Client

DEL and Invest NI

Project

Evaluation of the Second Round of the Northern Ireland Higher Education Innovation Fund (NI HEIF 2)

Appendices

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Invest Northern Ireland

Prepared On Behalf Of

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1 APPENDIX I – GLOSSARY OF TERMS

Table I.1

Glossary of Terms

Acronym	Definition
3M	Third Mission Fund (HEFCW, Wales)
A4B	Academia for Business Programme (HEFCW, Wales)
AFBI	Agri-Food and Biosciences Institute
ANIC	Association of Northern Ireland Colleges
ASEP	Analytical Services and Environmental Projects
AURIL	Association for University Research and Industry Links
AY	Academic Year
BERD	Business Enterprise Research and Development
BIS	Department for Business, Innovation and Skills
BMC	Belfast Metropolitan College
BSSP	Business Support Simplification Programme
CAE	Coordinator of Academic Enterprise
CAFRE	College of Agriculture, Food and Rural Enterprise
CAGR	Compound Annual Growth Rate
CAP	Commercial Advisory Panel
CBI	Confederation of British Industry
CDA	Confidential Disclosure Agreement
CEO	Chief Executive Officer
CHRONO	Centre for Climate, the Environment and Chronology (QUB)
CMS	Content Management System
CNP	Collaborative Networks Programme
CoE	Centre of Excellence
Connected	The project funded by the Higher and Further Education Collaboration Fund (DEL)
CPD	Continuing Professional Development
CRM	Client Relationship Management
CSPT	Centre for Software Process Technologies (UU)
CSR	Comprehensive Spending Review
DARD	Department of Agriculture and Rural Development
DECC	Digital Engineering Competence Centre (QUB)
DEL	Department for Employment and Learning
DETI	Department of Enterprise, Trade and Investment
DfES	Department for Education and Skills (UK)

Table I.1

Glossary of Terms

Acronym	Definition
DFP	Department of Finance and Personnel
DH	Department of Health (UK)
DIUS (now BIS)	Department for Innovation, Universities and Skills
DTI	Department of Trade and Industry
EA	Economic Appraisal
ECIT	Institute of Electronics, Communications and Information Technology
EIRs	Entrepreneurs in Residence
ESRC	Economic and Social Research Council
F/T	Full Time
FE	Further Education
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GPA	Grade-Point Average (RAE)
GVA	Gross Value Added
HE	Higher Education
HE-BCI	Higher Education Business and Community Interaction Survey
HEFCE	Higher Education Funding Council for England
HEFCW	Higher Education Funding Council for Wales
HEI	Higher Education Institution
HEIF	Higher Education Innovation Fund
HEROBC	Higher Education Reach-Out to Business and the Community
HESA	Higher Education Statistics Agency
HESES	Higher Education Students Early Statistics Survey
HFU	Horizon Fund for Universities (SFC, Scotland)
HMRC	HM Revenue and Customs
HSC	Health and Social Care
ICT	Information and Communication Technologies
IDB	Information, Diagnosis and Brokerage
IICs	Industry-led Innovation Communities
INI	Invest Northern Ireland
IP	Intellectual Property
IREP	Independent Review of Economic Policy
IT	Information Technologies
KE	Knowledge Exchange

Table I.1

Glossary of Terms

Acronym	Definition
KEIG	Knowledge Exploitation Implementation Group
KEU	Knowledge Exploitation Unit
KM	Knowledge Management
KT	Knowledge Transfer
KTC	Knowledge Transfer Centre
KTG	Knowledge Transfer Grant (SFC, Scotland)
KTN	Knowledge Transfer Network
KTO	Knowledge Transfer Office
KTP	Knowledge Transfer Partnership
KTT	Knowledge and Technology Transfer
LGD	Local Government District
MTA	Material Transfer Agreement
NESTA	National Endowment for Science, Technology and the Arts
NICENT	Northern Ireland Centre for Entrepreneurship
NISP	Northern Ireland Science Park
NITC	Northern Ireland Technology Centre
NRC	Northern Regional College
NWRC	North West Regional College
OSI	Office of Science and Innovation
P/T	Part Time
PACEC	Public and Corporate Economic Consultants
PfG	Programme for Government
PID	Project Initiation Document
PoC	Proof of Concept
PPRC	Polymer Processing Research Centre
PRC	Publicly Funded Research Centre
PSA	Public Service Agreement
QUB	Queen's University Belfast
QUBIS	Queen's University Belfast Incubation Service
QUESTOR ATU	Queen's University Environmental Science and Technology Research – Applied Technology Unit
R&D	Research and Development
RAE	Research Assessment Exercise
RC	Research Council
RDA	Regional Development Agency

Table I.1

Glossary of Terms

Acronym	Definition
RDI	Research, Development and Innovation
RIS	Regional Innovation Strategy
RTD	Research and Technological Development
SERC	South Eastern Regional College
SET	Science, Engineering and Technology
SFC	Scottish Further and Higher Education Funding Council
sKTP	Shorter Knowledge Transfer Partnership
SLR	Standard Labour Requirement
SME	Small and Medium Enterprise
SRC	Southern Regional College
STEM	Science, Technology, Engineering and Mathematics
SWC	South West College
THE	Times Higher Education
ToR	Terms of Reference
TSB	Technology Strategy Board
UCS	University Consultancy Scheme
UCSD	University of California, San Diego
UKIRC	UK Innovation Research Centre
UoA	Unit of Assessment (RAE)
UU	University of Ulster
UUJ	University of Ulster – Jordanstown
UUK	Universities UK
VFM	Value For Money
WAG	Welsh Assembly Government

Source: FGS McClure Watters (2010)

2 APPENDIX II – CONSULTEES

2.1 Project Steering Group

Table II.1: Project Steering Group - Completed Consultations

Title	Forename	Surname	Title	Org.
Ms	Sheila	Rodgers	Head of Higher Education Research Policy	DEL
Mr	Boyd	McDowell	NI HEIF 2 Project Manager, Higher Education Research Policy	DEL
Ms	Anne**	Conaty	Head of Innovation Policy	DETI
Mr	Eoin	McFadden	Innovation and Policy	DETI
Ms	Claire	Griffin	Invest NI Knowledge Transfer Team	INI

** Anne is not a member of the Project Steering Group, but met us along with Eoin McFadden.

2.2 Stakeholder Consultations - Completed

Table II.2: Stakeholders - Completed Consultations

Title	Forename	Surname	Position	Org.
Professor	Norman	Black	PVC (Research and Innovation)	University of Ulster
Professor	Richard	Barnett	Vice Chancellor	University of Ulster
Mr	Tim	Brundle	Director of Innovation	University of Ulster
Mr	Eddie	Friel	Head of Business Liaison and Academic Enterprise	University of Ulster
Mr	Sean	Nelson	Manager of (Head of Innovation Services)	University of Ulster
Mrs	Claire	Mulrone	Science Shop - Administration Officer	University of Ulster
Ms	Sylvia	Alexandra	Director of Access & Distributed Learning	University of Ulster
Mr	Trevor	Newsom	Director of Research and Regional Services Directorate	QUB
Mr	Richard	Millen	Head of Regional Office	QUB
Mr	John	Thompson	Director of Knowledge Exploitation Unit	QUB
Mr	Gerry	McNally	Director Polymer Processing Research Centre	QUB
Mr	Tom	Edgar	Head of Consultancy & Technical Services, NITC	QUB
Mr	Colm	Higgins	Manager, NITC	QUB
Ms	Margaret	Connolly	Accounting Services	QUB
Dr	Wilson	McGarel	Director, QUESTOR	QUB
Dr	Paul	Donachy	Knowledge Exploitation Unit	QUB
Dr	Emma	McKenna	Regional Office (Science Shop)	QUB
Ms	Eileen	Martin	Regional Office (Science Shop)	QUB
Mr	Nigel	Smyth	Director	CBI
Mr	Colin	Walsh	Managing Director } AND	Crescent Capital
Mr	Hal	Wilson	Investment Manager }	Crescent Capital
Ms	Linda	Brown	Divisional Director	IoD Belfast
Mr	Peter	Dirkin	Knowledge Management	Technology Strategy Board
Mr	Panos	Lioulias	CE - QUBIS	QUBIS
Dr	David	Brownlee	Innovation Advisor	Clinical Research Support

Table II.2: Stakeholders - Completed Consultations				
Title	**Forename**	**Surname**	**Position**	**Org.**
				Centre
Ms	Roz	Carson	Internationalisation of R & D	Invest NI
Dr	Alan	Mawson	Chairman	Clarendon Fund Managers
Mr	Joel	Ferguson	Business Manager	AFBI

2.3 Surveys – Companies, Academics and Students

Table II.3 outlines the status of surveys to companies, academics and students overall as per the PID in which we proposed three types of survey (company, academic and student) and actuals achieved. Based on information provided to us by QUB and UU, we split the consultees into six categories and developed tailored questions for each of these six sub-groups. Note the total **target number of consultees** remains unchanged. More details on the numbers completed are included in Table II.4.

Table II.3: Companies, Academics and Student Surveys

Survey	Proposed Approach	Target / Categories to complete based on datasets provided by QUB and UU	Status of each of the six survey types
Company Survey - KT clients: Queen's University Belfast	Survey X 110	55 SMEs 5 spin outs 10 voluntary & community organisations using Science Shop 20 CPD participants *The remaining 20 (to make up 110 in total) were academics who had used the patent service*	**SME** • Almost 80% of the target for this sub-group was achieved (117 / 150) as a result of follow up on previous contacts and making contact with new contacts provided by UU and QUB. The total completed is: 48 / 55 QUB; and 69 / 95 UU. • Reasons for non-participation included: some respondents did not wish to participate and others could not be contacted within timescales for completion of the survey (although at least 3 attempts would have been made). Although we had a large number of contacts originally provided, others were not suitable for inclusion owing to e.g. incorrect contact details or duplicate contact details. **Spin-outs** • Information collated from QUB and UU and validated / developed through follow up calls with 5 spin-out companies (2 from QUB and 3 from UU) **Voluntary and community organisations** who used science shop – 20 / 20 completed; **CPD participants** (companies) – 19 / 20 completed
Company Survey - KT clients: University of Ulster	Survey X 110	95 SMEs 5 spin outs 10 voluntary & community organisations using Science Shop	
Academic Survey - Queen's University Belfast and University of Ulster Associates	Survey X 25	25 academics from QUB and UU *also 20 QUB academics who had used patent service*	**Academics** – 46 / 45 completed;
Student Survey - Queen's University Belfast and University of Ulster Student placement students	Survey X 20	20 students from QUB and UU	**Students** (placements + science shop participants) – 21 / 20 completed

Table II.4 Companies, Academics and Student Surveys – Status at 2nd February 2010

Target Group	Status	Target to complete			No of contacts provided*		No. completed		
		QUB	UU	TOTAL	QUB	UU	QUB	UU	TOTAL
A. SMEs	Surveys completed Data analysis completed	**55**	**95**	**150**	124 + 37 of which 127 valid*	166+ 123 of which 218 valid*	**48**	**69**	**117**
B. Spin-outs	Surveys completed Data analysis completed	**5**	**5**	**10**	5	9	**2**	**3**	**5**
C. Vol & comm. orgs who used science shop	Target surveys completed Data analysis completed	**10**	**10**	**20**	27	42	**11**	**9**	**20**
D. CPD participants (companies)	Target surveys completed Data analysis completed	**20**	**n/a**	**20**	40	n/a	**19**	**n/a**	**19**
E. Academics	Target surveys completed Data analysis completed	**25** (total academics (general) - QUB + UU) + **20** (QUB academics who used patent service)		**45**	88 (general) 15 (patent granted) 27 (patent not granted) **130 total**	23	**35**	**11**	**46**
F. Students (placements + science shop participants)	Target surveys completed Data analysis completed	**20** (total across QUB + UU)		**20**	10 placements 7 science shop **17 total**	1 placement 10 science shop **11 total**	**12**	**9**	**21**

Notes:
- UU does not use NI HEIF funding to support CPD for companies
*- *Total available contacts are reduced as some of the contacts are duplicates and / or missing / incorrect contact details– particularly affects no of SMEs, but also other categories*
- Target of 110 QUB KT clients are split across SMEs (55), spin-outs (5), Vol & Comm orgs (10), CPD (20), Academics / patents (20)
- Target of 110 UU KT contacts are split across SMEs (95), spin-outs (5), vol & comm. orgs (10)

3 APPENDIX III – STRATEGIC CONTEXT

3.1 Introduction

In this section, we set out the need for NI HEIF 2 funding, providing a detailed consideration of the strategic context in which NI HEIF 2 operates including its contribution to local, national and EU policies. The documents we have considered include the following:

UK Strategic and Policy Context

- Lambert Review of Business – University Collaboration (2003)
- UK Ten Year Science and Innovation Investment Framework (2004-14);
- Science and Innovation Investment Framework 2004 – 2014: Next Steps (2006)
- Sainsbury Review of Government's Science and Innovation Policies (2007);
- Department for Innovation, Universities and Skills (DIUS) –Innovation Nation White Paper (2008);
- Higher Ambitions – The Future of Universities in Knowledge Economy (BIS, November 2009);
- Measuring and mapping absorptive capacity in UK nations and regions (NESTA, October 2008);
- Stepping Forwards: NI's Innovation Future (NESTA, June 2009);
- Wellings Report on Intellectual Property and Research Benefits (2008);
- UK Innovation Research Centre (UKIRC) – Knowledge Exchange between Academics and the Business, Public and Third Sectors (2009); and
- The Impact of Universities in the UK Economy (November 2009).

NI Strategic and Policy Context

- Programme for Government 2008-11;
- DETI's Economic Vision for Northern Ireland (2005);
- DETI Regional Innovation Strategy – Think-Create-Innovate (2003);
- DETI Regional Innovation Strategy for NI – Action Plan (2008-11);
- DEL's Skills Strategy 'Success through Skills' (2006);
- First Report of MATRIX: The Northern Ireland Science Industry Panel (2008);

- InnovationLab (Ireland) Ltd Report for DEL 2006: An Examination of Higher Education Research and Development and Knowledge Transfer in Northern Ireland;
- DETI– Innovation Survey Results (2007);
- Varney Review of the Competitiveness of Northern Ireland (2008);
- Public R&D And Regional Development: Spillovers From University And Company-Based Research Centres Working Paper No. 104 (June 2009); and
- Barnett / DETI and Invest NI: Independent Review of Economic Policy (September 2009).

Managing Economic Downturn

- Stronger Together – Business and Universities in Turbulent Times (CBI Higher Education Taskforce, September 2009);
- HM Government (2009): Building Britain's Future: New Industry, New Jobs;
- UUK, Guild HE, HEFCE: Standing Together. Helping Universities through the Downturn (2008); and
- The Connected University: Driving Recovery and Growth in the UK Economy - NESTA

3.2 UK Strategic and Policy Context

3.2.1 Lambert Review of Business – University Collaboration (2003)

Lambert highlighted the importance of encouraging **closer links between industry and the research base**; and demonstrated that some of these collaborative activities have been instrumental in helping firms advance knowledge and propel new technologies in many areas – such as biotechnology, pharmaceuticals and manufacturing.

The Lambert Review strongly acknowledged that the Government's funding of knowledge transfer has helped to generate culture change and increased capacity to engage with business, and that this was delivering results. For example, third stream funding such as HEIF has enabled universities to build up their capacity to:

- Engage in networking and other outreach events with businesses, including SMEs.
- Market their research and teaching to business.
- Establish business liaison and technology transfer offices to provide advice and to negotiate consultancy, contract and collaborative research and licence agreements.
- Establish spin-out companies.
- Provide entrepreneurship training for science and engineering graduates.
- Provide work placements for students in industry.

3.2.2 UK Ten Year Science and Innovation Investment Framework (2004-14)

This document set out a long-term vision for UK science and innovation, with a headline ambition that **public and private investment in R&D should reach 2.5 per cent of GDP by 2014**. As well as measures to improve the sustainability of the UK science base, it put particular emphasis on stimulating business-university collaboration and making the science base more responsive to the needs of the economy.

Within the Framework, Government support for the conclusions and recommendations of the Lambert Review is noted and its responses to the Lambert Review recommendations summarised; key points include:

- The Government will task the Regional Development Agencies to help a broader spectrum of businesses develop more productive links with the university base, including through support for business-focused research. The RDAs have agreed that business-university collaboration will be one of the measures of RDA performance.
- Working in close consultation with the HE sector, the RDAs' deployment of their own funds in this area should meet the following broad criteria:
    - investment should be driven by demonstrated support from business;
    - regional investment should complement national innovation priorities; and
    - public support should not directly subsidise industry's near-market research that is rightly for business to fund.
- There is also confirmation of Government support for the **Higher Education Innovation Fund (HEIF)** as a permanent third stream of funding for universities in England to further build capacity in the university sector for Knowledge Transfer, and it would increase HEIF to £110 million a year by 2007-08.
- The Government has facilitated the establishment of an **Intellectual Property (IP)** working group comprising representatives from business and universities. The working group intends to draw up a range of model collaborative contracts and undertake work to develop an IP protocol.

3.2.3 Science and Innovation Investment Framework 2004 – 2014: Next Steps (2006)

The "Next Steps" document published in March 2006 as part of the Chancellor's 2006 budget underlined the importance of building on the original 2004 strategy in order for the UK to remain attractive as a location for research and innovation.

In particular, it stressed a need to create the right "ecosystem" for science and innovation in the UK by:

"…..ensuring that its world-class science base connects with business, and that the right mix of incentives, skills, and support mechanisms are in place to grow new knowledge-based firms and take advantage of commercial opportunities arising from research." (HMT, DH, DfES, DoH).

3.2.4 Sainsbury Review of Government's Science and Innovation Policies (2007)

This document reviews the UK Government's science and innovation policies with a focus on the role it plays in increasing the country's competitiveness in the global economy, in particular against the emerging economies. The review recognises the UK's Higher Education Institutions' consistent performance in producing high quality research. It also recognises the **importance of knowledge transfer to see this innovative research translated into the market:**

*"Diversity of excellence is required, with **research universities** focusing on curiosity-driven research, teaching and knowledge transfer, and **business-facing universities** focusing on the equally important economic mission of professional teaching, user-driven research and problem-solving with local and regional companies."*

The review underlines the significant increase in the translation of university research into commercial goods and services in the past decade (e.g.: number of spin-off companies, number of patents, income from licensing agreements or income from business consultancy). The performance of UK's universities in this area is now comparable with US universities.

The Review makes four recommendations to strengthen UK performance in knowledge transfer.

Recommendation
More support through HEIF to business-facing universities, incentivising them to perform more knowledge transfer with small and medium-sized enterprises. **HEIF should move to a fully formulaic basis** and increase support for knowledge transfer between business-facing universities and local small and medium-sized enterprises (SMEs)
Drive up the knowledge transfer activities of Research Councils (RCs), which should agree and be measured against firm knowledge transfer targets, including specific targets for knowledge transfer from their own institutes, and for the funds they will be spending on collaborative R&D through the TSB.
The number of **Knowledge Transfer Partnerships** should be doubled in number, subject to the Business Support Simplification Programme (BSSP).
Encourage further education colleges to undertake more knowledge transfer. To improve access for SMEs, a shorter, more flexible, mini KTP scheme should be introduced, subject to the BSSP. The Review sees considerable scope for further education (FE) colleges to help raise the innovation performance of SMEs and recommends that KTPs are further extended to FE colleges.
Source: Sainsbury Review: A Race to the Top. A Review of Government's Science and Innovation Policies

The review identifies the Higher Education and Innovation Fund (HEIF) and Knowledge Transfer Partnerships (KTP) as successful schemes in contributing to knowledge transfer and recommends that both continue to be funded and developed further. The review also recommends more focused support to develop KTP in Further Education colleges as their potential is currently unexploited.

3.2.5 Department for Innovation, Universities & Skills (DIUS): Innovation Nation White Paper (2008)

The White Paper sets out proposals for how the UK can promote both strong, innovative businesses and research bases. It presents recommendations for increasing and supporting interactions between Higher/Further Education institutions and businesses as a driver of innovation.

The paper states that there has been a steady growth in the level of HEI-business interactions and knowledge transfer activities:

"In recent years, there has been a culture shift in UK universities as the translation of research and business engagement has shifted from being a minor sideline to a core part of a university's mission."

This report indicates that this trend has largely been supported by the funding streams made available, including the Higher Education Innovation Fund. The paper notes the scope of HEI-business interactions in providing workforce skills development. In particular, the interactions will equip graduates with work-place skills that make them more employable and also provide existing staff with new skills and ways of working.

The white paper also notes the important role of Further Education institutions in working collaboratively for innovation, particularly with SMEs.

3.2.6 Higher Ambitions – The Future of Universities in Knowledge Economy (BIS, November 2009)

This report aims to set out a course for universities to maintain the progress they have made, drive up excellence and build on their success in a time of rising competition and tighter public funding constraints. In a knowledge economy, the report understands universities as '*the most important mechanism we have for generating and preserving, disseminating and transforming knowledge into wider social and economic benefits'*.

The report recommended actions and support in six different areas. The table below presents the relevant ideas for this evaluation:

Table III.1 Higher Ambitions – Recommendations relevant to the NI HEIF 2 Evaluation

Area of Support	Recommendations
Support universities in making an even bigger contribution to economic recovery and future growth	7) Our expectations of business will continue to rise: they need to be **active partners** with universities, **not passive customers**. (This reflects the crucial role that businesses have to play in the funding and design of programmes, in the sponsorship of students, and in offering work placements and practical experience for students.)
Strengthen the research capacity of our universities, and its translation into economic impact	9) In a more challenging climate for research, with tighter fiscal constraints and increased competition from other countries, we will need to carefully protect the excellence of our research base. This will require a greater focus on world-class research and greater recognition of the potential benefits of research concentration in key areas. 10) We are establishing strong new incentives to increase the economic and social impact of research. 11) We will support stronger long term relationships between business and universities. (This recognises: • that interaction between universities and business has increased significantly over the last decade and the desire to build on this with continued investment in collaborative research via the Research Councils and the Technology Strategy Board • a desire to build on the success of the HEFCE **Higher Education Innovation Fund** which has supported the development of links between business and universities. The primary motivation for supporting this research commercialisation and knowledge exchange is to generate economic and social benefits for the nation, not simply to raise revenue for institutions. We will encourage universities to seek greater use of shared services for managing and commercialising their intellectual property.)
Strengthen the role of universities at the heart of our communities and shared intellectual life, and as one of the key ways in which we engage with the wider world	14) We will build on the contribution that universities have made, in partnership with Regional Development Agencies and local business, to regional economic development. To sustain the role of universities in urban renewal and regeneration, the Government will protect the freedoms that HEIs currently enjoy, within the framework of existing capital and investment approval processes, to devise their own business plans and borrow commercially to fund new developments. The Government supports the role that RDAs play to provide capital for university schemes that they judge to be of high economic value to the locality and region. The Government also believes that RDAs have a key role to play in working with business at local and regional level to support knowledge transfer activities and deepen university links with local and regional businesses: this is crucial to improving the quality of management in Britain and Britain's future success as an innovation economy.

Source: Higher Ambitions – The Future of Universities in Knowledge Transfer (DBIS, November 2009)

The aim of proposals shown in the table above is to build a new national consensus between individuals, government, and employers as to how HE system should be supported, adapted and expanded. It was highlighted that Government support for knowledge exchange through programmes such as HEIF had driven a culture change in university-business interactions, with increasing levels of engagement between universities, business and other users. One

measure of the level of such interaction is universities' external income, which rose to £2.8 billion in 2007/08 – a 50% increase in real terms since 2001.

The report considered that HEIF has been successful in developing universities' capacity to undertake knowledge exchange, both in business development and more specialised research commercialization. But it is noted that in the future, as these activities mature, there will be a need to make them more efficient and effective. The report also notes that three quarters of universities now make knowledge exchange an integral part of their institutional strategies, and more than half use it in their criteria for career advancement.

The relationship between universities and employers is critical for both parties and the future prosperity of the country. The capacity of the higher education system to equip people for the modern world of work depends on this relationship being productive and based on mutual understanding. These partnerships should cover the full range of economic activity, including innovation, knowledge transfer, and jointly developing centres of excellence between businesses and universities.

3.2.7 Measuring and Mapping Absorptive Capacity in UK Nations and Regions (NESTA, October 2008)

Absorptive capacity refers to firms' ability to identify, assimilate and exploit knowledge from external sources and it has been strongly linked to the economic development of regions. This report details the results for each of the 12 regions in the UK regarding five main components of an innovation system: two "development capacities" - Knowledge Creation and Knowledge Exploitation; and three "absorptive capacities" - Knowledge Access Capacity, Knowledge Anchoring Capacity and Knowledge Diffusion Capacity.

Knowledge Creation is defined as a region's ability to source new ideas, discoveries and innovations. The report reviewed the quantitative analysis of **knowledge creation** across the UK regions and after reviewing a number of indicators developed a composite score and then compared this score to the economic productivity in a region. Northern Ireland scored 3rd from the bottom on the UK regions, with the East and West Midlands only performing worse, however the individual indicators under this measure show mixed results. For example considering the proportion of first degrees which are either first or upper second class, Northern Ireland has the highest proportion (62.6%); Northern Ireland is ranked joint 3rd in terms of the level of R&D performed (£million) within HE as a percentage of regional GVA 2005.

Knowledge Exploitation is the process of transforming, combining and reshaping knowledge in the form of research, science and technology into a tradable commodity. It is the general capacity to use knowledge commercially and extract value from it. The onus of knowledge exploitation falls on companies and it is therefore essential that regions understand the capacity of their business communities to exploit knowledge. Exploitation capacity is measured through:

- Innovative active enterprises- measuring the potential propensity of businesses to exploit their knowledge (Northern Ireland 9th out of 12);
- Process innovations new to industry (Northern Ireland 5th out of 12);

- Product innovations new to market (Northern Ireland 6th out of 12);
- Early stage private equity investment (Northern Ireland 12 out of 12); and
- Exports of Knowledge Services (Northern Ireland 6th out of 12 - NI figures combined with Scotland & Wales[1]).

Knowledge Access Capacity is the capacity to link and connect to international networks and connect to international networks of knowledge and innovation. It is measured through:

- Access to inward flows of knowledge through firms' global networks;
- Access to inward flows of knowledge through research networks; and
- Communications and international transport networks.

Analysis by the authors of the data relating to each show that Northern Ireland is relatively isolated in comparison to other parts of the UK.

Knowledge Anchoring refers to the capacity to attract overseas people, investments and firms to establish and embed themselves in a region. Similar to Knowledge Access Capacity, Northern Ireland ranks low on this indicator.

Knowledge Diffusion is defined as the movement of ideas, information and knowledge between people, firms, and institutions and the capacity of a region to absorb this knowledge which may be embodied in new innovations, practices or technologies. A number of individual indicators relating to knowledge diffusion are considered – these cover four main elements:

1. Population's learning capacity.

2. Workforce learning capacity.

3. Knowledge sharing capacity.

4. Knowledge diffused in firms

A composite score – based on the knowledge diffusion indicators - has also been created. Using this composite knowledge diffusion indicator, Northern Ireland has the lowest score of all UK regions (ranked 12th out of 12 regions).

Within Knowledge Diffusion (and in particular the third element – Knowledge Sharing Capacity), consideration is given to business-university interactions, acknowledging that increasingly the focus is to stimulate a process of joint creation of more fundamental knowledge, which is less directly applicable to other firms. One indicator focuses particularly on funding for business-university collaborative research, and research and consultancy contracts. Taken from the HE-BCI survey, it provides a useful measure of the level of interaction and exchange of both tacit and codified forms of knowledge across sectors between higher education and the wider world sector itself. Analysis of the metric - Total

[1] Note that combined results were presented for this indicator only.

funding for business-university research and consultancy (taking into account business-university collaborative research, and research and consultancy contracts) per academic staff 2005-06 – shows that Northern Ireland has the lowest score of all the UK regions i.e. it has the lowest funding relative to the number of academic staff. This provides an indication of the transfer of knowledge taking place between universities and businesses.

Northern Ireland fares much better on the fourth element – the level of knowledge diffusion in firms. Considering the metric - % of innovations that are new to firms (innovation active firms only), 2005 - Northern Ireland is ranked 4th out of 12 in the UK regions.

The report pushes for policy changes which will support those regions such as Northern Ireland that have low absorptive capacity and stresses the link between a region's absorptive capacity and its economic growth potential. The main areas of work for Northern Ireland are:

- Business needs to exploit the knowledge within universities;
- Increased private equity investment;
- Increased international networking and linkages; and
- Increased Business and University linkages.

3.2.8 Stepping Forwards: NI's Innovation Future (NESTA, June 2009)

In a recently launched NESTA report[2] (June 2009) Stephen Roper highlighted the process required to maximise the benefit of R&D and Innovation in the development of SMEs.

Critically companies need to first be able to identify the areas within their business for development - whether that is the need for product development, process improvement or completely new research or technology. Once this has happened, then the company needs to be aware of the opportunities for support and how these link with the needs assessment and from this action plan. The third and final stage is that the company needs to be able to absorb the innovation, technology, research into the company and for this to happen effectively there is a need for the **barriers to absorption to be identified and overcome** whether they be skills deficiencies, attitude change etc. All of this highlights the need for companies to be **networked** and working with a series of supports /advisers in a connected way in order to ensure that the process runs smoothly. Any barriers at any of these stages will minimise the benefit to the company and ultimately to the economy.

Although NI has innovation advantages which create the potential for Northern Ireland to move forward, it also faces significant innovation challenges alongside the current recession. Northern Ireland is better placed to meet these challenges than many other regions due to the discretion provided by the devolved administration, the resources committed to supporting innovation, high quality universities and the commitment of a wide range of regional stakeholders to the innovation agenda.

[2] Stepping Forwards – Northern Ireland's Innovation Future, Discussion Paper April 2009: Professor Stephen Roper

To address Northern Ireland's innovation challenges, the report suggested working towards four key recommendations:

1. **An Innovation Council** – develop the existing MATRIX initiative to become an Innovation Council to analyse, challenge and support developments in Northern Ireland's innovation capability. Ideally, the Innovation Council would be close to the heart of government, have a strong analytical capability, an expressly cross-cutting remit and a strong advocacy function for innovation. (Such a body would provide a much needed forum in which the disparate stakeholders/ interests in innovation could come together.

2. **A Service Innovation Grant** scheme modelled on Finland's Tekes 'Serve' scheme should be introduced to support non-technical innovation across Northern Ireland industry.

3. **Collaboration** should be a required element of any publicly funded R&D or innovation project. This should apply both to the R&D grant scheme and the Service Innovation Grant scheme.

4. **Two-tier funding** for universities should be considered to achieve a stronger alignment between developmental activity in the universities and the needs of the regional economy.

   Note: This refers to Scottish Government proposals to introduce 2 separate funding streams (see Section 8.4 in the main report for more information):

   - General Fund for Universities (GFU) which would provide formula-based, mainstream funding for universities with fewer restrictions and more flexibility on how this money can be spent.
   - Horizon Fund for Universities (HFU) which would provide additional funding but this would be linked to outputs or outcomes related to key government strategies and priorities.

   The overarching aim is to ensure that public funding for universities is supporting "activities which are well aligned with the Scottish Government's Purpose, its economic and skills strategies and its other policy frameworks".

3.2.9 Wellings Report on Intellectual Property and Research Benefits (2008)

This report examines how the issue of university Intellectual Property (IP) impacts on the success of collaborative research between universities and businesses. It is noted how universities play a central role in innovation through the training of students and knowledge creation. The European Commission has suggested the following measures in order for member states to strengthen their university sector:

- Ensure that knowledge transfer forms part of the strategic mission of the institution;

- Publish procedures for the management of IP;
- Promote the identification, exploitation and protection of IP with a view to maximising socio-economic benefits;
- Provide appropriate incentives to help staff play an active role; and
- Build critical mass in knowledge transfer by pooling resources at local or regional levels.

Wellings states that while the incidence of collaborative research with businesses is increasing in UK universities, licensing income to universities from the commercialisation of IP is growing at a slow rate. The report describes several barriers that exist in forming successful collaborative relationships between universities and businesses:

- An over-emphasis on IP when universities and businesses work together on collaborative research projects;
- A lack of clarity on the primary aims of collaborative research, allowing uncertainty as to whether the aim is to generate a direct income for the university or a wider benefit for the economy; and
- A rather variable implementation of aspects of good practice in the process of negotiation.

The report notes that disagreements over IP can obstruct collaborative working between universities and businesses, which will have the knock on effect of impeding innovation.

In order to make more effective use of IP generated by universities and strengthen the UK's HE sector over the next two decades, the report sets out recommendations for Government, HEFCE, universities and for funding.

3.2.10 UK Innovation Research Centre (UKIRC) – Knowledge Exchange between Academics and the Business, Public and Third Sectors (2009)

This report is based on a research project carried out in the Centre for Business Research (CBR) at the University of Cambridge. The project entitled "University Industry Knowledge Exchange: Demand Pull, Supply Push and the Public Space Role of Higher Education Institutions in the UK Regions" is part of the Impact of HEIs on the Regional Economies Initiative supported by the Economic and Social Research Council (ESRC) in partnership with the Scottish Funding Council (SFC), Department for Employment and Learning (DEL) in Northern Ireland, the Higher Education Funding Council for England (HEFCE) and the Higher Education Funding Council for Wales (HEFCW).

In addition to the important core missions of research and teaching, policy has focused on promoting 'technology transfer' concentrating on the commercialisation of science through such mechanisms as patents, licences and spin-outs. This study shows these mechanisms are important, but highlights that they are an incomplete representation of the wide process of knowledge exchange that takes place between academics from all disciplines with

partners in the private, public and the so-called third sector which includes charities, voluntary organisations and social enterprises.

The report outlines the lack of systematic quantitative evidence on the interactions that academics, from a wide range of disciplines, have with external organizations; and addresses that gap by reporting the results of a unique large scale survey – 22,170 responses – of academics in the UK.

The report criticises the '**Knowledge Transfer'** approach because it focuses on a simple range of indicators and mechanisms to understand the interactions between academics and business, public and third sectors – such as patents, licenses and spin-outs. In contrast, a **'Knowledge Exchange'** approach is defended as a more complete model to understand the academy-society interactions. The dimensions and multiple mechanisms listed are as follows:

- **Educating People**
    - Training skilled undergraduates, graduates & post doctorates.
- **Providing public space**
    - Forming/accessing networks and stimulating social interaction; and
    - Influencing the direction of search processes among users and suppliers of technology and fundamental researchers:
        - Meetings and conferences;
        - Hosting standard-setting forums;
        - Entrepreneurship centres;
        - Alumni networks;
        - Personnel exchanges (internships, faculty exchanges, etc.);
        - Visiting committees; and
        - Curriculum development committees.
- **Increasing the stock of 'codified' useful knowledge**
    - Publications;
    - Patents; and
    - Prototypes.
- **Problem-solving**
    - Contract research;
    - Cooperative research with industry;

- Technology licensing;
- Faculty consulting;
- Providing access to specialized instrumentation and equipment; and
- Incubation services.

Northern Ireland

In a presentation of the report in January 2009, three types of interactions were identified in regard to knowledge exchange:

- People-based activities (e.g. training, student placements);
- Problem-solving activities (e.g. research, advice, publications); and
- Community-based activities (e.g. public lectures, school projects).

The table below shows that Northern Ireland is the part of the UK which consistently has the highest level of academics engaged in (intensive) interactions — including people based, problem based and community interactions.

Table III.2 Academics Engaged in Interactions – Highly Intensive Interactions by Region (% of respondents)

Region	People based interaction	Problem solving interaction	Community based interaction	All interactions	Total respondents
Northern Ireland	**30.5**	**22.4**	**26.5**	**28.1**	**633**
Wales	24.6	19.2	25.3	23.2	1,135
North East	23.6	18.3	24.4	22.8	980
Yorkshire & the Humber	23.5	17.7	21.2	20.3	1,913
West Midlands	23.1	17.3	21.4	19.8	1,325
North West	23.1	16.8	23.0	20.5	2,041
Scotland	22.0	19.9	22.9	21.4	2,997
East of England	21.5	19.1	22.6	21.6	1,675
South West	20.8	16.7	24.6	19.6	1,275
London	20.0	17.0	19.0	18.9	3,984
South East	19.1	16.0	22.1	18.1	2,661
East Midlands	18.3	15.0	21.8	16.7	1,438
All (%)	**21.7**	**17.7**	**22.2**	**20.2**	**-**
All (N)	**4,775**	**3,849**	**4,711**	**4,461**	**22,057**

Notes:
- *The table is ranked on People based Interactions.*
- *Definition of 'high interaction':*
  - *People based: A score of 6 or more out of a possible 9.*
  - *Problem solving: A score of 6 or more out of a possible 10.*
  - *Community based: A score of 2 or more out of a possible 4.*
  - *All interactions: A score of 12 or more out of a possible 23.*

Source: Centre for Business Research / ESRC Survey of Academics (2008)

This report clearly demonstrates that the universities' overall mission covers a much wider and complex remit than just technology transfer based on the commercialisation of science

through patents, licences and spin-outs. Therefore, the focus on a limited range of technology transfer mechanisms is considered a 'narrow' model and a wider model is suggested. This model should focus on a wider, more complete range of interactions, understanding them as an exchange rather than a transfer of knowledge.

The following conclusions can be drawn:

- There is no one ideal model of university-business interactions;
- There is a wide range of interactions, but people-based interactions are the most important;
- Interactions encompass a wide range of disciplines and involve the business, public and third sectors;
- Many interactions involve strategic, long-term problems rather than specific technical issues; and
- Importance of "gatekeepers", on both sides of the relationship, to identify, promote and ensure the success of interactions.

3.2.11 The Impact of Universities in the UK Economy (November 2009)

In November 2009, the fourth edition of the Impact of Universities in the UK Economy was released. This latest report provides new evidence of the impact of universities as independent businesses – additional to their role in increasing the stock of human capital; the economic activity generated by university expenditure – the aspect of the sector's economic contribution which is most readily quantifiable; and the scale of university activity across the UK also means that this can be very important at the macroeconomic level.

