produce more energy at a lower cost.

After completing his PhD at Queens University on modelling wake effects of underwater turbines, Dr. Brewster designed dynamic subsea systems on offshore Oil & Gas projects. This Research and Engineering experience has been key to the emergence of Pure Marine in this exciting sector.

Brendan Cremen, University College Dublin

Brendan Cremen was recently appointed as Director of Enterprise and Commercialisation at UCD and is based in NovaUCD, where he is responsible for developing the commercialisation and business partnership agenda in the University. Prior to this, Brendan was Director of Technology Transfer at UCC for 5 years, establishing the technology transfer capability and the campus company incubation facilities there. Brendan graduated as an Electronics Engineer from UCC and from 1981 to 1993 he worked in the US in various product development and senior management roles, most specifically with Lattice Semiconductor from founding through IPO. He returned to Ireland in 1993 and worked in Xilinx Ireland from its launch building the R&D capability across all aspects of the business.

Professor Lokesh Joshi, NUI Galway

Professor Joshi is the Stokes Professor of GlycoSciences at National University of Ireland Galway, Ireland. He has a PhD in Biological Sciences and Biochemistry from Bath University, UK. He completed Post-Doctoral and Research Associate experience at Cornell University, Ithaca, New York. He was an Associate Professor (tenured) in the Department of Bioengineering and Director of Center for Glycoscience and Technologies in the Biodesign Institute at Arizona State University. Professor Joshi co-founded a biotechnology company, Arizona Engineered Therapeutics, which was acquired and the products are currently in FDA clinical trials. Professor Joshi has published over 60 articles and book chapters. He is the Director of SFI funded Alimentary Glycoscience Research Cluster and is the Coordinator of 'GlycoHIT' an FP7-Health funded consortium. His laboratory focuses on the role of glycoscience in health and diseases.

Michael McAleer, The Irish Times

Michael McAleer is the Editor of the Innovation Magazine at The Irish Times. He was previously the Special Reports Editor at the newspaper. He is a graduate of University College Dublin and Dublin City University.

Patricia McGovern, DFMG Solicitors

Patricia McGovern is Chairman and Head of the Intellectual Property Department and the Corporate and Commercial Department at DFMG Solicitors. Patricia has practised in almost all areas of corporate and commercial law. She has considerable expertise in the buying and selling of private companies, public listings both in Ireland and the UK, rights issues, public offers, competition law, pensions and general strategic commercial advice. In her 20 years of practice she has acted in a significant number of high profile acquisitions and public listings and takeovers.

Patricia advises on all aspects of intellectual property law. She is regarded as one of the leading intellectual property lawyers in Ireland and has consistently been highly recommended by many organisations such as 'The Legal 500' for many years. She has considerable experience in advising on brand strategies, protection strategies for patents, trademarks, designs and copyright, from prosecution to registration of trademarks and designs before the Irish Trade Marks Office and the Community Trade Marks & Designs Office, the exploitation of intellectual property rights including licensing arrangements, and on all contentious aspects in intellectual property to include trade mark, copyright and design infringement actions, passing off actions, anti-counterfeiting actions, patent infringement actions, actions for invalidity of patents and for declarations of non-infringement.

She also deals with all aspects of franchising, data protection and the competition aspects of intellectual property. In addition, she has extensive experience in dealing with issues affecting e-commerce and the internet, all aspects of technology agreements, all types of media contracts and the intellectual property aspects of employment.

Dr. John McKeon, Allergy Standards Ltd.

John is a serial entrepreneur, currently involved in his third successful start-up. He qualified in Trinity College Dublin, is a Fellow of the Royal College of Surgeons in Ireland and also holds his United States Medical Licensing exams.

John is currently CEO of Allergy Standards Ltd, an international standards and product certification body, working with the Asthma and Allergy Foundation of America and big brands such as Disney, Dyson and LG. John is passionate about entrepreneurship, researching the habit patterns of successful entrepreneurs and mentoring other start-ups.

John graduated first in his class from the Hothouse Programme with a Post Graduate Diploma in new business development and also won the Docklands Innovation Park innovation awards sponsored by the Sunday Business post. He graduated with distinction from the DIT business school with a post graduate diploma in International Selling.

John is a member of the Institute of Directors and a frequent guest speaker at business events. Recent speaking events include the Dublin University Business School, Small Firms Association, the Hothouse program graduation awards as well being a judge at a Ryan Academy of Entrepreneurship business competition.

Dr. Eucharia Meehan, Higher Education Authority

Dr. Eucharia Meehan is Head of Research Programmes and Capital Investment at the Higher Education Authority (HEA), the statutory planning and development body for higher education and research in Ireland. Recently she has been appointed the Interim Director of the Irish Research Council, the Council having been established by the Minister for Research and Innovation Mr. Sean Sherlock T.D. in late March 2012.

Since joining the HEA in late 2001, Eucharia has played a key role in policy formulation and strategy development in the higher education and research domain. She is a member of national and international committees, her most recent appointment being to the Prioritization Action Group chaired by Minister Sherlock. She is the Director of the Programme for Research in Third Level Institutions (PRTLI) which has, since its inception in 1999, allocated over € 1.2 billion of Exchequer and non-Exchequer funds to develop strategic research infrastructure and capacity.

Prior to joining the HEA, she was a member of the management team at Elan Biotechnology Research (EBR), specifically as Head of Programme Management with responsibility for sites in Ireland and the USA. In that role she had particular responsibility for the management of formal business collaborations between the EBR and other external third parties. EBR was awarded a National Innovation Award in 2000.

Eucharia holds a PhD in Pharmacology (Neuropharmacology) from NUIG, in addition to a number of postgraduate management, accounting and finance qualifications. She is a former chair of Women in Technology and Science (WITS), the national group which promotes the participation of women in science, engineering and technology, and a former member of the board of the Broadcasting Complaints Commission of Ireland. Currently she is a member of the boards of the National Institute for Bioprocessing Research and Training (NIBRT), and the School of Cosmic Physics in the Dublin Institute for Advanced Studies (DIAS).

Theme 1

Entrepreneurial Education and Scholarship

Student Enterprise as a University Innovation Intermediation Resource – A Comparative Study

Dr. Joe Bogue, Department of Food Business and Development, National University of Ireland, Cork. Email: j.bogue@ucc.ie
Dr. Brian O'Flaherty, Department of Business Information Systems, National University of Ireland, Cork. Email: BOFlaherty@AFIS.ucc.ie

Background

This study examines Third level student teams as potential innovation intermediaries, a resource that can play a significant role in advancing the commercial exploitation of technology within Universities. Howells (2006) defines the innovation intermediary as "*an organisation or body that acts as an agent or broker in any aspect of the innovation process between two or more parties.*" Innovation intermediation refers to a range of functions in innovation processes, such as scanning, knowledge creation, testing, validation and commercialisation.

Aim of the Study

The aim of this research was to investigate the innovation intermediation role of IS and Food student enterprise teams for the exploitation of University and Industry research.

Methodology

A comparative case study of two separate innovation programmes was undertaken with historic longitudinal data collection: MBS (Information Systems) and BSc Food Business. Data sources included: business plans, learning journals, cross-case comparisons and student interviews. Data analysis was completed using the NVivo programme.

Findings

Students played an important role as innovation intermediaries linking ideas with technical specifications and identifying routes to market. Across IS and Food domains, contemporary issues were significant sources of ideas, as were ideas generated from University sources/IP which indicated the close link between project supervisors and research groups. Data revealed that IS liaisons with research groups were less consistent and more diversified than those in the Food domain. Analysis of innovation intermediation identified three intermediary roles: 1) External scanning, 2) University/Technology IP Liaison and 3) Creative scanning. Sources of innovation in student enterprise as External Scanning Intermediaries were ideas that centred on new technologies or social issues such as social media, radio frequency identification (RFID) or health and wellness foods. Both groups sourced ideas from industry needs and/or external firms and also acted as University/technology IP liaison intermediaries. Examples of intermediation included: Food teams exploited IP in functional foods and IS teams applied wireless sensor network (WSN) technology to medical and energy applications, such as geriatric remote living support and wireless vital signs monitoring in emergency settings.

Conclusions

This research revealed that university programmes played an important role in innovation intermediation and fostered an innovation culture. The innovation contributed to a number of business start-ups, development of IP and patents. The three enterprise intermediary roles

identified from this research, consistent with the literature (Tietze, 2010), existed in two distinct and independent entrepreneurship programmes, which could be categorised as high-tech versus low-tech. Future research could focus on the student experience relative to the intermediary roles and future cross-case analysis will validate the understanding of these roles.

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Advancing Innovation through Engaged Scholarship: The Innovation Value Institute

Dr. Gabriel Costello, Galway-Mayo Institute of Technology, Galway.
Email: gabrielj.costello@gmit.ie
Professor Brian Donnellan, National University of Ireland, Maynooth.
Email: brian.donnellan@nuim.ie

The Innovation Value Institute (IVI 2011) provides an Irish example of practitioner-academic engagement that has a global reach. The Institute was co-founded in 2006 by the National University of Ireland Maynooth, (NUIM) and Intel to help drive the transformation of IT management. The IVI Consortium draws from a peer community of over seventy Academic Institutions, Partner Organizations and End-Users (from both the Public and Private Sectors). Furthermore IVI is a response to the enduring call for the academic community to ground its research (Ågerfalk 2010; Goldkuhl 2012) and adopt practice orientated approaches (Costello et al. 2011; Mårtensson and Lee 2004). The aim of the IVI is to facilitate a collaborative community of like-minded peers committed to investigating, advancing and disseminating the frameworks, tools and best practices associated with managing IT Value and IT enabled Innovation. IVI is currently focused on the development and distribution of the IT Capability Maturity Framework (IT-CMF) which maps IT organizations onto a capability maturity curve based on empirically derived industry best practice across 33 different capabilities within IT management

Van de Ven (2007) describes engaged scholarship as a participative form of research for obtaining the views of key stakeholders to understand a complex problem By exploiting differences between these viewpoints, he argues that engaged scholarship produces knowledge that is more penetrating and insightful than when researchers work alone. Engaged scholarship has a number of facets:

- a form of inquiry where researchers involve others and leverage their different perspectives to learn about a problem domain
- a relationship involving negotiation, mutual respect, and collaboration to produce a learning community
- an identity of how scholars view relationships with their communities and their subject matter

In Van de Ven's view, you can increase the likelihood of advancing knowledge for science and practice by engaging with practitioners and other stakeholders in four steps;

a) Grounding the problem or research question in a real-world scenario.
b) Address the situation by developing a range of theories
c) Collection of evidence
d) Application and dissemination of the findings

Applying the principles of engaged scholarship (Mathiassen and Nielsen P. A. 2008; Van de Ven A.H. 2007), innovation is being investigated in the IVI using a design process with defined review stages and development activities based on the Design Science Research guidelines advocated by Hevner, March, Park, & Ram (2004). During the design process, researchers participate together with practitioners within research teams to capture the views of key domain experts. The Innovation Capability Maturity Framework extends directly the

approach proposed by the Information Technology Capability Maturity Framework (IT-CMF) as described in associated publications (Curley 2004; Curley 2006; Curley 2007).

In summary, many organizations today are struggling to accurately capture or manage the true value from their IT investments. Furthermore, organizations are demanding that their IT Capability better support or drive innovation within the organization. The Innovation Value Institute is responding to this challenge by merging practice oriented research concepts with in-depth field studies of organisational transformation.

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Entrepreneurship Education for Non-Business Learners! - A Synthesis of the Key Elements Required to Develop an Entrepreneurial Ecosystem in Higher Education Institutions which will Create Entrepreneurial Graduates.

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Traditionally, access to entrepreneurship education for non-business learners in Irish higher education institutions has been diffuse and sporadic Entrepreneurship Education in Ireland: Towards Creating the Entrepreneurial Graduate (2009). Locating entrepreneurship education in the business school, developing a business plan exclusively for business learners was the recognised pathway for potential entrepreneurial graduates, providing limited access opportunities for non- business learners. Such concepts and skills were not evident in the curriculum of humanities and the social sciences, until recently.

This discussion research paper wishes to explore this issue. It will analyse the key elements required to develop the entrepreneurial ecosystem necessary to create entrepreneurial graduates from a non-business discipline. Entrepreneurship education for non-business learners is a developing paradigm, with limited examples of literature, theory and best practice exemplars available. It is therefore important that this area of research is explored to determine the optimum theoretical, philosophical and policy framework to support the creation of this entrepreneurial ecosystem. This discussion paper contributes to a limited body of knowledge and discourse surrounding this topic and is a preliminary stage of an action research project known as "Innovation and Creativity in Humanities" developing Entrepreneurship skills in the Early Childhood Care and Education graduate.

What is going on in Ireland's Higher Education Sector? Are We Educating for Innovation?

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Many of the World's once economically prominent countries are struggling in the grips of recession. Ireland is trying to fly her flag in this brave new world, claiming innovation as a key player in the recovery of her economy. Creativity, ambition and invention have historically been the foundations of each society, only to be uncovered and once again hailed as that upon which we build, when the rubble of an economic collapse has been lifted (Neville 2010). It is a new beginning when policy makers recognise the raw wealth that is social and human capital. Only then can the borderless expansion of the individual's imagination become the road map for future developments (Neville 2010). Innovation is the creative process of maximising new ideas. It most often begins its ascent in the education sector. Every level of the education sector has its role to play in this task but the higher education sector has a special and important role in educating for innovation.

Universities have become the centre of the knowledge economy, or to be more correct, have become the third side of the steely triangle of government and industry, in a new form of social partnership (Kenny et al, 2009). This article examines higher education in Ireland, through the various initiatives of innovation that are exercised in its numerous Institutes of Technology (IT's) and Universities. The literature on innovation and educating for innovation is reviewed, definitions explored and the application of educating for innovation practices in Ireland's higher educational sector investigated. Clear conclusions are reached on Business and Technological Innovation, Service Learning and Community/Industry Links as well as Teaching and Learning Strategies to develop the innovation skill set. Recommendations for how to progress the innovation agenda within Ireland's HEI's in 2012 and beyond are made.

Theme 2

Innovation Within and Outside Firms

Entrepreneurial Behaviour and the Diffusion of Innovations: Insights from Cultural Evolutionary Theory

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Cultural evolutionary theory – viewing human culture as a Darwinian evolutionary system – allows us to link individual-level behaviours with population or society-level phenomena (Paciotti et al. 2006). In this paper I review research into entrepreneurial behaviour and the diffusion of innovations in the light of recent advances in cultural evolutionary theory. I begin by providing a brief overview of current research into cultural evolution that has its origins in the academic disciplines of archaeology, anthropology and psychology and uses the tools and techniques that biologists employ to study biological evolution (Mesoudi 2011; Bentley et al. 2011; Richerson & Boyd 2004). I then examine entrepreneurial behaviour and the spread of innovations within a cultural evolutionary framework in order to demonstrate how cultural evolutionary theory can provide new insights in these areas. Based on this examination I provide some practical advice for entrepreneurs and business leaders who wish to alter their marketing and innovation strategies to take advantage of research in this area.