This study presents an analysis of key economic characteristics of UK universities and colleges in the academic year 2007/08. It also presents modelled analyses of the impact of university expenditure in generating additional output and employment in other parts of the national economy. It covers 131 HE institutions located in England, 19 in Scotland, 12 in Wales and 4 in Northern Ireland.

The evidence confirms that higher education (defined as the universities together with the expenditure of their staff, international students and international visitors) is a substantial industry, with a significant impact on the national economy. It also reveals that higher education is particularly effective in generating GDP per capita, compared to several other sectors of the economy.

The study did not set out to examine higher education's broader social and economic impact, such as that achieved through knowledge transfer and innovation or cultural and community engagement. Neither did it seek to place a value on the work undertaken by higher education. It is nevertheless clear that higher education is a core part of the national economic infrastructure, generating significant employment and export earnings and making a substantial contribution to GDP.

The report confirmed the growing economic importance of the sector, which had an income of £23.4 billion a year in 2007/08 (compared with £16.9 billion in 2003/04), gross export earnings of £5.3 billion and employed more than 1% of the UK's total workforce. In terms of its wider economic impact the sector generated over £59 billion of output. The equivalent figure five years ago was nearly £45 billion, confirming a rapid growth in economic impact. The study demonstrated that the effectiveness of the higher education sector in generating impact is relatively high compared to other sectors of the economy.

The overall impact of the HE sector impact is defined in this study to be that of the universities together with that of their international students and visitors. Through both direct and secondary or multiplier effects, this generated over £59 billion of output and over 668,500 F/T equivalent jobs throughout the economy. The total employment generated was equivalent to around 2.6% of all F/T equivalent employment in 2007.

Higher education's contribution to GDP: The importance of HE to the economy can be seen through the generation of significant levels of output and employment. However a key measure of its contribution to the national economy is its impact on GDP. GDP is used by all countries as an annual measure of the total value of all goods and services produced by an economy.

In the year 2007/08, universities contributed over £31 billion to UK GDP. The off-campus expenditure of their international students and visitors made a further £2.4 billion contribution to GDP. Taken together this contribution came to over £33.4 billion - equivalent to 2.3% of UK GDP in 2008.

3.3 NI Strategic and Policy Context

3.3.1 Programme for Government 2008-11

Growing the economy is the top priority in the Programme for Government. PSA targets which are of particular relevance to this evaluation are highlighted in the tables below – these fit under PSA 1 and PSA 3.

Table III.3 Programme for Government 2008/11 – PSA 1 – Selected Objectives, Actions and Targets

Objectives	Actions	Targets	Dept.
PSA 1: PRODUCTIVITY GROWTH. Improve NI's manufacturing and private services productivity			
4. Promote higher value-added activity through innovation and the commercial exploitation of R&D	Invest NI will: • Secure Research & Development investment commitments of £120M • 300 companies to engage in Research & Development for the first time • **Increase the commercialisation of intellectual property from**	Increase the BERD expenditure in Invest NI client companies with less than 250 employees by a 8% Compound Annual Growth Rate (CAGR) Increase the BERD expenditure in Invest NI client companies with greater than 249 employees by a 5% CAGR	DETI DEL

Table III.3 Programme for Government 2008/11 – PSA 1 – Selected Objectives, Actions and Targets

Objectives	Actions	Targets	Dept.
PSA 1: PRODUCTIVITY GROWTH. Improve NI's manufacturing and private services productivity			
	NI's university and company research base Support MATRIX, which will advise DETI on policies to better target resources to technology areas of greatest future potential and exploit core niche strengths in the R&D and science base.		
5. To develop and sustain a HE research sector that holds a strong position within the UK and beyond and makes a major contribution to economic and social well-being.	Support MATRIX, which will co-ordinate business, Government and academia and **develop a more effective relationship between industry and the R&D/science base.** **DETI/DEL/Invest NI to work with DFP to secure the necessary resources for permanent "Third Stream" funding in NI's universities to increase knowledge transfer and cooperation between the tertiary education sector and local industry**	Exercise (RAE) {DN: no direct comparison between 2001 and 2008 RAE, will be possible due to changes in output, i.e. - the results being produced as a graded profile rather than a fixed seven point scale}. Increase by 10% the key Knowledge Transfer indicators as measured by the HE - Business and Community Interaction (HE-BCI) Survey for Academic Year 2010/11 (HEBCI 2011 survey published 2012). {DN: DEL's current metrics based NI HEIF 2 allocations run from AY 2007/08 to AY 2010/11. The key HEBCI metrics inform these funding allocations}	DEL DETI

Source: Programme for Government 2008/11.

Table III.4 Programme for Government 2008/11 – PSA 3 – Selected Objectives, Actions and Targets

Objectives	Actions	Targets	Dept.
PSA 3: INCREASING EMPLOYMENT. increase employment levels and reduce economic inactivity by addressing the barriers to employment and providing effective careers advice at all levels			
1. Tackle the skills barriers to employment and employability	Development and implementation of a regional strategy to widen participation in Higher Education	By 2011, make progress, year on year, towards fair access to higher education.	DE/DEL
4. Promote business growth	Invest NI will: • Promote growth projects from locally-owned clients, including Global and External Start-ups	Support 45 new start-ups exporting outside the UK and 300 exporting to GB	DETI

Source: Programme for Government 2008/11.

3.3.2 DETI's Economic Vision for Northern Ireland (2005)

The Economic Vision identifies Northern Ireland as a '*high value-added, highly skilled, innovative and enterprising economy which enables us to compete globally leading to greater wealth-creation and better employment opportunities for all'*. It also identifies the need for NI, in order to secure a sustainable globally competitive economy, to continue to improve its competitiveness and move from a position which relies less on low costs to compete to **one based on higher value-added products and services, innovation, creativity and high workforce skills**.

Increasing workforce skills and in particular increasing the proportion of the workforce with high and intermediate level skills is a key objective in the achievement of the Economic Vision which also *"encourages stronger and better links between business and education and increasing levels of new business start".*

The drivers and key objectives to achieve this vision which are most relevant to this evaluation are as follows:

- **Increase investment in R&D and promote innovation** / **creativity** as key elements to contribute to competitiveness and driving economic growth:
    - **Increased expenditure on R&D, innovation and design** by companies across all sectors and targeting of specific emerging sectors and technologies which offer a high potential economic return.
    - **Greater commercialisation** of innovations as reflected in a high proportion of sales from new or improved products as well as the use of modern production processes.
    - **Better and stronger links** between the HE/FE/training sectors and industry/business, greater transfer of knowledge and technology between the research base and industry and greater commercialisation of R&D at university level.
    - **Support to Northern Ireland universities** is focused on those areas of research where Northern Ireland firms are world class and/or have the potential to compete with the very best in the world.
    - **A stronger research infrastructure** which maximises the potential of the Northern Ireland Science Park and the Research and Technological Development Centres of Excellence.
- Promote and encourage enterprise:
    - Better and stronger links exist between local business and HE/FE.
    - Clusters are developed across sectors where more Northern Ireland companies have a competitive strength or have a national or international standing.

3.3.3 DETI Regional Innovation Strategy – Think-Create-Innovate (2003)

The RIS set out a vision *"to create a culture and environment within which Northern Ireland will prosper by using its knowledge, skills and capacity to innovate". The strategy* challenged:

"… industry and academia to work more closely together to create an 'industrial pull' and 'university push' *dynamic... and the universities, business, and the public sector to work in closer partnership to exploit and commercialise the research currently available".*

Table III.5 presents the strengths and weaknesses with regard to Research, Development and Innovation identified in the RIS in 2003 – highlighting areas of particular relevance to this evaluation.

Table III.5 Research, Development and Innovation – Strategic Context (2003)

Strengths	Weaknesses
• Increased research expenditure by companies and government. • Good examples exist of co-location of R&D investments from inward investors with strong linkages to the universities. • Sectoral strengths reinforced by proactive development and network support. • **University sector actively engaging industry. Academic-industry interaction is relatively high. The Centres of Excellence programme, university spin-outs and others have helped academic industry links.** • Strong education and training system and record of achievement comparing favourably with the UK levels of achievement. • Devolution highlighted the possibilities for 'joining up' policy and engagement of the wider community. • **Opportunities exist for greater commercialisation of public sector research**.	• Overall research and development expenditure is weak relative to the rest of the UK and is significantly below the levels of the more successful innovating regions and still below the UK average. • Concentration of expenditure in relatively few larger companies. • **Northern Ireland's firms appear to have fewer innovation linkages when compared to other regions**. • **Patent applications are below the UK average and those of Europe's stronger regions.** • Northern Ireland has low levels of start-up firms and entrepreneurial activity. • Capital invested by UK venture firms is behind comparator regions such as Wales and Scotland. • **Low levels of enterprise activity and public sector commercial research.**

Source: DETI Regional Innovation Strategy – Think-Create-Innovate (2003)

The RIS includes four key Priorities and eight related Action Areas which should assist the development and maintenance of a world-class innovation system for Northern Ireland. Those of relevance for this evaluation are:

Priority 1: Create a Coherent R&D and Innovation Infrastructure

The key issue with this Priority is to bring existing R&D and innovation activities under the central co-ordinating umbrella of the Regional Innovation Strategy.

Action Aim Two: To encourage and facilitate the commercial exploitation of publicly funded R&D.

Action Area (i) A closer and more co-ordinated business / university interface should be established across Northern Ireland, and research clusters should be encouraged and enhanced.

Action Area (ii) Industry and the universities should work together to capitalise on the commercial potential of university based R&D.

Priority 2: Enhance the Use of R&D and Innovation by the Business Sector

Priority 2 is focused on encouraging more and better use of R&D and innovation by NI firms, through partnership with academia and government.

Action Aim Four: To target public support into areas of future potential, emphasising skills and resources.

Action Area (v) University and FE Colleges' linkages with SMEs should be encouraged and developed through targeted programmes, with support from government.

The strategy highlighted that any Regional Innovation Strategy for Northern Ireland would need to:

- encourage and enable individuals and firms to absorb, adapt and exploit the research, development and innovation that is created and disseminated by the region's universities, public sector and leading innovative firms;
- ensure that sufficient funds are made available to enable the universities to create the research and development outputs which can then be exploited by the private sector, or to enable the universities to exploit their own research through, for example, the establishment of spin-out companies.

The process of creating the opportunities for investing in new products, services and skills needs to be seen within the context of the range of activities carried out in research, development and innovation - all elements that can be understood in terms of knowledge creation, adaptation and exploitation as well as in regard to the "stakeholders" that are involved in the process.

NI HEIF 2 has a critical role to play in this regard – through recognising knowledge opportunities and supporting the knowledge economy. Whilst not explicitly stated, NI HEIF 2 has an important role to play in the wider STEM agenda.

3.3.4 DETI Regional Innovation Strategy For NI - Action Plan (2008/11)

The action plan is built upon an evaluation of the Regional Innovation Strategy that was published in 2003, consultations with stakeholders and benchmarking against UK, RoI and international best practice. It sets out a four-year plan to develop Northern Ireland's innovation system and infrastructure based on four imperatives, each of which have associated output-driven strategic objectives and actions.

The four imperatives are:

- To establish Northern Ireland as an outward focused and competitive region in the global knowledge economy - with an international reputation for innovation excellence;
- Encourage Northern Ireland's businesses to become more innovative and creative in order to compete in the global market;
- To encourage Northern Ireland Government and the wider Northern Ireland public sector to lead by example in championing and exploiting innovation and R&D; and
- To ensure that the Northern Ireland Education system adopts an enhanced role in developing a culture of innovation and creativity and enables people to recognise opportunities in the knowledge economy.

The importance of collaborative partnerships between businesses and the education sector is a central theme and the action plan notes the successful role of the Regional Innovation Strategy (2003) in supporting this:

"Under the auspices of the Regional Innovation Strategy, organisations and individuals across the public, private and academic/education sectors have forged new and dynamic partnerships and launched joint-initiatives which would otherwise not have happened. Such work has undoubtedly enhanced and improved Northern Ireland's capacity to innovate and will be the bedrock on which to build for the future."

It goes on to note that these successes can only be built on if the collaborative working continues:

"Building an effective regional innovation system depends not only on the actions of each stakeholder, but on the connectivity and flow of information between stakeholders to achieve something greater than the sum of the parts. This Action Plan is about building a more responsible and more genuinely collaborative partnership between the private, academic and public sectors."

Imperative 2 of the Action Plan focuses on the need to *encourage and support NI's businesses in building the capacity to take forward innovative ideas into new products, services and processes.*

- Under Objective 2.3 (*Encourage and support Northern Ireland businesses in building the capacity to take forward innovative ideas into new products, services and processes*), ***Action 2.3.6*** details support for NI HEIF stating that *DETI, Invest NI and DEL will support the universities' core Knowledge Transfer activities through the second round of HEIF, a permanent third stream fund.*

Imperative 4 of the Action Plan focuses on the need to *ensure that the Northern Ireland education system adopts an enhanced role in developing a culture of innovation and creativity and enables people to recognise opportunities in the knowledge economy.*

- Under Objective 4.1 *(encourage the tertiary education sector to take appropriate steps to realise the commercial opportunities of its research to enhance the wealth of*

the region) ***Action 4.1.9*** details that under the NI HEIF Programme, the universities will work with the Business Alliance, DEL, DETI, Invest NI and ANIC/FE colleges to develop an innovative and cost effective programme of business and community engagement that will more effectively transfer technology to local enterprises, secure increased BERD and promote innovation in business and industry. This will lead to the establishment of 5 pilot competence centres in Digital Engineering; Environmental Management; High-performance computing; Polymer Technologies; and Creative Digital Industries.

- Under Objective 4.3 (*Ensure that more people are encouraged to recognise career opportunities through science and technology.*) ***Action 4.3.9*** states that Queen's University Belfast will promote and champion the development of an entrepreneurial culture among staff and students through the operation of NICENT, Roberts' Review, SET (Science, Engineering and Technology) funding and NI HEIF, including the establishment of a Student Enterprise and Employability Unit within the Students' Union. This includes: (i) establishment of the Student Enterprise and Employment Centre; (ii) commencement of an Enterprise Fellowship Scheme; and (iii) embedding of entrepreneurship in all Arts and Social Science Degree programmes.

3.3.5 DEL's Skills Strategy 'Success through Skills' (2006)

DEL's "Skills Strategy" highlights the importance of a **coordinated approach between the FE sector and the universities** in meeting the needs of business:-

"Colleges will be the key players in the liaison between the development activity in Further Education, the identification of employer needs in specialist areas and the R&D and knowledge transfer activity in the universities."

The strategy details a vision of how Northern Ireland can build its productivity and competitiveness in the global marketplace through increasing the skills of its workforce to meet the demands of employers. The strategy comprises four components:

- Understanding the demand for skills;
- Improving the skills levels of the workforce;
- Improving the quality and relevance of education and training; and
- Tackling the skills barriers to employment and employability.

Under the first component, understanding the demand for skills, the strategy describes a vision of how employers will better understand and anticipate their current and future demand for skills. It also describes how this demand will be met by the education and training sector.

"The sector will work in a more collaborative way, and will have established appropriate partnership working arrangements between colleges, schools, Higher Education Institutions, employers, private sector training organisations, and the community and voluntary sector. This will have led to enhanced quality, synergy and customer satisfaction."

One of the key targets under this component was the development of employer-led sub-regional Workforce Development Forums. Six Workforce Development Forums now exist; their work covers two areas: Matching local skills supply-demand on an ongoing basis; and Identification of emerging skills needs in the area.

The first component also details the importance of innovation to the economy and the growth of local businesses. The strategy proposes to identify the skills needed for this and the role of the education and training sector in providing support.

Under the third component, improving the quality and relevance of education and training, one of the key targets is: In consultation with HE sector and employers, develop a policy for higher level skills and the enhancement of student employability. This will be achieved through consultation with Higher Education Institutes and employers to meet the demands for higher level qualifications and skills.

3.3.6 First Report of MATRIX: The Northern Ireland Science Industry Panel (2008)

MATRIX is a business led expert panel set up to identify Northern Ireland's strengths in science, technology and innovation and advise on policy to exploit these for economic gain. In its first report, MATRIX identifies four imperatives for NI to maximise its potential to compete in the global technology and knowledge economy. The first imperative is:

"To compete more effectively as a modern knowledge and technology based economy Northern Ireland must develop a more innovative culture of collaboration across industry, government and academia."

In order to address these imperatives, the Panel made several recommendations including:

- creation of 'industry-led' communities formed by the businesses, academia and government interacting around a specific market theme. These communities will work together to aggregate their innovation resources;
- creation of (industry-driven) road maps by the industry-led communities that clearly outline the outputs required from each member and therefore driving more effective knowledge and technology transfer exchange between partners;
- A world class Intellectual Property Business Infrastructure must be created in Northern Ireland. In this there must be a more comprehensive understanding among the business and academic community of the intrinsic value of IP and how to exploit it and Northern Ireland should also nurture more leading capability within the region's R&D and business community to develop fundamental IP.

A review of the work completed by the MATRIX Horizon Foresight Programme has provided more detail on the opportunities with highest economic significance to Northern Ireland. These include opportunities in 5 sectors (Life & Health Sciences, ICT, Agri-Food, Advanced Materials and Advanced Engineering (Transport Sector)). The MATRIX Horizon reports also have identified future world market opportunities:

- Clean and Green Future World Markets;
- Health, Well Being and Vitality;
- Joined Up and Connected World Marketing; and
- Safe / Protected and Secure Future World Markets.

3.3.7 *InnovationLab (Ireland) Ltd Report for DEL 2006: An Examination of Higher Education Research and Development and Knowledge Transfer in Northern Ireland*

The key objective of this report was to contribute to the knowledge base for policymaking in Northern Ireland, emphasise a number of challenges and suggest some of the particular issues faced by the Northern Ireland HEIs. Central among these is the tension between the HEIs' desire to undertake world class research and their desire to support a local economy where many firms have relatively low absorptive capacity.

In light of the above, the report recommends the HEI sector in Northern Ireland to undertake more applied and experimental research as opposed to basic research. The rationale for this is that the ability of local firms to absorb applied and developmental research may be greater, and this type of research would create greater synergies between academia and local industry. A number of dangers inherent in this approach were highlighted, however, including:

- A potential weakening of the academic research base with consequences including a decline in international reputation – particularly in science and engineering disciplines;
- A reduced capability to attract external funding, levels of which from research councils are already below those in other UK regions;
- Reduced levels of codified knowledge in the form of published research articles as well as patent applications, licenses etc;
- A diminution in wider social benefits given that these tend to be higher from basic research than applied or experimental development; and
- Reduction in international reputation in some research fields with a subsequent lessening of the halo effect of strong research labs in attracting large multinational organisations with R&D capability.

The strategic view was that instead of encouraging the NI universities down the applied research route, a more differentiated strategy was appropriate with the universities focusing on basic research, supported by effective technology transfer organisations.

The report concluded that the universities – and the process of knowledge creation and exploitation of which they are a part – will be an increasingly important driver of regional competitiveness in the future. Therefore, the process of developing the appropriate R&D and technology transfer capabilities is a crucial one.

3.3.8 DETI – Innovation Survey Results (2007)

The survey results show information on the extent of innovation activity, the impact of innovation on businesses and the barriers to innovation over the three-year period from 2004-06.

57% of NI businesses were innovation active during the period 2004-06, which is relatively unchanged from the 2005 result of 56%. However, the gap between NI and the UK is widening. The UK's rate for 2004-06 was 64%, a large increase on their 2005 result of 57%. NI has the second lowest level of innovation activity in the UK; the only region that is lower is London with 55%.

Within the survey cost factors are highlighted as the most common barrier to innovation in NI enterprises with 12% citing this as a significant constraint. However, for NI businesses who are not engaged in innovation activity, a perceived lack of knowledge and market-related factors are the most commonly cited barriers in engaging in innovation activity.

The most commonly cited factor in driving innovation in NI enterprises was improving the quality of goods or services. This was a particularly strong driver in large enterprises with 63% considering it to be of high importance. The least common factors reported were reducing environmental impacts and improving health and safety.

Respondents were asked about collaborative relationships with other partners in innovation. 30% of NI enterprises had co-operation partners in government or public research institutes while 37% had partners in universities or Higher Education Institutions.

3.3.9 Varney Review of the Competitiveness of Northern Ireland (2008)

The review notes that while Northern Ireland enjoyed high growth rates over the last decade relative to other UK regions, it is still disadvantaged by a relatively underdeveloped private sector and structural weakness including the lowest productivity and lowest economic inactivity rates in the UK.

Varney focuses on identifying measures that will enhance economic competitiveness in Northern Ireland through developing innovative businesses and strengthening the country's skill base.

The review enforces the important role of innovation in fostering growth and economic competitiveness. Varney supports the plans laid out in Northern Ireland's Regional Innovation Strategy and offers a number of recommendations for the Executive to build on this:

Recommendation
The Executive should consider whether more should be done to **support clusters based on world-class expertise and support for university excellence.**
The Executive, Invest NI and HM Revenue and Customs (HMRC) should work together to address further the take-up of **R&D tax credits** in Northern Ireland.

The Executive should prioritise embedding **a permanent third stream of finance for universities** such as the Northern Ireland **Higher Education Innovation Fund.**
Current Further Education (FE) reforms should ensure that FE skills provision clearly supports the Regional Innovation Strategy.
The Executive should ensure that reciprocal arrangements for the **innovation voucher scheme** are developed, and explore arrangements to allow Northern Ireland's businesses to access research support in Great Britain.
To improve further the level of **international technology transfer and collaborative research**, the Executive, UK and Irish Governments and research funding bodies should jointly explore how mainstream science funding and long-term strategy can be aligned.
Source: Varney Report: Review of the competitiveness of Northern Ireland (2008)

The review identifies the relationship between higher/further education and businesses as an important driver of innovation through the supply of skilled labour and also through collaborative working.

The level of engagement of Higher Education Institutions with businesses is high in Northern Ireland (in the academic year 2005-06, institutions engaged with 226 businesses per institution, compared with 75 per institution in England, 95 in Scotland and 39 in Wales (note the nature of engagement is not specified) and the number of Knowledge Transfer Partnerships is higher than in many UK regions. Varney suggests that high levels of economic support have contributed to this high frequency of interaction, but states that there is potential to further improve these relationships through continued funding commitment and support.

Varney supports research collaboration between Northern Ireland's two universities as a means of establishing economies of scope and scale. Competing with each other may hinder progress as well as their capacity to interact with businesses and lead innovation.

3.3.10 Public R&D and Regional Development: Spillovers from University and Company-Based Research Centres Working Paper No. 104 (June 2009)

Public funding of university and company-based R&D centres of excellence - widespread both in core and more peripheral regions – seeks to generate local knowledge spillovers. In this paper, the authors examine 18 publicly funded R&D centres (8 university and 10 company based) which were established as part of the Invest NI Centres of Excellence programme, and with the objective of contributing to regional competitiveness.

Comparing the patterns of external connectivity developed by a group of new, university-based and company- based publicly funded research centres (PRCs) suggests:

- university-based PRCs in the sample had established significantly larger average numbers of new external connections than the company-based PRCs across the whole range of locations (local and extra-regional) and linkage types both on average and

relative to their level of R&D investment. This is consistent with other evidence which suggests the strong contribution to economic development of university research;

- company-based PRCs have a bias towards knowledge/technology sharing relationships rather than knowledge/technology transfer relationships. Further company-based PRCs are relatively more likely to form technology transfer relationships with suppliers or customers; and

- the formation of external links by the PRCs is not constrained by proximity. Physical closeness of partners does not appear to be a pre-requisite in knowledge sharing or knowledge transfer relationships. This is particularly the case for university-based PRCs with almost three-quarters of all connections being formed with partners outside the region. Similarly, for company-based PRCs external connections are more likely to occur outside the region.

The results of this study are positive - suggesting a potential catalytic role of public investments in PRCs as a means of stimulating R&D and innovation activity (evident in substantial leverage achieved and in the extensive network of new connections developed) and emphasising the potential for public R&D investments to generate increased local and extra-regional connectivity. The university PRCs were found to be more likely than company-based PRCs to engage in both knowledge sharing and the co-creation of knowledge as well as knowledge transfer activities. The suggestion is that knowledge spillovers from university-based PRCs are likely to be greater than those from company-based PRCs.

Whilst the results suggest the value of public support for PRCs in generating new knowledge and knowledge diffusion, they also highlight the difficulties of capturing the potential benefits locally. They also suggest a prioritisation among such investments, however, in order to derive the maximum benefit for regional economic development.

3.3.11 DETI and Invest NI: Independent Review of Economic Policy (Barnett, September 2009)

In December 2008 DETI launched the Independent Review of Economic Policy and established a Review Panel chaired by Professor Richard Barnett, Vice Chancellor of the University of Ulster. The principal aim of the review was to determine whether the existing DETI and Invest NI policies, programmes and resources will contribute optimally to the delivery of the productivity goal contained in the Programme for Government (PfG).

The Review included a number of recommendations – those most relevant for this evaluation include:

With regard to the drivers of regional economic growth:

- The promotion of **Innovation and R&D** – including business sophistication and, at the regional level, technology transfer – is the most important long term driver of productivity. This is essential for NI to move up the value chain.

With regard to...realigning economic policy in NI:

- In light of the reducing regional aid ceilings, grants for business expansion – which tend to have low levels of additionality – should be phased out towards 2013. The resources should be redirected to provide greater levels of support to **Innovation and R&D** in indigenous and foreign owned companies, and also to attract companies new to NI;
- A new institution for commercially-orientated research should be explored in NI, along the lines pioneered by the successful VTT institute in Finland. (VTT is the Technical Research Centre of Finland).

With regard to...what is required from other areas of government to raise productivity and living standards in NI:

- The local education system should prepare now to meet the anticipated increased demand for higher level skills in STEM and other Innovation relevant subjects, arising from the increased prioritisation of Innovation and R&D.

Implementation of the IREP recommendations is intended to lead to a much greater emphasis on supporting Innovation / R&D.

3.4 Managing the Economic Downturn

A number of recently published documents reflect the current economic environment and advise on how to manage the economic downturn. A key message is an emphasis on the importance of collaboration.

3.4.1 Stronger Together – Business and Universities in Turbulent Times (CBI Higher Education Taskforce, September 2009)

This Confederation of British Industry (CBI) report set out what business wants from higher education (HE), and how it can work with government and universities to improve outcomes. Its overall recommendation was **a stronger relationship between higher education and business**, given that universities are a vital public good that make a crucial contribution to the intellectual, cultural, social and economic well-being of the UK; and play an essential role in ensuring that the country has the skills and knowledge necessary for its long-term success. In light of this, two points were emphasized:

- universities are vital to the success and competitiveness of industries and business, but they have other important stakeholders; and
- the business community should do more to support students and graduates to develop closer partnerships with universities on research and innovation activity, and to find better ways of communicating with HE. Businesses will benefit and must therefore contribute more.

The proposed commitments which all businesses should consider are:

- Employers should provide greater financial support for new graduate recruits;

- Business should do more to encourage the development of the skills it values in science, engineering, technology and maths. The quality and quantity of STEM graduates will improve if business provides more guidance on the content of courses and offers more opportunities for work experience at secondary school and undergraduate levels;
- Undergraduates should be given the chance to undertake real-life projects as part of their degree, and more internships and sandwich placements should be provided. Business should provide guidance on the nature of employability skills in all subjects;
- **To increase overall research collaboration, business should seek to work with universities as a core part of their innovation activity;** and
- Businesses should seek to engage with the HE system to develop and help finance bespoke training provision for their employees.

Six business priorities for HE were set out as follows:

- Support high-quality research and teaching in increasingly challenging circumstances;
- Raise the numbers and quality of graduates in science, technology, engineering and maths (STEM);
- Ensure all graduates have employability skills;
- **Improve the environment for university-business collaboration on research and innovation;**
- Encourage more workforce training; and
- Support diversity in the HE system to cater for an ever-wider range of student and business needs.

3.4.2 Building Britain's Future: New Industry, New Jobs (BIS, April 2009)

This paper sets out the Government's strategic vision for Britain's recovery from the recent economic crisis. It aims to place Britain in a competitive position in the recovering global economy by building on its existing strengths. Following the last decade's sustained investment in science, research and innovation, Britain is in a strong position to respond to increasing demand for high value-added, sophisticated goods and services. However, other countries may catch up if Britain does not maintain its comparative advantage. Two key factors are:

"…a continued focus on ensuring that our economy is driven by high levels of skills and creativity. Britain is, and will continue to be, an economy driven by the creation and exploitation of knowledge. Over the last fifteen years the contribution of high-technology manufacturing and knowledge-intensive services to UK gross value added has increased steadily to over 40%. For this reason, any constraint on the ability of UK-based businesses to exercise comparative advantage on the basis of high levels of skills or knowledge must be regarded as a serious impediment to the UK's economic success."

"…it will also be necessary to pay particular attention to technological change where this is reshaping industries and demanding high levels of innovation, skills and investment from those businesses who will ultimately lead in these markets."

Key areas identified for immediate action and reform to win a bigger share of the opportunities ahead are centred on innovation, skills, finance, infrastructure and trade. Of particular relevance to NI HEIF 2 are:

- more support for turning bright ideas into products that win in the marketplace by building the Technology Strategy Board into a world leader and making sure we **maximise economic opportunities from the work of our university researchers**;
- **smarter, more joined-up Government that** understands the importance of creating wealth, is better at identifying economic opportunities from the big public challenges facing us (especially moving to a low carbon world) and **uses its buying power to support innovation and skills.**

The paper notes the importance of government intervention in areas where the market acting alone would under-invest, particularly in training or investment in innovation:

"This could include measures such as the Government facilitating industry contacts or collaboration; financial support for sectoral centres of excellence or business-university links; or other forms of Government support to overcome a barrier to economic development."

3.4.3 UUK, Guild HE, HEFCE: Standing Together. Helping Universities through the Downturn (2008)

This document is aimed at businesses and details different ways to engage with HEIs that are mutually beneficial to both parties in the current difficult economic climate. It provides information and examples on how to do this including examples such as KTPs and Innovation Vouchers. It describes the important role HEIs play in providing skilled people, through graduates and also through providing training for the existing workforce.

The document highlights the research expertise that is held within HEIs and the importance of knowledge transfer in contributing to the economy. It states that:

"Four in five universities and higher education colleges now see the exchange of knowledge and expertise with business and the wider community as a central part of their mission."

It goes on to explain the importance of building these relationships between HEIs and SMEs in fostering a culture of innovation.

The report notes that the economic downturn will be challenging for many companies and their employees, but highlights that universities and higher education colleges are better placed than ever to help them cope. It concludes that collaborative working which leads to innovation not only improves the company's productivity and competitiveness but also contributes to the national economy.

3.4.4 The Connected University: Driving Recovery and Growth in the UK Economy (NESTA, 2009)

A recent report published by NESTA in April 2009 highlights the importance of universities to economic growth and it presents eight case studies showing how clusters of economic activity have grown up around leading universities. The case studies show that universities interact with businesses in different ways and that the processes are evolving all the time. Universities are now thinking more and more about their role in building clusters, connecting to the national and international economies and bringing together thinking, practice and finance. It is this model of a Connected University that the authors feel holds the key to further economic growth.

It recommends ways in which universities can become more connected as follows:

- Getting the basics right, ensuring that technology transfer organisations are performing at the standard set by leading UK institutions;
- Embracing the model of the Connected University: recognising the importance of building networks with local firms, nurturing local clusters, creating national and international connections and putting this at the heart of their strategies;
- Recruiting, developing and promoting people whose experience encompasses both public and private sectors and who can build links between them; and
- Measuring the benefits of university/business interaction more effectively and communicating these to the public.

It also recommends that the funding system should take into account the importance of university/business interaction; at the heart of this recommendation is the desire to see collaboration that is effectively measured and rewarded. Hence the way in which funding such as HEIF is determined should better reflect the contributions that universities make to local, national and international economies and also sharpen the incentives for cooperation.

The report notes that there is "*an urgent need to improve the metrics that universities use to gauge their broader relationships with business*" in order to measure performance. It suggests that: "*alongside spin-outs and patents, we need to develop ways to measure and assess university business exchange of staff, joint research, cluster size and stability, and the impact of interdisciplinary work*."

4 APPENDIX IV – DETAILS OF COUNTERPART INITIATIVES

4.1 Introduction

In this section we describe other programmes which are working to increase knowledge transfer in Northern Ireland.

The programmes considered – as agreed with the Project Steering Group - include:

- DEL's Higher and Further Education Collaboration Fund ("Connected");
- Invest NI's Knowledge Transfer Partnerships and Short Knowledge Transfer Partnerships;
- Invest NI's Innovation Voucher Initiatives;
- Invest NI's Proof of Concept programme;
- Invest NI's Centres of Excellence;
- Invest NI's Collaborative Networks Programme;
- NISP "Connect" Initiative;
- UK Technology Strategy Board's "Knowledge Transfer Networks";
- Local Council Programmes; and
- DARD / CAFRE Programmes.

4.2 DEL's Higher and Further Education Collaboration Fund ("Connected")

4.2.1 Introduction

The Higher and Further Education Collaboration Fund ("Connected") was set up to run for three years from April 2007 to March 2010 with a budget of £1 million per annum. Queen's University Belfast, University of Ulster and ANIC (on behalf of the 6 regional colleges) deliver Connected via a joint partnership approach. The three main tenets of Connected are:

- Promotion of Knowledge Transfer;
- Delivery of Knowledge Transfer; and
- Training and Internal Knowledge Transfer between HE and FE.

Connected was set up to provide the structure and resources to help link HE and FE with SMEs and in doing so increase the level of Innovation and R&D in SMEs, thereby increasing their competitiveness. There is clear evidence that the structures and resources provided under Connected are needed to help ensure that HE and FE work together to meet the needs of businesses. The situation prior to the establishment of Connected was one where the HE and FE institutions worked generally in isolation from each other with a focus on competition rather than collaboration.

4.2.2 Aims and Objectives

The aim of Connected is to enable the Higher Education (HE) and Further Education (FE) sectors to identify and meet the knowledge transfer needs of businesses and the wider community in a coordinated and holistic fashion.

The objectives of Connected are to:

- Increase the capability of both universities and the FE sector to respond to the needs of business (including companies of all sizes but especially SMEs) with a clear focus on wealth creation;
- Build on what has been achieved between the two universities and the FE sector to date, particularly in relation to Knowledge Transfer (KT) and skills development;
- Help the universities and FE Colleges to develop together in partnership their mission in engagement with business and the community;
- Encourage a holistic approach between the universities and FE Colleges to address the needs of business and the wider community with a primary focus on the priority sectors/clusters highlighted in the "Northern Ireland Regional Innovation Strategy" and the "Further Education Means Business" Strategy Review;
- Enhance the capacity of the FE sector, through effective links with the HE sector, to provide timely and helpful advice and support to SMEs on the effective adoption of new technology and innovative business practices;
- Realise further the potential socio-economic benefits of the work of Northern Ireland's universities and FE Colleges through developing further linkages with the Social Economy sector to enhance the sector's ability to provide quality services to disadvantaged communities and to create innovative pathways into employment for those excluded or distant from the labour market;
- Improve the exploitation of Northern Ireland's science, engineering and technology base; and
- Improve the overall innovation performance of the NI economy.

4.2.3 Supported Activities and Funding Available

The targets specified for the three-year pilot programme for Connected provide an indication of the activities supported.

Table IV.1 Connected Pilot Deliverables

Target	Year 1	Year 2	Year 3
Establishment of a Connected Central Unit	By end Aug 2007		
Establishment of an interactive website	Active by end February 2008		
No. of website hits	1,000	4,000	6,000
Promotional outputs	6 launch events 7 events attended Brochure 3 newsletters Web-enabled film 8 press articles	4 showcase events 10 events attended 4 newsletters 12 press articles	4 showcase events 10 events attended 4 newsletters 12 press articles
No. of enquiries received by central unit and through 'sales' visits	300	600	700
No. of short duration 'added value engagements' following enquiries received by the central unit and through 'sales' visits	100	200	250
No. of projects delivered from enquiries received by the central unit and through 'sales' visits	24	42	60
No. of joint KTPs delivered	3	6	6
Value of the projects delivered (i.e. income/fees paid to HE/FE)	£138,000	£270,000	£342,000
No. of placements in/from business/community organisations	7	10	10
No. of major training and development opportunities	10	20	20
No. of staff exchanges/visits within HE/FE to encourage interaction	30	50	50
No. of international networking visits to acquire know-how and best practice	4	4	4

Source: Higher and Further Education Collaboration Fund – Economic Appraisal (15th January 2007).

The Connected programme has a budget of £1 million per annum, allocated across three main delivery areas: 10.2% to the Central Unit; 73.3% to knowledge transfer project delivery (focusing on the employment of staff within each of the Partners); and 16.5% to internal knowledge transfer activities.

Allocation across the Partners was as follows:

- Queen's University Belfast – 19.3%;
- Ulster University – 19.3%; and
- ANIC (for Central Unit and the activities of the 6 FE Partners) – 61.4%.

4.2.4 Eligibility

Connected works to encourage, ease and increase the potential knowledge exchange links between academia and industry, particularly small and medium-sized enterprises.

4.2.5 Uptake

Table IV.2 below presents a summary of projects recorded within the Connected CMS (Content Management System) database by industrial sector. Against a high proportion of activity (41.1% or 219 projects) no specific sector information is recorded[3]. Of the 314 projects against which a sector has been recorded, business from the Engineering sector represents the largest group at 39% of recorded activity, followed by Construction at 20% and Energy at 13%.

Table IV.2 Connected activity by industrial sector

Sectors	Total	
	No.	%
Engineering	123	39.2%
Construction	62	19.7%
Energy	41	13.1%
ICT	24	7.6%
Food and Drink	21	6.7%
Social Economy	14	4.5%
Electronics	9	2.9%
Life Sciences	8	2.5%
Tourism	6	1.9%
Financial Services	4	1.3%
Aerospace	2	0.6%
Total*	**314**	**100%**

Excludes 219 projects where no specific sector was recorded
Source: Connected CMS 25th May 2009

[3] No specific rationale was given for non recording; however it was often the case that consultees noted that the updating of the on-line database was carried out on an ad hoc basis, with resources focused on actual project activity.