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Making Decisions that Influence Operating Environments: An Example from Decision Making in Agile Systems Development Teams

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Management literature continuously stresses the importance of utilising employee knowledge and know-how to rapidly respond to changing customer requirements and increase an organisation's flexibility when operating in turbulent market economies. Recent management accounting innovations seek to enable this required flexibility while maintaining control through specifically designed management control models. One such model is the Beyond Budgeting model which seeks to replace centrally controlled, pre-determined goals with self-regulating, relative competitive benchmarks and to transfer power and decision making authority from the centre of the organisation to the front line.

In this paper we use the Beyond Budgeting model as a lens through which to examine decision making within software development teams. Specifically we explore decision making in seven agile systems development (ASD) teams within two large multinational organisations. ASD is a systems development methodology which was introduced in the early 2000s as a response to the increasing need for flexibility within the software development community. ASD teams operate in a flexible operating environment and are expected to continuously respond to changing customer requirements throughout the systems development lifecycle.

Through in depth case studies we examine the level of decision making rights assigned to ASD team members and explore how these decision making rights influence the functioning of the ASD team. Our findings suggest that decision making practices can be divided into two categories; internal decisions that the team members make regarding their daily work practices and external decisions made by functions external to the team such as human resources, finance and strategic management. We find that both decision categories have an impact on team practices. Internal decisions directly influence teams' behaviour through their daily operations while external decisions have an indirect influence on team behaviour through their impact on team dynamics. For example, internal team decisions such as prioritisation of tasks for short-term planning and goal setting or the frequency with which the team demo their product to the customer determine which tasks team members focus on during a typical four week development phase. External decisions such as the hiring of a new team member, the reward structure or the project budgeting process also influence the intrinsic behaviour of the team members by determining the operating environment and boundaries within which the team functions.

We discuss the different decisions that influence the team and explore how team members react to decisions they make themselves and decisions imposed upon them from upper management. We also discuss the potential paradox of seeking an empowered and enabled workforce while trying to ensure this workforce make decisions which are complementary to both higher level decisions and the strategic aims of the organisation.

Keywords: Decision Making, Systems Development, Teams, Management Control

The Impact of Organisational Culture on Agile Decision-Making: an Industry-Academia Partnership

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The last 10 years or so has seen the emergence of a number of team-based agile systems development (ASD) methods to develop software products. Agility as a software development concept and method is multifaceted and contextual, and agility is achieved through different means depending on the project environment. Decision making intensifies using agile methods: factors affecting decision making in agile teams can be understood from an organisational cultural perspective. Indeed volatile business environments require decision making and communication that is fast and emergent: agile software development has been adopted to respond to such business environments. For this type of decision making to be successful, it requires communication methods, processes, systems and structures that deliver the required and oft changing outcomes in software development.

Feedback to agile development teams is critical in a dynamic environment. Deal and Kennedy (BPP, 2011), in their cultural model, suggest that the culture arises as a result of the speed at which feedback and reward is received after team members have done something and the level of risk they take. McKinsey (BPP (1), 2011) identifies the elements that when combined define the culture of the team and therefore the decision-making environment. The cultural environments in which teams operate contribute to the culture of the team. It is currently unclear how organisational cultural characteristics affect decision-making.

The study will identify key elements required for decision making within agile systems development from an organisational cultural perspective. The aim is to develop a framework that includes characteristics of the cultural environment, which influence decision-making activities in agile teams, and to explore impacts on agile decision making.

A quantitative study is proposed on behaviours influenced by culture and its effects on decision-making. This will be developed through key partnerships and industry contributors, namely Storm Technology, Information Mosaic, & Lumension. It is envisaged that the data will initially indicate which software tools are employed on agile teams at various stages of a project and which software tools could be used effectively in decision making throughout the agile process, as a focus on one component of the cultural web of influencing elements. Subsequently, it is intended that a decision support system/method as a new creation or a culmination of existing software tools could be developed which attempt to consider the cultural influences on decision-making. Contributions will focus on how to ensure appropriate consideration of the cultural factors, such as systems, style, and skills in agile development to help establish an appropriate mix when creating an environment for agile teams.

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Decision-Making in Agile Software Development Teams: Solving the Optimal Timing Problem

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Agile methods are a recent but widely diffused innovation in Information Systems development (ISD). Agile methods call for the creation of organic, flexible and empowered teams who work in active and close collaboration with customers over a series of rapid development iterations. Agile methods can deliver productivity and quality gains by improving task prioritisation, design flexibility, and communication and coordination within and across teams. However, teams must overcome a range of obstacles if these advantages are to be realised. In particular, decision-making in agile settings is challenging, decentralised and pluralistic, frequent and short-term, dynamically complex (decisions are highly inter-related), time and resource constrained, often unstructured, and minimally documented. As such, there have been repeated calls for research on decision making in agile settings.

Partnering closely with industry partner companies, our proposed study builds upon the findings of a set of pioneering studies on agile decision making carried out at NUI Galway (cf. Drury *et al*., 2011a, 2011b, 2012; see also Maurer and Zannier, 2007) that suggest the need to focus future research efforts on decision making processes in agile teams. It is also informed by the results of a preliminary focus group (carried out in December, 2011), which identified temporal problems as one of the main barriers to success in agile software development. In particular, this study addresses the following research question: how can agile teams optimise the timing of decision-making tasks?

The study employs a sequential mixed methods approach to answer this question. The first phase of the study is designed to generate a rich understanding of the temporal dimensions of decision-making processes in agile teams. This component of the study will include, for example, an analysis of the *speed* at which individual decisions are made in agile teams, the overall *tempo* or velocity of decision making processes in agile teams, and coordination or *timing issues* in decision making in agile teams. The second component of the study is a quantitative, survey-based investigation of relationship(s) between the temporal dimensions of decision making and decision quality in agile settings.

We anticipate that the study will contribute to research on agile methods by presenting much-needed empirical data on how decisions are actually made in agile settings. At the same time, its findings will be of significance to the broader field of decision support, as they will identify best practices for supporting decentralised decision-making in dynamic contexts. Perhaps most crucially from the perspective of this conference, its findings will be

immediately applicable to agile practitioners wishing to improve team performance by optimising decision-making processes.

Theme 3

Product and Service Innovation, and SMEs

University–Industry Research in the Development of the Growth Mapping Process in the Entrepreneurial SME: An Irish Solution to an International Problem?

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In Ireland and many other countries the need to grow and support the creation of new dynamic, high-performance indigenous firms is a constant feature of industrial development (Bridge, O'Neill and Cromie, 2003). Assisting their growth is regarded as crucial to economic regeneration and creates a compelling case for supporting these firms - which is why enterprise agencies are tasked to ensure a constant supply of such firms for the 'enterprise' market (O'Gorman and Cooney, 2007).