Table IV.3 presents an analysis of activity by employee sizeband, as with recording of sectoral profile a large proportion of activity has no record of employee size. Of the remaining 276 records, small enterprises (based on business with 50 or less employees) represent 63% of all activity, with medium and large sized enterprises (based on enterprises with 51 employees or more) representing 37% of recorded activity.

Table IV.3 Connected activity by number of employees

Employee Band*	Total	
	No.	%
1 – 5	64	23.2%
6 – 10	32	11.6%
11 – 20	38	13.8%
21 – 50	41	14.9%
51 – 100	32	11.6%
101 – 500	42	15.2%
501 +	27	9.8%
Total**	**276**	**100%**

** employee bands have been defined within the Connected CMS database – these do not correlate with best practice in business categorisation (Micro 1-9 employees, Small 10-49 employees, Medium 50-249 employees, Large 250+ employees)*

***Excludes 257 projects where no employee size reference was recorded*

Source: Connected CMS 25th May 2009

The table below presents an overview of the activity recorded within the Connected database as at 25th May 2009. The activities have been categorised in the following way[4]:

- Consultancy related activity i.e., those projects whereby the partner provided advice / guidance to a company or organisation e.g. general business advice on HR and staffing issues, advice on building regulations;
- Product i.e., the activity recorded related to the development or refinement of a product close to or already in the market e.g. the development of contaminated water separation filters, production of prototypes for new designs, testing of water valves, innovative cot design, investigations into component breakage at a late stage of manufacture etc;
- Skills – economic impact i.e. the activity recorded relates to the development of courses/training that are company specific, have the potential to improve the skills base within the company and improve competitiveness;

[4] Note that the analysis is not designed to provide an indication of the level of involvement or activity that has been completed but rather provides a high level analysis of the type of activity that has been generated to date under Connected regardless of whether the activity progressed beyond an initial enquiry stage or not. An analysis of 'active projects' as defined within the Connected monitoring framework was not possible due to lack of accurate recording information.

- Skills - student placement i.e. where there has been a transfer of knowledge from the Partner to the company through a student placement;
- Skills other – where there is potential for transfer of knowledge from the Partner but the recipient is public sector or where in the private sector the economic impact is questionable;
- Technology - research and development type activities. Product idea is not currently near the market place. Examples from the database include research into biofuel issues, prototyping etc;
- International i.e. the activity recorded has an international dimension. These can include networking, company visits etc;
- Networking i.e. the activity recorded relates to networking activities only. These activities are with private sector clients and academic partners etc;
- Networking – public sector i.e. the activity recorded relates to networking activities with the public sector e.g. meeting with Invest NI, DETI etc;
- Process i.e., the activity recorded relates to improvements in company process e.g., production processes, business development activities; and
- Process (technology) i.e. the activity recorded relates to improvements in company process with a technological focus e.g., e-commerce etc.

Table IV.4 Categorisation of Connected CMS activity

Project Category	Number	Per cent
Skills (economic impact)	186	31.4
Technology	63	10.6
Networking	52	8.8
Process	48	8.1
Product	45	7.6
Unknown	40	6.8
Process (technology)	34	5.7
Consultancy	30	5.1
Networking (public sector)	28	4.7
International	26	4.4
Skills (student placement)	22	3.7
Skills (other)	18	3.0
Total	**592**	**100.0**

Source: Connected CMS 25th May 2009

A large proportion of projects are focused on skills development (38.1%) with 15.7% on process or product development and 10.6 % on technology/research projects.

4.2.6 Impacts and Outputs

Overall Connected has been effective in meeting the targets set for the three-year pilot programme 2007/10. Connected successfully met, and in some cases exceeded, 11 of the 17 targets set, including:

- 567 value added engagements recorded, against a target of 300;
- Delivery of 259 projects, against a target of 66;
- Generated income of £601,552, against a target of £408,000; and
- 56 major training and development engagements against a target of 30.

In addition Connected has also developed 18 sector specific projects, involving collaboration between HE/FE partners, designed to support KT. This activity has resulted in the following notable high profile successes:

- SERC was awarded the NI Business Eye Business/Education award.
- Belfast Metropolitan College won the *learndirect*'s Working with Employers Award which recognises learning centres who work with local businesses to support learners.
- The development of Northern Ireland's first Skills Set Academy under which the University of Ulster, BMC, NWRC and SRC were selected to be in a network of creative media excellence. They are part of one of only 17 centres in the world to be a Skillset Media Academy.

Connected also successfully supported the development of three joint KTPs involving FE Colleges as leads, these are the first ever FE-led KTPs in Northern Ireland.

In 2009, the Connected initiative was the subject of an independent evaluation. This noted that the majority of projects supported to date through Connected are focused on skills development/curriculum development. While acknowledging the relevance of these, but also taking into account the overall aims and objectives of the Programme, the review recommended that there should be a reinvigorated focus on product/process development and/or research/innovation projects amongst the project allocation, particularly within the FE sector. Following this review, Ministerial approval has been granted for its further development: a new 4-year programme will be developed commencing in April 2010.

4.3 Knowledge Transfer Partnerships (including shorter KTPs)

4.3.1 Introduction

Knowledge Transfer Partnerships (KTP) is a UK-wide graduate placement programme that encourages collaboration between businesses (company partners) and academic institutes (knowledge base partners) including higher education institutes, further education institutes, research and technology organisations and public sector research institutes.

Under a KTP each partnership employs one or more recent graduates, called Associates, for a period of up to three years (therefore also includes the 10-40 weeks of shorter KTPs) on a project that will transfer knowledge from the higher and further education sectors into business.

KTP is funded by some 21 sponsors representing Research Councils, Research Development Agencies and Devolved Administrations led by the Technology Strategy Board (an executive non-departmental public body of BIS). Invest NI commits up to £1m per annum to part fund KTP projects in Northern Ireland. KTPs are part-funded (60% for SMEs) by a Government grant (Invest NI pay up to 50%, another funder pays the remainder. This other funder may be a government funder and depending on the project there may be more sponsors, for instance the Research Councils may also part sponsor a project.). The remaining cost (40%) involved is covered by the company partner.

KTPs have become an important part of the Northern Ireland regional innovation system and culture. KTPs are particularly important in a region where there are few firms of sufficient scale to maintain their own, independent research and development capability.

Invest NI is also piloting short KTPs (sKTP – known throughout the sector as shorter KTPs). sKTPs are designed to be more flexible than Classic KTPs and assist small firms who may not have worked with higher or further education institutes before. sKTPs were launched in Northern Ireland in November 2008 with the first call for applications in January 2009. They are operating as a three year pilot initiative in Northern Ireland although they have gone live in the rest of the UK.

4.3.2 Aims and Objectives

The aim of KTP is to facilitate the transfer of skills, knowledge and technology from knowledge bases to businesses in order to improve productivity and competitiveness.

The overall aim of sKTPs is to encourage more innovation in SMEs in Northern Ireland. It is hoped that sKTPs will build capacity within the company and increase the uptake of classic KTPs. sKTPs have a short-term tactical focus, compared to the classic KTP (which is strategic), and are shorter in duration lasting between 10 to 40 weeks.

4.3.3 Supported Activities and Funding Available

KTPs are part financed by a government grant made to the Knowledge Base. The size of the grant depends on the size of the company and how many KTP associates are employed. A SME participating in a KTP for the first time will typically contribute 40% of the project costs, which is on average £17,000 - £31,000 per annum (these figures are specific to NI), depending on which Knowledge Base partner is involved in the project.

The proposed project should be of either strategic or tactical importance to the company partner and clearly demonstrate the potential to improve productivity and competitiveness.

(Depending on whether the project is of strategic or tactical importance, either a KTP or a SKTP is adopted.) Projects are assessed against the following criteria[5]:

- Relevance to the strategic plans of the business;
- Demonstration of a clear need for the knowledge or skills of the knowledge base;
- Intellectual stimulation for the Associate;
- Academic Benefits;
- Demonstration that the company partner is financially sound; and
- Potential to be an Invest NI client.

4.3.4 Eligibility

KTPs are open to all businesses in the UK although, in NI, companies of all sizes across all industry sectors can participate.

The Invest NI's criteria for a sKTP application are more stringent: sKTPs are only open to micro-organisations and SMEs (although the TSB has now indicated that it will sponsor large companies for sKTPs in NI). In addition, the following criteria[6] apply to Northern Ireland sKTPs:

- "The project must provide the Associate with an intellectually challenging learning experience appropriate to his/her background and experience.
- If training costs are submitted there must be a clear and appropriate training plan for the Associate.
- There must be an appropriate level of company support and academic support available to the Associate.
- The potential outcomes/benefits for all partners will not occur to the same extent without the shorter-KTP (additionality).
- The company partner must be regarded as being financially stable based upon their latest annual accounts.
- The company partner must be an Invest NI client, or have the potential to become an Invest NI Client.
- The company partner must be an SME and capable of exploiting the knowledge skills or technology to be transferred.

[5] Invest NI (January 2007): Knowledge Transfer Partnership brochure.

[6] source: Invest NI website – document entitled: Northern Ireland Criteria for Shorter KTP

- The proposed project must aim to meet specific needs or solve an identified problem of tactical importance to the company.
- There must be a clear need for the knowledge, skills or technology input from the knowledge base to the proposed project.
- There must be evidence of commitment to the proposed project by the Knowledge Base and the company.
- There must be clear benefits for the Knowledge Base partner including target outcomes.
- The stated potential benefits for the Knowledge Base and the Company partners are likely to accrue".

The Evaluation of the Higher and Further Education Collaboration Fund, Final Report (September 2009) noted that: *"Invest NI anticipates that sKTPs will appeal to the FE sector as they are easier to manage than Classic KTPs, and facilitate the delivery of 'short – sharp' tactical projects that are more aligned to FE delivery. However to date uptake and interest in sKTPs has been slower than anticipated with only one sKTP currently operational in Northern Ireland (Queen's University)."*

4.3.5 Process

Any business can approach a Knowledge Base (this may have a KTP office or a specific individual within the organisation – all NI Knowledge Bases have at least one person who is responsible for KTP) - or they may approach Invest NI who can refer them to the appropriate contact - to discuss the feasibility of its project idea. If the Knowledge Base's academics don't have the skills to match the project, they may refer the company to another potential Knowledge Base partner that does. Once a prospective knowledge base partner is identified, the Partnership Proposal Form and Grant Application are jointly completed. The Proposal is submitted for consideration. If successful, a Grant Offer Letter is issued on behalf of the Technology Strategy Board to the knowledge base partner with a copy going to the Company Partner.

Both Partners are responsible for recruiting the KTP Associate(s) who is the individual responsible for carrying out the work. The Associate's contract is with the knowledge base partner but they are based at the company's premises for the duration of the project (and therefore are working under the terms and conditions of the Company.). Each KTP is bespoke to the company partner's needs and can range in duration from 10 to 40 weeks to 1 to 3 years.

Two KTP Advisers operate in Northern Ireland - the Advisers act as project champions and are there to provide advice and guide the process; they also represent government to ensure appropriate use of funding.

4.3.6 Uptake

KTP activity in Northern Ireland, Scotland and Wales (i.e. the devolved administrations) is, in part, supported by the funding provided by Invest Northern Ireland, the Scottish Government and the Welsh Assembly Government respectively. At the end of the 2008/09 year, the UK Knowledge Transfer Partnerships portfolio comprised 977 Partnerships, facilitating the exchange of knowledge between the UK knowledge base and business (see Table IV.5). Despite the recession, portfolio numbers have been maintained.

Northern Ireland is particularly successful in initiating KTPs, representing almost 7% of the UK's total KTPs, well above its share of UK GDP.

Table IV.5 Geographic distribution of businesses participating in Knowledge Transfer Partnerships (2005 - 2009)

At March...	Total KTPs (No.)	England (%)	Scotland (%)	Wales (%)	NI (%)
2005	858	75%	11%	9%	6%
2006	1002	74%	11%	10%	6%
2007	1048	74%	12%	8%	6%
2008	975	73%	13%	7%	7%
2009	977	72%	12%	10%	7%

Source: KTP Annual Report 2008/09.

Invest NI has indicated that KTPs are primarily taken up by the HE sector (split 84% HE KTPs and 16% FE KTPs). Table IV.6 shows the number of active KTPs in Queen's University Belfast, University of Ulster and FE Colleges at 31 December 2009. Queen's University Belfast has over half (54%) of all active KTPs while the University of Ulster is responsible for just over one third (34%). Three of the FE Colleges are currently engaged in KTPs, accounting for 13% of the NI total.

Table IV.6 Active KTPs in NI by Knowledge Provider (31 December 2009)

Knowledge Provider	Frequency	Percent
Queen's University Belfast	35	54%
University of Ulster	22	34%
Belfast Metropolitan College (BMC)	6	9%
Southern Regional College (SRC)	1	2%
South Eastern Regional College (SERC)	1	2%
Total	**65**	**100%**

Source: www.ktponline.org.uk – Quarterly Statistical Report on Current KTPs (31st December 2009)

4.3.7 Impact and Outputs

It is difficult to calculate the outputs from KTP as the projects vary to such a degree. The information shows that, on average, the benefits a company partner can expect to gain from a KTP are:

- An increase of over £220,000 in annual profits before tax;
- The creation of three genuine new jobs;
- An increase in skills of existing staff;
- The creation of a long-term strategic relationship with the higher/further education sectors; and
- The fostering of a culture of innovation within the company.

The graduate employed on the project gains business-based experience and skills. A more tangible output can be a professional qualification related to the subject area in which they work. An Associate typically spends 10% of his/her time in training and personal development. During the duration of the project they complete an Associate Development Course and are given the opportunity to complete a Level 5 Diploma in Management & Leadership. They are also given a personal training budget of £2,000 to manage and can decide in which courses to enrol, subject to agreement from all partners.

4.4 Invest NI Innovation Voucher Initiative

4.4.1 Introduction

The Innovation Voucher Initiative is jointly administered by Invest Northern Ireland and Enterprise Ireland. The Initiative was launched in May 2008 based on the recognition that the level of innovation in small businesses in Northern Ireland was relatively low in comparison with other regions. On this basis, Invest NI decided to test a form of motivation to get small enterprises (i.e. those with less than 50 employees and under £10m on their balance sheet) to engage in innovation and R&D.

The Initiative provides a voucher of up to £4,000 for small enterprises to access expertise from knowledge providers (academic institutes such as universities, FE colleges or publically funded research organisations) in Northern Ireland and the Republic of Ireland.

The initiative is managed by Invest NI in conjunction with Enterprise Ireland allowing access to 38 knowledge providers throughout Ireland. The budget over the period between October 2009 and March 2012 is £2.7 million.

4.4.2 Aims and Objectives

The aim of the Innovation Vouchers Initiative is to encourage Knowledge Transfer between the knowledge provider and the small enterprise in order to solve knowledge problems and encourage innovation.

4.4.3 Supported Activities and Funding Available

Small enterprises can apply for Innovation Vouchers up to a value of £4,000 (or €5,000 if they choose a knowledge provider in the Republic of Ireland). An additional £1,200 is given to the provider to cover overheads (use of equipment, electricity, admin etc).

The vouchers can only be redeemed against work activities that are eligible under the initiative and provided by any of the 10 approved knowledge providers in NI or the 28 knowledge providers in the Republic of Ireland. Table IV.7 details eligible and ineligible activities:

Table IV.7 Innovation Voucher Initiative – Eligible & Ineligible Activities

Eligible activities	Ineligible activities
Innovation or technology audits with your business	Achieving compliance with statutory regulations or legislation
Tailored training in innovation management	Standard training courses
New business model development	Software purchases and software development
New service delivery and customer interface	Aid that would promote/subsidise the cost of exports
New service development	Internships for students of knowledge institutions
Product and service testing and economic impact assessment	Design and production of advertising material
Efficiency audits and process change	Sales activities
Supply chain management and logistics	Website development and online optimisation
	Business plans and economic appraisals
	Activities that might be supported by other Invest NI mainstream support mechanisms
Source: Invest NI	

4.4.4 Eligibility

The Initiative is available to all registered small enterprises in Northern Ireland and the Republic of Ireland (excluding those in the transportation and agricultural sectors in line with specific State Aid guidelines). For this purpose, a small enterprise is defined as a company or (if part of a group) a group of companies where the total number of full-time employees in the company (or the entire group) is less than 50 and has either an annual turnover and/or an annual Balance Sheet total not exceeding €10m. Sole traders and Partnerships cannot apply.

An enterprise can only have one 'active' voucher at any one time. Enterprises can apply for up to three vouchers for different projects. A 2nd or 3rd voucher can be applied for once the

previous project is completed and the voucher has been redeemed. The level of assistance varies for each voucher:

- ***1st voucher (£4000)***
    - The company pays the VAT associated with the project and any project costs which exceed the voucher value (of £4000).
    - A first voucher is intended to stimulate a new collaboration with the knowledge base and therefore a 1st voucher cannot be awarded if the business has worked with a specific department of any Knowledge Provider before on a formal knowledge transfer project.
- ***2nd voucher (£4000)***
    - The company pays the VAT associated with the project and any project costs which exceed the voucher value (of £4000).
    - If the company uses the same individual Knowledge Provider as used for the 1st voucher then the voucher is worth 90% up to a maximum of £4000 of the project cost and the company must contribute 10% of the cost and the VAT.
- ***3rd voucher (£4000)***
    - The voucher is worth 80% up to a maximum of £4000 of the project cost and the company must contribute 20% of the cost and all of the VAT.

4.4.5 Process

Small enterprises access either a word version of the application form or an online application from at: www.innovationvouchers.com / www.innovationvouchers.ie and are issued with a £4,000/€5,000 Innovation Voucher if successful. All projects are assessed by an independent panel, following a call for applications. Upon finding a suitable Knowledge Partner, the work plan is agreed and the project must be completed a minimum of six weeks before the Voucher expiry date. Upon completion, the Knowledge Provider is given the Voucher in lieu of payment. If the project costs exceed the Voucher value, the small enterprise must pay the remaining amount in addition to the VAT on the entire project cost.

4.4.6 Impact and Outputs

To date 350 vouchers have been issued out of a total of 611 applications, with approximately 110 projects having been completed. Some examples of supported projects are:

- Food products (development of new recipes, extension of shelf life);
- New product development and testing; and
- Fire certificate testing.

The majority of activity in Northern Ireland to date has come from the universities, accounting for some 75% of vouchers issued. However, Invest NI has indicated that most of the Further Education Colleges in NI now have at least one project, with some having as many as four or five. In the Republic of Ireland, the converse is true where the Institutes of Technology are responsible for generating most activity.

4.5 Invest NI Proof of Concept Programme

4.5.1 Introduction

Launched in December 2003, the Proof of Concept (PoC) programme supports the pre-commercialisation of leading-edge technologies emerging from Northern Ireland's Research Organisations. It helps researchers to export their ideas and inventions from the laboratory to the global marketplace.

The programme supports the development of early-stage ideas, which will normally have secured, or be in the process of securing, patent protection or other appropriate forms of protection. It is not simply another source of research funding. Successful bidders must demonstrate that their ideas have originality and true commercial potential. Projects will therefore ideally result in one or more of these possible outcomes:

- Working prototype/demonstrator;
- IP;
- Documented Process/Methodology;
- Collaborative Research;
- Commercial Partners; and
- Additional funding.

Proof of Concept represents a strong commitment to exploiting research advances and encouraging innovation within Northern Ireland's Research Organisations.

4.5.2 Aims and Objectives

The key objective of the Proof of Concept programme is to improve the level and quality of commercialisation from within Northern Ireland's Research Organisations through the provision of funding for early stage development activity.

4.5.3 Supported Activities and Funding Available

The programme focuses on a model where individuals or small groups work on short applied projects to develop an idea through to a stage where a route to commercialisation is clear, either as a spin-out or by licensing to an existing company.

The funding is aimed at supporting and developing new ideas, which would normally have secured, or be in the process of securing, patent protection or other appropriate forms of

intellectual rights, but which have not reached full laboratory-scale demonstration, or "proof of concept". Because of the embryonic nature of the ideas to be supported, they are generally not capable of securing funding from commercial sources, such as venture capital funds.

The Proof of Concept programme allows the development of intellectual property to take place in a way which:

- extends protection of that property;
- extends applicability of that property;
- improves confidence in its anticipated commercialisation; and
- underpins the validity.

To maximise impact in this important area of economic growth, eligible projects will attract 100% funding. Funding for a Proof of Concept project is capped at 100% of eligible costs up to a maximum of **£100,000** of assistance. There are two strands to the funding:

- a ***technology strand*** of 12 months duration with maximum assistance of up to **£80,000** (Includes Staff costs; Overheads (@ 40% of staff costs); Consumables; Patent costs; Subcontracting; Equipment; Other (i.e. Trials and testing); and Audit Fees (Mandatory); and
- a ***commercialisation strand*** of 15 months duration with maximum assistance of up to **£20,000,** which overlaps with the technology strand (includes Market Assessment Consultancy; and Travel and Subsistence).No additional forms or proposals need to be submitted to receive the commercialisation funding – it is automatically allocated if a project is approved for funding by the Proof of Concept Assessment Panel.

4.5.4 Eligibility

The Proof of Concept programme is available to academics at Queen's University Belfast, the University of Ulster, the Agri-Food and Biosciences Institute and Health and Social Care Trusts.

Businesses are not eligible for support.

4.5.5 Process

Application Procedure

The Proof of Concept programme closed for applications on 31 March 2009. Application Guidelines and Application Form are available from the webpage. All applications to the programme must be fully vetted & formally approved by:

a. the Research Office; and

b. the Research Organisation's Technology Transfer Office prior to submission to Invest NI.

All applications are assessed to ensure that the following basic eligibility requirements are met (as specified in the Invest NI PoC brochure (2009)):

- *"The application has been signed by the relevant Research Organisation authorities;*
- *The project is not curiosity or strategic driven;*
- *The Research Organisation is not seeking an alternative source of research funding; and*
- *State aid rules are not breached."*

Projects that are deemed to meet these requirements will be forwarded marketing and patent assessments.

Selection Criteria

The PoC Assessment Panel reviews, assesses and decides on the appropriateness of the project for funding under the PoC programme. The Panel considers the following for each application in their decision making process:

- Economic impact on Northern Ireland;
- Fit with Proof of Concept programme;
- There is existing or near-future IP potential;
- Competitive advantage through innovation;
- Market potential; and
- Technical work programme.

State Aid

Financial support from Invest NI must comply with State Aid Rules which means that it cannot be used in any way which could be deemed as anti-competitive. As the funding is 100% grant, it cannot be used to fund company research. Research Organisations must not therefore involve industrial partners in the project.

Project Managing and Monitoring

Each project supported under the programme has an associated Project Management Panel, comprising the Research Organisation's Project Technical Team (led by the Principal Investigator), a representative from the Research Organisation's Commercialisation Office and the Invest NI Technology Executive. The remit of the Panel is to review technical progress on the project, as well as monitor costs.

The Principal Investigator records, on a standard Project Management Panel Report provided by Invest NI, technical progress and financial spend. A separate written report is not required.

Duration of Project

As a general rule, projects will be up to 12 months duration, although this may be extendable to up to 18 months by mutual agreement between the Research Organisation and Invest NI.

4.5.6 Uptake

The PoC programme was evaluated at the end of a three-year pilot in 2006: over four funding rounds, grants of £5.2m were given to 40 projects. The evaluation established strong demand for the programme from both universities proving that the programme filled a gap between early stage funding and commercialisation.

The new PoC programme (£6m) was launched in 2008 and Invest NI has committed £2.6m arising from 28 offers to QUB and seven offers to UU (35 projects approved in 2008). A second PoC funding round was announced in February 2009 and 25 projects have been approved. Overall, a total of 60 projects has been approved over the 2 funding rounds and Invest NI has now fully committed its budget. (Invest NI is now in the process of doing the necessary evaluation, economic appraisal and casework to get more funds.)

The Proof of Concept Fund projects already underway fall under at least one of the technology areas presented in Table IV.8.

Table IV.8 Proof of Concept Fund – Projects already underway (at November 2009)

Technology Area	No. of Projects Funded
Life Science	10
Life Science & Biotechnology	4
Life Science & Biotechnology & Food Science	1
Life Science & Biotechnology & Nanotechnology	1
Life Science & Chemistry	1
Life Science & Engineering	1
Biotechnology	3
ICT	4
Engineering	3
Engineering & Nanotechnology	1
Engineering & Environmental Science	1
Engineering & Physics	1
Environmental Science	1
Chemistry	2
Total	**34**

Source: Invest NI website (accessed November 2009).

http://www.investni.com/index/grow/research_and_development/technology_collaboration/proofofconcept/proofofconcept_categories.htm

As some of the Proof of Concept Fund projects already underway fall across more than one technology area, we can isolate the numbers by unique technology area – as illustrated in Table IV.9.

Table IV.9 Proof of Concept Fund – Projects already underway (at November 2009)

Technology Area	No. of Projects Funded
Life Science	18
Biotechnology	9
Engineering	7
ICT	4
Chemistry	3
Nanotechnology	2
Environmental Science	2
Physics	1
Food science	1
Material science	0
Construction	**0**
Total	**47***

** Note: Some projects are counted in more than one technology area. Therefore, the total illustrated in the table above may be greater than the total number of unique projects.*

Source: Invest NI website (accessed November 2009).

http://www.investni.com/index/grow/research_and_development/technology_collaboration/proofofconcept/proofofconcept_categories.htm

4.5.7 Impacts and Outputs

The PoC evaluation noted that the large majority of projects were in Life Sciences, Engineering and ICT. The evaluation concluded that both the commercialisation of projects and the number of spin-outs would be considerably lower than initially projected, although more licensing deals were projected.

The evaluation also reported a number of softer benefits from the programme, including better business / commercial skills, identification of potential future projects and increased enthusiasm for commercial activities.

4.6 Invest NI Centres of Excellence

4.6.1 Introduction

Invest NI's Centre of Excellence (CoE) Programme has stimulated commercially focused research through the establishment of both university and company based facilities. The Centres have varied sectoral profiles, for example aerospace, pharmaceuticals, engineering, electronics and food. To date Invest NI has invested £50m in the establishment and ongoing work of nine university centres and 13 company centres.

As a follow-on to the CoE Programme, Invest NI has developed proposals to provide support for the establishment of Competence Centres (six Expressions of Interest have been accepted to proceed to full proposal stage; none have been approved yet). Competence Centres are unique amongst Invest NI initiatives in that they are collaborative and industry led

and governed, while operating in the area of long-term research. Competence Centres are resourced by the universities and other research bodies, empowered to undertake strategic research on behalf of industry. The research direction can be re-focused to take advantage of market opportunities as they arise.

4.6.2 Aims and Objectives

Centres of Excellence

The Invest NI Research and Technological Development (RTD) Centres of Excellence Programme was established in 2002 with the explicit objective of "contributing to regional competitiveness". Specifically: "*The RTD Centres of Excellence Programme supports the establishment of R&D centres to stimulate leading edge, industrially exploitable and commercially focused research which will demonstrably improve the competitiveness of Northern Ireland industry"*.

The Centres of Excellence Programme was aimed at enhancing Northern Ireland research and innovation capabilities through large and sustainable investments that were intended to strengthen the region's technological infrastructure over the funding period and beyond, with the emphasis being on sustainability. The desired economic effect was to help increase the competitiveness of Northern Ireland's industrial sector. At the time it was introduced, there was a strong rationale for the Programme based upon Northern Ireland's research and technology development gap and overall economic position.

Competence Centres

The objective of the Competence Centre initiative is to encourage innovative companies to work with the Northern Ireland research base to achieve competitive advantage for industry in Northern Ireland. Not only will the companies participating in Competence Centres benefit from the shared intellectual property and research produced, but Northern Ireland's economy will benefit in terms of knowledge generated and retained in the region for long-term growth.

4.6.3 Supported Activities and Funding Available

Centres of Excellence

The Centres of Excellence Programme was established as a result of a single open call for receipt of proposals between 3rd September 2001 and 28th February 2002. The Centres of Excellence Programme had two main stages in terms of funding;

a) first, the initial funding period, during which time the Centres received grant support from Invest NI and PEACE II; and

b) second, the Proposer funding period, during which the Centres were supported by their sponsoring organisations. The continuation of each Centre throughout the Proposer funding period was a condition of the original letter of offer. Specifically, "the Promoter undertakes to maintain the Project for a period of three years after the funding period has ended".

The intention was that each would be given three-year Invest NI funding followed by a three-year period in which the sponsoring organisation was obliged to maintain Centre activity.

A total of 18 Centres was established, with only one being in excess of 36 months (being for 5 years). Of the eighteen projects which were funded: eight were university led projects and ten industry led projects. Over the funding period, the projects were to receive £34.5m in total, with £21.46m available from PEACE II and the remaining funds provided by Invest NI. This was matched by additional investment of £79.42m from the Centres' host organisations.

Of the university projects, the spending profile between the two NI universities is greatly skewed by the ECIT eligible project costs. There were 4 QUB projects (73.3% by project value), 3 UU projects (9.5% by project value) and 1 joint project (17.2% by project value). ECIT was by far the largest project, with eligible costs of almost £37.76m and a Grant Offer of £8.28m. When the Nanotec NI project is assessed by individual university, QUB received 77% of total grants awarded to the universities, with UU receiving 23%.

Of the 18 projects:

- One (QUB) was awarded over £8 million grant, this being the ECIT project;
- One (Joint QUB / UU) was awarded over £5 million grant, namely Nanotec NI;
- Two (1 QUB / 1 UU) were awarded over £2 million grant;
- Eight (2 university and 6 company projects) were awarded over £1 million grant, the largest company award was £1.73m to Randox;
- Six (2 university and 4 company projects) were awarded less than £1 million grant.
- ECIT involves a particularly significant R&D investment, with eligible costs of almost £37.76m and a Grant Offer of £8.28m. This investment was over 3 times higher than the next largest Centre, the joint Nanotechnology Centre (Nanotec NI), and it accounted for more than half of the total expenditure by the university-based Centres. Invest NI financial support for ECIT, although being at a much lower percentage of eligible costs than the other university-based Centres (22% compared to circa 50%), still amounted to more than a third of the total grant support offered to the university-based Centres.

According to an evaluation undertaken in 2007 by Invest NI[7], the majority of expenditure was accounted for by Salaries (46.6%); Capital expenditure (27.9%); and Overheads (23%).

Competence Centres

A Competence Centre is a group of businesses and researchers coming together to agree and undertake collaborative strategic research of common interest. The Centre must be industry led and the research must be market focused and deliver benefits to industry.

Funding reflects the unique requirements of each Competence Centre. It is expected that participants make a meaningful contribution reflecting their commitment to the Centre. The

[7] *Invest NI (November 2007): Evaluation of the RTD Centres of Excellence Programme.*

combined industry contribution should represent at least 25% of total costs, some of which can be made up of in-kind contributions. Research providers are expected to increase their cadre of research staff to fulfil the Centre's requirements. Continued funding depends on a range of metrics such as increasing industry research funding, growing the number of companies involved, the level of international collaboration and level of knowledge transfer, licences and the revenue from them and spin-offs, and new products and processes leading to increased export sales.

The costs of the Competence Centre that the programme supports include:

- staff costs relating to the research and management of the Centre;
- costs of contracted research;
- intellectual property protection costs;
- travel and subsistence; and
- consultancy costs.

4.6.4 Eligibility

Centres of Excellence

The primary thrust of the Centres of Excellence Programme was to support major proposals for the establishment of R&D Centres within Northern Ireland's industry and universities. These had to be leading edge stimulating, industrially exploitable and commercially focussed.

As a general rule, projects were to be not less than 24 months and not more than 36 months in duration. Only in exceptional circumstances would the Industrial Research and Technology Unit (IRTU - a legacy agency of Invest NI) consider projects in excess of 36 months. The intention was that each would be given three-year Invest NI funding followed by a three-year period in which the sponsoring organisation was obliged to maintain Centre activity.

At the time of its launch, the RTD Centres of Excellence Programme was seen as a more flexible programme, when compared to existing IRTU R&D programmes such as START and Compete, spanning infrastructural, as well as revenue costs, and including applied, development, as well as more basic research. As noted above, the Programme was also supported by PEACE II funding, with the impact on NI economic activity of ICT and the themes of reconciliation, being key themes.

Support for the 18 projects under the Centres of Excellence Programme was focused on a range of sectors that were considered crucial to the future development of the Northern Ireland economy. These included the aerospace industry, ICT, nanotechnology, environmental technologies, pharmaceutical and medical technologies which were deemed to be areas of high growth, with global potential. High growth sectors would therefore create economic wealth and bring economic prosperity to the company and the employees. The Centres also presented opportunities to retain graduates within NI, with employment based upon matching the technical requirements with the skills base.

Competence Centres - Target Participants

- Any Northern Ireland based company with an R&D strategy or vision that is open to working with like-minded companies and prepared to collaborate with research performers;
- Other companies that can demonstrate that they will strengthen the consortium and bring technical and economic benefits to Northern Ireland; and
- Northern Ireland's research organisations.

The project must demonstrate that it is industry led and has industry commitment and therefore the lead partner is in general expected to be an industry organisation although applications may be stimulated by an academic organisation. There must be at least four partners in a consortium.

In principle, spin-out companies from universities, start-up businesses and sole-traders and partnerships can apply to be part of a consortium.

A key aim of Competence Centre support is to help improve Northern Ireland's innovation performance. Collaborators outside Northern Ireland – EU and non EU – are acceptable, but there must be a clear and substantial gain for Northern Ireland brought about by their involvement. They will not, however, receive funding from the programme, although their project costs may be included when calculating total eligible project costs.

4.6.5 Process

Centres of Excellence

Call for Applications

The Centres of Excellence was announced as a competitive Programme using PEACE II monies. There was an original call within a short timeframe, and approximately 30 companies returned applications. All proposals underwent a technical and economic appraisal. The applications were scored against the assessment criteria at 2 separate meetings (which are stated to have neither disadvantaged those considered first or last). There was also consideration of the PEACE II measure.

The technical appraisal covered all key technical areas of the project, including milestones. With the exception of ECIT, the economic appraisals followed the format of an assessment of the reasonableness of costs, assessment of additionality, and the benefits to the NI economy etc. All were approved by DFP after consideration of the Green Book requirements. A more detailed appraisal was conducted for ECIT, reflecting the large-scale nature of the project. For the 3 Centres of Excellence approved, or under review, since 2002, all have been subject to a higher level of economic scrutiny.

Programme management

The university projects were required to establish industry advisory panels. Achieving industrial relevance in a university centre generally required a proactive approach to the management of linkages with industry. The model that Invest NI sought to embed in the university Centres was as follows:

- A research advisory group;
- An industry advisory or steering group; and
- A commercial project manager, typically concerned with:
    - Day-to-day management;
    - Promotion of the Centre to local industry;
    - Progressing grant applications; and,
    - Developing a sustainability strategy.

Monitoring

In terms of monitoring, Invest NI Technology Executives have maintained close contact with projects. Meetings are held on at least a four- monthly basis. Progress reports are submitted for review and signed off by the Invest NI Technology Executives. These, together with the progress meetings, are used by the Technology Executives as the basis for payment of grant claims and evidence of progress made. Claims (together with reports on progress) are submitted by Centres at least three times each year - only during the funding period.

Under the terms of the letters of offer for Centres of Excellence, promoters were required to submit a final report at the end of the funding period.

Competence Centres

The first step in the process is Invest NI's call for Expressions of Interest from groups of companies. This call was advertised in the local press. The call closed on 22 April 2009, but it is expected there will be a further call. Applicants were required to outline their common research interest and the likely impact of a Competence Centre on their business area.

Interested groups of companies are encouraged to consult with Invest NI on the best approach to submitting an Expression of Interest.

If the company is already part of an established consortium that has well developed research plans identifying resources, timelines, costs, benefits, and governance, it can apply directly for support by registering the Expression of Interest. If the applicant is not already involved in a consortium, Invest NI offers advice and facilitation to help them set up a consortium and carry out a detailed planning exercise to define their consortium's research agenda.

It is anticipated that some of the Expressions of Interest may lend themselves to the merging of groups. Applicants may also be redirected towards other more appropriate initiatives such as the Collaborative Networks Programme as a preparatory stage.

An evaluation panel assesses the Expressions of Interest. Priority is given to those groups whose Expressions of Interest indicate the highest potential impact and Invest NI works closely with these groups to develop their detailed "Description of Needs". This may involve Invest NI providing external facilitators or consultants as part of this process.

The Detailed Description of Needs will be likely to include some of the following:

- numbers of companies involved;
- commercial and economic impacts;
- research and training plans;
- description of structure;
- location;
- intellectual property rights agreement;
- proposed funding model;
- mechanisms to develop an international reputation; and
- collaborative agreements.

The Detailed Description of Needs is assessed on the basis of Invest NI's recognised R&D assessment criteria including strategic fit, Centre viability, degree of innovation, potential commercial benefit, technical viability and wider economic benefits. There are additional

Centre-specific considerations including significance and expansion of consortium membership, IP and commercialisation arrangements and governance, etc.

Governance

Each Competence Centre is expected to form a board with an industry chair and industry leadership, which is empowered to function as a board by a legal agreement. This may involve a consortium agreement with a number of companies and research providers, or the formation of a separate non-profit legal entity depending on the needs of the companies involved.

Intellectual Property

Intellectual property rights need to be dealt with by a formal agreement between the parties, which allows companies to enter or exit a Centre over time. This process will require considerable effort and time to complete. It must, therefore, be dealt with prior to completion of a Competence Centre contract.

Exploitation of intellectual property is on the basis of prior agreements made in the consortium. Intellectual property developed within the project is the property of the consortium. The allocation of rights to this intellectual property should be covered by the collaboration agreement.

4.6.6 Uptake

Centres of Excellence

A total of 18 Centres was established (10 are in the private sector and 8 based in the two universities), with only one being in excess of 36 months (being for 5 years).