To enable the supply of effective and robust new firms, the ability to validate and appraise the entrepreneurial idea or proposal becomes a critical business episode for the entrepreneur and the enterprise advisor/investor. This validation has traditionally revolved around the business plan process (Delmar and Shane, 2003) and in this way the business plan has acted as a proxy for entrepreneurial thinking. However, the fact that entrepreneurial thinking tends to operate on a high 'assumption to knowledge' ratio (MacGrath and McMillan, 1995) has been by-passed in much small business planning and validation activity - which remains a largely practice-led process.

Recent research has begun to consider the entrepreneurial business model as acting as a proxy for the business plan. (Brown and Proudlove, 2009; Osterwalder & Pigneur, et al, 2009). This consideration of the business model as a visual connection between entrepreneurial cognition and business practice goes beyond what traditional business plans traditionally emphasise and potentially offers unique opportunities for the entrepreneur/owner-manager and policy-maker/advisor. This 'visualisation of the business system' is increasingly evident across other mapping frameworks such as the Balanced Scorecard and the Strategy Map (Kaplan and Norton 2004) which introduced attempts to more readily identify the linkages between business planning and strategy. These frameworks fail to incorporate the foundational entrepreneurial assumptions directly into the visualisation process, however. The literature also reveals that, although assumptions are well recognised, especially across organisational growth and development studies, they do not appear to have migrated to the SME business literature.

This paper argues for this migration. It suggests entrepreneurial assumptions can be used to bridge managerial cognition and organisation practice in ambitious small and medium-sized firms. It presents this case by introducing the concept of 'Growth Maps' - a new mapping/visualisation technology based on the extension/integration of Drucker's Theory of the Business (1994) and Osterwalder's Business Model Canvas (2009). The paper presents recent field research in the growth-oriented SME and outlines a number of case studies which demonstrate how assumptive-based 'Growth Maps' successfully challenged entrepreneurial thinking leading to enriched organisation practices and outcomes. Implications for the incorporation of growth maps in the business advisory, planning and investment contexts are outlined and discussed.

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The FutureSME Framework for Transformation

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Background

futureSME is an €8million 7th Framework EU research project involving 26 partners from eight countries, including SMEs, academia, consultants, networks and agencies. To ensure that the outputs are of practical benefit to SMEs, 50% of the partnership is comprised of small companies from a range of industrial sectors and of varying levels of maturity.

Aim of Study

The objective of futureSME is to develop a practical new business model for manufacturing SMEs, to help them compete successfully nationally and globally.

Methodology

Throughout the project, the SME group have evaluated the results of all development activities to ensure that they are of practical value.

Research was carried out on a worldwide basis into evolving best practices for the development and support of small companies. This research was accompanied by practical analysis within the partner SMEs. Arising from this, an architecture was developed to model the SME of the future. This architecture was deployed as a Transformation Process, with supporting tools and training. The transformation process was tested in partner companies and also externally. Resulting from this, the transformation process was refined repeatedly in order to make it more robust.

Findings

futureSME has identified four key capabilities, which are developed on a continuous basis while the transformation process is being implemented. These are:-

- *Managerial:* Ensuring excellent Management at all levels, including personal, team and organisational leadership.
- *Strategic:* Having a systematic, visual and widely shared approach for business analysis and deployment within the organisation.
- *Operational*: The seamless integration of strategic goals into plans, measures and activities to implement improvements at an operational level, which deliver the overall ambitions of the organisation.
- *Adaptive*- Having the ability, across the organisation, to identify and react to potential opportunities in the business environment.
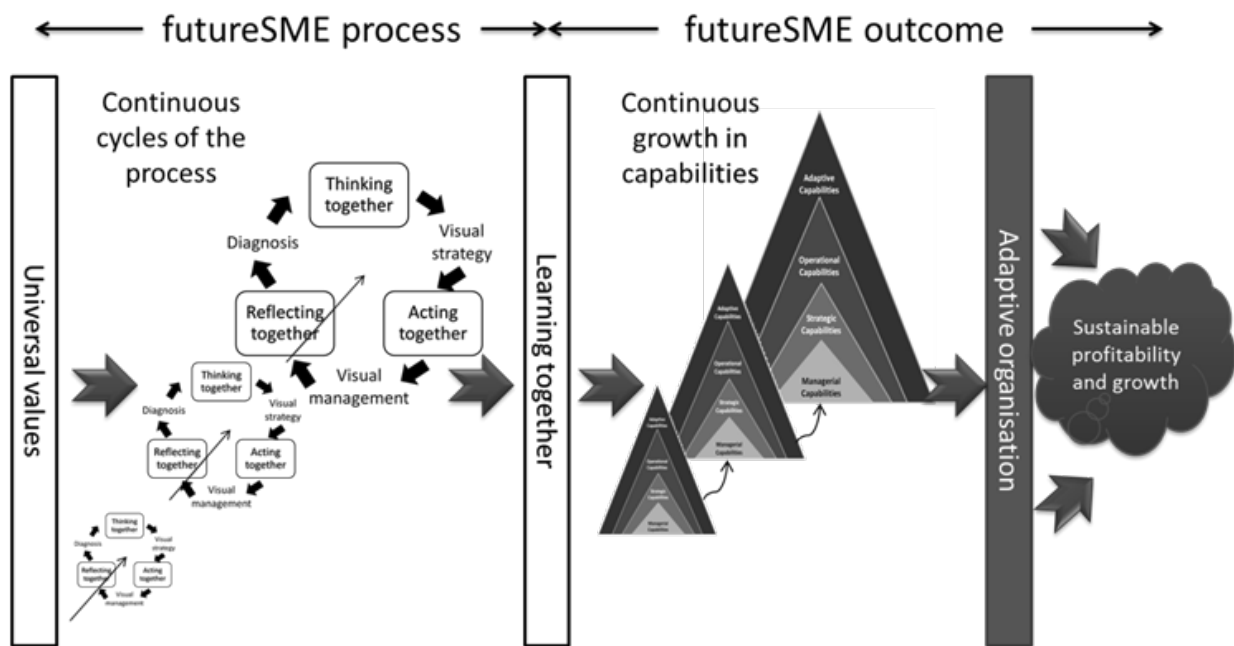
Figure 1: The FutureSME Framework for Transformation

Conclusions and Implications

The futureSME Transformation Process enables an organisation to learn by thinking, acting and reflecting together in an open and inclusive working environment. This unique process is designed specifically for small companies.

- It helps companies to examine how they carry out business processes, both from a strategic and operational perspective.
- It seeks to change organisation culture, such that "thinking as one brain" becomes mainstreamed. This involves getting all teams aligned towards common goals in an environment of respect and trust.
- It recognises the difficulty which companies face in trying to change. It promotes a virtuous cycle of improvement, where each cycle builds on the positive results from the previous cycle.
- It strongly promotes the use of visual tools both for strategy management and operational management, with the goal of including all relevant personnel, not just management.
- It teaches a company how to become "adaptive" and prepare itself to take advantage of potential opportunities in the wider marketplace.

Towards Developing a Research Roadmap for Service Innovation in Ireland

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The systematic development, design and testing of new and/or improved service offerings, processes and business models, i.e. service innovation, represents a timely and relevant growth area transcending European and Irish innovation and socio-economic recovery strategies. However, research into the development and practice of service innovation vis-à-vis product innovation, is a relatively emerging domain and is at best characterised as emerging and fragmented. The existing body of research knowledge is derived largely from product innovation and fails to provide concrete processes by which to embed service innovation at the firm-level. Hindered by a lack of integrative theoretical and supportive framework models, success rates for service innovation are low and there is a lack of tailored instruments and tools for planning, designing and developing service innovations which has significant implications in terms of industry awareness, deployment and impact. Additionally, it has been well documented that innovation policy and supports have not been well attuned to service innovation, particularly as current framework mechanisms are predominantly biased towards technological and product innovation.