Invest NI's Annual Report and Accounts 2002/03 to 2008/09 reviews the progress of the initiative each year. Tables IV.10 and IV.11 show this progress and the expected against actual performance.

Table IV.10

Centres of Excellence – Progress of the Initiative

Year	Progress
2002/03	Established 17 Centres of Research Excellence that will significantly enhance Northern Ireland's innovation capabilities and strengthen links between industry and the universities.
2003/04	Established a further two Centres of Research Excellence and secured an additional £7m of research funding – the Institute of Electronics, Communications and Information Technology (ECIT) and the FG Wilson Research & Development Centre. In total, this brings the number of new Centres of Excellence established to 18, spanning a range of technology sectors important to the growth of the Northern Ireland economy. To date, almost £35m has been allocated towards a total public/private sector investment of over £100m.

Year	Progress	
2004/05	The 18 Centres of Research Excellence are performing well against targets, having secured additional research funding of over £8 million and having generated over £52 million in income. The refinement of support structures for wealth creating innovation and R&D is a key element of our strategy. (...) The initiative has already helped generate over £50 million of commercial income for the industrial Centres through new products and increased sales, and enabled the academic Centres to source almost £15 million worth of additional grant funding from various sources.	
	31 March 2005 Target	**Year End Achievement**
	Establish 2 additional Centres of Research Excellence. From established Centres of Excellence: - undertake commercial research to value of £0.5m - Secure additional research funding of £3.0m	No Centres of Excellence established but in advanced discussions with 2 projects £0.7m £7.9m
2005/06	Among other programmes, Invest NI approved Centres of Excellence (2006: £4,230,000, 2005: £7,972,000)	
2006/07	During the year Invest NI acted as a managing agent for a number of programmes, with no balances held in the books of Invest NI. Among other programmes, Invest NI approved Centres of Excellence (2007: nil, 2006: £4,230,000).	
2007/08	An evaluation of Centres of Excellence supported to date concluded that the £35 million of funding provided has resulted in almost £200 million of total investment and in some £500 million of additional revenue, an outstanding result.	
2008/09	1 Centre of Excellence established against the 3 targeted.	
Source: Invest NI Annual Report and Accounts 2002/03 to 2008/09 & Corporate Plan 2002/05		

Table IV.11

Competence Centres – Projects target and actual figures

Year	Centres Targeted	Centres Established
2002/03	17	16
2003/04	2	2
2004/05	1	0
2005/06	1	1
2006/07	1	1
2007/08	2	2
2008/09	3	1
Total 2002/03 to 2008/09	**27**	**23**
Source: Invest NI Annual Report and Accounts 2002/03 to 2008/09 & Corporate Plan 2002/05		

Competence Centres

Invest NI's call for Expressions of Interest from groups of companies closed on 22 April 2009, but it is expected there will be a further call.

4.6.7 Impacts and Outputs

Centres of Excellence

In 2007, BDO were commissioned to conduct an evaluation of the initial 18 centres. Of the 8 university centres and 10 company centres, total additional income at that time was £503.1m (compared to the Programme cost of £113m which included grant of £34m, of which around £21.5m was supported under the EU PEACE II Programme with the remainder provided by Invest NI). This income comprises £43.5m for the universities and £459.6m for the company centres outlined below.

Table IV.12
Centres of Excellence – Evaluation (2007)

Achievement to Date	Additional Grant Income from other sources, e.g. Research Councils (£m)	Additional Commercial Income Achieved (£m)	Total (£m)
University	34.0	9.5	43.5
Company	N/A	459.6	459.6
Total	**£34.0m**	**£469.1m**	**£503.1m**

Source: Invest NI / BDO – NI HEIF 1 Evaluation (2007)

In addition, 4 of the 8 university centres and all 10 of the company centres anticipated future annual income: 3 anticipating additional income of <£500k per annum, 4 anticipating £1-5m, 2 anticipating £10-25m and 5 anticipating £25m+ additional income per annum.

The evaluation also noted other "spin-off" effects:

- 51 patents have been applied for, or filed, within 15 Centres.
- There have been 7 patent awards to date.
- One Centre (ECIT) has had four spin-in companies.
- Five Centres report licensing fees.

Competence Centres

The Invest NI Competence Centre Information Booklet describes the following expected benefits of participation in these:

- **Companies benefit from:**
    - the opportunity to engage in higher-risk, longer- term research into market problems that, once solved, can offer them a competitive edge;
    - having direct input into the strategic direction of the Centre's research;
    - being able to access intellectual property and have an early influence on its exploitation;

- networking with senior and influential researchers that could lead to involvement in EU and other R&D initiatives.

- **Researchers benefit from;**
  - dynamic interaction with industry that will ensure research will deliver economic benefits;
  - a longer term funding mechanism allowing time to bring their research to fruition;
  - the possibility to spin-out new commercial entities and exploit intellectual property;
  - being able to access larger streams of funding to develop the research infrastructure by leveraging other research schemes.

Impacts expected to come from Competence Centres include:

- commercialisation of innovative products and processes;
- increased company expenditure and involvement in R&D, including leveraging other R&D funding streams such as EU Framework Programme;
- exports, spin-outs, patents and licences.

Additional less tangible impacts are expected in: the two-way transfer of knowledge between the markets and academia, training of researchers, transferring research into industry and improved skills and networks.

4.7 Invest NI Collaborative Networks Programme

4.7.1 Introduction

The Invest NI Collaborative Networks Programme (CNP) was set up in 2007 to support business-led collaborative networks and stimulate economic development within Northern Ireland. Evidence suggests that working collaboratively may improve the company's efficiency, market position and profitability, often resulting in new products or processes.

Common themes for collaboration include:

- Training;
- Marketing;
- Logistics;
- Sales; and
- Research and development.

4.7.2 Aims and Objectives

The objective of CNP is to develop the capability and capacity of regional clusters/networks by attracting private sector companies, investors, researchers and academia to maximise collaborative opportunities in the development of new products, processes or services.

Collaborative networks fit into one of four stages in their Life-Cycle which are explained below.

1) Embryonic collaborative networks – those at the early stage of growth with no formal structure in place, those who see potential and value for developing collaborative projects but need facilitation to define commercial collaborative projects.

2) Established collaborative networks – those who have room for further growth whose members formally agreed to collaborate but require ongoing facilitation.

3) Mature collaborative networks – those that are stable or will find further growth difficult.

4) Declining collaborative networks – those that have reached a peak. Collaborative networks at this stage can sometimes reinvent themselves.

The CNP is best suited to collaborative networks that are categorised as 'embryonic' (1) and / or 'established' (2).

4.7.3 Supported Activities and Funding Available

The CNP is aimed at developing business-led collaborative networks. These networks must have an interest in undertaking time limited collaborative initiative/s that will achieve measurable benefits for the members of the network.

The initial pilot fund is limited and once funding is fully committed no additional funding for Feasibility Study and / or Network Facilitation is available during the pilot period. Funding is available for the period December 2007 to March 2010. Funds are provided through the European Regional Development Fund, but are partly subject to the De Minimis rule.

Table IV.13

Invest NI – Collaborative Networks Programme – Eligible Activities, Costs and Levels of Support by Phase

Phase	Eligible Activities	Eligible Costs	Levels of Support Available
Phase 1 – Feasibility Study	Scoping activity; Development of a Business Plan; Developing of Marketing Plan; and Development of a Project Plan.	Facilitation and consultancy fees; and Travel and subsistence.	The Feasibility Study phase is supported at 75% of eligible cost up to a maximum of £15,000.

Phase	Eligible Activities	Eligible Costs	Levels of Support Available
Phase 2 – Facilitation Funding	Project management; and Facilitation of the network: Organisation of workshops/ seminars/ best practice events & study visits; Management of the shared web-based community; and Marketing of the network.	Facilitation labour costs; Travel and subsistence; Salaries and wages of staff directly involved with the collaboration project (must be verifiable); Overheads and administrative costs directly involved with the collaboration project (must be verifiable); and Consultancy costs	The maximum levels of aid available in this phase are £250,000 or 50% of eligible costs, whichever is the lesser. Furthermore the facilitation labour costs must not exceed 50% of the overall project costs.

Source: Invest NI

Companies in receipt of CNP support may also be eligible to apply for other financial assistance such as aid under the Regional Aid Guidelines for other projects. Due diligence is carried out by Invest NI to ensure that the cumulation of aid does not exceed the maximum allowable. Applicants are required to provide signed declarations that all state aid rules including cumulation are being adhered to.

Although it is likely that the programme will continue, the format is not yet finalised.

4.7.4 Eligibility

Invest NI's Collaborative Network programme supports companies working together for a common business benefit. This potentially involves engaging with other partners including, but not limited to, academia and training providers.

The collaborative network must include at least 4 private sector companies that are clients (or potential clients) of Invest NI or other Northern Ireland based economic development bodies. The collaborative network must also demonstrate they have potential to engage with the relevant stakeholders and include those organisations necessary to extend the value chain such as academia, trade associations and suppliers.

This fund is not available directly to:

- Trade Associations;
- other public bodies;
- voluntary sector organisations.

However this does not exclude those bodies listed above (along with organisations based outside NI) from participating as a network member and / or stakeholder. Invest NI would encourage academia to present applications in partnership with the private sector network.

The network must consist of at least four NI-based companies, but can also include other stakeholders, both within NI and beyond.

Proposals submitted after the closing date of 31 March 2010 are not eligible.

4.7.5 Process

As this is a pilot initiative the funds available are limited and awarded through an open call to those networks that can demonstrate additionality and / or feasibility. Applicants for the Collaborative Network Programme have to complete an application form and present the signed version to be submitted for formal consideration. Further to this Invest NI require a signed declaration from all participants that they concur with the aims/objectives and targets of the application (to accompany the signed application).

The CNP will be available in two phases.

- **Phase 1 – Feasibility Study**

Invest NI will provide funding for a feasibility study to identify and scope out a collaboration project. Support will be available at 75% up to a maximum of £15,000.

- **Phase 2 – Facilitation**

Invest NI will support a collaborative project which is:

  - industry-led;
  - project focused; and
  - of a duration between 2 & 5 years.

Support can only be given to either the network directly (if it is a legal entity) or the lead partner. Collaborative Network proposals need not avail of Phase 1 support in order to apply for funding under Phase 2.

Project Assessment and Approval

Companies that apply for aid under phase 2 must provide clarification of the feasibility of the projects in this network, including relevant baseline data on all participants, such as:

- Capabilities and core competencies (including skills);
- Technological specialisation;
- Current market share;
- Identified need & opportunity.

Invest NI will operate an approval process and each Collaborative Network proposal will be subject to appraisal by an Approval Committee. The proposal must satisfy the following criteria:

- Strong business and economic benefits for the majority of network participants and wider sector;
- Demonstrate the need for financial assistance to satisfy Invest NI additionality;

- Ability to achieve measurable economic improvements or benefits to participating companies in terms of regional development, product innovation, and export growth;
- Evidence that the project is additional to any existing work already being undertaken by the participants;
- Contributing to sustainable network development; and
- Demonstration of participants' commitment to the project, including in-kind costs.

The Collaborative Network Programme is awarded to business-led collaborative networks that will do most to achieve the objectives and offer the best value for the funds available. In appraising the projects Invest NI will examine project size, level of risk, strategic impact and funding.

Monitoring and Evaluation

All projects in receipt of CNP aid are subject to regular monitoring throughout the life-cycle of the project by Invest NI. An evaluation of each project takes place within 18 months of completion of the project.

4.7.6 Uptake

Examples of some of the Collaborative Networks include:

Table IV.14

Invest NI – Collaborative Networks Summary

Cluster	Network	No. of Network Members
Life & Health Technologies Cluster	Medical Devices	12
	Functional Foods	8
	INSPIRE	11
	Connected Health	25
Digital Content Cluster	E-Learning	11
	NISINE	11
	Project Kelvan	13
	Digital Content	349 Social network members, 149 voting members
Sustainable Energy Cluster	Biotecture	20
	Biomass O&M	5
	Biomass Mfr	4

Cluster	Network	No. of Network Members
	Global Marine Alliance	11
	Global Wind Alliance	14
	Smart Grid Network	17
	Plastics & Polymers	47
	Waste water	6
Source: Invest NI – Members of Collaborative Networks Summary, March 2010		

4.7.7 Impacts and Outputs

Recognised benefits of Collaborative Networks include:

- Improved productivity - associated with ease of access to suppliers, technology, partners, support organisations etc.;
- Public sector and University support - because of increased pooling of resources and enhanced lobbying capacity;
- Improved access to employees - reduced recruitment and relocation costs due to close proximity and provision of specialized skills and training from local education providers;
- Reduced transaction costs - due to shorter supply chain;
- New business formation - new companies tend to grow in close proximity to other companies rather than in isolation; and
- Enhanced Innovation - better visibility of the activities of suppliers, competitors and customers leads to early identification of new opportunities.

4.8 Northern Ireland Science Park (NISP) "Connect" Initiative

4.8.1 Introduction

The first CONNECT organisation was started in 1985 at the University of California, San Diego (UCSD). It was created on the initiative of the local business community and sought to redirect an ailing local economy into the knowledge-based era. Since then, over 600 new high tech companies and 120,000 new jobs have been created in connection with the San Diego network. In addition, new networks have grown up inside and outside the borders of the US.

Global CONNECT

Established in 2003 within UCSD, Global CONNECT seeks to work with regions around the world to understand and further develop their innovation systems. The Global CONNECT membership network then applies the principles of the regional CONNECT

model to an international matrix of regions and companies to achieve similar benefits on a global scale. Today the CONNECT model has been replicated in Scotland, Yorkshire, Midlands UK, Sweden, New Zealand, Jordan, Seattle, Estonia, Norway, Denmark and Taiwan.

4.8.2 Aims and Objectives

Northern Ireland Science Park (NISP) CONNECT is an independent, non-profit organization fostering entrepreneurship by accelerating the growth of promising technologies and early stage companies. Its core purpose is *'to connect people, technology and capital to drive innovation and create wealth through building high value IP-based companies in Northern Ireland'*, aiming *'to help to establish a thriving entrepreneurial eco-system where innovation, vision and talent flourish'*.

4.8.3 Supported Activities and Funding Available

A collaboration between NISP, the University of Ulster and Queen's University Belfast, NISP CONNECT acts as an 'honest, neutral broker' within the region. The collaboration provides direct delivery programmes, mentorship/coaching services (Springboard), educational seminars and events geared at developing and encouraging entrepreneurial ideas (Frameworks), talent and leadership (Evening Series). It encourages entrepreneurship in academia (£25k Award) and helps companies get early stage funds (halo).

NISP CONNECT designs and delivers bespoke programmes and forums dedicated to creating and sustaining the growth of innovative technology companies. It mentors entrepreneurs, assists them with business model development, advises them on growth strategies and provides them with access to venture capital providers through their network.

NISP manages 'halo', the local angel network, for which it provides administration and logistical support. It prepares companies for their investment consideration. In addition, NISP invites entrepreneurs and investors from outside the region to participate in its programmes. This expands the CONNECT network, highlights the region, and creates opportunities for outside investment in Northern Ireland.

NISP CONNECT depends on small government grants, sponsorship and the good will of the business community.

Table IV.15

NISP – "Connect" Initiative – Activities

Activity	Description
Springboard	Springboard provides free assistance for life sciences & high tech companies in all stages of development, including concept, start-up, challenge and opportunity. Entrepreneurs accepted into the program spend 3 to 8 weeks in coaching sessions with one of NISP CONNECT's Entrepreneurs in Residence or Springboard Fellows. Upon completion of this process, the entrepreneur is invited to make a presentation of their business model to a select group of experts. This group usually includes a venture capitalist, seasoned entrepreneur with domain expertise, accountant, corporate and patent attorneys, marketing professional, and an executive from a successful company in the

Activity	Description
	same industry. Experts are also being drawn from insurance, real estate, human resources and other areas as needed. The panel of experts is tailored to the individual needs of each company. The goals of the panel presentation are to provide the entrepreneur with candid recommendations for the refinement of their business plan and to help identify next steps to achieve the company's goals. Following the panel presentation, the entrepreneur meets with their Entrepreneur in Residence or Springboard Fellow to identify next steps, incorporate the feedback from the panel and implement a strategic plan for the next six to twelve months.
Frameworks Workshops	Many of today's business founders and future entrepreneurs have scientific and technical backgrounds but have had limited experience in industry, so they often lack exposure to critical information which is essential to leading a start-up. To fill this gap, Frameworks workshops offer content-rich, targeted, educational programmes that help young to mid-staged companies build a business around their promising science or technology. Subject matter expertise is provided by knowledgeable top-tier professionals and industry veterans to facilitate the transfer of knowledge and experience. Programme attendees gain valuable business vocabulary and tactical skills and presenters gain credibility with future business leaders. Entrepreneurs attending Frameworks workshops include technology and biotech founders, CEOs, top management or scientists and technology experts considering a business start-up. The workshops attract people from a wide range of disciplines including technology, communications, software, life sciences and business services.
Evening Series	Throughout the year NISP produces events targeted at showcasing the experiences of local or international science and technology corporation that were once start-ups. Access is open to all constituents of Northern Ireland's "venture community": entrepreneurs, capital providers, economic development agencies, service providers and executives.
25k Award 2009	The purpose of the £25K contest is to identify, qualify, prepare and present the intellectual property from the publicly funded research base in Northern Ireland with the most commercial potential. Winners are announced in September before an audience of more than 250 top executives, entrepreneurs, investors, service providers and academics. It is a great opportunity to meet the innovators of the next great technology in the categories of: Hitech; Biotech; CleanTech; and Digital Media and Software.
NISP CONNECT Videos	NISP CONNECT offers key events and people throughout the year through video. Examples of videos available include 'Spirit of Ireland - Dissection of an 11billion Euro start-up'; 'Toby Coppel - Ex SVP of Yahoo Europe speaks at the annual 25k award dinner in 2009'; or 'The Next Big Thing - What do you think will be 'the Next Big thing' - a panel of industry experts voice what they believe the Next big thing will be in Bio-Tech / Life Sciences, Electronics / Telecoms, Software / Internet and Clean-Tech'.
Source: NISP website	

4.8.4 Eligibility

NISP CONNECT's focus is strictly on start-up ventures and the commercialisation of science and technology ready to leave the research base. NISP CONNECT cannot help established companies (post series A of VC investment) or established companies in distress.

Table IV.16

NISP – "Connect" Initiative – Eligibility

Activity	Target Group
Springboard	Entrepreneurs from life sciences & high tech companies in all stages of development; including concept, start-up, challenge and opportunity stages.
Frameworks Workshops	Entrepreneurs attending Frameworks workshops include technology and biotech founders, CEOs, top management or scientists and technology experts considering a business start-up. The workshops attract people from a wide range of disciplines including technology, communications, software, life sciences and business services.
Evening Series	Access is open to all constituents of Northern Ireland's "venture community": entrepreneurs, capital providers, economic development agencies, service providers and executives.
25k Award 2009	Organisations with intellectual property from the publicly funded research base in Northern Ireland with the most commercial potential under the categories of hi-tech, bio-tech, clean-tech and digital media and software.
NISP CONNECT Videos	Available online.

Source: NISP website

4.8.5 Process

See under previous section - Section 4.8.3

4.8.6 Uptake

- 96 % of all community members (entrepreneurs, research professionals, professional service providers, investors) who had attended a NISP CONNECT event or volunteered support said that they would "recommend NISP CONNECT to a friend or family member" in a survey conducted in March 2009.
- There was a high quantity of quality early stage ventures and promising science and technology engaging in NISP CONNECT activity between April 08 and March 09:
  - Over 200 unique early stage companies and wantrepreneurs[8] have attended a NISP CONNECT event or forum or received customized support
  - 71 proposals were received from the research base to commercialise their science or technology in the 2008 25K programme
- There is a strong willingness from the community to volunteer support
  - 26 Venture capital funds have engaged
  - 23 Professional service firms engaged and have provided pro bono support
  - 25 Entrepreneurs in Residence pledged (6 have engaged in coaching)

[8] Wannabee entrepreneurs.

- There is willingness for the community to come together:
  - NISP CONNECT produced 30 events and forums in 2008 / 2009
  - There were over 1,100 total attendees at events (+ an additional 350 online)
  - NISP CONNECT events raised private sector sponsorship of £40K

There is a strong willingness to align and collaborate between the region's technology transfer offices, research institutions and trade associations. In addition, NISP and NISP CONNECT are becoming viewed as a birthplace/ nursery for new communities (e.g. Connected Health Campus, Software initiative (with Momentum)).

NISP CONNECT purpose is to develop Northern Ireland's social infrastructure, the target outcomes were set to ensure focus on key activities and the facilitation of forums where new relationships could be created. Choosing the right metrics was critical and hence avoiding pressure to link targets explicitly to job creation which would ultimately skew focus.

4.8.7 Impacts and Outputs

Table IV.17 shows that the key targets have all been exceeded.

Table IV.17

NISP – "Connect" Initiative – Performance vs Targets April 08 - March 09

Programme		Target	Results
Frameworks	# of Workshops Entrepreneurs attending average Average rating (max 5.0)	8 15 3.5	12 32 4.6
Evening Series	Events Average attending	3 50	4 90
£25k Awards (new)	Teams entering Independent private sector volunteers (mentors/ judges) in process	30 30	71 40
Springboard (partial)	Companies graduating Entrepreneurs in Residence (EiRs)	3 5	4 25
Affiliate programme: **Halo**		Keep alive	halo re energized

Source: NISP – "Fostering a More Innovative and Successful Regional Economy': A Report on the Operation of NISP CONNECT, One Year On (March 09)

4.9 UK Technology Strategy Board's "Knowledge Transfer Networks"

4.9.1 Introduction

A Knowledge Transfer Network is a single over-arching national network in a specific field of technology or business application which brings together people from businesses, universities, research, finance and technology organisations to stimulate innovation through knowledge transfer.

Knowledge Transfer Networks (KTNs) have been set up to drive the flow of knowledge within, in and out of specific communities.

KTNs have been established and are funded by government, industry and academia. They bring together diverse organisations and provide activities and initiatives that promote the exchange of knowledge and the stimulation of innovation in these communities. There are currently 24 KTNs.

4.9.2 Aims and Objectives

The objective of a Knowledge Transfer Network is to improve the UK's innovation performance by increasing the breadth and depth or the knowledge transfer of technology into UK-based businesses and by accelerating the rate at which this process occurs. The Network must, throughout its lifetime, actively contribute and remain aligned to goals of the Technology Strategy Board.

Within the overall objective of accelerating the rate of technology transfer into UK business, the specific aims of a Knowledge Transfer Network include the following:

- To deliver improved industrial performance through innovation and new collaborations by driving the flow of people, knowledge and experience between business and the science-base, between businesses and across sectors;
- To drive knowledge transfer between the supply and demand sides of technology-enabled markets through a high quality, easy to use service;
- To facilitate innovation and knowledge transfer by providing UK businesses with the opportunity to meet and network with individuals and organisations, in the UK and internationally; and
- To provide a forum for a coherent business voice to inform government of its technology needs and about issues, such as regulation, which are enhancing or inhibiting innovation in the UK.

4.9.3 Supported Activities and Funding Available

Knowledge Transfer Networks (KTNs) have been set up to drive the flow of knowledge within, in and out of specific communities. KTNs are funded by the Technology Strategy

Board[9] to help businesses innovate by providing them with networking and partnering opportunities, giving them up-to-date knowledge on markets, technologies and routes to funding. Their main role is to put companies and innovators in contact with the knowledge and funding that they need to bring new products, services and processes to market.

KTN Central website[10] provides information about Knowledge Transfer Networks and the government funding body behind them, the Technology Strategy Board. As well, there is information available about individual KTNs, the scientific and technological disciplines they cover and how to become a registered member.

The Knowledge Transfer Networks share a common on-line platform to help them disseminate and transfer knowledge to individuals as well as industry and other networks, for example.

The KTN Platform is a common online platform that has been developed and enhanced under the KTN programme to implement an online capability set that exceeds current market expectations featuring:

- An industry standard online configuration interface;
- A simple document storage tool for easy deployment of structured content;
- A high level collaboration suite incorporating advanced security features, document version control, discussion areas and alerting;
- A full content management suite supporting scaleable work-flow processes; and
- A rich online conferencing suite using state of the art Voice over IP technology.

Technologies of the portal

Apart from the Branding of the portal in terms of the "Grid" layout, header and footer, colours used and the designated content regions, each KTN is free to present content any way it needs to. The portal uses standard portlet technology to allow discrete areas of the site to be developed independently, using free text, HTML, bespoke content types within content manager, or structured presentation interfaces and wizards.

Each KTN defines its own user groups and permission structure to allow dynamic service and customisation to the user.

Administration and web-mastery can be delegated throughout the KTN permission structure. No specialist knowledge of web development is needed. HTML experience is advantageous.

Fundmap

Fundmap provides easy navigation to the grants and funding available to businesses in the UK technology sector:

[9] The Technology Strategy Board is an executive non departmental public body (NDPB), established by the Government in 2007 and sponsored by the Department for Innovation, Universities and Skills (DIUS). (Note DIUS now superseded by BIS).

[10] http://www.ktnetworks.co.uk

Table IV.18 KTN – Fundmap – Grants and Funding available in the UK by category

Category: Development Stage	No. of Support Schemes
Design & Development / Business Development	158
Prototype / Clinical	147
Proof of Concept	125
Design / Preclinical	122
Blue Sky	118
Collaborative	95
Start up	93
Sales & Marketing	80
Production / Manufacturing	77
Academic Collaboration / Facilities	38
Employment & Training	35
Internationalisation	28
Category: Type of Support	**No. of Support Schemes**
Grant/subsidy	158
Venture capital	75
Loan	68
Equity investment	56
Consultancy grant	7
Competition based funding	4
Tax relief	3
Loan guarantee	3
Angel investment	2
IPO support	1
Category: Applicable Organisation	**No. of Support Schemes**
SME	335
Non-SME	199
Academic	71
Category: Market Sector	**No. of Support Schemes**
Medical / Healthcare	291
Engineering and Industrial	251
Renewable Energy	246
Data Communications / Telecoms	231
Aerospace	230
Consumer Electronics	226
Space	226
Automotive	225
Utilities	223
Scientific and Analytical	220
Broadcasting / Film & TV / Audio	215
Travel and Tourism	203
Instrumentation & Control	199

Table IV.18 KTN – Fundmap – Grants and Funding available in the UK by category	
Digital Media / Games	198
Security	191
Defence / Military	180
Marine	176
Oil & Gas	174
Nuclear Energy	173
Lighting	173
Media	160
Financial Services	152
Retail	136
Government	122
Category: Region	**No. of Support Schemes**
Not region specific	144
Scotland	35
Wales	26
Yorkshire & Humber	23
North East	20
South East England	18
East Midlands	18
London	17
South West England	14
Northern Ireland	12
England – (region not specified i.e. these are England-wide support schemes not restricted to a particular region)	10
North West	9
West Midlands	9
East of England	4
Sub-Total Europe	**14**
Sub-Total UK	**144**
Sub-Total Regional	**207**
TOTAL	**365**
Source: Knowledge Transfer Network – Fundmap website (http://www.fundmap.co.uk)	

Technological Areas Covered by KTNs

Table IV.19 Knowledge Transfer Network – Networks	
Networks	**Description**
Aerospace & Defence	The UK Aerospace & Defence Knowledge Transfer Network (KTN) task is to help promote innovation and collaboration across UK industry, Government and academia, helping to improve industrial performance and implement the UK National Aerospace Technology strategy (NATS).
Biosciences	Biosciences KTN serves the agriculture, food and industrial biosciences sectors to connect and catalyse knowledge transfer, promote networking and

Table IV.19 Knowledge Transfer Network – Networks

Networks	Description
	stimulate innovation to help industry profit and grow from new technology-enabled products and processes.
Chemistry Innovation	The Chemistry Innovation KTN has been set up with Government and academic support to bring together a range of expert people and organisations that can assist with large or small science, engineering or manufacturing changes in your business.
Creative Industries	The Creative Industries Technology Innovation Network (CITIN) will work with a variety of creative industries including: advertising; architecture; art and antiques markets; computer and video games; crafts; design; designer fashion; film and video; music; performing arts; publishing; software; television and radio. It will identify and clarify the challenges and opportunities of a rapidly changing technology landscape and bring together creative industry companies, technology providers and researchers to exploit this potential, drive innovation and secure the UK's international competitiveness.
Digital Systems	The Digital Systems KTN (DSKTN) brings together expertise in scalable computing, location & timing and cyber security in order to drive the development of a digitally-enabled Britain.
Digital Communications	The Digital Communications KTN members share white papers on technical developments and business planning, case studies of new business ventures, coordination in research programmes, links to business sectors inside and outside the communications environment, information on developing regulations and standards and an industry technology roadmap.
Electronics	A key objective of the Electronics-KTN is to provide access for companies right across the electronics value chain to knowledge that will help them to understand how to capitalise on their innovations.
Energy Generation & Supply	The mission of the Energy Generation and Supply Knowledge Transfer Network (EG&S KTN) is to create an integrated and dynamic network of business, technology, academic and policy stakeholders delivering strategic and effective knowledge exchange to advance the UK Energy Generation & Supply sector.
Environmental Sustainability	The Environmental Sustainability KTN draws together organisations and businesses that deal with environmental and resource management and assists them to accelerate the development and uptake of innovative sustainable solutions. The KTN focuses upon areas where there is the greatest potential for addressing the interlinked challenges of excessive use and depletion of natural resources, environmental degradation and loss of biodiversity, and climate change. Its efforts are particularly concentrated upon Key Priority Areas where the competitiveness of British businesses and the UK economy as a whole can be enhanced.
Financial Services	The Financial Services Knowledge Transfer Network (KTN) harnesses cutting edge scientific research to support and protect innovation, competitiveness and market stability.
HealthTech & Medicines	A KTN dedicated to advancing the UK's human health life sciences sector, through knowledge transfer, innovation and building powerful networks of forward thinking organisations in priority areas such as medicines, medical devices, diagnostics, regenerative medicine, associated bioprocessing and

Table IV.19 Knowledge Transfer Network – Networks

Networks	Description
	convergence. The KTN is able to operate at a strategic level, liaising with relevant government departments and trade associations to enable a better climate for innovating in the UK, and supports groups or individual businesses to access the knowledge and resources needed to move innovations forward.
Industrial Mathematics	The Industrial Mathematics KTN harvests the UK's world-leading strengths in modelling and analysis to accelerate innovation. The KTN unlocks value in business operations, products and services, illuminating the best ways forward for companies and giving early warnings of potential difficulties.
Intelligent Transport Systems	Intelligent Transport Systems (ITS) have huge potential to reduce the environmental impact of road transport, increase productivity through reduced congestion and improve the safety and security of the road transport network. The ITS provides a platform to bring together industry thinking stimulate collaborative working across ITS industries, services, and R&D. The ITS KTN is led by innovITS, the UK Centre of Excellence for Transport Telematics and Sustainable Mobility.
Low Carbon	'Description under development'
Materials	The Materials KTN aims to bring together the views of all in business, design, research and technology organisations, trade associations, the financial market, academia and others in an overarching value network across the materials community.
Nanotechnology	The Nanotechnology KTN has been established to provide a market-oriented focus for the facilities, people and organisations engaged in Micro and Nanotechnologies in the UK and to lower entry barriers and drive the widespread market development and exploitation of these technologies.
Modern Built Environment	The Modern Built Environment KTN has been established to intensify technological innovation within the modern built environment through improved knowledge transfer. The KTN will achieve this through a series of activities, which will identify and communicate information on new and emerging technological innovations that are both relevant and applicable to key industry sectors.
Photonics & Plastic Electronics	Photonics and plastic electronics are key technology areas for future development of capabilities and for addressing the 'green agenda.' Moreover, these are technologies where the UK has established a global reputation for innovation. Photonics has matured considerably from the days of the first laser devices and is now a technology firmly embedded in our society at all levels from consumer products to high value capital equipment. Plastic electronics, in which the UK is a world leader, is an exciting embryonic technology that will enable the conception of new products and bring about revolutionary changes in the way current products are designed and manufactured.
Sensors and Instrumentation	The Sensors and Instrumentation KTN covers the whole of the UK's sensing community, from academics and large industries to small businesses, research councils and government departments. The KTN embraces sensing in its entirety – from the principles of measurement to novel sensor technologies, deployment in the field and data analysis.

Table IV.19 Knowledge Transfer Network – Networks	
Networks	**Description**

Source: http://www.ktnetworks.co.uk

Each of the 19 KTNs presented in the table have their own website, management board and steering committee, organisation structure, programmes and activities, resources and funding, membership policies, events and conferences, etc.

4.9.4 Eligibility

Members are usually individuals from business, research, or government organisations concerned with developing and exploiting a technology for the economic benefit of the UK.

Registration for membership of a KTN is possible through visiting the homepage of that KTN and following the instructions. Each KTN manages its own applications.

4.9.5 Process

Organisations use the KTNs' resources to find new routes to market, collaborative partners or new customers; get help with finding funding for their projects; get access to the latest academic knowledge and skills; or to understand the impact of new and emerging technologies on their business model.

4.9.6 Uptake

In October 2009, there were 19 knowledge transfer networks with a membership of around 60,000[11]. The newest KTNs were in Energy Generation and Supply and Financial Services.

4.9.7 Impacts and Outputs

KTNs provide many benefits for members including:

- **Networking** – frequent opportunities to network with other businesses and academics through targeted events, meetings and Special Interest Groups organised by the KTN.
- **Information and news** – free access to on-line services such as reports, newsletters, webinars/e-training, events diaries, e-conferencing and collaboration tools and general sector/application specific information.
- **Funding opportunities** – advice on Technology Strategy Board Collaborative R& D calls, Knowledge Transfer Partnerships and other sources of funding for innovation such as Framework Programme 7, Eureka and Venture Capital.

[11] *Source: Technology Strategy Board Brochure – What is a Knowledge Transfer Network or KTN? (October 2009)*

- **Policy and regulation** – a communications route between their community, Government and EU, giving members the opportunity to influence policies and regulation in the UK and abroad.

- **Our strategy** – KTNs are playing an increasingly important role in the development of the Technology Strategy Board's future direction.

Optimising the KTN 'Family'

During 2008 a review of the Knowledge Transfer Networks was carried out to assess their current effectiveness and scope. The comprehensive review, which obtained views from 2,100 KTN users and R&D intensive businesses, strongly confirmed the value of the networks. 75% of business respondents rated KTN services as effective or highly effective. Over 50% had developed, or were developing, new R&D or commercial relationships with people met through a KTN and 25% had made changes to their innovation activities as a result of their engagement.

The most highly rated functions of KTNs, according to the survey, are monitoring and reporting on technologies, applications and markets; providing high quality networking opportunities; and identifying and prioritising key innovation related issues and challenges. The review also emphasised the strong benefits brought to the KTN programme through links with a wide range of partners. KTNs engage with trade associations, technology providers, research councils, Regional Development Agencies and the Devolved Administrations to deliver benefits to businesses of all sizes.

The review highlighted an opportunity to refocus the work of the KTNs, optimising the coverage of business and technology sectors, creating a more targeted, comprehensive and accessible range of network resources to help accelerate innovation.

4.10 Local Council Programmes - Lisburn City Council – University of Ulster: Innovation Networks Programme

4.10.1 Introduction

The Innovation Networks Programme is funded by Lisburn City Council and the EU under the Sustainable Competitiveness Programme 2007-2013. The tender was awarded in June 2009 and it is being delivered by University of Ulster (managed by the Office of Innovation) in partnership with South Eastern Regional College. It is assisting local businesses to identify and develop new technologies, new processes, new systems or products to add value and improve overall business competitiveness and profitability.

4.10.2 Aims and Objectives

The programme aims to:

(1) provide innovation support to 12 businesses in the Lisburn City Council area;

(2) present Ulster research commercialisation opportunities to Lisburn-based businesses; and

(3) develop innovative joint collaborative projects between Lisburn-based businesses.

Support and advice is provided to businesses in order to tap into world class research to boost new business ventures or add new products and services to established businesses. The vision of the programme is to 'work together in strategic partnership as the building block for innovation'.

Through this programme, innovation is promoted as accessible by all, with businesses encouraged to network, and to share best practice and ideas around innovation thus maximising commercial opportunities, creating new jobs and helping to grow the local economy.

The programme also offers businesses the opportunity to access the world class research and new technologies developed by University of Ulster staff, which provided opportunities to explore the development of new commercially viable products.

The support offered also means a way for the University of Ulster's scientists and researchers to commercialise their technology breakthroughs through technology licensing to businesses.

4.10.3 Supported Activities and Funding Available

The Innovation Networks Programme has four key elements:

1. ***Access Innovation Roadshows***

   The range of support offered was showcased through the 'Access Innovation Roadshows' series of seminars, held throughout the City of Lisburn in September 2009 (3 in Lisburn, 1 in Belfast and 1 in Dunmurry). These were aimed at meeting with local companies and undertaking a bespoke business innovation and technology audit to highlight areas for improvement and opportunities for growth within the business. More seminars are expected to be held on an ongoing basis.

   Support and advice offered included the following:

   - A free bespoke business innovation and technology audit to highlight areas for improvement and opportunities for growth within the client's business;
   - Access to cutting edge expertise and facilities from University of Ulster and South Eastern Regional College;
   - Opportunity for businesses to join a new Council-funded Innovation Support Programme; and
   - Advice on other innovation funding opportunities.

2. ***Innovate***

Each participating business recruited to the "innovate" element of the programme benefits from up to 6 days innovation support from experts at the University of Ulster or South Eastern Regional College to explore a business opportunity or solve technological or knowledge based problems, as well as signposting to additional support if appropriate. Types of projects may include product development, design, prototyping or feasibility study.

Spaces are limited on this element of the programme and are allocated on a competitive basis. To take part, eligible businesses were requested to complete an expression of interest for the 'Innovate' element of the programme, including company name, contact details, type of business, number of employees, main product / service and stating if they are Invest NI clients.