Reflective of this, The European Expert Panel on Service Innovation has recently identified that the key underlying challenge facing Europe is the development of a coherent policy framework that enables and supports the transformative and horizontal cross-cutting economic potential of service innovation. Therefore, to underpin Ireland's emerging service innovation agenda, informed research is required to address the underlying challenges that exist at policy, research and industry levels. Through a combination of desk research and semi-structured interviews with key stakeholders within Ireland's innovation ecosystem, a range of challenges and action points relating to Ireland's engagement and potential to exploit service innovation at policy, practice, research and education levels are surfaced. Moreover, the study subsequently proffers a responsive research roadmap, informed by EU best practice, as a starting point to stimulate further research developments within the field. Accordingly, the research impacts and has implications at various stakeholder levels, most notably in terms of informing policy development through evidence based research, prioritising applied and academic research gaps and challenges and also signals the need to prioritise industry awareness and practice of the discipline.

Bridging the Gap between Research and Industry in Product Service System Development

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Background

The defining lines between product and service are becoming increasingly blurred[1]. The importance of services is increasing within manufacturing companies. Companies seeking to meet customer expectations and requirements with personalised, flexible and increasingly comprehensive solutions must convert their product strategies into product and service strategies or Product Service Systems (PSS). In response, numerous models have been developed which aim to effectively integrate product and service development processes and ultimately create a successful PSS offering.

However, there is a gap between industry and academia developed PSS models in relation to the understanding, approach and implementation of PSS strategies.

Aim of Study

This study aims to gain a better understanding of the contrast between academic and industry approaches to PSS strategies, the rationale for the contrast in approach and the inhibitors to the wide scale application of academically developed PSS models.

Methodology

The study began with an in-depth comparison of academically developed PSS models. In addition, two industry service experts were interviewed in relation to their experiences in facilitating the transition of traditional manufacturing companies to PSS and their approaches and processes in its implementation. Companies were asked to map their approach into a representational model. Academic and industry models were then compared and contrasted in relation to their approaches, focus and fundamental requirements for implementation.

Supplementary to this, eight companies were selected for interview in relation to their current development processes, opinions, understanding and experience of PSS. This was provided a context in which the models were to be implemented and a deeper understanding of cultural and pragmatic barriers to the implementation of a PSS strategy.

Findings

The rational for the different approaches can be heavily related to the models context of application. Academically developed models have a higher level of definition in relation to the aims of the model prior to implementation. The area of research is focused on the implementation and short term results in order to validate the model. Industry developed models have a wider contextual approach to PSS, quantifying outputs to justify implementation, accounting for elements within the company(e.g. existing processes, staff reluctance to change), capturing the results of the new strategy and creating feedback loops to create a cycle of PSS based innovation. Focus is on long term financial results. The driving factors behind these differences will be discussed in more detail in the extended paper.

Conclusions and Implications

Justification, pre-existing barriers, breath of focus and long term return should be taken into account in order for academic models to be effectively implemented. Industry should be aware of new developments within academia which could substantially improve their PSS models.

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Theme 4

Innovation: Future Issues

A Partnership in the Cloud: an Industry-Academia Approach to Innovative Collaboration in Pedagogy

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Ensuring that students graduate from universities with career-focused and employment-related qualifications and skills is a central concern for educators, and a vital issue for employers across a range of industry sectors. An ever-increasing number of jobs require and necessitate advanced skills levels and abilities in information and communications technologies (ICT). Technological change is fast and evolving, with continuing new and emerging job opportunities. One particularly topical and rapid growth area of ICT is cloud computing. Identified by the Irish Government, Forfás and the IDA as one of the best potential high-value growth areas for Ireland, and a vehicle for future jobs, cloud computing is set to provide a new generation of infrastructure, services and solutions for businesses. Indeed businesses whose primary focus is not necessarily ICT per se, are recognising the potential for cloud technologies and services to offer new ways of doing business, new business value, and new approaches to work. Although offering a great many advantages for both businesses and individuals, from a societal perspective, cloud computing brings with it a number of potentially impactful issues, such as privacy, security, and trusting remote machines to store data. It is clear that these aspects of cloud computing provide a number of areas requiring further research as to their potential, from new business models to sustainability of cloud-based services, and the viability of globally-accessible cloud-based applications and facilities to business, individuals and society.

To address these aspects, NUI Galway, together with Hewlett-Packard's Worldwide Cloud Services Innovation Centre have created a new innovative and international masters degree programme of advanced research on cloud computing and services. Available in both one-year full- and two-year part-time modes, the programme is a fundamental and critical support component in developing and sustaining Ireland's smart economy, and in the creation of high value employment. The programme is structured to be very favourable to distance learners: indeed on-site presence is minimal, requiring just two weeks per year. Scheduled for implementation in September 2012, the degree provides a vehicle for persons working with cloud technologies and services in a variety of industries to obtain an accredited qualification recognising their skills, and also provides an avenue for existing graduates to extend their qualifications through a masters degree. It is this latter route that also facilitates a flow of such graduates into cloud-related jobs. From its launch in March 2012, initial interest has been very strong, is primarily focused on the part-time mode. There is heavy interest from persons working in both ICT- and non-ICT related industries, and also from existing undergraduate students. In its initial year, the degree programme seems to have found favour amongst its target audiences, and would indicate that innovative leading-edge collaborations between academia and industry can bear immediate fruit for all stakeholders, industry, universities and society.

Innovation in China: Some Lessons for European Policymakers

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Much has been written about the relationship between foreign investors and the state and it is a useful context in which to consider the recent evolution of China's innovation policy. To some extent the relatively new policy of 'indigenous innovation' from 2006 onwards is a reaction or response to China's experience with FDI during the past 30 years. The earlier policy was based around the expectation of technology transfer from foreign to domestic companies in exchange for market access. During this early period of China's opening, many foreign multinationals were very successful in China in sectors such as telecommunications, for example, since they faced very little competition from Chinese companies. In the meantime, a number of very successful Chinese companies have emerged and created considerable competition for multinationals, not only within China, but globally.

The new policy of indigenous innovation appears to be a much more aggressive attempt to ensure the development of Chinese-owned technology in the medium term. An important driver for this policy is the realization that China must develop a more sustainable economic model, and move up the value chain from being a mere low-cost manufacturing centre. It is not surprising that after a long period of sustained economic growth that China would focus more on indigenous innovation. Most countries that have had a high level of dependency on FDI-related foreign technology, realise that it is very difficult to acquire enduring benefits without ownership of core intellectual property. Expectations relating to technology spillovers to domestic firms can prove disappointing. The Chinese strategy of insisting on joint ventures between foreign and domestic firms in the early stages of FDI in China does not appear to have resulted in significant technological benefits to local firms. This is not too surprising, since the MNC model, even when it involves offshoring of R&D activity to China, does not envisage sharing IP with competitor firms. The key motivation for many foreign firms investing in China is to benefit from Chinese talent and the local market.