3. ***Collaborate***

The programme provides an opportunity for businesses to network with other companies to identify and progress exciting new collaborative projects between businesses. Network events are being scheduled at the moment of undertaking this report.

4. ***Commercialise***

Businesses also have access to the world class research and new technologies developed by the University of Ulster staff, which provide opportunities to launch new commercially viable products and enter new markets. Showcase events are being scheduled at the moment of undertaking this report.

4.10.4 Eligibility

The programme targets business located in the Lisburn City Council area interested in improving their business performance and identifying new opportunities for growth through innovation.

4.10.5 Process

Local companies are encouraged to grow their business through increased levels of R&D by identifying and developing appropriate new technologies, new processes, new systems and new products that will add value and improve overall business competitiveness and profitability.

The University and College undertake initial scoping projects with the business to test feasibility of a new business concept, or to test the physical prototyping of a new product or service, or in identifying a new process or service, before applying for support or funding for further development.

4.10.6 Uptake

The programme is in its initial stages; however, it aims to provide innovation support to 12 businesses in the Lisburn City Council area.

4.10.7 Impacts and Outputs

The programme is in its initial stages – too soon to say.

4.11 DARD / CAFRE Knowledge and Technology Transfer Activities[12]

4.11.1 Introduction

DARD knowledge transfer activities are delivered to farmers, growers and the food industry.

Within DARD, the College of Agriculture, Food and Rural Enterprise (CAFRE) has overall responsibility for delivery of Knowledge and Technology Transfer (KTT). This was announced by Minister Pearson in 2003 when he outlined the Government's final decisions on the O'Hare Review of Agri-food Education and Research and Development[13].

The current structures, established post-O'Hare, bring together CAFRE, other branches within DARD's Service Delivery Group, DARD policy leads and the Agri-food and Biosciences Institute (AFBI) with the aim of ensuring cohesive and comprehensive delivery of the KTT programme. At operational level, staff from CAFRE and AFBI co-ordinate work programmes through a series of link groups across all types of enterprise i.e. beef and sheep, dairy, pigs, crops etc.

DARD's current model to implement these arrangements has recently been reviewed as part of the ongoing roll-out of its Evidence and Innovation Strategy 14, launched in July 2009. The latter recognizes the important role of innovation in securing a sustainable and competitive rural economy and society and that effective KTT is a key vehicle for promoting innovation. To that end, knowledge transfer arrangements will form an integral part of future DARD-funded research programmes and the link groups referred to in the previous paragraph will, in future, report to one of four high- level research programme management boards, led by policy grade 5s.

In addition, the Strategy outlines DARD's plans for an in-depth review of the department's knowledge transfer arrangements, starting next year.

The remainder of the section describes the existing KTT arrangements.

4.11.2 Aims and Objectives

DARD's Strategic Plan 2006-11[15] sets out its Vision of a thriving and sustainable rural community and environment. The Vision is underpinned by 5 strategic Goals, namely:

[12] Information in this section provided by Elaine McCrory, Head of Research Policy, DARD

[13] See http://www.publications.parliament.uk/ for Ian Pearson MP's Written Ministerial Statement on 31 Mar 03

[14] http://www.dardni.gov.uk/evidence_and_innovation_strategy_2008-2013_final.pdf.pdf

[15] http://www.dardni.gov.uk/dard-strategic-plan-2006-2011.pdf

- To improve performance in the market place;
- To strengthen the social and economic infrastructure of rural areas;
- To enhance animal, fish and plant health and animal welfare;
- To develop a more sustainable environment; and
- To deliver effectively our services to customers.

DARD's current KTT activities serve all of these goals to some extent, but more particularly, Goal 1.

In addition, DARD's KTT activities support PSA Target 4 of the Executive's Programme for Government 2008-11; "*Help agri-food businesses and rural SMEs develop and grow and contribute to a more sustainable environment" and, in particular, the strategic target to "Increase by 5% the performance of assisted farm businesses by 2011*".

4.11.3 Supported Activities and Funding Available

The demonstration of new technologies and systems to the industry at CAFRE is achieved mainly through technology projects and initiatives. These projects aim to equip those in the industry with the knowledge, skills and experience to adopt the appropriate technologies and systems within their businesses. Depending on the project, economic, environmental, health and safety and animal welfare benefits will accrue to the agri-food industry.

A list of Knowledge and Technology Transfer projects currently being delivered by CAFRE is attached at Appendix V.

It is difficult to put a specific figure on the level of funding for DARD's knowledge transfer activities at CAFRE, as funding for most of the programme is from the College's overall annual budget allocation from DARD.

4.11.4 Eligibility / Target Audience

The target audience for CAFRE's Knowledge and Technology Transfer programme includes developing farm and commercial horticulture businesses and food processing businesses. (A developing farm business is one generally of > 1 Standard labour requirement (SLR) where the farmer has the potential, attitude and capacity to implement change and improve farm business performance.)

4.11.5 Process

Farmers and Growers

The process of delivery of technology projects / systems to farmers and growers at CAFRE follows a number of defined steps:

a. **Investigation –** this involves desk analysis of recently developed technologies emerging, for example, from R&D projects / systems developed within DARD or from around the world to identify and investigate those with greatest potential benefit for the Northern Ireland agri-food sector. On identification of a potential technology / system, a business case for full implementation of the project is prepared and presented for approval to the appropriate CAFRE Head of Branch.

b. Initiation of the project follows. This involves the implementation of the technology / system in the working environment on either the CAFRE farm / unit and / or on partner farms / units throughout Northern Ireland. This enables the technology / system to be tested under practical conditions and put in to a business context through financial evaluation. The implementation of a new technology / system on a typical farm under local conditions has proven to be a very effective training and development method in order to allow other farmers to adopt the technology / system on their farms. During this phase, the competences and skills needed by farmers to adopt and apply the technology / system are identified and development commences on appropriate training programmes to facilitate adoption.

c. Demonstration – this third phase involves the dissemination to the industry of information about the technology. This is achieved through a range of activities such as Open days where those within the sector are invited to observe and discuss the technology / system and the benefits delivered. The technology / system is also promoted through publications, information bulletins and technical articles within the farming press and by means of the RuralNI website**.**

d. **Adoption** is the final stage of the CAFRE Knowledge and Technology Transfer process. This is achieved by CAFRE Development Advisers through the delivery of short courses and "Challenge programmes" which encompass one or several technologies / systems and which places a strong emphasis on the development of the business. This training is delivered in both the formal teaching situation and through visits to partner farms, early adopters and Focus Farms to discuss the application and adoption of the technology / system in a practical setting. The experiences of partner farmers and early adopters in applying the technology within their own business provide a practical illustration of the benefits to be gained. Similarly, the adoption of a technology by a Focus Farm provides a means for promoting the technology / system to a wider audience than the customers of Development Service Advisers and programme participants.

Training is supported by "mentoring" to enable participating farmers / growers to apply the knowledge and skills gained within their own business. The adoption phase normally continues for a period of five years, following the completion of the technology / system.

Food industry

Technologists based at Loughry Campus work across all key industry sub-sectors to encourage innovation, promote the adoption of appropriate technologies and provide a comprehensive range of accredited training.

Technology transfer projects delivered by Loughry Campus comprise two main types: -

a. Proactive projects – where new products/processes are identified and potential applications of new and emerging technologies are assessed. The outcomes from this work are disseminated / demonstrated to the industry and, where appropriate, adoption is encouraged.

b. Reactive projects – where a project is initiated on the request of a food company for the benefit of that company. This "tangible" service is a chargeable service.

4.11.6 Uptake

See the next section (Section 4.11.7 – Impacts and Outputs).

4.11.7 Impacts and Outputs

The output of CAFRE's Knowledge and Technology Transfer is measured through the number of businesses adopting technology. At the end of the year a Management Report is prepared by CAFRE which details the apportioned cost of each main programme area delivered.

Details of the number of farm, commercial horticulture and food businesses that have adopted technology over the last three years are summarised in the Table IV.20.

Table IV.20 Knowledge Transfer Network – Networks

Sector	Number of businesses adopting technology		
	2008/09	2007/08	2006/07
Dairy	340	0	401
Pigs	46	0	65
Beef & Sheep	394	0	524
Crops	124	120	122
Horticulture	71	79	
Food	211	241	270
Total	**1186**	**440**	**1382**

Note: In 2007/08, due to the deployment of Livestock Development Advisers to Farm Nutrient Management Scheme duties, technology adoption on farms could not be progressed and fully implemented. Therefore it was not possible to fully progress the adoption of technology on livestock farms in that year. However, during the year, technologists based at Greenmount continued working on the various Technology projects, with some initial roll out at the start of the year by Development Advisers to the industry which could not be measured.

Source: CAFRE

4.11.8 Fit with NI HEIF 2

There are some similarities between NI HEIF 2 and CAFRE's Knowledge and Technology Transfer programme. However, at present CAFRE has no linkages with NI HEIF 2 to deliver the Knowledge and Technology Transfer programme.

Following the recent review, DARD is now liaising with DEL on the scope for CAFRE and AFBI to be involved in the Connected programme.

5 APPENDIX V – CAFRE – KT PROJECTS

Table V.1: List of CAFRE Knowledge and Technology Transfer Projects

	Project title	Status
Beef and Sheep	Aberdeen Angus Quality Beef	Adoption
	Two year old calving	Adoption
	Utilising easy calving and maternal EBVs	Adoption
	Composite suckler cow genetics	Adoption
	Rissington (M&S Lamb)	Demonstration
	Utilising the Fecpak as a tool for the sustainable control of parasites	Adoption
	Grass/clover monitor farm	Demonstration
Dairying	Constructed Wetland Treatment of dairy unit dirty water	Initiation
	Slurry separation	Demonstration
	Impact of forage maize on milk protein	Demonstration
	Summer Diet Costs 2008	Demonstration
	EID/EDT Livestock Development Centre Cattle	Demonstration
	EID/EDT CAFRE Sheep Flocks	Demonstration
	EID/EDT Dunbia Project	Demonstration
	Energy Efficiency and water management	Adoption
	Improving grass utilization	Adoption
	Heifer rearing	Adoption
	Improving milk quality	Adoption
	Fertility	Adoption
	Lameness prevention	Adoption
	Mastitis prevention	Adoption
	Labour efficiency &IT	Adoption
	Slurry and waste management	Adoption
	Winter feed efficiency	Adoption
Pigs	Energy Efficiency Technology Adoption	Adoption
	Use of IT	Adoption
	PIGIS	Adoption
	Reduction of internal parasitic burden	Adoption
	Reducing feed costs through a reduction in creep and link levels	Initiation
Horticulture	Precision water management	Initiation
	Growing hydrangea	Demonstration / initiation
	Rain water recycling	Initiation / demonstration
	Growing peonies	Demonstration / adoption
	Spore trapping	Adoption
	Cut Foliage	Demonstration / adoption
	High density orchard	Demonstration / adoption
	Frost protection in apple orchards	Demonstration
	Bumble bees for pollination	Demonstration / adoption
	Mustard for weed control	Demonstration/ adoption
	Peat alternatives	Initiation / Demonstration / Adoption

Table V.1: List of CAFRE Knowledge and Technology Transfer Projects

	Project title	Status
	High value ornamentals	Initiation / Demonstration / Adoption
	Slug control in Brassicas	Pending new project leader
	Bio degradable pots	Initiation / Demonstration
	First year Flowering perennials	Adoption
	Cut Flower Production	Adoption
	Composting	Initiation / Demonstration
Arable	Early sown winter wheat	Adoption
	Nitrogen rates for spring barley	Adoption
	Wild bird cover	Adoption
	Chip project	Initiation / Demonstration
	Speciality potatoes	Adoption
	Blight-Net	Adoption
	Hot boxing	Adoption
Food	Microencapsulation	Initiation
	Functional Ingredients	Initiation
	Oils and Seeds	Initiation
	Application of bioprotective cultures to increase shelf life of cooked meal	Adoption
	Shelf life extension through use of natural preservatives	Demonstration
	Natural sweeteners in bakery and apple products	Initiation
	Targeting Health – Fortification of food	Demonstration
	Targeting Health – Reduction / Replacement of fat and sugar in foods	Demonstration
	Targeting Health – Reducing / replacing salt in food	Adoption
	Replacement of carmine (colour) in meat products	Initiation
	Liquid Refrigerant Pumping Technology	Demonstration
	Compositing food waste	Initiation
Renewables	Oilfields	Adoption
	Sustainable energy unit	Demonstration
	Short rotation coppice willow	Demonstration / Adoption
	Wind Turbines for power production	Initiation
	Energy Efficiency On Farm	Demonstration / Adoption
	Biomass for Heat Production	Initiation

Source: DARD (January 2010)

6 APPENDIX VI SME – SURVEY RESULTS

6.1 Methodology

A questionnaire was developed specifically for SME participants; this was circulated to the Project Steering Group and agreed by them. The questionnaire was designed to capture information about the respondents' company profiles; previous KT awareness and experience; awareness of University KT services / support; current KT support including experience of Knowledge Transfer services / support received from QUB and UU since August 2007 and impact / assessment of KT activity; KT support from other organisations; additionality and future KT services. The questionnaire was piloted to ensure that it captured the required data.

We were provided with the contact details of 450 SMEs who had received KT support / services, 161 from QUB (127 valid[16]) and 289 from UU (218 valid[16]). We contacted all of the SME participants by phone up to 5 times in order to schedule appointments to complete the survey. In addition, we issued an email with a link to an online version of the survey to provide more flexibility to the potential respondents to complete the survey. A total of 117 questionnaires was completed.

Table VI.1: Response rate

	Target to be completed			No. of contacts provided*			No. completed		
	QUB	UU	Total	QUB	UU	Total	QUB	UU	Total
SMEs	55	95	150	161	289	450	**48**	**69**	**117**

*Note: *Total available contacts are reduced as some of the contacts are duplicates and / or missing / contain incorrect contact details*

Source: FGS McClure Watters, February 2010

[16] Total available contacts are reduced as some of the contacts are duplicates and / or missing / or contain incorrect contact details.

6.2 Company Profile

6.2.1 *Invest NI Client*

The majority of the companies that took part in the survey (75%) were Invest NI clients and 20 companies (22%) were not. Only one company was an Invest NI client in the past, but no longer.

Table VI.2: Is your company currently an Invest NI Client?

Invest NI client	QUB		UU		Total	
	No.	%	No.	%	No.	%
Yes	38	79%	50	72%	88	75%
No	9	19%	17	25%	26	22%
Was in the past, but no longer	0	0%	1	1%	1	1%
Don't know	1	2%	1	1%	2	2%
Non Response	0	0%	0	0%	0	0%
Total	**48**	**100%**	**69**	**100%**	**117**	**100%**

Source: FGS McClure Watters, February 2010.

Both QUB and UU presented a similar percentage of companies that were Invest NI clients (around 75%).

6.2.2 *Company Size – Employees*

Table VI.3 shows the size in terms of number of employees of the sample of companies that completed the questionnaire, by university and overall.

Table VI.3 How many employees are there in your company at present?

No. of employees	QUB		UU		Total	
	No.	%	No.	%	No.	%
<10	10	21%	37	54%	47	40%
10 – 99	20	42%	24	35%	44	38%
100 – 249	12	25%	4	6%	16	14%
250 – 499	3	6%	1	1%	4	3%
500 – 999	0	0%	1	1%	1	1%
1000 +*	3	6%	2	3%	5	4%
Non Response	0	0%	0	0%	0	0%
Total	**48**	**100%**	**69**	**100%**	**117**	**100%**

Source: FGS McClure Watters, February 2010.

The majority of respondents (92%) worked in a company with fewer than 250 employees, with a preponderance of companies with less than 10 workers (40%) and between 10 and 99

workers (38%). Only 10 respondents (8%) worked in a company with more than 250 employees.

* Those with more than 1,000 employees included the following responses:

- 1,400 employees;
- 4,000 employees;
- 5,000 employees;
- 10,000 employees; and
- 60,000 employees.

The majority of respondents that received support from UU had less than 10 employees (54%), followed by 10-99 employees (35%) and 100-249 (6%). In contrast, the majority of companies related to QUB had 10-99 employees (42%), followed by 100-249 employees (25%) and companies with less than 10 employees (21%).

6.2.3 Sector

Table VI.4: What sector is your company in?

Sector	Frequency	Percentage
Business Services	3	3%
Construction	9	8%
Construction Products	4	3%
Creative Design	1	1%
Distribution / retail	5	4%
Engineering	15	13%
Food and Drink	2	2%
Life Sciences	1	1%
Minerals	0	0%
Printing / Packaging	1	1%
Software / International ICT	9	8%
Textiles	1	1%
Tourism	0	0%
Transport products	1	1%
Waste Management	1	1%
Other (see further breakdown below)	64	55%
Non Response	0	0%
Total	**117**	**100%**
Other Sectors Breakdown	**Frequency**	**Percentage**
Manufacturing	21	18%
Renewable Energy / Waste Water	5	4%
Pharmaceuticals / Biotech	4	3%

Social Enterprise / Social Economy	4	3%
Media and animation	2	2%
Health Service / Health Care	2	2%
Charity	2	2%
Energy	2	2%
Medical	2	2%
Medical Device Manufacturing	2	2%
Industrial Sector /Industrial Service Sector	2	2%
Accountancy	1	1%
Aerospace	1	1%
Beverage Dispense Equipment	1	1%
Communications (Publications)	1	1%
Electronics / Design	1	1%
Environmental Consultancy	1	1%
Environmental Management	1	1%
Environmental Technology	1	1%
Hard Disk Drivers Storage	1	1%
Life Saving Equipment (jackets, vests…)	1	1%
Lifelong Learning	1	1%
Product Design and Development	1	1%
Project Management	1	1%
R&D	1	1%
Service Sector	1	1%
Sports and Leisure	1	1%
Source: FGS McClure Watters, February 2010.		

The majority of respondents (55%) indicated that their company was in the 'other' sector, with a clear preponderance of manufacturing (18%), followed by engineering (13%), construction (8%), software / international ICT (8%) and renewable energy / waste water (4%).

Table VI.5 overleaf presents a breakdown of sectors by university. Overall, both QUB and UU supported the majority of companies in the sector classified as the 'other' category (60% and 51% respectively). Whereas 21% of the companies supported by QUB fell in engineering and 6% in software / international ICT; UU provided support to companies in the construction sector (10%), software / international ICT (9%), engineering (7%) and distribution/retail (6%).

Table VI.5: What sector is your company in?

Sector	QUB		UU		Total	
	No.	%	No.	%	No.	%
Business Services	1	2%	2	3%	3	3%
Construction	2	4%	7	10%	9	8%
Construction Products	1	2%	3	4%	4	3%
Creative Design	0	0%	1	1%	1	1%
Distribution / retail	1	2%	4	6%	5	4%
Engineering	10	21%	5	7%	15	13%
Food and Drink	1	2%	1	1%	2	2%
Life Sciences	0	0%	1	1%	1	1%
Minerals	0	0%	0	0%	0	0%
Printing / Packaging	1	2%	0	0%	1	1%
Software / International ICT	3	6%	6	9%	9	8%
Textiles	0	0%	1	1%	1	1%
Tourism	0	0%	0	0%	0	0%
Transport products	0	0%	1	1%	1	1%
Waste Management	0	0%	1	1%	1	1%
Other	29	60%	35	51%	64	55%
Non Response	0	0%	0	0%	0	0%
Total	**48**	**100%**	**69**	**100%**	**117**	**100%**

Source: FGS McClure Watters, February 2010.

6.2.4 Local Government District (LGD)

Table VI.6: Which District Council Area is your company based in?

District Council Area	QUB		UU		Total	
	No.	%	No.	%	No.	%
Antrim Borough Council	1	2%	4	6%	5	4%
Ards Borough Council	1	2%	1	1%	2	2%
Armagh City and District Council	1	2%	0	0%	1	1%
Ballymena Borough Council	0	0%	0	0%	0	0%
Ballymoney Borough Council	0	0%	0	0%	0	0%
Banbridge District Council	2	4%	2	3%	4	3%
Belfast City Council	8	17%	20	29%	28	24%
Carrickfergus Borough Council	0	0%	1	1%	1	1%
Castlereagh Borough Council	1	2%	1	1%	2	2%
Coleraine Borough Council	1	2%	1	1%	2	2%
Cookstown District Council	2	4%	3	4%	5	4%
Craigavon Borough Council	2	4%	2	3%	4	3%

District Council Area	QUB		UU		Total	
	No.	%	No.	%	No.	%
Derry City Council	4	8%	4	6%	8	7%
Down District Council	0	0%	3	4%	3	3%
Dungannon and South Tyrone Borough Council	1	2%	2	3%	3	3%
Fermanagh District Council	0	0%	0	0%	0	0%
Larne Borough Council	0	0%	1	1%	1	1%
Limavady Borough Council	0	0%	2	3%	2	2%
Lisburn City Council	2	4%	7	10%	9	8%
Magherafelt District Council	3	6%	3	4%	6	5%
Moyle District Council	0	0%	0	0%	0	0%
Newry and Mourne District Council	3	6%	0	0%	3	3%
Newtownabbey Borough Council	4	8%	3	4%	7	6%
North Down Borough Council	2	4%	1	1%	3	3%
Omagh District Council	2	4%	3	4%	5	4%
Strabane District Council	0	0%	0	0%	0	0%
Other	8	17%	5	7%	13	11%
Non Response	0	0%	0	0%	0	0%
Total	**48**	**100%**	**69**	**100%**	**117**	**100%**

Source: FGS McClure Watters, February 2010.

Approximately one quarter of respondents (24%) worked in a company based in the Belfast City Council area. This was the most common response, followed by Lisburn City Council (8%) and Derry City Council (7%).

13 respondents indicated other locations for their company headquarters. Their responses included:

- UK (x7), including Bucks, Cambridge, Essex, Midlands,, South Manchester, Warrington;
- RoI (x4), including Dublin, Westmeath and Letterkenny; and
- USA (x2), including New Jersey.

From the profile in Table VI.6, the most common location of the companies was as follows:

- UU – Belfast CC (29%), Lisburn CC (10%) and 'Other' (7%); and
- QUB – Belfast CC (17%), 'Other' (17%), Derry CC (8%) and Newtownabbey BC (8%).

6.2.5 Length of Time Established

The largest proportion of respondents (22%) worked in a company that had been established between 6 and 10 years ago, followed by those companies started up between 21 and 30 years ago. 23% of respondents worked in a company established within the last 5 years.

Table VI.7: How long has your company been established?

Time metric	QUB		UU		Total	
	No.	%	No.	%	No.	%
Company not yet formed	0	0%	1	1%	1	1%
1 year	1	2%	5	7%	6	5%
2 years	0	0%	5	7%	5	4%
3 years	2	4%	5	7%	7	6%
4 years	2	4%	3	4%	5	4%
5 years	3	6%	1	1%	4	3%
6 to 10 years	12	25%	14	20%	26	22%
11 to 15 years	3	6%	7	10%	10	9%
16 to 20 years	2	4%	4	6%	6	5%
21 to 30 years	11	23%	8	12%	19	16%
31 to 50 years	2	4%	4	6%	6	5%
More than 50 years	7	15%	4	6%	11	9%
Non Response	3	6%	8	12%	11	9%
Total	**48**	**100%**	**69**	**100%**	**117**	**100%**

Source: FGS McClure Watters, February 2010.

By university, the periods most companies had been established were:

- QUB – 6 to 10 years (25%), 21 to 30 years (23%), less than 5 years (16%) and more than 50 years (15%).
- UU – 5 years or less (27%), 6 to 10 years (20%), 21 to 30 years (12%) and 11 to 15 years (10%).

6.2.6 Company Size - Turnover

The majority of the respondents were not aware / could not provide details of their company's annual turnover (24%). Of those who responded, the largest proportion worked in a company with a turnover between £1 million and £5 million (18%); the second highest response was a turnover of £100k-£250k (17%).

Table VI.8: What is your company's annual turnover?

Turnover (£)	QUB		UU		Total	
	No.	%	No.	%	No.	%
£0 – 99k	2	4%	4	6%	6	5%
£100k – £250k	4	8%	16	23%	20	17%
£251k– £499k	2	4%	3	4%	5	4%
£500k – £999k	3	6%	7	10%	10	9%
£1m – £4.99m	12	25%	9	13%	21	18%
£5m – £14.99m	5	10%	7	10%	12	10%

Over £15m	11	23%	4	6%	15	13%
Non Response	9	19%	19	28%	28	24%
Total	**48**	**100%**	**69**	**100%**	**117**	**100%**
Source: FGS McClure Watters, February 2010.						

6.3 Previous Knowledge Transfer Experience

6.3.1 Barriers to Knowledge Transfer

Barriers to improving business innovation were ranked by respondents (where '1' is the most significant barrier and '5' the least significant) as illustrated in Table VI.9. The most significant barrier was 'lack of finance to fund development' (average rank of 1.7), followed by 'lack of time' (2.1 rank), 'lack of experience in KT projects' (2.9 rank) and finally 'lack of awareness of how R&D could help business' (3.2 rank).

Table VI.9: Which of the following would you say are the critical barriers to improving innovation in your business?

	Frequency						
	(Most significant)			(Least significant)		N.	Average Rank
Barrier	1	2	3	4	5		
Lack of time	37	32	14	10	5	**98**	**2.1**
Lack of experience in Knowledge Transfer projects	10	24	20	23	7	**84**	**2.9**
Lack of awareness of how R&D could help your business	8	12	21	33	6	**80**	**3.2**
Lack of finance to fund development	57	27	9	6	2	**101**	**1.7**
Other	5	2	6	0	2	**15**	**2.5**
Source: FGS McClure Watters, February 2010.							

15 respondents indicated 'other' critical barriers to improving innovation in their business and ranked these too (the average rank of 2.5). These were as follows:

- **Ranked 1 (Most Significant):**
  - ***Lack of skills (x2)***
  - Lack of government policy in place in terms of putting right programmes in place for renewable energy products;
  - Inaccessibility and lack of business acumen amongst knowledge provider;
  - Boundaries of current technology;

- **Ranked 2:**
    - ***Manpower and skills set / experience; and***
    - ***Lack of resources.***
- **Ranked 3:**
    - ***Skills set / Lack of skills (x2);***
    - Government participation in industry – there is no follow up and there is a need have more decisive Government policies;
    - ***Resources;***
    - ***Lack of money;***
    - Not having broadband.
- **Ranked 4:**
    - None.
- **Ranked 5 (Least Significant):**
    - Small scale businesses are less likely to receive assistance, particularly within environmental sector, Invest NI is not proactive and the scope of their assistance is not enough. There is no commitment and not a lot happening on the ground; and
    - Learning process, moving forward new technology.

Clearly skills and resources are a commonly cited barrier as highlighted above – although the relative significance of these varies.

6.3.2 Use of University KT Services / Support pre-August 2007 by University

Overall, the majority of respondents' company (56%) had not used university KT services / support before August 2007. Of those who did receive services / support, the most common were Knowledge Transfer Partnerships (15%) and Research (12%). A small proportion also mentioned Student Work Placements (5%), Facilities & Equipment (3%), Consulting (3%), and Knowledge Club UU (2%).

Table VI.10: Which University Knowledge Transfer services / support had you used prior to August 2007?

University Services / Support	QUB		UU		Total		Approx. Date
	No.	%	No.	%	No.	%	
None	24	50%	42	61%	66	56%	
Patent Support Service	0	0%	0	0%	0	0%	
Licence Support	0	0%	0	0%	0	0%	
Facilities and Equipment	2	4%	2	3%	4	3%	- 2000 onwards - August 2007
Research	8	17%	6	9%	14	12%	- Since 1996 - 2000 onwards - August 2007 - 2003/04 - 2004/05 - Aug 2006 onwards - 2007
Consulting	1	2%	3	4%	4	3%	- 2000 onwards
Knowledge Transfer Partnerships (KTPs)	11	23%	7	10%	18	15%	- Late 1990's - 2000 onwards - 2001 (x2) - 2003 (x2) - Aug 2006 onwards
Student work placements		0%		0%	6	5%	- Mid 1980's onwards - 2003/07 - 2005/06 - June-August 2007 - Every year
Participating in Continuing Professional Development (CPD)	0	0%	0	0%	0	0%	
Investment	0	0%	0	0%	0	0%	
Knowledge Club (UU)	0	0%	2	3%	2	2%	- 2002
Marketing and Sales Support (QUB)	0	0%	0	0%	0	0%	
Other	1	2%	0	0%	1	1%	

Note: Respondents could provide more than one response. Percentages calculated dividing the frequency by the total number of respondents (48 QUB + 69 UU = 117 SMEs).
Source: FGS McClure Watters, February 2010.

Considering the split of responses by university which had provided the support, the majority of companies whether supported by QUB or UU indicated that they had not used university Knowledge Transfer services / support prior to August 2007 (50% and 61% respectively). The support / services received the most were KTPs (23% of the respondents related to QUB / 10% of the respondents related to UU) and research (17% QUB companies / 9% UU companies).

6.3.3 Use of University KT Services / Support pre-August 2007 by Company Size

Considering the split of responses by company size (number of employees), the majority of companies whether supported by QUB or UU indicated that they had not used university Knowledge Transfer services / support prior to August 2007. The greatest proportion who had not used KT services before were amongst the smallest companies (62% of those with Up to 9 employees) and the largest companies (80% of those with 250+ employees).

Table VI.11: Which University Knowledge Transfer services / support had you used prior to August 2007? By Company Size - Total

University Services / Support	Up to 9		10 – 99		100 – 249		+ 250		Total		Date
	No.	%	No.	%	No.	%	No.	%	No.	%	
None	29	62%	22	50%	7	44%	8	80%	**66**	**56%**	
Patent Support Service	0	0%	0	0%	0	0%	0	0%	**0**	**0%**	
Licence Support	0	0%	0	0%	0	0%	0	0%	**0**	**0%**	
Facilities and Equipment	0	0%	4	9%	0	0%	0	0%	**4**	**3%**	- 2000 onwards - August 2007
Research	5	11%	6	14%	1	6%	2	20%	**14**	**12%**	- Since 1996 - 2000 onwards - August 2007 - 2003/04 - 2004/05 - Aug 2006 onwards - 2007
Consulting	1	2%	3	7%	0	0%	0	0%	**4**	**3%**	- 2000 onwards
Knowledge Transfer Partnerships (KTPs)	2	4%	11	25%	5	31%	0	0%	**18**	**15%**	- Late 1990's - 2000 onwards - 2001 (x2) - 2003 (x2) - Aug 2006 onwards
Student work placements	1	2%	4	9%	1	6%	0	0%	**6**	**5%**	- Mid 1980's onwards - 2003/07 - 2005/06 - June-August 2007 - Every year
Participating in CPD	0	0%	0	0%	0	0%	0	0%	**0**	**0%**	
Investment	0	0%	0	0%	0	0%	0	0%	**0**	**0%**	
Knowledge Club (UU)	2	4%	0	0%	0	0%	0	0%	**2**	**2%**	- 2002
Marketing and Sales Support (QUB)	0	0%	0	0%	0	0%	0	0%	**0**	**0%**	
Other	0	0%	1	2%	0		0	0%	**1**	**1%**	
Total Respondents by Category	**47**	**100%**	**44**	**100%**	**16**	**100%**	**10**	**100%**	**117**	**100%**	

Note: Respondents could provide more than one response. Percentages calculated dividing the frequency by the total number of respondents under each category.

Source: FGS McClure Watters, February 2010.

6.4 Awareness of University KT Services / Support

One fifth (20%) of respondents became aware of the universities' KT services and support through an Invest NI Client Executive; the next most frequent responses were 'QUB website', 'network event or conference' and 'visit/ contact from a university' (10% each). Respondents were asked to specify details of the final two responses:

- ***Network event or conference:***
  - Social Economy networking meeting (x1); and
  - Not specified (x11).
- ***Visit / contact from a university:***
  - Gerry McNally from QUB-Polymer Processing Research Centre (x2);
  - Vincent Farrelly, QUB (x2);
  - Colm Higgins QUB and Marie McHugh UU (x1);
  - Colm Higgins (x1);
  - Prof Bernie Smith, QUB (x1);
  - UU student previously (x1);
  - C. Murphy, UUJ (x1); and
  - Not specified (x2).

Table VI.12: How did you first become aware of the universities' Knowledge Transfer services?

Source	Frequency	Percentage
DEL website	0	0%
Invest NI website	8	7%
Invest NI Client Executive	23	20%
QUB website	12	10%
UU website	7	6%
Network event or Conference	12	10%
Press Article	1	1%
Visit / Contact from a University	12	10%
Other	39	33%
Non Response	3	3%
Total	**117**	**100%**
Source: FGS McClure Watters, February 2010.		

The majority of the respondents (33%), though, indicated that they first became aware of the universities' KT services through a source in the 'other' category. These Other responses included:

- Other projects / contracts with Queen's (x3)
- Previously a Teaching Company Associate (1988-90) (x3)
- QUESTOR (x2)
- SERC (x2)
- Lisburn City Council (x2)
- Work West Enterprise Agency (x2)
- Queen's company (x1)
- Director from Action Renewables (x1)
- Women in Business Network (x1)
- Queen's Knowledge Transfer Centre (x1)
- Correspondent from Belfast City Council (x1)
- Innovation Vouchers (x1)
- Company is a spin-out from Queen's (x1)
- Contacts from Sustainable development sector (x1)
- Internal Product Team (x1)
- Bio Business NI (x1)
- Invest launch (x1)
- Just when this survey came in! (x1)
- Fusion (x1)
- Cane Programme in Letterkenny (x1)
- Mentor on Social Entrepreneurship Programme Pauline from Newry and Mourne Enterprise Agency (x1)
- Own research (x1)

- Enterprise Scheme (x1)
- Royal Victoria Hospital (x1)
- INI roadshow (x1)
- Contacts from educational bodies (x1)
- LEDU (x1)
- Already knew about ICT services before started working at company (x1)
- Not specified (x5)

6.5 Current Knowledge Transfer Activities

6.5.1 Current Usage of KT Services / Supports

In comparison to the relatively low proportion of companies that had used universities' KT services and support before August 2007, a significant number of respondents indicated they had used at least one service. The most common response was research (44%), followed by KTPs (26%) and consulting (14%).

Table VI.13: Which of the universities' Knowledge Transfer services and support have you used from August 2007 onwards?

Knowledge Transfer Services	Frequency	Percentage
Patent Support Service	4	3%
Licence Support	0	0%
Facilities and Equipment	11	9%
Research	52	44%
Consulting	16	14%
Knowledge Transfer Partnerships (KTPs)	31	26%
Student work placements	7	6%
Participating in Continuing Professional Development (CPD)	1	1%
Investment	0	0%
Knowledge Club (UU)	1	1%
Marketing and Sales Support (QUB)	1	1%
Other	15	13%
Non Response	3	3%

Note: Respondents could provide more than one response. Percentages calculated dividing each frequency by the total number of potential respondents (117 SMEs).

Source: FGS McClure Watters, February 2010.

15 respondents indicated that the universities' Knowledge Transfer services they had attended fell in the 'other' category. Their responses included:

- Innovation Voucher / Voucher Scheme (x4)
- Design Programme (x3)
- Carried out tests on roller shutters for fire rating (x1)
- Review was carried out within the business (looking at bar-coding of a product) (x1)
- There has been collaboration with QUB since the company was set up. We are currently looking at creating more collaboration with QUB. (x1)
- Ulster Fire Testing Facility (x1)
- UU (x1)
- Web support (x1)
- Written a programme to facilitate stock control (x1)
- Unsure (x1)

6.5.2 Details of KT Services / Supports (including Impacts)

Respondents were asked to provide details of the KT service they had used. Specifically, they were asked to describe the project and quantify any impact it had on their business. A total of 19 respondents gave no response for the impact on their business i.e. they did not specify the impact. Table VI.14 provides a summary of responses; Tables VI.15a to VI.15l provide more detailed information relating to these responses.

Table VI.14: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards?

Knowledge Transfer Services	QUB	UU	Total
Patent Support Service	1	3	4
Licence Support	0	0	0
Facilities and Equipment	6	5	11
Research	22	30	52
Consulting	7	9	16
Knowledge Transfer Partnerships (KTPs)	20	11	31
Student work placements	4	4	7*
Participating in Continuing Professional Development (CPD)	1	0	1

Knowledge Transfer Services	QUB	UU	Total
Investment	0	0	0
Knowledge Club (UU)	0	1	1
Marketing and Sales Support (QUB)	1	0	1
Other	3	12	15

* 1 company indicated they received student work placement from both QUB and UU. Therefore, the total number for this category (7) does not include this duplicate.

Source: FGS McClure Watters, February 2010.