What is happening in China in recent years has some similarities to what happened in other late developing countries, but there are also some significant differences which have implications for both China and also other major world regions such as Europe. Indeed European policymakers are becoming increasingly concerned about China's growing attractiveness for high quality FDI in R&D. While European policymakers may draw some lessons from China's recently developed policy in relation to indigenous innovation, China may also have some insights to gain from the experience of small countries like Ireland, which has had a long involvement in FDI, and whose profile of investment has become more sophisticated over time with an increasing share of R&D.

Collaborative Innovation in Ireland: Have We Embraced the Fifth Generation Model?

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Irrespective of size, commercial organisations must constantly innovate in order to remain competitive within their markets and sustainable into the future. The pressure to optimise the capacity to innovate has encouraged companies to search beyond their organisational boundaries and to collaborate with other organisations in order to bring innovations forward (Rothwell, 1994; O'Sullivan and Dooley, 2008). Collaborating with their external community enables organisations to access diverse sources of knowledge, scarce expertise and specific organisational capabilities to achieve innovation objectives (Tidd and Bessant, 2009; Chesbrough, 2003). Rothwell (1994) views the most progressive 'fifth-generation' of innovation process as having collaborative innovation at its core and suggests that organisations operating from such a perspective may achieve higher performance from their innovation process and be able to leverage this for increased competitive advantage. While collaborative innovation has attracted significant academic interest in recent years, (e.g. knowledge clusters, networks, open innovation, user-driven communities), little research has been undertaken to examine how widespread the collaborative phenomenon is within the industrial landscape. Consequently, this paper seeks to address this issue within the Irish context through a quantitative-based approach that examines collaborative innovation activity across the spectrums of organisational cognitive and geographic distance.

Keywords: Collaborative innovation, Organizational Size, Geographic and Cognitive distance

Theme 5

Innovation Strategy and Management

Analysis of a Recruitment Strategy for the Formation of Cross-Functional Multidisciplinary Teams

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Background

BioInnovate Ireland is a multi-institutional programme focussed on medical device innovation training. Designed as an output from the government innovation task force, BioInnovate aims to harness the depth of knowledge and experience of academics, clinicians and industry in the Irish Med Tech sector. The flagship programme, the research fellowship, consists of teams of high calibre multi-disciplinary individuals working to develop innovative and novel medical technologies and solutions. Teams are carefully constructed based on testing and interview to promote maximum innovation and creativity.

Aim of Study

To assess whether the novel method of recruitment is conducive to producing multi-disciplinary teams capable of delivering innovative outputs and to explore if a blended methodology of psychometric profiling, individual and group assessments with a range of assessors from different backgrounds can unanimously select motivated, high-calibre teams with individuals possessing exceptional skill-sets when compared to -one-on-one interviews alone.

Methodology

Fellowship candidates from various backgrounds including Medicine, Engineering, Science, Business and Information Technology were selected via a traditional review of curriculum vitae and reference review. A pool of 25 short-listed candidates were invited to complete a psychometric test and participate in a day-long assessment centre. Two teams of four individuals were constructed on the basis of the aforementioned assessments outcomes. The recruitment day involved three challenge exercises in which interviewees worked as teams to assess their natural tendencies in a group setting. This activity was complimented by a series of one-to-one interviews where key core competencies, were assessed by a range of independent experts. Overall the candidates were assessed by more than 25 individual assessors during this selection process.

Findings

Initial analysis of the team functionality, and outputs from the innovation process, indicate that the constructed teams functioned as they were predicted to, and that there are several novel outputs from the process. Data analysis from the first years recruitment cycle is ongoing, and as recruitment for year 2 has now closed, a second data set is now available for analysis. It was found that emotional intelligence, enterprising capabilities and those with consultative or delegative leadership styles were important inherent qualities, not captured

through traditional methods of candidate selection, when constructing multi-disciplinary teams to embrace the innovation process.

Conclusions and Implications
While data analysis for the initial year is ongoing, preliminary results indicate that the combination of the interview process to identify potential teams supplemented with the psychometric testing data allows the construction of highly functional cross-disciplinary teams. Given the outputs, this system of recruitment may be of benefit in both academic and industry settings.

Does a Network Influence the Market Orientation Capability of Irish Academic Spin Out Companies?

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Market orientation is a critical organisation capability (Hooley, Fahy et al., 1999), which reflects the ability of the organisation to understand and respond to the needs of the market (Kohli and Jaworski, 1990). Gaining access to market and customer information to inform a market orientation requires companies to engage effectively within industry and customer networks. The ability of the firm to capably manage its network of relationships illustrates network capability (Ritter and Gemunden, 2003). Examination of the network dimension to market orientation has been surprisingly sparse and in particular the influence of a network capability on market orientation efficacy has been relatively ignored in the literature. This is surprising as the focus of market orientation is outward to the market, capturing insights into market dynamics and using these insights to drive a more meaningful customer focus. University spin out companies can face obstacles to growth and may suffer from non availability and lack of resources at the time when they need them and studies have shown that market related problems can persist through the various stages of growth and development (van Geenhuizen and Soetanto, 2009). Academic spin out companies still continue to face problems in relation to marketing (Roberts, 1991; Chiesa and Piccaluga, 2000; Oakey, 2003). As noted by Nicolaou and Birley (2003) networks are critical for spin out companies to obtain information and resources, and the success of spin outs significantly depends on the company's ability to establish and build upon links with numerous actors, such as research labs, local authorities, clients, other companies and financial institution (Chiesa and Piccaluga, 2000).

Aim of the Study

The aim of this study is to explore the influence of a network upon the market orientation capability of Irish academic spin out companies and to establish how companies utilise their networks to gain critical market insight. The empirical context for this study is rooted in the university spin out sector. These enterprises tend to represent high potential for value creation, with intellectual property originating in university research within key economic areas such as biotechnology and electronics. A market focus is particularly critical for these enterprises in order to guide innovation which is more likely to meet market needs.

Methodology

This study adopted a three stage multi- method approach (quantitative and qualitative). Stage one: the *scoping* study (technology transfer manger interviews), stage two: the *main* study (National survey of academic spin out companies) and stage three: the *follow up* study (interviews with academic spin out companies).

Findings

The findings provide evidence of the influence of the network on the efficacy of market orientation and yield insight into how this influence manifests. Findings also reveal the critical role of the university (through its technology transfer office or commercialisation directorate) in facilitating access through the academic network to market intelligence for spin out companies.

Conclusions and Implications

The network is of critical importance to academic spin out companies and in particular as a mechanism through which to learn about markets. This study has key implications for business practitioners and academics alike within the marketing strategy and commercialisation areas and noted contributions to policy surrounding Irish academic spin out companies are evident.

How to Create Something out of Nothing – Innovation Management in the Development of Nanotechnology in Ireland

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Background
Nanotechnology is defined as being work using materials in the range between 1 and 100 nanometres (a nanometre [nm] is one billionth of a metre).

The study sought to investigate innovation management in the new area of nanotechnology to establish whether any techniques could be used or adapted generally, to create new knowledge in the area of innovation management.

Aim of Study
To identify, through empirical research, the innovation management techniques that are used in nanotechnology companies, and to further establish whether these techniques could be used by other companies.

Methodology
This was a mixed methods research study which used both self-completion questionnaires and semi-structured interviews as primary data collection tools. The interviews were recorded for later transcription and analysis.

The companies and individuals interviewed all worked in the area of nanotechnology and the companies interviewed were either in the ICT or Biotechnology sectors. A total of 40 interviews were conducted in 29 different organisations.

Secondary data was collected from the companies' websites. This took the form of company financial information and general company information such as the size of the company and the number of employees.

The researcher used a combination of the two general approaches to analysing qualitative data which are - coding and review and comparison. This approach suggested by Glaser and Strauss (1999) combines the constant review and comparison and the explicit coding procedure. This is called the constant comparative method of coding and analysis and it is believed that it generates theory more systematically than the other approaches.

The qualitative software package NVivo 7 was chosen as a means to add structure to the data analysis. This software is a very flexible tool and allowed more complex searches of raw text associated with the data.

Findings
In this research certain themes have emerged which provide evidence of originality by the discovery of new facts. The first of these themes is staff autonomy and Nemeth (1997) said that 'the ability of staff to think outside the box to find original solutions required freedom to break rules without fear of reprisals or rejection' and this research provides further evidence of this. Shea (2005) refers to cross-sectoral innovation and the Matrix Report (2008) refers to opportunities that exist between sectors and this research suggests that this multidisciplinary

theme, prevalent in the researched nanotechnology companies, could be exploited by multidisciplinary skills development in education. This research has demonstrated the use of stage gates or flesh on the bones investments and the use of the FMEA methodology in nanotechnology companies in Ireland thereby adding to existing knowledge.

Conclusions and Implications

It is important that we understand innovation in the nanotechnology context since nanotechnology is a multidisciplinary area which requires workers to have cross disciplinary skills in business, ICT, engineering, physics, chemistry and the biosciences. Insight from a Physics PhD and the interviewee in Company H of this research calls for universities to provide a multidisciplinary undergraduate degree course to give graduates a wider range of skills for entering industry. Further Fagerberg (2005) said that one obstacle to improving our understanding of innovation is the fact that it has been studied by different communities of researchers with different backgrounds and he says 'the failure of these communities to communicate more effectively with one another has impeded progress in this field.' This study has provided communication across disciplines and has in a small way added to the understanding of innovation.

The Development of an Engineering Knowledge Framework for Improved Project Outcomes through Collaboration, Entrepreneurship and Innovation between Industrial and Research Partners

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Background:

Companies must continue to innovate if they are to remain relevant to changing market and customer needs. This is more prescriptive for mature companies where product maturity and innovation may have peaked and internal entrepreneurship is challenging. Multinational companies are constantly questioning their offering and seeking new ways to innovate and change to remain relevant and competitive. SMEs are seeking opportunities in breakthrough technologies and methodologies and to find reference sites to develop their offerings. Academia are being challenged to address relevant problems confronting industry in existing and future technologies and practices.

Analog Devices, Kostal GmbH and Piercom along with NUIG adopted a collaborative and consortia model around a specific knowledge domain namely 'The development of an engineering knowledge framework that supports improved outcomes in Software Test (and could be used later in New Product Design engineering practices).

Aim of the Study

This case study looks at three technology companies, two multinational and one SME, sharing knowledge and innovating to identify areas for best practice improvements and key follow-on research areas. The study attempts to incorporate insight into how a collaborative model can work and how innovation and entrepreneurship have contributed to a dynamic collaboration.

Methodology

A consortia workflow model was adopted as a tool to identify the different relationships between the partners of the consortia and to establish a project methodology and process workflow to manage the work program. A knowledge framework was designed to capture the findings for the specific domain research.

The specific research domain of software testing was selected as a result of specific test coverage issues experienced by ADI and Kostal. Piercom were appointed as consultants in software engineering to examine ways to improve test outcomes. It soon it became obvious that a ''Framework model and methodology '' was required to capture key elements at play in test. This framework consisted of the following pillars: Process, People, Technology, Metrics and Infrastructure. Interviews were conducted and test programs analysed to identify gaps.

Findings

Analog Devices and Kostal GmbH identified the need to extend their test coverage compliance to include software test programs to achieve a holistic response to customer errors. Once areas of weakness were identified in the test process using the Framework approach selected areas for short term or longer term research were identified. Such findings

resulted in discussions with academia around boundary analysis testing, test coverage and associated framework research in project management and code design.

Conclusions & Implications

There were a number of significant outcomes and conclusions from our work program:

1. A consortia workflow model to manage the work program and follow on research
2. Sharing skill and knowledge across companies.
3. A working knowledge framework to manage complex engineering projects.
4. IP which can be used by Multinationals and developed by the SME to leverage the market.
5. The research areas identified that would lead to advanced academic research programs.

Designing a Modelling Tool to Support Practitioners in the Design of Effective Innovation Strategies

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Innovation is the means by which organisations respond to their environments in order to excel at both exploiting their current positions and exploring for future positions. Innovation management is, therefore, critical to the wellbeing of organisations but it is also an extremely complex and uncertain undertaking. While some organisations manage piece-meal innovation, most fail to sustain innovation over the longer term because of their inability to design sustainable innovation systems. The latter task should not be underestimated owing to management teams lacking: (1) a clear conceptualisation of what innovation is; as well as (2) a shared language; and (3) a visualisation scheme – each of which is important for describing, communicating, and sharing the specifics of their innovation systems. Management teams can, therefore, do with the support of tools when designing innovation strategies.

While the management literature is renowned for producing new concepts and frameworks, few of these are ever translated into tools, even though they could bring considerable value to management teams. A case in point is the *innovation model*, which this study proposes is an external representation of the innovation system of an organisation and which abstracts from reality a set of pertinent features useful in describing, explaining, and predicting innovation in the organisation. The concept offers the potential for empowering management teams to more readily: (1) understand what their innovation system is; (2) communicate the system to others; and (3) prototype, visualise, and evaluate alternative system designs. This supports management teams in taking their individual internal ideas and turning them into a series of prototype models (i.e. doing) that can be visualised (i.e. seeing), evaluated (i.e. thinking), and tossed around (i.e. playing).

But academia and practice has heretofore failed to embrace the concept of the innovation model and they have not succeeded in proposing a standard approach or tool for modelling innovation in organisations (Scozzi et al., 2005). The objective of this study is to address this gap through designing an innovation modelling tool that supports management teams in visualising, as innovation models, the innovation systems of organisations.

This study uses an interactionist design science approach undertaken over a 48 month period to build and evaluate an innovation modelling tool to assist practitioners in formulating innovation strategy. This approach incorporated various stakeholder interests and perspectives in order to build and refine the tool and ultimately in order to understand and explain the utility of the resulting prototypes. In undertaking its ambitious journey, the study faced up to two main challenges: (1) to arrive at a research approach for designing the tool necessary to support practitioners in representing innovation systems as innovation models; while at the same time (2) to put the knowledge derived from the design activity on a scientific footing. The study addressed both challenges through an adaptation of the design research paradigm. Over hundred individuals were used in the design and evaluation of the tool.