Table VI.15a: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **PATENT SUPPORT**

Patent Support			
University	**Project Description**	**Date**	**Impact on project /business**
QUB	Provided knowledge to our firm on equipment such as PVCs, Polymer thermal type knowledge. Queen's used equipment on behalf of the firm and reported back to us.	2007/08	Helped us to come to terms with the issues and understand what was happening within certain fields. Queen's approved us with knowledge we don't have.
UU	Scientific analysis of oils.	Nov 08 – Nov 09	Increase in potential sales after results are published.
UU	Test value of products.	Finished Jun 09	Did not demonstrate what we expected.
UU	n/a	n/a	n/a

Table VI.15b: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **LICENCE SUPPORT**

Licence Support			
University	**Project Description**	**Date**	**Impact on project /business**
n/a	n/a	n/a	n/a

Table VI.15c: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **FACILITIES AND EQUIPMENT**

Facilities and Equipment			
University	**Project Description**	**Date**	**Impact on project /business**
QUB	Stone Weathering testing facilities	Ongoing from 1998 & frequent	Assisted in us developing a unique specialist service
QUB	We have used the facilities to manufacture test equipment and identify sources of raw material.	Aug 2006 onwards	Allowed us to increase quality and use different raw materials types. Difficult to say, maybe 50k extra turnover.
QUB	Develop the medical device market from moulding to product design to	n/a	10%

	assembly and manufacturing		
QUB	Materials Testing	Sep. 2008	n/a
QUB	Supply software Queen's has produced to sell commercially	Aug 2009 - Ongoing	No impact yet- hope for increase in sales
UU	Used lab equip we have not got	n/a	-
UU	Tyre pressure monitoring systems	2007-2008	Gave us options to consider
UU	Provide 3D visual display / slide show of our drawings for all to see	Ongoing 2 years	Very positive experience. We are happy to secure £3million contract deal by middle of February
UU	Development of mini tennis net	Ongoing past 2 months	Not developed yet
n/a	Quality Testing and Research on Raw Materials	2007/09	-

Table VI.15d: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **RESEARCH**

Research			
University	**Project Description**	**Date**	**Impact on project /business**
QUB	Re-branding of company	-	-
QUB	Liaising with Queen's has kept us at the forefront of polymer R&D.	Aug 2006 onwards	We are now lead partners in an EU frame work 7 projects with a €1M budget. We also have other smaller R7D projects which are yet to generate any revenue but will improve profitability.
QUB	Scheme where contaminated land would be cleaned by farming products	Dec 08-May 09	No impact, not through any fault of Queen's. The project was not viable.
QUB	Electronic circuit research into circuit board	Ongoing-started feb/march	-
QUB	Investigate + implement new technologies	2007/09	Very positive experience
QUB	Supply software which is used internally for teaching + R&D	Ongoing	Partners- share info and ideas
QUB	Develop an automated cement mixing system.	Not sure when started: ended in 2007	No impact: not commercially viable
QUB	Assessment of compound mucolytic activity	Nov - Dec 2009	Proof of concept
QUB	Stone weathering research with Pro. Bernie Smith and his team	Ongoing from 1998 in multiple projects	Assisted in us developing a unique specialist service, creating new jobs and a significant additional turnover.
QUB	Discussions of drug formulations	Finished july 09	Project didn't move forward, so no impact
QUB	Material development	Ongoing-started earlier this year	Can't say as it is still ongoing
QUB	Carried out testing of chemical analysis of dollarmite(removal of waste water, sewage)	2008/09	Due to technical problems over last 3 months project has been parked.
QUB	Follow up to study below live practical into alternative solvents (polymer) that we have.	2008	No suitable alternative for process
QUB	Research testing for accoustic petitions. Graduate worked along with member from queens, petition testing for 54 db rating.	Oct 07-aug 09	-

Research			
University	**Project Description**	**Date**	**Impact on project /business**
QUB	Research into bio-gas	Ongoing-began sep 09	Expect more income
QUB	Analysis of pvc formulations	2009	Yes-answers to questions
QUB	Supporting academic collaboration - drugs development.	June 2009 - June 2010	Results not finalised.
QUB	Experimental work to help patients with mucus problems.	Ongoing - should be completed at the end of January.	Project not finalised yet.
QUB	Looking at effective broadband in high density areas	Oct-08	No impact
QUB	Polymer Research	2008	1 new employee
QUB	Funding for Questor (PhD scholarships membership)	Sep 08-present	Made an impact on networking + marketing
QUB	Autonautical research/developments	Jan-March 09	No impact at present
UU	Developing new product (construction)	Still on-going (started this year, can't remember exact date)	-
UU	Developed a solar roofing prototype that was then tested by UU.	Lasted approx 2-4 weeks. Received final report on 15/09/09	Great to try out a new idea. Developed opened up possibility of a business opportunity
UU	Building a prototype for metal forming	Ongoing for past 12 months	Received money from a client using technology from UU
UU	As above	-	-
UU	Product testing	Ongoing	No impact; nothing has been done to date
UU	Research+development of new product (paperweight)	0ct 08-Nov 09	The product has not been developed to the standard we expected so no impacts have been made
UU	Alternative uses of waste products going to landfill	On going past 6 months	None; research still going on
UU	Testing of hands free google system.	Started 09 - project ongoing/last another 4-6 months	At minute no, product not complete
UU	Market research on our sector	2007/08	Help us to continue towards business plan. No financial impact
UU	Research into plain english in government publications	Ongoing past 6 months	None to date
UU	Investigation into xray materials	Ongoing	None
UU	Develop parking device	Ongoing	Very helpful to date
UU	Clean air technology	1year 08-09	Now looking at r+d projects
UU	Assessment performance of a window	2009	-
UU	Research into an I-ap for I-pod touch phone.	January - April 2009	Useful but took so far too long and by end of the process it was irrelevant.
UU	Physiological effect of cryotherapy	Sep-08	Improved product design
UU	Design of new items	Ongoing	No impact as of yet
UU	Research into online email marketing system	Feb 2009 - Sept 2009	None as yet due to time. Expect to launch the product
UU	Develop new applications for mobile phone	2008 - 2009	Excellent service. Research pointed us in right direction. Saved time and money

Research			
University	**Project Description**	**Date**	**Impact on project /business**
			(unable to quantify)
UU	Highlighted critical success factors. Streamlined operations	July 2009 - August 2009	Highlighted areas for improvement and identified measures for us to implement. Pointed us in the right direction
UU	Proposals for the development of one of our centres	Oct 2008 - Aug 2009	Provided a blueprint to take forward future development
UU	Currently have a service called "Golden and silver plating"; and wanted to find if there was a niche in NI market	June 2009 - August 2009	Identified there was a need. However, need more finance
UU	114 of vouchers used for IT services and rest were used to measure impact of social enterprises in general in NI	-	IT side was good, however we were not happy with the work in relation to measuring impact of SE as we were not provided with right knowledge provider who knew enough about social enterprises
UU	Research on how to recycle flat screen monitors	Dec 2008 - Dec 2009	No impact
UU	x-ray testing	June 2009 - July 2009	Provided us with more information
UU	Research and evaluation of energy payment awareness campaign	2008 - 2009	-
UU	Research Heat Pump technologies	Dec-09	Work is underway so too early to state
UU - Magee	TALKING CARD	May-09	none as yet

Table VI.15e: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **CONSULTING**

Consulting			
University	**Project Description**	**Date**	**Impact on project /business**
QUB	Digital Simulation of Proposed Manufacturing Line	2007	Enabled preparation of business plan for new market area
QUB	Seminars and workshop	on-going	10% (same as Q12.3 above)
QUB	Advice / knowledge on air flow dynamic	Feb 09-May 09	-
QUB	Development of censors(testing)	Sep 09	No impact as of yet but we would expect to see an increase in sales
QUB	Looked for alternatives to solvents (process study)	Late 07-08	No impact
QUB	Research into nutritional solutions to 3 year project	Autumn 2009	Enhance our reputation. While we are abroad in international markets, we will be seen as independent. Expect to see $1-2 million increase in turnover once the project is completed
QUB	Introduce CAM into business	2005 - 2008	Gave us opportunity to work on new contracts which we would previously not have been able to do
UU	Material research	Sep-07	Small project-small impact-helped move into larger projects
UU	Improve efficiency of internal work (stores,etc.)	Early 08-lasted 2months	Implemented recommendations: better control of stock and now more efficient. Have risen by approx 5% costs
UU	Prototype development of a medical device	2006	Further funding from industrial partner

Consulting			
University	**Project Description**	**Date**	**Impact on project /business**
UU	Examination of new technology	Sep-09	Positive in terms of desired outcome - no impact on profit, employment
UU	Search engine optimisation	Oct-08	Significant increase in visitors to website from ~ 3,000 to ~ 13,000 per month
UU	Advice on construction contracts	May - Aug 2009	Provided us with an extra resource and provided us with more knowledge
UU	IT Consultancy	2008	1 new employee
UU	Understanding of education in HE Institute.	2009	Useful, worth money.

Table VI.15f: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **KTPs**

Knowledge Transfer Partnerships (KTPs)			
University	**Project Description**	**Date**	**Impact on project /business**
QUB	3D factory Simulation and 3D work instructions	2008 and 2009	increase in sales and employment
QUB	Process Improvement	2007/09	3% improvement in profits from process related savings
QUB	Imaging+ processing (iog) - training+equipment	2 years-now finished	Commercial project
QUB	Implement 3d package project management system	Can't remember	Able to talk to people about best practice + gained a lot of knowledge
QUB	Marketing on line software services	2006-2008	Marketing collateral, market intelligence
QUB	We have been involved in 4 full and 1 mini KTP from Aug 2006 onwards. These cover a wide range including R&D, Quality, Environmental management and marketing.	Aug 2006 onwards	Massive impact on the company. These projects have really improved our competiveness. Hard to put a figure on but maybe around Â£500,000 turnover generated.
QUB	Cost reduction: rationalising materials. Increasing production levels	4years-ended Oct 07	Moved from 4million turnover to 10million turnover. Increased employment by 40%.
QUB	Post graduate 2 year mechanical engineer	31st august 09 (start date)	Expecting to be positive experience. So far we are pleased
QUB	Building bio gas plant.	Planning (lasted 2 years) has now finished	Project has not kicked off yet
QUB	Marketing plan for business	Early 2008 (lasted 6 months)	Planning on implementing the recommendations. However, it all fell apart due to recession.
QUB	Introduction of catla v5 (software package)	Lasted 3 years - finishes in mayo 2010	Efficiency improvements within business
QUB	Two separate KTP's both related to stone weathering research, the first developing a methodology and database, the second, and current one, developing high resolution scanning techniques	2004-2007 and 2009- current	Developed new specialist service, now with 4 staff, recognised as market leader in field
QUB	Welding project	Can't remember	Helped reduce scrap costs
QUB	Development of a flexible arch bridge	Ongoing 07-09	Employment of 2 staff. Confident turnover will increase by 10%
QUB	Development of tubes for beverage industry	Sep-08	5% increase in sales with more potential

Knowledge Transfer Partnerships (KTPs)			
University	**Project Description**	**Date**	**Impact on project /business**
QUB	Processing/manufacturing of chicken	June 2006 - November 2008	Employed a graduate to look at this research which improved running of project we did learn a few things from the project
QUB	May 2009 - August 2011	Developing pet shop online.	Still ongoing so no impact as of yet
QUB	Develop specialist product for patients who undergo bowel surgery	3 year project - ongoing	Expect to see an increase in turnover
QUB	Introduce 3d models software and systems into our design process which would then feed into manufacturing process	May 2008 - Ongoing	It has saved us 2,000 man hours a year which has been excellent. We are also working on product designs which will raise our market share
QUB	Developing a product	August 2007 - January 2011	Provided us with more contacts within QUB
UU	Scoping R&D project for voice over internet enablement	Dec-08	Yes, made an impact in terms of moving business forward
UU	Strategic Review to analyse business and identify opportunities for development.	June-Sept 2009	A better understanding of our business, and a commitment to developing new business opportunities in 2010 and beyond.
UU	Transfer a paper based methodology on how to measure training effectiveness onto a web portal	Oct-09	Still too early to tell.
UU	Bringing in educational, computer expertise into company	Aug-09	-
UU	Study the benefits the product brings to end user	Feb-09	Yes-will be great
UU	Implementing 3D and solid edge	2009	-
UU	Testing materials against fire	Mar-09	Positive experience. Sales have risen
UU	Design/innovation and product range.	Dec 2007 - Sept 2009	Increase in orders/productivity - gave us a better understanding of manufacturing and pointed us in right direction
UU	Looking at various communication styles to improve communication within company.	2006 - lasted 6 months	Greatly improved communications within company. We are now moving in right direction
UU	Bring in clinical expertise / occupational service for children/adults with a disability	2006 - 2008	Grow credibility in export market, grow business where goals set were achieved

Table VI.15g: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **STUDENT WORK PLACEMENTS**

Student work placements			
University	Project Description	Date	Impact on project /business
QUB	Software for on line assessment service	2003-2008	Improved asset base
QUB	We have had a variety of summer placement projects in the areas of health and safety and statistical process control.	June 2006 onwards	Better compliance with health and safety legislation and also around £20,000 in additional annual profit due to efficiency savings.
QUB	Graduate worked to build a knowledge	November 2005	Positive experience. Provided us with

	base between our company and QUB	- July 2008	more knowledge
QUB, UU and many others	Architecture and QS courses have year out and professional practice requirements.	Annually and ongoing	We normally have 3-5 students at any one time, and find they contribute greatly to the work and capacity of the office.
UUJ	Costing+marketing	2007	Helpful
UUJ	Student placement to help develop marketing	2007/08	Media pack produced and increased publicity for business
UUJ	Evaluation of components & Preparation of Training Materials	2008-9	-

Table VI.15h: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **CPD**

Participating in Continuing Professional Development (CPD)			
University	Project Description	Date	Impact on project /business
n/a	n/a	n/a	n/a

Table VI.15i: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **INVESTMENT**

Investment			
University	Project Description	Date	Impact on project /business
n/a	n/a	n/a	n/a

Table VI.15j: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **KNOWLEDGE CLUB**

Knowledge Club (UU)			
University	Project Description	Date	Impact on project /business
UU	IT for Hospital Bed management	2007	none

Table VI.15k: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **MARKETING AND SALES SUPPORT**

Marketing and Sales Support (QUB)			
University	Project Description	Date	Impact on project /business
n/a	n/a	n/a	n/a

Table VI.15I: Please provide details of those university-based Knowledge Transfer services and support that you have used from August 2007 onwards? **OTHER**

Other			
University	Project Description	Date	Impact on project /business
QUB	Assist to design and better market company and products	Oct 08-Mar 09	Helped us to be more marketable. Produced video gave us more tools to target more customers esp. overseas
QUB	Redesign of system (shape of tank)	-	-
UU	Testing of solar heat exchanger	Over last 2 years	Positive impact on our business, given us credibility with potential customers. Can not quantify any impacts.
UU	Investigate bar-coding of a product	Cannot remember	No direct impact
UU	Stimulating of power station. Looking at equipment that could economise power station process using biomass as fuel source	Over last year	Provided data and stimulation model graphics, which is used as a pitch to investors
UU	Early start up company -research web based application	2008/09	Not yet -research hasn't taken place
UU	Tested roller shutter for fire rating	2007	No impact
UU	Design of 40+ jewellery products	March 2009 - June 2009	Designs were very good. Has been increase in sales but cannot quantify
UU	Programme to facilitate stock control through RFID technology	Lasted 9 months	Gave guidance on stock control

The most common impacts reported by respondents were as follows:

- **Sales / Turnover:** 12 respondents reported actual impacts on Sales / Turnover – for example:
    - secured £3m contract deal (x1)
    - lead partners in an €1M EU framework 7 project (x1)
    - £500,000 turnover generated (x1)
    - up to £50k (x1)
    - 10% (x1)
    - 5% increase in sales (x1)
- **Sales / Turnover and Staff:** 6 respondents reported actual impacts – for example:
    - Increased turnover by £6m and employment by 40% (x1)
    - Employed 2 members of staff and increased turnover by 10% (x1)

- **Efficiency Savings:** 5 respondents reported impacts in this area – for example:
  - saved up to 2,000 man hours a year (x1)
  - £20,000 in additional annual profit due to efficiency savings (x1)
- **Increase in Knowledge:** 12 respondents reported that it had increased their knowledge/understanding/information sharing e.g.:
  - Helped us to come to terms with the issues and understand what was happening within certain fields (x1)
  - Share info and ideas with partners (x1)
  - Provided us with more information (x1)
  - Able to talk to people about best practice and gained knowledge (x1)
  - A better understanding of our business, and a commitment to developing new business opportunities in 2010 and beyond (x1)
- **Develop new Product/Service/Ways of Working:** 14 respondents reported that they had developed new products, services or ways of working as a result of the project e.g.
  - Assisted us in developing a unique specialist service (x1)
  - Improved product design (x1)
  - Gave us opportunity to work on new contracts which we would previously not have been able to do (x1)
  - Developed new specialist service (x1)
  - Greatly improved communications within company. We are now moving in right direction (x1)
- **Too Early to Say:** 21 respondents (18%) reported that it was too early to quantify any impact, but many anticipate positive impacts e.g.
  - Increase in potential sales after results are published (x1)
  - No impact yet- hope for increase in sales (x1)
  - Expect to see an increase in turnover (x1)
- **No Impact:** 23 respondents (20%)reported that there had been no impact. 5 respondents gave a reason for this, their responses included**:**
  - Not commercially viable (x2)

- Did not demonstrate what we expected (x1)
- The product has not been developed to the standard we expected (x1)
- Planning on implementing the recommendations, however it all fell apart because of recession (x1)

6.5.3 Usage of Centres of Excellence

The university-based Centres of Excellence programmes the respondents indicated their company had received Knowledge Transfer support from are included in Table VI.16. The most common are as follows:

- 31%: Other Centres of Excellence (31%) – see breakdown below Table VI.16;
- 13%: Technology and Engineering Innovation Centre (UU);
- 11%: NITC - Northern Ireland Technology Centre (QUB);
- 10%: KTC - Knowledge Transfer Centre (QUB);
- 9%: QUESTOR Industry/University Cooperative Research Centre (QUB); and
- 7%: PPRC - Polymer Processing Research Centre (QUB).

Table VI.16: From which of the following university-based Centres of Excellence programmes has your company received Knowledge Transfer support?

Centres of Excellence programmes	Frequency	Percentage
DECC - Digital Engineering Competence Centre (QUB)	2	2%
QUESTOR Industry/University Cooperative Research Centre (QUB)	10	9%
PPRC - Polymer Processing Research Centre (QUB)	8	7%
NITC - Northern Ireland Technology Centre (QUB)	13	11%
KTC - Knowledge Transfer Centre (QUB)	12	10%
ECIT - Institute of Electronics, Communications and Information Technology (QUB)	3	3%
ASEP - Analytical Services and Environmental Projects (QUB)	1	1%
CHRONO - Centre for Climate, the Environment and Chronology (QUB)	0	0%
International Research Centre for Experimental Physics (QUB)	1	1%
Institute of Governance, Public Policy and Social Research (QUB)	0	0%
Virtual Engineering Centre (QUB)	0	0%
Sonic Arts Research Centre (QUB)	0	0%
Centre for Cancer Research (QUB)	0	0%
Centre for Theory and Application of Catalysis – CenTACat (QUB)	0	0%
International Centre for Research on System-on-Chip and Advanced Microwireless Integration - SoCaM (QUB)	0	0%
Centre for Functional Genomics (UU)	0	0%
CSPT - Centre for Software Process Technologies (UU)	3	3%
Nanotec Northern Ireland (UU)	1	1%
Technology and Engineering Innovation Centre (UU)	15	13%
Centre for Molecular Biosciences (UU)	1	1%
Centre for Research in Art, Technologies and Design (UU)	3	3%
Centre for Media Research (UU)	3	3%

Centres of Excellence programmes	Frequency	Percentage
Transitional Justice Institute (UU)	0	0%
Academy for Irish Cultural Heritages (UU)	0	0%
Other	36	31%

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, February 2010.

36 respondents indicated that their company had received Knowledge Transfer support from 'other' university-based Centres of Excellence. Their responses were as follows:

- School of Built Environment (x3)
- Civil Engineering at QUB (x1) / Civil Engineering (x1)
- Mechanical Engineering (x2)
- Science (x1) / Science department (x1)
- Business Centre (x1)
- Business department (x1)
- Cannot remember (Metal) (x1)
- CE marking programme (x1)
- Centre for Infection and Immunity, QUB (x1)
- Centre of Innovation (x1)
- Centre of Sustainable Technologies at UU (x1)
- Communications (x1)
- Computing and Informatics (x1)
- Department of Food and Science – Biomedical Sciences (UU) (x1)
- Engineering Composites Centre UU (x1)
- Fire Certificate (UU) (x1)
- Law Department (x1)
- Magee (x1)
- Marketing Department (x1)
- Psychology Department (x1)

- QUB Medical Bio Centre (x1)
- Rehabilitation Research Centre UU (x1)
- Renewable Energy (x1)
- Research and development (x1)
- School of Construction (x1)
- School of Education (x1)
- School of Pharmacy (x1)
- Sports Academy at UU (x1)
- Stone Weathering Group, School of Geography, QUB (x1)
- UU Science Shop Projects (x1)
- Not specified (x1)

6.6 Impact and Assessment of Knowledge Transfer Activity

6.6.1 Impact Overall

Respondents were invited to rate the impact of KT activity overall on them / their businesses. As not all respondents would have availed of all of the KT services / supports, we would not expect all respondents to give an answer for each service / support. Hence, the reason for the high non-response rate is that not all the metrics included as possible responses were relevant to the projects being carried out. A separate "non-response" field is included in this question to distinguish between those who indicated 'no impact' and those who did not provide a response (N/A) as this metric was not relevant or expected for the project.

In most areas, where a response was given, the most common was either some impact or significant impact.

- Improvement in existing skills / expertise (49%);
- Research Collaboration with university (46%);
- Technology transfer (44%);
- Networking / Collaboration with others (40%);
- Increased investment in product development (41%);
- Access to education (37%);
- Developed new technology (37%); and

- Invested in new technology (36%).

However, at least 20% indicated no impact in the following areas – although in these cases there was a greater proportion with some or significant impact:

- Increase in profit (27% no impact, 31% some or significant impact)
- Adopted new business practices (25% no impact, 33% some or significant impact)
- Acquired new skills / expertise (21% no impact, 42% some or significant impact)
- Increase in investment in R&D (21% no impact, 38% some or significant impact)

At least 20% indicated no impact in the following areas – although in these cases there was a lesser proportion with some or significant impact:

- Management development (30% no impact; 22% some or significant impact)
- Increase in sales (29% no impact, 29% some or significant impact)
- Increase in employment (32% no impact, 22% some or significant impact)
- Reduced costs (32% no impact, 22% some or significant impact)

Table VI.17: Overall, what impact would you say the universities' Knowledge Transfer services / support had on you / your business since August 2007?

Metric	No Impact		Some Impact		Significant Impact		Non Response	
	No.	%	No.	%	No.	%	No.	%
Access to education	14	12%	34	29%	9	8%	60	51%
Technology transfer	11	9%	26	22%	26	22%	54	46%
Research Collaboration with university	15	13%	30	26%	23	20%	49	42%
Management development	35	30%	18	15%	8	7%	56	48%
Improvement in existing skills / expertise	15	13%	40	34%	18	15%	44	38%
Acquired new skills / expertise	24	21%	32	27%	17	15%	44	38%
Adopted new business practices	29	25%	24	21%	13	11%	51	44%
Developed new technology	18	15%	28	24%	15	13%	56	48%
Invested in new technology	18	15%	28	24%	14	12%	57	49%
Networking / Collaboration with others	20	17%	30	26%	16	14%	51	44%
Increase in sales	34	29%	23	20%	11	9%	49	42%
Increase in employment	37	32%	19	16%	7	6%	54	46%
Increase in profit	32	27%	29	25%	7	6%	49	42%
Increase in investment in R&D	24	21%	31	26%	14	12%	48	41%
Increased investment in product development	16	14%	37	32%	11	9%	53	45%
Reduced costs	37	32%	19	16%	7	6%	54	46%
Other	6	5%	1	1%	1	1%	109	93%

Metric	No Impact		Some Impact		Significant Impact		Non Response	
	No.	%	No.	%	No.	%	No.	%
Source: FGS McClure Watters, February 2010.								

8 respondents indicated that utilising the universities' Knowledge Transfer services / support impacted on some 'other' factor/s. Their responses included:

- ***Other Impacts – No Impact (6)***
  - *'None yet, disappointed that our innovation voucher of March 09 has not been matched with university expertise yet'.*
  - *'The project did not have any impact on our business. The investigation made clear that we shouldn't be pursuing our proposal to QUESTOR as the project was not viable. However staff were excellent. Very pleased with service provided.'*
  - *'The project was not commercially viable. It had a negative outcome. We did learn about the market and of the concept, but whenever it was transformed into threat and bought to states we found that it was over-complicated, and more than was needed. In terms of impact there was none.'*
  - *'Still going - but we would like to have a major reduction in costs'*
- ***Other Impacts – Significant Impact (1)***
  - *'Profile of company and recognition as market leader in a specialist area'.*
- ***Other Impacts – Some Impact (1)***
  - *'Some impact was made in terms of reviewing their systems but there were no ideas of how to do things better.'*
- ***Other Impacts – Comment without Impact Estimation.*** *From the 109 respondents that did not estimate 'other' impacts, 12 provided a comment:*
  - *'Due to no funding available there has been no collaboration with Queen's. But from previously working with them I was happy with the service provided.*
  - *'Did not proceed with project therefore no impact was made. However, it did provide a better understanding of our capabilities.'*
  - *Cannot answer about this as the project is still on-going. There have been no impacts to date.'*
  - *'We are only in the development stage of this project. We would need advanced technology in order to bring it to market (this will take approx. 5 years). Lab testing has been completed, however, the next stage will be field testing. Currently we do not have resources for the project to progress to this stage due to current climate.'*

- *'No impact as there was not suitable alternative for solving the process.'*
- *'No impact as of yet as project has not been developed yet.'*
- *'Nothing has progressed to date, so no impacts.'*
- *'No impact has been made – research took longer than expected and we were disappointed in what was produced.'*
- *'To date no impact has been made. We thought the research was minimal and that the overall result did not tell us a lot.'*
- *'The innovation voucher proved useful. However, it is too early to tell. We expect a sales rise.*
- *'The biogas plant has not been built yet. However, when built it will produce renewable energy (electricity and heat). It will also capture methane and utilize it which is a substitute for fossil fuel use.'*
- *'Fell apart due to current climate; otherwise we would have taken recommendations on board.'*

6.6.2 Impacts by University

Tables V.18a and V.18b present the impact of the universities' KT services and support since August 2007 by university:

Table VI.18a: Overall, what impact would you say the universities' Knowledge Transfer services / support had on you / your business since August 2007? QUB

Metric	No Impact		Some Impact		Significant Impact		Non Response	
	No.	%	No.	%	No.	%	No.	%
Access to education	3	6%	12	25%	5	10%	28	58%
Technology transfer	1	2%	10	21%	12	25%	25	52%
Research Collaboration with university	2	4%	13	27%	10	21%	23	48%
Management development	9	19%	6	13%	5	10%	28	58%
Improvement in existing skills / expertise	3	6%	13	27%	10	21%	22	46%
Acquired new skills / expertise	3	6%	14	29%	8	17%	23	48%
Adopted new business practices	7	15%	8	17%	8	17%	25	52%
Developed new technology	4	8%	11	23%	7	15%	26	54%
Invested in new technology	2	4%	12	25%	7	15%	27	56%
Networking / Collaboration with others	8	17%	7	15%	9	19%	24	50%
Increase in sales	11	23%	7	15%	6	13%	24	50%
Increase in employment	12	25%	5	10%	5	10%	26	54%
Increase in profit	8	17%	12	25%	4	8%	24	50%

Metric	No Impact		Some Impact		Significant Impact		Non Response	
	No.	%	No.	%	No.	%	No.	%
Increase in investment in R&D	7	15%	11	23%	7	15%	23	48%
Increased investment in product development	6	13%	11	23%	7	15%	24	50%
Reduced costs	12	25%	7	15%	5	10%	24	50%
Other	2	4%	0	0%	1	2%	45	94%
Source: FGS McClure Watters, February 2010.								

Table VI.18b: Overall, what impact would you say the universities' Knowledge Transfer services / support had on you / your business since August 2007? UU

Metric	No Impact		Some Impact		Significant Impact		Non Response	
	No.	%	No.	%	No.	%	No.	%
Access to education	11	16%	21	30%	4	6%	30	43%
Technology transfer	10	14%	15	22%	14	20%	28	41%
Research Collaboration with university	13	19%	17	25%	12	17%	24	35%
Management development	26	38%	12	17%	2	3%	27	39%
Improvement in existing skills / expertise	12	17%	27	39%	7	10%	21	30%
Acquired new skills / expertise	21	30%	18	26%	7	10%	20	29%
Adopted new business practices	22	32%	15	22%	4	6%	25	36%
Developed new technology	14	20%	16	23%	8	12%	29	42%
Invested in new technology	16	23%	15	22%	7	10%	29	42%
Networking / Collaboration with others	12	17%	22	32%	7	10%	26	38%
Increase in sales	23	33%	16	23%	4	6%	23	33%
Increase in employment	25	36%	13	19%	2	3%	26	38%
Increase in profit	24	35%	16	23%	3	4%	24	35%
Increase in investment in R&D	17	25%	20	29%	6	9%	23	33%
Increased investment in product development	10	14%	25	36%	4	6%	27	39%
Reduced costs	25	36%	11	16%	2	3%	29	42%
Other	4	6%	1	1%	0	0%	62	90%
Source: FGS McClure Watters, February 2010.								

6.6.3 Impacts by Company Size

Tables V.19 presents the impact of the universities' KT services and support since August 2007 by company size.

Table VI.19: Overall, what impact would you say the universities' Knowledge Transfer services / support had on you / your business since August 2007? By Company Size

Metric	<10 employees (%)				10 – 99 employees (%)				100 – 249 employees (%)				>250 employees (%)			
	No Impact	Some Impact	Signif. Impact	N/A	No Impact	Some Impact	Signif. Impact	N/A	No Impact	Some Impact	Signif. Impact	N/A	No Impact	Some Impact	Signif. Impact	N/A
Access to education	19%	26%	2%	53%	9%	30%	14%	48%	0%	31%	13%	56%	10%	40%	0%	50%
Technology transfer	11%	28%	19%	43%	11%	16%	27%	45%	0%	25%	31%	44%	10%	20%	0%	70%
Research Collaboration with university	13%	26%	21%	40%	16%	27%	20%	36%	6%	19%	19%	56%	10%	30%	10%	50%
Management development	43%	6%	4%	47%	20%	25%	11%	43%	19%	19%	6%	56%	30%	10%	0%	60%
Improvement in existing skills / expertise	15%	40%	11%	34%	14%	30%	23%	34%	0%	31%	19%	50%	20%	30%	0%	50%
Acquired new skills / expertise	21%	34%	9%	36%	25%	23%	18%	34%	0%	31%	31%	38%	30%	10%	0%	60%
Adopted new business practices	32%	15%	6%	47%	23%	27%	11%	39%	6%	25%	25%	44%	30%	10%	10%	50%
Developed new technology	17%	26%	11%	47%	16%	20%	23%	41%	6%	38%	0%	56%	20%	10%	0%	70%
Invested in new technology	19%	26%	6%	49%	14%	20%	25%	41%	6%	38%	0%	56%	20%	10%	0%	70%
Networking / Collaboration with others	19%	19%	15%	47%	14%	36%	11%	39%	13%	25%	19%	44%	30%	10%	10%	50%
Increase in sales	36%	17%	9%	38%	23%	27%	11%	39%	19%	19%	13%	50%	40%	0%	0%	60%
Increase in employment	40%	13%	2%	45%	25%	27%	7%	41%	19%	6%	19%	56%	40%	0%	0%	60%
Increase in profit	34%	23%	4%	38%	25%	27%	7%	41%	13%	25%	13%	50%	30%	20%	0%	50%
Increase in investment in R&D	26%	28%	9%	38%	14%	34%	14%	39%	19%	13%	19%	50%	30%	10%	10%	50%
Increased investment in product development	15%	34%	9%	43%	11%	36%	9%	43%	13%	25%	13%	50%	20%	10%	10%	60%
Reduced costs	40%	9%	4%	47%	32%	20%	7%	41%	6%	25%	13%	56%	30%	20%	0%	50%
Other	6%	0%	0%	94%	5%	2%	2%	91%	6%	0%	0%	94%	0%	0%	0%	100%
Total by Company Size	N= 47 Companies (100%)				N= 44 Companies (100%)				N= 16 Companies (100%)				N= 10 Companies (100%)			

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, February 2010.

6.6.4 Satisfaction with KT Services

Overall, the respondents were satisfied with the universities' KT services. It is noteworthy that not all the services had the same number of users / respondents, and this has a clear effect on the results.

'Research' was the service with the higher number of respondents (over 50) and an average rate of 4 (meaning 'Satisfied') across the 3 categories – meeting project objectives, providing appropriate knowledge & experience, and timeliness of response. 'Knowledge Transfer Partnerships' were ranked by 33 respondents with an average rate of 4.4 (4.3 on timeliness of response), which was the higher average rank across all the services.

Table VI.20a: Using a 5-point scale where 1 = 'Very Dissatisfied' and 5 = 'Very Satisfied', please rate the universities' Knowledge Transfer services.

Services	Meeting your project objectives		Providing appropriate knowledge & experience		Timeliness of response	
	No.	Average Rate	No.	Average Rate	No.	Average Rate
Patent Support Service	1	**3.0**	1	**3.0**	1	**3.0**
Licence Support	0	**-**	0	**-**	0	**-**
Facilities and Equipment	11	**4.0**	11	**4.1**	11	**3.8**
Research	53	**4.0**	52	**4.1**	50	**4.0**
Consulting	15	**4.1**	14	**4.2**	15	**3.7**
Knowledge Transfer Partnerships (KTPs)	33	**4.4**	33	**4.4**	33	**4.3**
Student work placements	7	**4.3**	6	**4.0**	6	**4.3**
Participating in Continuing Professional Development (CPD)	1	**4.0**	1	**4.0**	0	**-**
Investment	0	**-**	0	**-**	0	**-**
Knowledge Club (UU)	1	**2.0**	1	**3.0**	1	**3.0**
Marketing and Sales Support (QUB)	0	**-**	0	**-**	0	**-**
Other*	7	**4.3**	7	**4.1**	7	**4.4**
Source: FGS McClure Watters, February 2010.						

The table below presents the 7 'other' services ranked and the average rate indicated:

Table VI.20b: Using a 5-point scale where 1 = 'Very Dissatisfied' and 5 = 'Very Satisfied', please rate the universities' Knowledge Transfer services – Other Supports

Other supports	Meeting Project Objectives	Providing appropriate knowledge & experience	Timelines of response
Voucher Scheme	5	5	5
Innovation Voucher	5	5	5
Review was carried out within the business (looking at bar-coding of a product	3	3	4
Design Programme	3	3	4
Design	5	5	5
Design	4	3	3
Written a programme to facilitate stock control	5	5	5
Source: FGS McClure Watters, February 2010.			

6.7 KT Support from Other Organisations / Individuals

6.7.1 KT Support from Other Organisations / Individuals Outside the University Sector

Table VI.21: Did you receive any Knowledge Transfer support from any other organisation or individual outside the university sector?

Support	Frequency	Percentage	Source
Patent Support Service	0	0%	
Licence Support	0	0%	
Facilities and Equipment	0	0%	
Research	6	5.1%	• Invest NI • John Thompson & Sons • Private Biotech Company • We are a small company supplier
Consulting	4	3.4%	• Finance FPM • Invest NI: Cost & power saving • Work West Enterprise Agency

Support	Frequency	Percentage	Source
			• As a result of the project moving so slowly I engaged with an independent business analyst to help review the business process to design the system
Knowledge Transfer Partnerships (KTPs)	4	3.4%	• KTP Advisor
Student work placements	0	0%	
Participating in Continuing Professional Development (CPD)	2	1.7%	• Post Graduate Diploma UCD • Royal Society of Ulster Architects
Investment	0	0%	
Other	10	8.5%	(See below)
Note: Respondents could provide more than one response. Not all respondents specified the source of the KT support received. In total, 25 respondents provided 26 responses. Source: FGS McClure Watters, February 2010.			

The majority of respondents that received KT support from other organisations / individuals outside the university sector (25 respondents) specified support under the 'other' category (10 respondents):

- '(a) Training and certification of installers from Lisburn Institute (2006/08) / (b) Graduate engineer from Dundalk Institute (2006/07).'
- 'Belfast College.'
- 'Consultants – market research, technology process improvements. Desk based studies that enhanced our knowledge and pointed us in right direction (2002/05).'
- 'German company called IBBK. Provided advice and guidance, and possibly source equipment from them.'
- 'Grant aid from Invest NI to market new brand.'
- 'Invest NI grant aiding prototype.'
- 'Invest NI sales and marketing research.'
- 'Local businesses.'
- 'NITC – prototype EMC testing (ongoing).'
- 'South Eastern Regional College – help with some of their courses (moulding injection).'

6.7.2 KT Support from Invest NI

39% of respondents indicated that they had received support from Invest NI's Innovation Vouchers scheme, followed by Knowledge Transfer Partnerships (37%) and Invest NI R&D Programme (11%).

Table VI.22: Please indicate which of the following Knowledge Transfer programmes you have received support from?

Support	Frequency	Percentage
Knowledge Transfer Partnerships	43	37%
Invest NI's Innovation Vouchers scheme	46	39%
Shorter Knowledge Transfer Partnerships	2	2%
Invest NI R&D Programme	13	11%
Invest NI Compete Programme	8	7%
'Connected' Initiative	1	1%
Others	5	4%
Note: Respondents could provide more than one response.		
Source: FGS McClure Watters, February 2010.		

5 respondents indicated that they had received Knowledge Transfer support from 'other' programmes. Their responses included:

- Invest NI collaborative network programme;
- Sent an application for Invest NI R&D programme;
- SMART Programme;
- Raised funding ourselves; and
- INI Enterprise Europe Network.

6.8 Additionality

6.8.1 Additionality - Overall

Table VI.23 presents the respondents' views on to what extent their companies would have been able to proceed with developing their project if the KT support from the universities had not been available.

Table VI.23: If the Knowledge Transfer support from the universities that you used had not been available to you, would you have been able to proceed with developing your project?

Metric	Yes, immediately		Yes, but over a longer timescale		Yes, but on a smaller scale		No	
	No.	%	No.	%	No.	%	No.	%
Patent Support Service	1	100%	0	0%	0	0%	0	0%
Licence Support	0	0%	0	0%	0	0%	0	0%
Facilities and Equipment	0	0%	2	20%	2	20%	6	60%
Research	2	4%	12	23%	1	2%	38	72%
Consulting	0	0%	6	38%	2	13%	8	50%
Knowledge Transfer Partnerships (KTPs)	2	6%	6	19%	7	22%	17	53%
Student work placements	1	14%	1	14%	4	57%	1	14%
Participating in Continuing Professional Development (CPD)	1	100%	0	0%	0	0%	0	0%
Investment	0	0%	0	0%	1	100%	0	0%
Knowledge Club (UU)	0	0%	0	0%	1	100%	0	0%
Marketing and Sales Support (QUB)	0	0%	0	0%	0	0%	0	0%
Other	0	0%	3	38%	0	0%	5	63%

Note: Respondents could provide more than one response.