Theme 6

Academic Entrepreneurship and Knowledge Transfer

Academic Researchers as Boundary Spanners in Science to Business (S2B) Knowledge Transfer: A Stakeholder Analysis of Ireland and Germany

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The commercialisation of scientific knowledge has become a primary objective for universities worldwide. Collaborative research projects are viewed as the key to achieving this objective. Collaborative research projects require new partnerships between government, industry and universities. However, there is mixed views on the roles of the various collaborators in scientific knowledge collaboration. On the one hand, scientists and industry partners will often criticise government agencies and Technology Transfer Offices (TTOs) as being well meaning but ineffective. On the other hand, industry partners and TTOs often criticise academics for their lack of understanding of the commercial world. This paper explores how networks in the scientific knowledge collaboration process are initiated and maintained from a multi-stakeholder perspective. It is based on case study evidence from 17 research collaboration projects in Irish and German universities derived from 82 stakeholder interviews with Principal Investigators PIs, centre managers, TTO managers, industry partners and government funding agents. It focuses on the role of PIs within these complex multi-stakeholder research projects. As the research design specifically included all stakeholders' views, we can unequivocal conclude that the PI plays the lead role in establishing and managing stakeholder networks. With 79 out of 82 respondents in agreement- this view is shared across stakeholders, irrespective of research centre size, type and geographical location. PIs are key conduits in knowledge commercialisation. The findings shed light on the key role of PIs at different stages in the development of networks. In terms of establishing collaborative networks, the PI is either directly responsible for making the contact himself or herself, or it is his or her reputation that attracts the attention of potential industrial partners. At this stage in the process, reputation is critical. Academic research is increasingly being incorporated into the global market for knowledge, and the global search for professors with expertise in relevant research domains has become a well-established industry strategy. However, PIs must also show willingness to engage with industry. Once the initial contact is established, the quality of the PI's work remains critical to the success of the partnership but increasingly, it is their ability to manage and negotiate with partners that determines the development, success and sustainability of the network. It shows how relationship quality, knowledge base and commercialisation service contribute to stakeholder satisfaction. It proposes that trust, commitment and a favourable attitude deriving from past collaborations contribute to the creation of loyalty. Loyal stakeholder will, in turn, repeat collaborative projects or recommend the institution to somebody else. However, the findings show that you cannot simply force PIs to do collaborations and PIs must be adequately incentivised. Overall, the study concludes that PIs are better placed than TTO managers to act as boundary spanners in bridging the gap between science and industry. Consequently, the role of TTOs in networks of scientific knowledge collaboration needs to be re-examined.

Determinants of Basic and Applied Research Outputs from Funded Research: Evidence from a Census of Irish Researchers

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Using data from the 2009 Census of Science Foundation Ireland (SFI) funded researchers, this paper examines the determinants of basic and applied research outputs. Basic research is defined as referred original articles, referred reviews, books, peer reviewed conference proceedings & papers, and edited conference proceedings. Applied research is defined as invention disclosures, licensed technologies, and patents filed and awarded. The paper examines which characteristics of research teams are more likely to be associated with basic and applied research outcomes. In particular the paper explores the influence of academic and/or industry collaboration, and the nature of that collaboration, on research output. We use ordered Probit and Probit analysis to identify the determinants of the extent of basic research by SFI funded researchers and the likelihood of applied research output respectively. We find that academic and industry collaboration has a positive effect on basic research output. Specifically, we find that academic collaboration with non-Irish institutions and both Irish and non-Irish institutions has a positive effect on publication output. In addition, collaboration with MNCs positively influences publication output. We find that collaboration with both Irish and non-Irish institutions has a positive influence on applied research. In relation to industry collaboration, we find collaboration with SMEs and MNCs positively influences commercial research output. We find no evidence of a complementary effect between basic and applied research output.

Bridging the Gap: Towards Effective Knowledge Transfer between Institutes of Technology and Industry in Ireland

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Knowledge Transfer between Higher Education Institutes (HEIs) and industry is essential in maintaining links between the research and development carried out in HEIs and the needs of industry. Recent reports on education in the third level sector in Ireland have advocated that the research carried out in HEIs should provide a gross return to the economy and that HEIs should be more proactive in research commercialisation and collaboration with industry [1].

Knowledge transfer between HEIs and industry in Ireland occurs at a low level [2]. However the economic development of the knowledge transfer processes between HEIs and industry has been referred to by the literature as an important 'third mission' [3]. In light of these facts this research aims to investigate knowledge transfer practices between Institutes of Technology (IoTs) and industry in Ireland in order to assess the current trends, benefits and barriers experienced by the main stakeholders.

Five stakeholders; Technology Transfer Officers, Innovation Centre Managers and IoT researchers in the fourteen Irish IoTs and international, national and local companies were surveyed for the purpose of this study. Undergraduate students in one of the IoTs, Athlone Institute of Technology were also surveyed. The array of stakeholders surveyed hoped to obtain a snapshot of the wide range of knowledge transfer processes that take place in within the IoTs and between IoTs and industry in Ireland.

A total of 321 responses were received resulting in a 56.5% overall response rate. Results show lack of communication between some of the stakeholders which results in companies being unfamiliar with potential research and development expertise available in their local Institutes of Technology. Intellectual Property protection was also a concern for companies who had in the past considered working with IoTs. The issue of time was a drawback to companies that considered working with IoTs yet it was also reported as an issue for Technology Transfer Officers in their work. Researchers identified the awarding of funding and enhanced employment prospects as benefits of their involvement in the knowledge transfer between IoTs and industry.

The survey completed by final year undergraduates showed that students' knowledge of on-campus research, collaborations and innovation was significantly limited. Almost half of the students surveyed (49.7%) had not considered research as a career option and 98% of students were unfamiliar with the role of other knowledge transfer stakeholders within their IoT.

This research has shown that issues with time constraints, Intellectual Property and communication were shown to exist in the process of knowledge transfer between IoTs and industry. This is the first of three parts of the complete study that hopes to bridge the gap towards effective knowledge transfer between IoTs and industry in Ireland by addressing the issues, some of which have been highlighted by the survey data.

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Research Intensity and Knowledge Transfer Activity – An Insight to the UK University Sector

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Background
As the innovation process has become more open and networked, Government policy in the UK has sought to promote both research excellence in the university sector and the translation of this into economic benefit through university-business engagement. However, this policy approach has tended to be applied uniformly with little account for organizational differences within the sector.

Aim of Study
In this paper we consider if differences between universities in their research performance is reflected in their knowledge transfer activity. Specifically, as universities develop a commercialization agenda are the strategic priorities for knowledge transfer, the organizational supports in place to facilitate knowledge transfer and the scale and scope of knowledge transfer activity different for high research intensive (HRI) and low research intensive (LRI) universities?

Findings, Conclusions and Implications
The findings demonstrate that universities' approach to knowledge transfer is shaped by institutional and organizational resources, in particular their ethos and research quality, rather than the capability to undertake knowledge transfer through a Technology Transfer Office (TTO). Strategic priorities for knowledge transfer are reflected in activity, in terms of the dominance of specific knowledge transfer channels, the partners with which universities engage and the geography of business engagement.

Keywords: university-industry, knowledge transfer, research intensive universities, innovation policy

Institutional Pluralism in Early Stage Entrepreneurial Universities: Implications for the Emergence of Academic Entrepreneurship

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The Entrepreneurial University paradigm has emerged in the European context as an institutional response to the commercialization imperative, and has been driven by multiple social, economic, and political pressures. This paradigm and its attendant institutional logic represent a re-conceptualization of the manner in which the university as a social institution contributes to wider society. Similarly, academic entrepreneurship represents a re-conceptualization of the expected behaviours at micro-level within the institution itself. While the academic entrepreneurship literature has been expanding rapidly in recent times, there has been limited exploration of the manner in which this plurality of obligations is experienced by academic researchers. In this paper, we adopt an in-depth case study approach to examine the tensions in micro-level logics which emerge in response to an early stage entrepreneurial university's attempts to adapt to its new institutional obligations. We discover a number of mechanisms through which the pre-existing institutional logics are maintained at the micro-level, and discuss the organizational implications for the entrepreneurial university paradigm and the proliferation of academic entrepreneurship.