Source: FGS McClure Watters, February 2010.

Table VI.24 describes how the respondents would have proceeded in developing their project / business in the absence of the Knowledge Transfer support from the universities:

Table VI.24: If the Knowledge Transfer support from the universities had not been available to you how would you have gone about this?

How respondents would have proceeded in developing their project / business in the absence of the Knowledge Transfer support from the universities	
Support	***'Yes, immediately'***
Research	▪ *Pay ourselves through company* ▪ *We raised funding*
Knowledge Transfer Partnerships (KTPs)	▪ *Other companies abroad*
Support	***'Yes, but over a longer timescale'***
Facilities and Equipment	▪ *Through firm or we would have found someone else* ▪ *With private help*

How respondents would have proceeded in developing their project / business in the absence of the Knowledge Transfer support from the universities	
Research	▪ *Sought other provider outside of Northern Ireland* ▪ *Taken money from company or higher overdraft from bank* ▪ *Contract work out to alternative supplier of models of interest* ▪ *Saved up and waited. It might not have happened* ▪ *Market place* ▪ *Explore different avenues / Look for a manufacturer to develop the product* ▪ *Bank loan* ▪ *Get another company to carry out the research* ▪ *Internally* ▪ *Pay ourselves through company* ▪ *We would have carried out the research ourselves* ▪ *Other Universities*
Consulting	▪ *Limited in-house capability would have been used - less effective result anticipated* ▪ *Through business* ▪ *Another grant from somewhere else* ▪ *Saved up and waited – it might not have happened* ▪ *Online research and volunteer input into search engine maximization* ▪ *Other organisations*
Knowledge Transfer Partnerships (KTPs)	▪ *Funded through business* ▪ *Through business* ▪ *Look for investor approach Business HALO angel* ▪ *Taken longer if went ahead* ▪ *Project might have failed* ▪ *In house* ▪ *Through company*
Student work placements	▪ *We view the student work placements as a two way process - the students benefit and it allows us to assess the talent emerging from the universities for future employment. Without the placements and year out process , recruitment would be a more hit and miss process*
Other	▪ *Vouchers- Taken money from company* ▪ *Sourced from company* ▪ *Design – taken money from company or higher overdraft from bank*
Support	***'Yes, but on a smaller scale'***
Facilities and Equipment	▪ *We would have looked elsewhere for this.*
Consulting	▪ *Online research and volunteer input into search engine maximisation*
Knowledge Transfer Partnerships (KTPs)	▪ *Direct recruitment* ▪ *We would have tried to meet the same objectives in house.* ▪ *Other companies abroad* ▪ *I would have had to appoint someone internally to carry out the assignment which would have carried a cost to the business in terms of lost billable time. It is also unlikely they would have had the resources or objectivity to carry out*

How respondents would have proceeded in developing their project / business in the absence of the Knowledge Transfer support from the universities	
	such an in-depth report. ▪ *Commercial organizations, other universities across water (e.g. Great Britain); consultants, etc.* ▪ *Used Engineers internally and paid for time on equipment in other facilities when required*
Student work placements	▪ *Direct recruitment / internal promotion* ▪ *We would have attempted this ourselves with less resources.* ▪ *Develop media pack using our own personnel resources over a longer time period.*
Knowledge Club (UU)	▪ *Don't know*
Note: Respondents could provide more than one response. Source: FGS McClure Watters, February 2010.	

6.8.2 Additionality – by University

The following 2 tables present the additionality of the different services / support provided by the universities – based on the university that provided the KT support / service. In most cases, respondents would either not have proceeded or would have proceeded over a longer timescale or on a smaller scale.

Table VI.25a: If the Knowledge Transfer support from the universities that you used had not been available to you, would you have been able to proceed with developing your project? QUB

Metric	Yes, immediately		Yes, but over a longer timescale		Yes, but on a smaller scale		No	
	No.	%	No.	%	No.	%	No.	%
Patent Support Service	1	100%	0	0%	0	0%	0	0%
Licence Support	0	0%	0	0%	0	0%	0	0%
Facilities and Equipment	0	0%	1	25%	1	25%	2	50%
Research	0	0%	4	17%	0	0%	20	83%
Consulting	0	0%	2	40%	0	0%	3	60%
KTPs	1	6%	3	18%	2	12%	11	65%
Student work placements	0	0%	1	33%	1	33%	1	33%
Participating in CPD	1	100%	0	0%	0	0%	0	0%
Investment	0	0%	0	0%	0	0%	0	0%
Knowledge Club UU	0	0%	0	0%	0	0%	0	0%
Marketing and Sales Support (QUB)	0	0%	0	0%	0	0%	0	0%
Other	0	0%	1	100%	0	0%	0	0%
Note: Respondents could provide more than one response.								

Metric	Yes, immediately		Yes, but over a longer timescale		Yes, but on a smaller scale		No	
	No.	%	No.	%	No.	%	No.	%
Source: FGS McClure Watters, February 2010.								

Table VI.25b: If the Knowledge Transfer support from the universities that you used had not been available to you, would you have been able to proceed with developing your project? UU

Metric	Yes, immediately		Yes, but over a longer timescale		Yes, but on a smaller scale		No	
	No.	%	No.	%	No.	%	No.	%
Patent Support Service	0	0%	0	0%	0	0%	0	0%
Licence Support	0	0%	0	0%	0	0%	0	0%
Facilities and Equipment	0	0%	1	17%	1	17%	4	67%
Research	2	7%	8	28%	1	3%	18	62%
Consulting	0	0%	4	36%	2	18%	5	45%
KTPs	1	7%	3	20%	5	33%	6	40%
Student work placements	1	25%	0	0%	3	75%	0	0%
Participating in CPD	0	0%	0	0%	0	0%	0	0%
Investment	0	0%	0	0%	1	100%	0	0%
Knowledge Club UU	0	0%	0	0%	1	100%	0	0%
Marketing and Sales Support (QUB)	0	0%	0	0%	0	0%	0	0%
Other	0	0%	2	29%	0	0%	5	71%
Note: Respondents could provide more than one response.								
Source: FGS McClure Watters, February 2010.								

6.8.3 Additionality by Company Size

This sub-section presents results with a breakdown by company size (number of employees). In most cases, respondents would either not have proceeded or would have proceeded over a longer timescale or on a smaller scale.

Table VI.26a: If the Knowledge Transfer support from the universities that you used had not been available to you, would you have been able to proceed with developing your project? By Company Size - Total Number of Responses

Metric	Yes, immediately (No.)					Yes, but over a longer timescale (No.)					Yes, but on a smaller scale (No.)					No (No.)					TOTAL
	<10	10 - 99	100 - 249	>250	Sub-Total	<10	10 - 99	100 - 249	>250	Sub-Total	<10	10 - 99	100 - 249	>250	Sub-Total	<10	10 - 99	100 - 249	>250	Sub-Total	
Patent Support Service							1			1					0					0	1
Licence Support										0					0					0	0
Facilities and Equipment							1		1	2		2			2	2	3			5	9
Research	2				2	10		1	1	12		1			1	11	16	5	6	38	53
Consulting						3	1	2		6	1	1			2	1	4	2	1	8	16
KTPs	1	1			2	1	4	1		6	1	5	1		7	6	7	4		17	32
Student work placements		1			1		1			1	1	2	1		4	1				1	7
Participating in CPD			1		1					0					0					0	1
Investment										0		1			1					0	1
Knowledge Club (UU)										0	1				1					0	1
Marketing and Sales Support (QUB)										0					0					0	0
Other						1	2			3					0	3	2			5	8

Note: Respondents could provide more than one response.

Source: FGS McClure Watters, February 2010.

Table VI.26b: If the Knowledge Transfer support from the universities that you used had not been available to you, would you have been able to proceed with developing your project? By Company Size - Total % of Responses

Metric	Yes, immediately (%)					Yes, but over a longer timescale (%)					Yes, but on a smaller scale (%)					No (%)					TOTAL
	<10	10 - 99	100 - 249	>250	Sub-Total	<10	10 - 99	100 - 249	>250	Sub-Total	<10	10 - 99	100 - 249	>250	Sub-Total	<10	10 - 99	100 - 249	>250	Sub-Total	
Patent Support Service					**0**		100	0	0	**100**	0	0	0		**0**	0	0	0	0	**0**	**1**
Licence Support					**0**		0	0	0	**0**	0	0	0		**0**	0	0	0	0	**0**	**0**
Facilities and Equipment					**0**		11	0	11	**22**	0	22	0		**22**	22	33	0	0	**56**	**9**
Research	4				**4**	19	0	2	2	**23**	0	2	0		**2**	21	30	9	12	**72**	**53**
Consulting					**0**	19	6	13	0	**38**	6	6	0		**13**	6	25	13	6	**50**	**16**
KTPs	3	3			**6**	3	13	3	0	**19**	3	16	3		**22**	19	22	13	0	**53**	**32**
Student work placements		14			**14**	0	14	0	0	**14**	14	29	14		**57**	14	0	0	0	**14**	**7**
Participating in CPD			100		**100**	0	0	0	0	**0**	0	0	0		**0**	0	0	0	0	**0**	**1**
Investment					**0**	0	0	0	0	**0**	0	100	0		**100**	0	0	0	0	**0**	**1**
Knowledge Club (UU)					**0**	0	0	0	0	**0**	100	0	0		**100**	0	0	0	0	**0**	**1**
Marketing and Sales Support (QUB)					**0**	0	0	0	0	**0**	0	0	0		**0**	0	0	0	0	**0**	**0**
Other					**0**	13	25	0	0	**38**	0	0	0		**0**	38	25	0	0	**63**	**8**

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, February 2010.

6.9 Future Knowledge Transfer Services

6.9.1 Improvements for Future KT

Respondents were asked to provide up to three recommendations on future improvements for the universities' KT services. 56 respondents provided 79 responses – See Table VI.27 – the most common issues raised were:

- **Timing**: 24 respondents made recommendations related to timing. The main issues were about the process overall being too slow and universities and businesses operating at different paces.
- **Business – Academic Relationships:** 14 respondents made recommendations related to the relationship between knowledge providers and SMEs. These included the need to find a good match, difficulties with staff turnover and issues arising from different expectations / perspectives.
- **Communication**: 13 respondents made comments about improvements to communication – the main issue was around raising awareness and promoting KT more widely.
- **Innovation Voucher Scheme**: 5 respondents made recommendations related these – the focus was on extending the scheme in terms of number of vouchers, value of vouchers and making them more easily available.
- **Agreed Expectations / Outcomes, Improved Follow Up and Increased Funding –** each of these issues were mentioned by 3 respondents.

Table VI.27: What future improvements would you recommend for the universities' Knowledge Transfer services?

Metric	Number	Percentage of Total Respondents (N=117)
Number of respondents giving 1 response	56	48%
Number of respondents giving 2 responses	19	16%
Number of respondents giving 3 responses	4	3%
Total	**79 responses**	**-**

Improvements	Number	% of Respondents (N=56)	% of Responses (N=79)
Timing			
Timing poor / Not good at meeting deadlines / Better delivery times / More urgency in what they do	9	16.1%	7.6%
Process – slow	5	8.9%	6.3%
Application process - difficult / slow	3	5.4%	3.8%
Shorter programme length	1	1.8%	1.3%

Improvements	Number	% of Respondents (N=56)	% of Responses (N=79)
Speed up to get closer to the speed Businesses need to move at.	1	1.8%	1.3%
Speedier contact UUK has wasted 9 months of the innovation voucher's validity	1	1.8%	1.3%
Funding cycle too short	1	1.8%	1.3%
Process - too long	1	1.8%	1.3%
Time frame of service / programme adjusted to suit specific needs of the company	1	1.8%	1.3%
Universities and private sector work at different paces	1	1.8%	1.3%
Business – Academic Relationships			
Partnership firm-university could be better	2	3.6%	2.5%
Provide knowledge providers who are experts in the field. Although the contact we had was very good he did not have the expertise with regard to recycling and electronics and this was a barrier to us	2	3.6%	2.5%
A greater choice over matching consultant with the project.	1	1.8%	1.3%
Assistance in choosing the best college/knowledge provider which fits business	1	1.8%	1.3%
Commercial / Academic relations outlook sometimes different	1	1.8%	1.3%
Dedicated point of contact	1	1.8%	1.3%
Find most appropriate knowledge provider who is well suited to the project very restrictive in this sense	1	1.8%	1.3%
It would be helpful if we could select 23 knowledge companies as opposed to being limited to one.	1	1.8%	1.3%
Limited to university	1	1.8%	1.3%
Turnover of staff within the university. Staff move on so a lot of what they do is gone with them	1	1.8%	1.3%
Research aligned to the requirements of the industry	1	1.8%	1.3%
Streamlined to suit needs of the industry as opposed to university needs	1	1.8%	1.3%
Communication			
Advertising - make services / support more known / clearer	6	10.7%	7.6%
Communication improvement / increase	5	8.9%	6.3%
Greater dissemination of information of available Knowledge Transfer opportunities	1	1.8%	1.3%
Use phone instead of mail	1	1.8%	1.3%
Innovation Vouchers			
Extend innovation voucher scheme to more than 3 vouchers	1	1.8%	1.3%
Remove limit on innovation voucher scheme	1	1.8%	1.3%
Voucher - clearer what covers from outset	1	1.8%	1.3%
Voucher value - increase	1	1.8%	1.3%
Vouchers - more easily available	1	1.8%	1.3%

Improvements	Number	% of Respondents (N=56)	% of Responses (N=79)
Agreed Expectations / Outcomes			
Expected outcomes - clearer	1	1.8%	1.3%
Greater understanding up front of everyone expectations	1	1.8%	1.3%
Precisely define work package	1	1.8%	1.3%
Other Improvements			
Follow up – improved	3	5.4%	3.8%
Funding – increase	3	5.4%	3.8%
Advice on how to improve company's profits from the knowledge gained	1	1.8%	1.3%
Business development	1	1.8%	1.3%
Flexibility - more	1	1.8%	1.3%
More information / assistance available	1	1.8%	1.3%
More input from survey	1	1.8%	1.3%
Networking improvement	1	1.8%	1.3%
Paperwork - too much	1	1.8%	1.3%
Policy problems - hard to get project off the ground	1	1.8%	1.3%
QUB more interested in the student gaining experience as opposed to project advancing	1	1.8%	1.3%
Support for in-house upskilling to match the KTP input	1	1.8%	1.3%
The plan was useful but it didn't offer many changes / variations	1	1.8%	1.3%
The project was not taken any further, never picked up by Invest NI.	1	1.8%	1.3%
Universities should help local businesses more	1	1.8%	1.3%
Utilising more students to take ownership of job would have saved time	1	1.8%	1.3%
Total	79	-	100.0%

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, February 2010.

18 respondents stated that they would not recommend any improvements, and 2 of them stated that were very pleased with the service received:

- *'Think the Knowledge Transfer is well organised and structured; and*
- *'Very pleased with the service'.*

6.9.2 Future Use of KT

The majority of respondents (95%) stated that they would seek Knowledge Transfer services from universities again. 5 of them provided a rationale to their answer:

- *'If all goes well'*

- *'If I could get another innovation voucher - 2 so far'*
- *'Very pleased with service'*
- *'3 year project at moment but we are very happy with service provider'*
- *'Innovation Voucher'*

1 respondent stated that they would not seek Knowledge Transfer services from universities again. The reason provided for this statement was that '*it was not successful*'.

Table VI.28: Would you seek Knowledge Transfer services from universities again?

Metric	Frequency	Percentage
Yes	111	95%
No	1	1%
Non Response	5	4%
Total	**117**	**100%**
Source: FGS McClure Watters, February 2010.		

6.9.3 KT as a Catalyst

60 respondents indicated that their experience of the universities' Knowledge Transfer services (funded by NI HEIF 2) acted as a catalyst for them to undertake other innovative activities within their company.

Table VI.29: Has your experience of the universities' Knowledge Transfer services (funded by NI HEIF 2) acted as a catalyst for you to undertake other innovative activities within your company?

Metric	Frequency	Percentage
No	32	27%
Yes, independently	45	38%
Yes, in a further partnership with QUB	10	11%
Yes, in a further partnership with UU	5	4%
Other	11	8%
Non response	14	12%
Total	**117**	**100%**
Source: FGS McClure Watters, February 2010.		

The breakdown of responses is as follows:

- ***Yes, independently :***
  - *The proposal needs some fine tuning. There may well be merit in future. However, we do not have resources at present. We propose to revisit this project in future.*

- *Acted as a stepping stone for us.*
- *It is still too early to tell whether we will go to tender to develop the system further or continue with the UU. Our only concern is the time delay, lack of commerciality.*
- *Research has given us first footing to go out and follow up and do it ourselves. If it was not for the scheme we would not have taken the plunge.*
- *Following on from our positive experience with the Knowledge Transfer services we made a successful application to the Creative Industries Innovation fund.*
- *Innovation is a big part of our company.*

- ***Yes, in a further partnership with QUB:***
  - *Yes we are undertaking a business process review and implementing an ebusiness solution.*
  - *We are now very focused on R&D and innovation and are developing new materials and better processes in collaboration with QUB.*
  - *I expect to continue my relationship.*
  - *Work is currently in progress so it is difficult to answer. If data is as hoped for then further work is certainly possible.*
  - *As detailed above, we are now on our second KTP on a related subject and already proving beneficial.*
- ***Yes, in a further partnership with UU:***
  - *I would be keen to do so but have not yet identified the appropriate activity.*
  - *It is still too early to tell whether we will go to tender to develop the system further or continue with the UU. Our only concern is the time delay, lack of commerciality.*

32 respondents indicated that their experience had not acted as a catalyst for them to undertake other innovative activities within their company. Only 2 reasons were provided:

- *We already undertake innovative activities as it stands; and*
- *Pushed us to be doing what we should be doing.*

Other responses (11) included:

- *A new project could have benefited from research we had wanted UUJ to do with the Innovation Voucher - sadly this is almost too late now.*
- *Employed an IT consultant in order to continue with bar-coding project.*
- *Difficult to say at the moment (x2).*

- *Suppliers and customers.*
- *In future, perhaps (x4).*
- *Project not completed yet (x3).*

7 APPENDIX VII – CPD SURVEY RESULTS

7.1 Methodology

The number of participants in CPD courses is one of the performance metrics in QUB's NI HEIF 2 Institutional Plan. Targets and progress against these are included in Section 4.2.3 of the main report (and Table 4.4). UU does not use NI HEIF 2 funding to support CPD in companies.

A questionnaire was developed specifically for CPD participants; this was circulated to the Project Steering Group and agreed by them. The questionnaire was designed to capture information about the respondents' company profiles and their experience of CPD courses delivered by QUB including motivation, satisfaction levels with the course attended and subsequent impact on knowledge transfer within their company. The questionnaire was piloted to ensure that it captured the required data.

We were provided with the contact details of 40 people who attended at least one CPD course at QUB since the current period of NI HEIF 2 funding commenced (August 2007). We contacted all of the CPD participants by phone up to 5 times in order to schedule appointments to complete the survey. Where appropriate, the questionnaire was also emailed to respondents to facilitate completion. A total of 19 questionnaires were completed.

Table VII.1: CPD Participants Response Rate

	Target to be completed			No of contacts provided*			No. completed***		
	QUB	UU**	Total	QUB	UU	Total	QUB	UU	Total
CPD Participants	20	N/A	20	40	N/A	40	19	N/A	19

Note:
**Total available contacts are reduced as some of the contacts are duplicates and / or missing / contain incorrect contact details*
*** UU does not use NI HEIF 2 funding to support CPD for companies*
Source: FGS McClure Watters, December 2009

7.2 Organisation Profile

7.2.1 Company Size - Employees

The majority of respondents (89%) work in a company with fewer than 500 employees. Only 2 respondents worked in a company with more than 1,000 employees.

Table VII.2: How many employees are there in your company at present?

No. of employees	Frequency	Percentage
<10	2	11%
10 – 99	7	37%
100 – 249	6	32%
250 – 499	2	11%
500 – 999	0	0%
1000 +	2	11%
Non Response	0	0%
Total	**19**	**100%**
Source: FGS McClure Watters, December 2009		

7.2.2 Sector

The majority of respondents (74%) indicated that their company was in the 'other' sector. Of these, manufacturing and non-profit organisations were the most common responses. The 14 respondents in the 'other' category stated that they worked in the following sectors:

- Manufacturing (x3)
- Voluntary / Non-profit organisation (x3)
- Public Sector / Local Government (x2)
- Tiles (x1)
- Housing / Trust (x1)
- Education (x1)
- Leisure and Entertainment (x1)
- QUB - Education (x1)
- Local service / Public Sector / Health & Social Care sector (x1)

Table VII.3: What sector is your company in?

Sector	Frequency	Percentage
Business Services	0	0%
Construction Products	0	0%
Construction	0	0%
Creative Design	0	0%
Distribution / retail	2	11%
Engineering	1	5%
Food and Drink	0	0%
Software / International ICT	0	0%
Life Sciences	0	0%
Minerals	0	0%
Printing / Packaging	0	0%
Tourism	0	0%
Transport products	0	0%
Textiles	0	0%
Waste Management	1	5%
Other	14	74%
Non Response	1	5%
Total	**19**	**100%**

Source: FGS McClure Watters, December 2009

7.2.3 Local Government District (LGD)

Respondents represented 12 of the 26 LGDs. Approximately one third of respondents (32%) worked in a company based in the Belfast City Council area. This was the most common response, followed by Craigavon Borough Council and North Down Borough Council with 11% respectively.

Table VII.4: Which District Council Area is your company based in?

District Council Area	Frequency	Percentage
Antrim Borough Council	0	0%
Ards Borough Council	0	0%
Armagh City and District Council	1	5%
Ballymena Borough Council	1	5%
Ballymoney Borough Council	1	5%
Banbridge District Council	0	0%
Belfast City Council	6	32%
Carrickfergus Borough Council	1	5%
Castlereagh Borough Council	1	5%
Coleraine Borough Council	0	0%

District Council Area	Frequency	Percentage
Cookstown District Council	0	0%
Craigavon Borough Council	2	11%
Derry City Council	0	0%
Down District Council	0	0%
Dungannon and South Tyrone Borough Council	1	5%
Fermanagh District Council	0	0%
Larne Borough Council	1	5%
Limavady Borough Council	0	0%
Lisburn City Council	1	5%
Magherafelt District Council	0	0%
Moyle District Council	0	0%
Newry and Mourne District Council	0	0%
Newtownabbey Borough Council	1	5%
North Down Borough Council	2	11%
Omagh District Council	0	0%
Strabane District Council	0	0%
Non Response	0	0%
Total	**19**	**100%**
Source: FGS McClure Watters, December 2009		

7.2.4 Length of Time Established

The largest proportion of respondents (63%) worked in a company that had been established for more than 20 years. Of these 12 respondents, only 2 specified the exact number of years the company had been established. Their responses were 40 years and 50 years respectively.

Table VII.5: How long has your company been established?

Time metric	Frequency	Percentage
Company not yet formed	0	0%
1 year	0	0%
2 years	1	5%
3 years	0	0%
4 years	0	0%
5 years	1	5%
6 to 10 years	2	11%
11 to 15 years	1	5%
16 to 20 years	1	5%
More than 20 years	12	63%
Non Response	1	5%
Total	**19**	**100%**

Time metric	Frequency	Percentage
Source: FGS McClure Watters, December 2009		

7.2.5 Company Size - Turnover

The majority of the respondents were not aware of their company's annual turnover and only 6 respondents specified an amount. These were as follows:

- £650k (x1);
- £1 million (x1);
- £15 million (x2);
- £25 million (x1); and
- £34 million (x1).

7.3 Awareness of CPD Course(s)

Approximately one fifth (21%) of respondents became aware of the CPD course(s) through the QUB website. One respondent became aware of the CPD course(s) through a visit/contact from a university; they indicated that this was though a leaflet from QUB.

The majority of respondents (64%) indicated that they first became aware of the CPD course(s) through a source in the 'other' category. Many of these respondents became aware of the CPD course(s) through a source in their own company. Responses from the 12 respondents in this category included the following:

- Supervisor (x3)
- Appraisal: P&A of Appraisal, Training Matrix, through corporate services (x2)
- Training section in the Council (x1)
- Training department (x1)
- Manager (x1)
- Through own organisation (x1)
- Member of staff (x1)
- DEL – MAP Programme (x1)
- KTPs (x1)

Table VII.6: How did you first become aware of the CPD courses offered through QUB?

Source	Frequency	Percentage
QUB website	4	21%
Invest NI Website	0	0%
Invest NI Client Executive	0	0%
Network event or conference	0	0%
Press article	0	0%
Visit / Contact from a University	1	5%
Word of mouth	2	10%
Other	12	64%
Non Response	0	0%
Total	**19**	**100%**
Source: FGS McClure Watters, December 2009		

7.4 Uptake of CPD Courses (including Motivation)

7.4.1 Uptake of CPD Courses pre-August 2007

Prior to the introduction of NI HEIF 2 funding in 2007, respondents had attended only 2 CPD courses at QUB; these were Effective Presentation Skills and Quality Auditing Principles & Practice.

Table VII.7: Prior to August 2007, which of the CPD course(s) did you attend in QUB (if any)?

CPD Course	Frequency	Percentage
Effective Presentation Skills	1	5%
Effective Project Management	0	0%
Finance for Non-Financial Managers	0	0%
Essential Management Skills	0	0%
Quality Auditing Principles & Practice	0	0%
Professional Writing	0	0%
Coaching & Delegating Skills	0	0%
Leading & Managing Effective Teams	0	0%
Quality Auditing Principles & Practice	1	5%
Other	0	0%
Note: Respondents could provide more than one response. Source: FGS McClure Watters, December 2009		

7.4.2 Uptake of CPD Courses since August 2007

Respondents were asked to name all the CPD courses they had attended in QUB since 2007; respondents could give more than one answer. The 19 respondents have attended a total of 32 CPD courses. The most popular course was Effective Project Management with 7 of the respondents attending this. 6 respondents indicated that they had attended a CPD course(s) in the 'other' category. Their responses included:

- Certificate in Business Management (x4);
- Leading change for business success / Successful proposal writing / Managing customer experience (x1); and
- Successful proposal writing (x1).

The introduction of the NI HEIF 2 funding in 2007 has clearly impacted on CPD course attendance in QUB, with the number of courses attended by this group of respondents increasing from 2 to 32.

Table VII.8: Since August 2007, which CPD course(s) have you attended in QUB?

CPD Course	Frequency	Percentage (of all respondents)
Effective Presentation Skills	1	5%
Effective Project Management	7	37%
Finance for Non-Financial Managers	5	26%
Essential Management Skills	5	26%
Quality Auditing Principles & Practice	1	5%
Professional Writing	1	5%
Coaching & Delegating Skills	2	11%
Leading & Managing Effective Teams	4	21%
Quality Auditing Principles & Practice	0	0%
Other	6	32%

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, December 2009

7.4.3 Motivation for Undertaking CPD Courses

Respondents were asked what they were seeking to achieve by attending the CPD course; respondents could give more than one answer. The most common response was career development (63% of respondents), whilst 53% of respondents attended the course to address a lack of in-house expertise in specific skills.

Table VII.9: What outcome(s) were you seeking by attending the CPD course(s)?

Outcome	Frequency	Percentage
Career development	12	63%
To address lack of in-house expertise in specific skills	10	53%
Opportunity to engage with QUB	0	0%
Other	0	0%
Total	**19**	**100%**

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, December 2009

7.5 Impact and Assessment of CPD Course(s)

7.5.1 Impact Overall

Respondents were asked how attending the CPD course had impacted on them and their organisation. Approximately one third of respondents (32%) felt that attending the course had significantly impacted on improving existing skills and expertise levels within their company. This was the most positive outcome in terms of significant impact, followed by the development of new skills and expertise within the company as reported by 26% of respondents.

One response fell within the 'other' category. This respondent indicated that attending the CPD course impacted significantly on their confidence building and professional speaking skills.

Table VII.10: Overall, what impact would you say that attending the CPD course(s) have had on you / your organisation?

	No Impact		Some Impact		Significant Impact		Non Response	
Metric	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Access to education	0	0%	11	58%	3	16%	5	26%
Improvement in existing skills and expertise levels within your company	0	0%	10	53%	6	32%	3	16%
Development of new skills and expertise within your company	1	5%	11	58%	5	26%	2	11%
Management development	0	0%	8	44%	4	22%	6	33%

	No Impact		Some Impact		Significant Impact		Non Response	
Metric	No.	%	No.	%	No.	%	No.	%
Adoption of new business practices	2	11%	9	47%	2	11%	6	32%
Networking/collaborating with others	2	11%	7	37%	4	21%	6	32%
Other	0	0%	0	0%	1	3%	18	56%
Source: FGS McClure Watters, December 2009								

7.5.2 Satisfaction

Levels of satisfaction with the CPD course(s) attended were high among respondents. All respondents (100%) were satisfied or very satisfied with each of the metrics with the exception of the 'providing opportunities for networking / collaboration' option, where 2 respondents stated that they were neither satisfied nor dissatisfied.

Table VII.11: How satisfied were you with the following aspects of the CPD course you attended?

	N	Very Satisfied		Satisfied		Neither Satisfied/ dissatisfied		Dissatisfied		Very dissatisfied	
Metric		No.	%	No.	%	No.	%	No.	%	No.	%
Knowledge & experience of course tutors	17	16	94%	1	6%	0	0%	0	0%	0	0%
Relevance of subject matter covered	17	12	71%	5	29%	0	0%	0	0%	0	0%
Improving my skills	17	11	65%	6	35%	0	0%	0	0%	0	0%
Equipping me with new skills	17	11	65%	6	35%	0	0%	0	0%	0	0%
Providing opportunities for networking / collaboration	15	5	33%	8	53%	2	13%	0	0%	0	0%
Source: FGS McClure Watters, December 2009											

7.6 CPD from Other Training Providers

Respondents were asked if they had attended a CPD course(s) supplied by a training provider other than QUB; respondents could give more than one answer. Respondents had attended a total of 6 courses, 5 of which had attended a CPD course in the 'other' category. Their responses included:

- Presentation skills, effective communication skills and team development (x2).

- How to become a leader (x1);
- Child Protection (x1); and
- Certificate for Balance / Process Mapping (x1).

Respondents were also asked to give the name of the training provider. Of the 6 that had attended a CPD course run by another provider, 4 gave the name of the training provider:

- Effective Presentation Skills – Provider: Time Associates (x1)
- Other – How to become a leader – Provider: Cantle (x1)
- Other – Child Protection – Provider: Child Protection Action Group UK (x1)
- Other – Presentation skills, effective communication skills and team development – Provider: Time Associates (x1)

Table VII.12: Have you attended CPD course(s) run by any other training provider (organisation or individual)?

CPD course	Frequency	Percentage
Effective Presentation Skills	1	5%
Effective Project Management	0	0%
Finance for Non-Financial Managers	0	0%
Essential Management Skills	0	0%
Quality Auditing Principles & Practice	0	0%
Professional Writing	0	0%
Coaching & Delegating Skills	0	0%
Leading & Managing Effective Teams	0	0%
Quality Auditing Principles & Practice	0	0%
Other	5	26%
Total	**6 responses**	**-**

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, December 2009

7.7 Additionality

Respondents were asked if they would have been able to achieve the same outcome if the QUB course had not been available to them. Approximately one third (32%) indicated that they would have been unable to achieve the same outcome. 68% of respondents indicated that they would have been able to achieve the same outcomes. Of these respondents, 21% reporting that they could have done this immediately. When asked how they would have achieved this, 3 of the 4 respondents answered; their responses are shown in Table VII.13.

47% reported that they would have achieved the same outcome, but it would have taken them longer. The respondents were asked how they would have gone about this and all gave an answer, their responses are shown in Table VII.14.

Table VII.13: If the CPD course(s) that you attended had not been available to you, would you have been able to achieve the same outcome in another way?

Metric	Frequency	Percentage
Yes, immediately	4	21%
Yes, but over a longer timescale	9	47%
Yes, but on a smaller scale	0	0%
No	6	32%
Total	**19**	**100%**

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, December 2009

Table VII.14: If the CPD course from the University had not been available to you how would you have gone about this?

How respondents would have proceeded in developing their project / business in the absence of this (CPD) support
Respondents who answered 'Yes, immediately'
Corporate services
Internet
Local Councils / Internet
Respondents who answered 'Yes, but over a longer timescale'
Internet / Word of mouth
Training sector
Networking through university and organisation
Research / Internet / Further Education sector
Elsewhere / Internet
Training provider / Internet
'Sureskills' or other training provider via website search
External / Via website
Training department in council

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, December 2009

7.8 Future CPD Courses

7.8.1 Improvements for Future CPD Courses

Respondents were asked to recommend improvements for future CPD courses; respondents could give more than on answer. Their responses are shown in Table VII.15. These include

various issues relating to course content (practical rather than theory), length of course, suitability of tutor and various other issues; there is no single dominant issue.

Table VII.15: What future improvements would you recommend for QUB's CPD courses?

Improvements – Metrics	Number	Percentage
Number of respondents giving 1 response	5	26%
Number of respondents giving 2 responses	3	16%
Number of respondents giving 3 responses	0	0%
Total	**8 responses**	**-**
Improvements – Breakdown	**Number**	**Percentage**
Less theory / More practical	2	25%
Administration	1	12.5%
Advance notice of cancellation of courses	1	12.5%
Finance for non-financial manager – assessment on what the candidate's customers would be, requirements	1	12.5%
More time-leading management and effective team	1	12.5%
1 day increase to 2 days	1	12.5%
Tutor was not suitable and no knowledge / enough skills	1	12.5%
Total	**8**	**100%**

Note: Respondents could provide more than one response.

Source: FGS McClure Watters, December 2009

7.8.2 Future Use of CPD Course(s)

The majority (89%) of respondents would consider attending a QUB CPD course again. Respondents were asked to explain their answer. 5 responded and gave the following answers:

- Training allowance (x1);
- Marketing 2010 (x1);
- Relevant – project leading / management (x1);
- Quality courses (x1); and
- Management development (x1).

One respondent stated that they would not consider attending a QUB CPD course again but did not explain why.

Table VII.16: Would you consider attending a QUB CPD course again?

Metric	Frequency	Percentage
Yes	17	89%
No	1	5%
Non Response	1	5%
Total	**19**	**100%**
Source: FGS McClure Watters, December 2009		

7.8.3 Recommendation of CPD Courses

The majority of respondents (79%) would recommend QUB CPD course(s) to others. Respondents were asked to explain their answer. One respondent replied with the following answer: staff development. However 2 respondents (11%) would not recommend the QUB CPD course(s) to others; neither of these respondents provided an explanation.

Table VII.17: Would you recommend the QUB's CPD courses to others?

Metric	Frequency	Percentage
Yes	15	79%
No	2	11%
Non Response	2	11%
Total	**19**	**100%**
Source: FGS McClure Watters, December 2009		

7.8.4 CPD Course(s) as a Catalyst

12 respondents indicated why their experience of the QUB CPD course (funded by NI HEIF 2) acted as a catalyst for them to undertake other innovative activities within their company. These were as follows:

- Future opportunity – implemented aspects of the course (x1);
- Training opportunities for staff (x1);
- Widen knowledge to deliveries (x1);
- More presentations (x1);
- Better understanding and awareness (x1);
- Additional work / challenges and confidence (x1);
- Potential in future (x1);
- Process audit (x1);
- Further Education (x1);

- Develop staff / approach / management (x1);
- Potential career development (x1); and
- Training related activities (x1).

Table VII.18: Has your experience of the QUB CPD course (funded by NI HEIF 2) acted as a catalyst for you to undertake other innovative activities within your company?

Metric	Frequency	Percentage
Yes	14	74%
No	2	11%
Non Response	3	16%
Total	**19**	**100%**
Source: FGS McClure Watters, December 2009		

7.9 Summary

A total of 19 people who had attended a CPD course at QUB were surveyed. The majority of respondents (89%) work in a company with fewer than 500 employees. Approximately one third of respondents (32%) worked in a company based in the Belfast City Council area. This was the most common response, followed by Craigavon Borough Council and North Down Borough Council with 11% respectively.

Respondents were asked about how they first became aware of the QUB CPD course(s). The most common response was through a source in the 'other' category, many of which had been informed through the organisation they work for. Approximately one fifth (21%) of respondents became aware of the CPD course(s) through the QUB website.

Respondents were asked to name all the CPD courses they had attended in QUB since 2007. The 19 respondents have attended a total of 32 CPD courses. The most popular course was Effective Project Management with 7 of the respondents attending this. The introduction of the NI HEIF 2 funding in 2007 has clearly impacted on CPD course attendance in QUB, with the number of courses attended by the respondents increasing from 2 in the period prior to 2007 to 32 in the period after 2007. Levels of satisfaction with the QUB CPD course(s) attended were high among respondents. The majority of respondents (up to 90%) were satisfied or very satisfied with the course they attended.

Respondents were asked how attending the CPD course had impacted on them and their organisation. Approximately one third of respondents (32%) felt that attending the course had significantly impacted on improving existing skills and expertise levels within their company. This was the most positive outcome in terms of significant impact, followed by the development of new skills and expertise within the company as reported by 26% of respondents.

Respondents were asked if they would have been able to achieve the same outcome if the QUB CPD course had not been available to them. Approximately one third (32%) indicated that they would have been unable to achieve the same outcome. 68% of respondents

indicated that they would have been able to achieve the same outcomes, 21% reported that they could have done this immediately, while 47% reported that it would have taken them longer. 79% of respondents indicated that their experience of the QUB CPD course (funded by NI HEIF 2) acted as a catalyst for them to undertake other innovative activities within their company.

8 APPENDIX VIII – VOLUNTARY & COMMUNITY ORGANISATIONS – SURVEY RESULTS

8.1 Methodology

A questionnaire was developed specifically for Voluntary and Community Organisations; this was circulated to the Project Steering Group and agreed by them. The questionnaire was designed to capture information about the respondents' organisation profiles and their experience of working with the Science Shop in QUB and UU including motivation, satisfaction levels with the outcome of the project and subsequent impact on knowledge transfer within their company. The questionnaire was piloted to ensure that it captured the required data.

We were provided with the contact details of 69 Community & Voluntary Organisations who had used the services of the Science Shop in QUB/UU since the current period of NI HEIF 2 funding commenced (August 2007). We contacted all of the organisations by phone up to 5 times in order to schedule appointments to complete the survey. Where appropriate, the questionnaire was also emailed to respondents to facilitate completion. A total of 20 questionnaires were completed.

Table VIII.1: Response rate

	Target to be completed			No of contacts provided*			No. completed		
	QUB	UU	Total	QUB	UU	Total	QUB	UU	Total
Voluntary & Community Organisations	10	10	20	27	42	69	11	9	20

Note:
**Total available contacts are reduced as some of the contacts are duplicates and / or missing / contain incorrect contact details*

Source: FGS McClure Watters, December 2009

8.2 Organisation Profile

8.2.1 Organisation Type

Over half of respondents (55%) indicated that the organisation they work for is a registered charity. The next most common organisation type was a community group with one fifth (20%) reporting that they work for one.

Table VIII.2: Organisation Type

Sector	Frequency	Percentage
Charity (registered)	11	55%
Company (registered)	1	5%
Club / Society	0	0%
Faith group	0	0%
Housing Association	0	0%
Parish Council	1	5%
Community Centre	1	5%
Social Enterprise	1	5%
Community Group	4	20%
Other	1	5%
Total	**20**	**100%**

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, December 2009

8.2.2 Sector

The most common sector for respondents to work in is the voluntary & community sector support, with 65% reporting this. Other responses included: training & education, community development, environment / conservation, faith & cultures and health & social care.

Table VIII.3: What sector is your organisation in?

Sector	Frequency	Percentage
Advice & information	0	0%
Advocacy	0	0%
Arts & media	0	0%
Children & families	0	0%
Community development	1	5%
Community safety/ criminal justice	0	0%
Counselling & rehabilitation	0	0%
Economic development	0	0%
Employment	0	0%
Environment/conservation	1	5%

Sector	Frequency	Percentage
Faiths & cultures	1	5%
Health & social care	1	5%
Housing	0	0%
International development	0	0%
Lobbying & campaigning	0	0%
Research & development	0	0%
Social & leisure activities	0	0%
Sports & exercise	0	0%
Training & education	3	15%
Transport	0	0%
Voluntary & community sector support	13	65%
Other	0	0%
Non Response	0	0%
Total	**20**	**100%**
Source: FGS McClure Watters, December 2009		

8.2.3 Organisation Size - Employees

The majority of respondents (85%) work in an organisation with less than 100 employees; only 3 work in a larger organisation. One respondent reported that they work in an organisation with more than 1,000 employees, but did not state the exact number.

Table VIII.4: How many employees are there in your organisation at present?

No. of employees	Frequency	Percentage
<10	8	40%
10 – 99	9	45%
100 – 249	1	5%
250 – 499	0	0%
500 – 999	1	5%
1000 +	1	5%
Non Response	0	0%
Total	**20**	**100%**
Source: FGS McClure Watters, December 2009		

8.2.4 Local Government District (LGD)

Approximately one third of respondents (30%) worked in a company based in the Belfast City Council area. This was the most common response, followed by Derry City Council and North Down District Council with 25% and 10% respectively.

Table VIII.5: Which District Council Area is your organisation based in?

District Council Area	Frequency	Percentage
Antrim Borough Council	0	0%
Ards Borough Council	0	0%
Armagh City and District Council	0	0%
Ballymena Borough Council	0	0%
Ballymoney Borough Council	0	0%
Banbridge District Council	0	0%
Belfast City Council	6	30%
Carrickfergus Borough Council	0	0%
Castlereagh Borough Council	1	5%
Coleraine Borough Council	1	5%
Cookstown District Council	0	0%
Craigavon Borough Council	0	0%
Derry City Council	5	25%
Down District Council	2	10%
Dungannon and South Tyrone Borough Council	1	5%
Fermanagh District Council	0	0%
Larne Borough Council	0	0%
Limavady Borough Council	0	0%
Lisburn City Council	1	5%
Magherafelt District Council	1	5%
Moyle District Council	0	0%
Newry and Mourne District Council	1	5%
Newtownabbey Borough Council	0	0%
North Down Borough Council	1	5%
Omagh District Council	0	0%
Strabane District Council	0	0%
Non Response	0	0%
Total	**20**	**100%**

Source: FGS McClure Watters, December 2009

8.2.5 Length of Time Established

The largest proportion of respondents (45%) worked in an organisation that had been established for more than 20 years. Of these 9 respondents, only 3 specified the exact number of years the organisation had been established. Their responses were as follows: 115 years, 36 years and 24 years.

Table VIII.6: How long has your organisation been established?

Time metric	Frequency	Percentage
Organisation not yet formed	0	0%
1 year	0	0%
2 years	1	5%
3 years	0	0%
4 years	0	0%
5 years	0	0%
6 to 10 years	6	30%
11 to 15 years	4	20%
16 to 20 years	0	0%
More than 20 years	9	45%
Non Response	0	0%
Total	**20**	**100%**
Source: FGS McClure Watters, December 2009		

8.2.6 Organisation Size – Turnover

Over half of respondents (55%) work in an organisation with an annual turnover of less than £1m. 4 respondents did not know their organisation's annual turnover. Two respondents indicated that their organisation's annual turnover was over £5 million; their responses were: £10.2 million; and £146 million.

Table VIII.7: What is your organisation's annual turnover?

Turnover (£)	Frequency	Percentage
£0 – 99k	2	10%
£100k – £250k	6	30%
£251 million – £499 million	2	10%
£500k – £999k	1	5%
£1 million – £5 million	3	15%
Over £5 million	2	10%
Non Response	4	20%
Total	**20**	**100%**
Source: FGS McClure Watters, December 2009		

8.3 Awareness of the Science Shop

One fifth (20%) of respondents indicated that they first became aware of Science Shop through a flyer. The majority of respondents (60%) indicated that they first became aware of Science Shop through a source in the 'other' category. Of these 15 respondents, 9 specified what the source was; their responses (each comment made by one person) were as follows:

- Staff members;
- MLA 5 years ago - Michael Ferguson;
- Advert on notice board;
- Lifelong learner;
- Email from social economy network
- Previous post holder;
- Previous contact from UU;
- Previously worked in QUB; and
- UU - Department / Internal source.

Three respondents indicated that they first became aware of the university Science Shop through a 'visit / contact from a university'. Their responses included:

- Department relationship with UU;
- Long relationship with QUB and UU; and
- Previous Education & Training Coordinator had liaised with UU - Science Shop.

Table VIII.8: How did you first become aware of the university Science Shop?

Sector	Frequency	Percentage
QUB website	0	0%
UU website	0	0%
QUB 'Queen's Students in the Community' newsletter	0	0%
The Science Shop – 'Engage' newsletter	0	0%
Flyer	4	20%
Network event or conference	0	0%
Press Article	0	0%
Visit / Contact from a University	3	15%
Word of mouth	1	5%
Other	12	60%

Sector	Frequency	Percentage
Non Response	0	0%
Total	**20**	**100%**
Source: FGS McClure Watters, December 2009		

8.4 Uptake of KT and Science Shop Services

8.4.1 Usage of KT Services prior to Science Shop

Respondents were asked if they had used any of the universities' other KT services before their contact with the Science Shop; respondents could give more than one answer. The majority (17 respondents) had not used any. Three of the respondent's organisations had used student placements prior to contacting Science Shop.

Table VIII.9: Prior to your contact with the Science Shop, had you used any of the following University services / support before?

University Services / Support	Frequency	Percentage	Approx. Date
None	17	85%	
Facilities and Equipment	1	5%	
Research	1	5%	
Consulting	0	0%	
Student work placements	3	15%	Prior to 2008 & 1999/00
Participating in Continuing Professional Development	0	0%	
Knowledge Club (UU)	0	0%	
Other	0	0%	
Total	**22**	**-**	
Note: Respondents could provide more than one response. A total of 20 respondents provided an answer			
Source: FGS McClure Watters, December 2009			

8.4.2 Usage of Science Shop since August 2007 (including Impacts)

Respondents were asked to detail all their Science Shop projects since 2007, describing the type of project, the approximate date and the impact on their organisation. Half (50%) gave details of one project, 35% gave details of two projects and 15% gave details of three projects. Summaries of all responses are shown in Table VIII.10 for UU and QUB Science Shop.

Perception research projects were the most common type of project carried out with the UU Science Shop, accounting for 55% of all UU Science Shop projects. Policy Review projects were the most common type of project carried out with the QUB Science Shop, accounting for 41% of all QUB Science Shop projects.

Table VIII.10: Please provide details of your Science Shop project(s) - since August 2007.

Metric	Number	Percentage
Number of organisations detailing 1 project	10	50%
Number of organisations detailing 2 projects	7	35%
Number of organisations detailing 3 projects	3	15%
Number of organisations detailing 4 or more projects	0	0%
Total	**20**	**100%**

Science Shop Project(s) Details	Summary
University	UU – 10 respondents detailed 11 projects
Project Description	The 11 projects can be summarised as follows: - 6 perception research projects; - 3 marketing strategy projects; - 1 business research project; and - 1 'other' project (volunteering project).
Approximate date	3 projects in 2007; 4 in 2008 and 4 in 2009.
Impact on the organisation	Projects provided evidence for funding application (x3); Created / contributed to marketing strategy (x3); Provided evidence for further project development (x2); Projects impacts were too early too estimate (x2); Had no impact (x2); and Project increased the uptake of the organisation (x1).
University	QUB – 10 respondents detailed 17 projects
Project Description	The 17 projects can be summarised as follows: - 7 policy review projects; - 4 perception research projects; - 2 marketing strategy projects; - 2 business research projects; - 1 feasibility study, 1 scoping study and 1 'other' (coppicing study and comparison). 1 'other' project (coppicing study and comparison).
Approximate date	1 project in 2007; 10 in 2008 and 5 in 2009 (1 non-response)
Impact on the organisation	Evidence for further project development (x3); Marketing strategy (x2); Evidence for funding application (x1); Increase in awareness (x1); Networking development (x1); Increase in enrolment (x1); In-depth knowledge (x1); Marketing skills; on-line site creation (x1); Increase in sales (x1) and too early to estimate (x1); and Respondents did not provide an answer (x6)

Note: Respondents could provide more than one response. A total of 20 respondents provided an answer (i.e.: 20 respondents / 22 responses).

Source: FGS McClure Watters, December 2009

8.5 Impact and Assessment of Science Shop

8.5.1 Motivation / Desired Outcomes

Respondents were asked what outcome(s) they were seeking to achieve in collaborating with the Science Shop; respondents could provide more than one answer. The most common response was to address lack of in-house staff time to work on project (80%); this was followed by addressing lack of in-house expertise in specific project skills and addressing lack of financial resources to employ consultancy services with 70% reporting each of these respectively.

Five respondents indicated they aimed to achieve 'other' outcomes in collaborating with the Science Shop on their project; their responses were as follows:

- Provide concrete evidence information (x2);
- Review the organisation's needs and develop them for training to deliver specific projects to the community (x1);
- Requirement for students / re-learning (x1); and
- Not specified (x1).

Table VIII.11: What outcome(s) were you seeking to achieve in collaborating with Science Shop on your project?

Outcome	Frequency	Percentage
To address lack of in-house expertise in specific project skills	14	70%
To address lack of in-house staff time to work on project	16	80%
To address lack of financial resources to employ consultancy services	14	70%
Opportunity to work with University	11	55%
Other	5	25%
Total	**20 respondents**	**100%**

Note: Respondents could provide more than one response.

Source: FGS McClure Watters, December 2009

8.5.2 Impact of Science Shop

Respondents were asked how working with the Science Shop had impacted on them and their organisation. Approximately one third of respondents (30%) felt that working with the Science Shop had a significant impact in their networking/collaborating with others. This was the most positive outcome in terms of significant impact. Up to 25% of respondents felt that working with the Science Shop had no impact on the stated metrics. Three respondents

indicated that working with the Science Shop had significantly impacted on 'other' areas, their responses were as follows:

- Allowing staff to concentrate on own tasks;
- Working with UU Jordanstown on placements in areas of youth and community. Also working with St. Mary's University College re: placements to the group in areas of youth; and
- Knowledge / in-house skills – Significant Impact.

Table VIII.12: Overall, what impact did working with the university Science Shop have on you / your organisation?

	No Impact		Some Impact		Significant Impact		N/A	
Metric	**No.**	%	**No.**	%	**No.**	%	**No.**	%
Access to education	5	25%	0	0%	2	10%	13	65%
Improvement in existing skills and expertise levels within your organisation	5	25%	6	30%	2	10%	7	35%
Development of new skills and expertise within your organisation	5	25%	3	15%	2	10%	10	50%
Adoption of new business practices	4	20%	5	25%	3	15%	8	40%
Networking/collaborating with others	5	25%	2	10%	6	30%	7	35%
Other	3	15%	0	0%	3	15%	14	70%
Source: FGS McClure Watters, December 2009								

8.5.3 Satisfaction with Science Shop

Respondents were asked about levels of satisfaction with various aspects of their experience in working with the Science Shop. Levels of satisfaction were high with at least 73% of respondents reporting being satisfied or very satisfied with each aspect.

Table VIII.13: How satisfied were you with the following aspects of the Science Shop project(s)?

	N.	Very Satisfied		Satisfied		Neither Satisfied/ dissatisfied		Dissatisfied		Very Dissatisfied	
Metric		**No.**	%	**No.**	%	**No.**	%	**No.**	%	**No.**	%
The capability of the student assigned to my organisation to address my	19	9	47%	5	26%	2	11%	0	0%	3	16%

Metric	N.	Very Satisfied		Satisfied		Neither Satisfied/ dissatisfied		Dissatisfied		Very Dissatisfied	
		No.	%	No.	%	No.	%	No.	%	No.	%
organisation's needs											
The support provided by the Science Shop team	20	13	65%	3	15%	2	10%	1	5%	1	5%
The outcomes of the project, i.e. what the student delivered for my organisation	17	8	47%	6	35%	0	0%	1	6%	2	12%
The knowledge / skills transferred into my organisation	15	9	60%	3	20%	0	0%	1	7%	2	13%
Source: FGS McClure Watters, December 2009											

8.6 Additionality

Respondents were asked if they would have been able to achieve the same outcome if the Science Shop support had not been available to them. The majority (80%) indicated that they would have been unable to achieve the same outcome. 20% of respondents indicated that they would have been able to achieve the same outcomes. Of these respondents, 5% reported that they could have done this immediately. When asked how they would have achieved this, the respondent replied that they would have done the work internally.

15% reported that they would have achieved the same outcome, but it would have taken them longer. The respondents were asked how they would have gone about this and 2 gave an answer; their responses are shown in Table VIII.14.

Table VIII.14: If the Science Shop support from the universities had not been available to you, would you have been able to achieve the same outcome in another way?

Metric	Frequency	Percentage
Yes, immediately	1	5%
Yes, but over a longer timescale	3	15%
Yes, but on a smaller scale	0	0%
No	16	80%
Non Response	0	0%
Total	**20**	**100%**
Note: Respondents could provide more than one response. Source: FGS McClure Watters, December 2009		

Table VIII.15: If the Science Shop support from the universities had not been available to you how would you have gone about this?

How respondents would have proceeded in developing their project / organisation in the absence of this support
Respondents who answered 'Yes, immediately'
Internally.
Respondents who answered 'Yes, but over a longer timescale'
The team would have done research.
Internally.
Note: Respondents could provide more than one response. Source: FGS McClure Watters, December 2009

8.7 Future Science Shop Services

8.7.1 Improvements for Future Science Shop Services

Respondents were asked to make recommendations for future improvements to the Science Shop service; respondents could provide more than one answer. The most commonly cited answer was to advertise and market the service more, followed by more communication/contact/regular updates on the project.

Table VIII.16: What future improvements would you recommend for the universities' Science Shop services?

Metric	Number	Percentage
Number of respondents giving 1 response	17	85%
Number of respondents giving 2 responses	4	20%
Number of respondents giving 3 responses	0	0%
Total	**21 responses**	**100%**
Improvements	**Number**	**Percentage**

None	5	29%
Advertisement and marketing of the services offered	4	24%
More communication / contact / regular updates / two-way communication etc. on project	4	24%
Communication with students	1	6%
Future collaboration engagements	1	6%
Initial planning	1	6%
Keep with project timescale	1	6%
Lead-in times	1	6%
Meeting to negotiate the way forward	1	6%
More effective collaboration between parties.	1	6%
Other research projects	1	6%
Total	**17 respondents**	**100%**
Note: Respondents could provide more than one response.		
Source: FGS McClure Watters, December 2009		

8.7.2 Future use of Science Shop Services

When asked if they would use the Science Shop services again, all respondents (100%) answered "yes". Respondents were asked to explain their answer; 14 provided the following rationale for their statement:

- Other projects (x9);
- Follow on project (x3);
- More in-depth research (x1); and
- If needed in the future (x1).

Table VIII.17: Would you seek support from the universities' Science Shop again?

Metric	Frequency	Percentage
Yes	20	100%
No	0	0%
Non Response	0	0%
Total	**20**	**100%**
Source: FGS McClure Watters, December 2009		

8.7.3 Recommendation of Science Shop Services

When asked if they would recommend the Science Shop services to other community/voluntary organisations, all respondents (100%) answered "yes". 8 of 20 respondents indicated the reason why they would recommend the Science Shop services to

other Community/Voluntary organisations. All of these responses referred to the value of the service and included:

- 'Amazing, great attention, excellent service';
- 'Have already recommended, great service';
- 'Very useful, easy access and minimum fuss';
- 'Excellent service. Science Shop students are from local area, extremely keen in helping'; and
- 'Have done. Very impressed.'
- 'Valuable service.'
- 'Great service'
- 'Excellent, very useful, best approach'.

Table VIII.18: Would you recommend the Science Shop services to other Community/Voluntary organisations?

Metric	Frequency	Percentage
Yes	20	100%
No	0	0%
Non Response	0	0%
Total	**20**	**100%**
Source: FGS McClure Watters, December 2009		

8.7.4 Science Shop as a Catalyst

15 respondents indicated that their experience of working with the universities' Science Shop acted as a catalyst for them to undertake other innovative activities within their organisation. Of these 15 respondents, 14 gave the following examples of activities:

- Additional projects (x9);
- Follow on project (x2);
- Further involvement with QUB (x1);
- Strategy development (x1); and
- Internally – research department (x1).

4 respondents indicated that their experience had not acted as a catalyst for them to undertake other innovative activities within their organisation, but none of them commented

on the reason why. One respondent said they could not provide an answer as the project had not finished yet.

Table VIII.19: Has your experience of working with the universities' Science Shop (funded by NI HEIF 2) acted as a catalyst for you to undertake other innovative activities within your organisation?

Metric	Frequency	Percentage
Yes	15	75%
No	4	20%
Non Response	1	5%
Total	**20**	**100%**
Source: FGS McClure Watters, December 2009		

8.8 Summary

A total of 20 Community/Voluntary organisations that had used the services of UU/QUB Science Shop were surveyed. The majority of respondents work for a registered charity (55%) community group (20%). The majority of respondents (85%) work in an organisation with less than 100 employees and 55% work in an organisation with an annual turnover of less than £1m.

The majority of respondents (60%) indicated that they first became aware of Science Shop through a source in the 'other' category; most of these were through colleagues in their organisation or QUB/UU. A further 20% of respondents indicated that they first became aware of Science Shop through a flyer.

Respondents were asked if they had used any of the universities' other KT services before their contact with Science - the majority (85%) had not. Three of the respondent's organisations had used student placements prior to contacting Science Shop.

Perception research projects were the most common type of project carried out with the UU Science Shop, accounting for 55% of all UU Science Shop projects. Policy Review projects were the most common type of project carried out with the QUB Science Shop, accounting for 41% of all QUB Science Shop projects.

Respondents were asked what outcome(s) they were seeking to achieve in collaborating with the Science Shop; respondents could provide more than one answer. The most common response was to address lack of in-house staff time to work on the project, with 80% reporting this, followed by addressing lack of in-house expertise in specific project skills and addressing lack of financial resources to employ consultancy services, with 70% respectively reporting this.

Respondents were asked how working with the Science Shop had impacted on them and their organisation. Approximately one third of respondents (30%) felt that working with the Science Shop had a significant impact in their networking/collaborating with others. Levels of satisfaction were high with at least 73% of respondents reporting being satisfied or very

satisfied with their experience of working with the Science Shop. When asked if they would use the Science Shop services again, all respondents answered “yes”. Similarly, when asked if they would recommend the Science Shop services to other community/voluntary organisations, all respondents answered yes.

Respondents were asked if they would have been able to achieve the same outcome if the Science Shop support had not been available to them. The majority (80%) indicated that they would have been unable to achieve the same outcome. Most of the remaining 20% stated that they would have done the work internally.

Respondents were asked to make recommendations for future improvements to the Science Shop service; respondents could provide more than one answer. The most commonly cited answer was to advertise and market the service more, followed by more communication/contact/regular updates on the project.

75% of respondents indicated that their experience of working with the universities’ Science Shop acted as a catalyst for them to undertake other innovative activities within their organisation.

9 APPENDIX IX – ACADEMICS – SURVEY RESULTS

9.1 Methodology

A questionnaire was developed specifically for Academics; this was circulated to the Project Steering Group and agreed by them. The questionnaire was designed to capture information about the respondents' experience of working in knowledge transfer activities within the University including the rationale for KT activities, barriers to their involvement in KT, knowledge and use of the University KT Units/Offices, motivation, satisfaction levels with the outcome of activities and subsequent impact on KT with businesses. The questionnaire was piloted to ensure that it captured the required data.

We were provided with the contact details of 153 Academics who had taken part in KT activities funded by NI HEIF 2 (since the current period of NI HEIF 2 funding commenced in August 2007). We contacted all of the organisations by phone up to 5 times in order to schedule appointments to complete the survey. Where appropriate, the questionnaire was also emailed to respondents to facilitate completion. A total of 46 questionnaires were completed.

Table IX.1: Academics Response rate

	Target to be completed			No of contacts provided*			No. completed		
	QUB	UU	Total	QUB	UU	Total	QUB	UU	Total
Academics	25		**45**	130	23	**153**	35	11	**46**
	20	-							

Note:
**Total available contacts are reduced as some of the contacts are duplicates and / or missing / incorrect contact details*
- Target to be completed included 25 academics (general) across QUB and UU and 20 QUB academics who used patent service
- QUB 130 academic contacts included: 88 general, 15 patent granted, 27 patent not granted.
QUB 35 academics completed included: 14 general, 9 patents granted, 12 patent not granted

Source: FGS McClure Watters, December 2009

9.2 Rationale for Knowledge Transfer

9.2.1 Importance of KT to Universities

Respondents were asked to rate how important they believe it is for the University to get involved in KT activities. All respondents (100%) believe that it is important with 83% rating it as very important.

Table IX.2: How important do you think it is that the universities get involved in Knowledge Transfer activities?

Universities' involvement in Knowledge Transfer – Importance	Frequency	Percentage
Very important	38	83%
Quite important	8	17%
Neither important / unimportant	0	0%
Not very important	0	0%
Not important at all	0	0%
Non Response	0	0%
Total	**46**	**100%**
Source: FGS McClure Watters, December 2009		

9.2.2 Barriers to Engaging with Business

Respondents were asked to rank the critical barriers to them engaging with business and the wider community in terms of significance. The most commonly cited barrier was lack of time followed by lack of finance. A total of 6 'Other' critical barriers (3 respondents only ranked 'other' category but did not specify their response) were indicated and ranked as follows:

- Ranked 1 - It is not my primary job function.
- Ranked 1 - Making contracts within industry.
- Ranked 1 - Invest NI is the biggest barrier / Bureaucracy at Quango + Government Level.
- Ranked 3 - Limited number of hi-tech firms in NI.
- Ranked 5 - Conflict of interests on the timing for academic publications and patent filling.
- Ranked 5 - Reluctance of business.

Table IX.3: Which of the following would you say are the critical barriers to you engaging with business and the wider community?

Barrier	Frequency					N.	Average Rank
	1 (Most significant)	2	3	4	5 (Least significant)		
Lack of time	17	15	8	2	2	44	**2.0**
Lack of finance	13	12	7	7	4	43	**2.5**
Lack of awareness of how to engage with businesses	5	7	15	5	10	42	**3.2**
Lack of experience in Knowledge Transfer projects	0	3	11	15	10	39	**3.8**
Other	3	1	2	1	2	9	**2.8**
Source: FGS McClure Watters, December 2009							

9.3 Awareness of University KT Services / Support

9.3.1 Role of KT Unit / Office

Table IX.4: Which of the following are you aware of and have you used? Please comment on the importance of this resource in getting you involved in Knowledge Transfer.

Knowledge Transfer Units / Offices	Percentage		
	Aware	Used	N/A (i.e. were not aware (and not used)
QUB Regional Office	71%	41%	29%
QUB Knowledge Exploitation Unit	76%	59%	24%
UU Business Liaison Office	24%	9%	76%
UU Technology Transfer Office	31%	20%	70%
Other	2%	2%	98%
Source: FGS McClure Watters, December 2009			

Respondents were asked to comment on the importance of each KT Unit/Office in getting them involved in KT activities. The responses received for each office / unit were as follows:

- QUB Regional Office:
  - Those who were aware of:
    - Only useful for project costing (x1)
    - Important for creating links with businesses (x1)
    - Great applications (x1)
  - Those who were aware of and had used:
    - Important / Excellent / Fundamental (x10) – 4 specified why: for contracts, introducing industry partners, for IP issues and helping link in with business and research throughout the university.
    - Difficult to work with SMEs (x1)
    - They have got their work themselves (x1)
    - Happened. Bureaucracy. Cost money to provide? (x1)
    - Would like to see University benefit from my projects with possible KT value (x1)
- QUB Knowledge Exploitation Unit:
  - Those who were aware of:

- Barrier routines (x1)
- Excellent 1) patent advice/support and 2) support to lever funds from Invest NI (x1)
- Provides important support for all knowledge transfer activities, facilitating the process for all parties involved (x1)
- Responsive to me (x1)

  - Those who were aware of and had used:
    - Important / Excellent / Fundamental (x20), including consultancy, practical areas of research, instruction, patents and licences, staff help, expertise and advice, delivering knowledge transfer activities and engaging successfully in programmes with industry, IP issues and general support.
    - Involved in POC + Patents (x1)
    - KTP Office critical (x1)
    - Potential for exploitation of KT on some existing projects (x1)
    - Yes, newish, not worked with them a lot. Good model (x1)
    - Could -experiment at the moment, thinks they will get better over time (x1)

- UU Business Liaison Office:
  - Those who were aware of and had used:
    - Important / Excellent / Fundamental (x2), including critical experience and support.
    - Great at signposting companies to appropriate academics (x1)

- UU Technology Transfer Office:
  - Those who were aware of:
    - Important / Excellent / Fundamental (x1).
  - Those who were aware of and had used:
    - Important / Excellent / Fundamental (x5), including good at assisting in how to commercial research - how to approach companies and first contact to engage commercialisation of research.
    - Don't provide enough support. Academics need to do a lot of leg work on technology transfer and this should be done by them (x1).

9.4 Current KT Activities

9.4.1 Usage of KT Services since August 2007

Respondents were asked which of the universities' KT services and supports they had used since the introduction of NI HEIF 2 in 2007. Their responses are shown in Table IX.5 – the most common services / supports are: patent support service (78%), research (56%), consulting (47%) and KTPs (42%).

One respondent indicated 'other' universities' Knowledge Transfer services and support used since August 2007 onwards. This was 'Connected Knowledge Acquisition Visit'.

Table IX.5: Which of the universities' Knowledge Transfer services and support have you used / been involved with from August 2007 onwards?

Knowledge Transfer services	Frequency	Percentage
Patent Support Service	35	78%
Licence Support	7	16%
Facilities and Equipment	17	39%
Research	25	56%
Consulting	21	47%
Knowledge Transfer Partnerships (KTPs)	19	42%
Student work placements	12	27%
Participating in Continuing Professional Development (CPD)	10	22%
Investment	6	13%
Knowledge Club (UU)	2	4%
Marketing and Sales Support (QUB)	3	7%
Other	1	2%
Note: Respondents could provide more than one response.		
Source: FGS McClure Watters, December 2009		

9.4.2 Details of KT Services used (including Impacts)

Respondents were asked to provide details on the KT services and supports they had used, including a description and date of the project and the impact. A summary of the responses received for each of the universities' KT services is shown below in Table IX.6.

Table IX.6: Please provide details of those university-based Knowledge Transfer services and support that you have used / been involved with from August 2007 onwards.

KT Service	Summary of Responses
Patent Support Service	**Summary of the 35 Responses**
University	QUB (x18); UU (x9) and N/A (x8)
Project Description	The projects described cover a vast array of specific and technical science areas, with a majority related to biomedicine (e.g. development of anti-cancer

	protein or development of diagnostic infertility test for zoospermic patients).
Approximate date	The dates indicated cover a period from 1998 to 2010. The majority of support used commenced in 2008 (10 projects), followed by 2007 (8 projects) and 2009 (5 projects).
Impact on project /business	29 impacts were detailed as follows: • Filed a patent / Waiting for approval (x16) • Patent granted (x7) • PCT stage (x3) • Advice on process (x1) • Technological improvements on previous patent (x1) • Very important impact (x1)
Licence Support	**Summary of the 7 Responses**
University	QUB (x4) and N/A (x3)
Project Description	Projects were described as follows: Genetics of age-related macular degeneration; Novel transdermal patch system; Develop anti-cancer protein; Flexible concrete arch; Potential Spin-off from Framework6. Advice from Pipeline and Biocentre POC.
Approximate date	2005 (x1); 2007 (x2); 2008 (x1) and 2009 (x3)
Impact on project /business	• 2 licences completed; • 1 licence external; • 1 licence & patent; • 1 waiting for licence arrangements to be signed; • 1 planning sub-licensing internationally; and • 1 N/A.
Facilities and Equipment	**Summary of the 17 Responses**
University	QUB (x6); UU (x1); NISRC (x1) and N/A (x9)
Project Description	Projects were described as follows: IceMOS; Special machinery & new product development; Pipe-manufacturing; ARMAC; Flexible concrete arch; Photo-reactive surfaces; Numerous projects using facilities of the NI Technology Centre; Transcutaneous wireless link for instant power delivery in a trial defibrillation; Contact lenses company; T.G. AKEN: physical chemical analysis; Fusion antibodies-imagining facilities and Innovation vouchers
Approximate date	2007-ongoing (x6); ongoing (x2) and 2009/10 (x2).
Impact on project /business	10 respondents reported positive impacts on the project / business: • project would not have gone ahead (x2); • useful service provided; • delivery of contract; back-up testing crucial for project development; • full IP / patenting support provided; • using facilities to aid in delivery of consultancy and research projects; • provision of important materials and electronic fabrication processes; • funded work in school; • essential for industry to use their equipment. Economies of sale-they couldn't afford to buy their own equipment. 1 respondent indicated it would not be possible to complete the project without sharing equipment; and 1 respondent indicated that the company went on to buy their own equipment as a result of using the University's.
Research	**Summary of the 25 Responses**
University	QUB (x15); UU (x7) and N/A (x3)
Project Description	Projects were described as follows: • PreMade project - 3 year project researching digital manufacturing and lean principles • Andor Technology • Help with obtaining funding to characterise the EpoR monoclonal

	antibodies • PoC Award (INI) Development of diagnostic tools for the rapid detection of markers of inflammation within the clinic • Transdermal drug delivery systems • transdermal microneedles project • several PoC INI programmes • Material development. Start-up companies: To advise on their procession +material • Smith-Nephew.Developing electron beam • ARMAC. Breast cancer campaign • Very expensive research project • Flexible concrete arch • Contact lenses company • PoC in breast cancer survival prediction • Transcutaneous wireless link for instant power delivery in atrial defibrillation. • Vacuum photovoltaic concentrating panel • IOSH - Voice Care for Call Handlers June 2008 - Sept 2009 • Innovation vouchers (4) • Contract-research for external companies in Holland
Approximate date	From 2006 to ongoing projects
Impact on project /business	• I was involved in project managing and delivering this £2.5M project major • POC grant (£60K) awarded by Invest NI to Dr Perry Maxwell and myself to support work of PDRA for one year • Successful programme now investigating ongoing commercialization • Considerable market support to identify potential commercial partners - essential • Full and comprehensive support provided • Company started-up + still running • Awareness of medical device industry • Key patent office + research equipment • Funded work in the school • Patent submitted. Currently engaging industrial partners to commercialise technology • Research staff for 12 months (£ 36,000) • Research is currently ongoing • They've employed someone in the uni on a 3-4 year + extended research
Consulting	**Summary of the 21 Responses**
University	QUB (x11); UU (x8) and N/A (x2)
Project Description	• Numerous consultancy projects delivered from the Northern Ireland Technology Centre • Special machinery & new product development • Pharmaceutical consulting • Formulation Development • Mushroom extraction • Product dev. + Prototyping • Used the service for confidentiality agreements • Outside-US Companies • Cambridge: research, strategic director of NASA project • Team of 12 employed in QUESTOR to carry out consultancy in general, research, demonstration + compliance • Investigating new treatment to kill apicomplex parasites in waste water • Developed a wireless system for a local company in the creation of a new

	prototype product. • Transcutaneous wireless link for instant power delivery in a trial defibrillation. • Materials testing • In testing of solar water heaters. evaluated-_ energy systems • Overview of Health + safety laboratory
Approximate date	From 2007 to ongoing projects (x7 ongoing)
Impact on project /business	• Directly involved in delivery and project management of numerous projects • Delivery of contacts, tangible benefits to customers. Enhanced customers capabilities • Completion of contract with company • Would have done, but would have taken a lot longer • Helped to get 100K from Rolls Teye(Sanc10) + helped Airbus contract • Funded work in the school • Preliminary test have been carried out and funding has been granted to do a full assessment • Successfully completed and evaluated by InvestNI. Company sought to patent and commercial the system further. • Professional market validation. Preliminar FTO search and patentability opinion. • Published journal article and presented research work in the World Renewable Energy congress in 2008 and International Solar Energy Society in 2009. • Supported small local industry
Knowledge Transfer Partnerships (KTPs)	**Summary of the 19 Responses**
University	QUB (x18); UU (x1) and N/A (x1)
Project Description	• Project with Horizon Renewables on Load Controller • KTP with Nitronica, Ballynahinch • Seagate • Development of Self-Compacting Concrete for precast cladding panels • Collaboration with Randox Laboratories • Creation of a new design process for development of next generation trigger sprayer • Transcutaneous wireless link for instant power delivery in atrial defibrillation. • Pipe manufacturing • ANOY SUTTON (INVEST INI) Arranged meeting with American (INNOVALYST). • Flexible concrete arch • PYOBIE
Approximate date	From 2004 to ongoing projects.
Impact on project /business	• Improves applicability of small wind turbines • Academic supervisor for this project. • Significant • The project had higher impact for the company as it is sustainable, saves energy, cost and is environment friendly • Industrial experience. Implementation of theory in an industrial environment. Enhanced customers capabilities • Full support provided • Undergoing negotiations with Heartsine Technologies Ltd. • Led into another KTP. Also led into framework 7. Funding application • Facilitated development of strong links with Macrete • Led onto the other projects

Student work placements	Summary of the 12 Responses
University	QUB (x5); UU (x5) and N/A (x2)
Project Description	• Numerous student work placements supervised • Structural and dynamic analysis of a parallel kinematic machine by means of Finite Element Analysis. • Transcutaneous wireless link for instant power delivery in atrial defibrillation. • CAM Placement • Spanish students come each year • Train+Teach students • 3/4 on placement every year • Placements: UU degree students
Approximate date	From 2007 to ongoing placements.
Impact on project /business	• Supervising both year out and summer placement students working on numerous projects for industry • The work done by the student on deflection of the machine due to gravity provided some extremely useful information both on the software and FEA techniques which allowed my FEA models to progress much more rapidly to a useable state. • Participation of a Final Year Electronic Engineering student final Year Project (from Sep/2009 to May/2010) • 3/4 students, full-time jobs • Publish paper based on their work • help on project work+helps students with their degree
Participating in Continuing Professional Development (CPD)	**Summary of the 10 Responses**
University	QUB (x6); UU (x3) and N/A (x1)
Project Description	• Participation in professional scheme run by the Royal College of Pathologists • Business Management Course • Counselling Strategic Development • Has applied to go on Business management course • Disability • Business planning course - external course on research leadership • Teaching related : outside • Project management • Supervision of students Feb 09
Approximate date	From 1995 to ongoing projects.
Impact on project /business	• Useful course providing insight and expertise on business modelling and creating a business plan • Big impact on ability to plan workload • Impacted on management skills • Helped with management of masters / PHD students
Investment	**Summary of the 6 Responses**
University	QUB (x3); UU (x2) and N/A (x1)
Project Description	• Tunable Filters - exploitation of liquid crystal technology • Financial support for patent • Flexible concrete arch • Proof of Concept - To work on diabetics management technology
Approximate date	2005 to ongoing; and January 2010 with Invest NI funding.
Impact on project /business	• Strong impact on commercialisation of technology developed for space sector

	• Assistance with patent via Murgitroyd • Take research to next stage+bring to a point of receiving interest from industry • Wouldn't have gone ahead without funding
Knowledge Club (UU)	**Summary of the 2 Responses**
University	UU (x2)
Project Description	• Attended various functions and seminars. Also co-hosted visiting expert in 2009 • Transcutaneous wireless link for instant power delivery in atrial defibrillation.
Approximate date	May 2009 and September 2009-October 2010.
Impact on project /business	• Very important in our current work • None, to the best of my knowledge
Marketing and Sales Support (QUB)	**Summary of the 3 Responses**
University	QUB (x3)
Project Description	• Methods for monitoring decay in stone structures • Press released their KTP .Global Marketing.KTP
Approximate date	N/A
Impact on project /business	• Putting together a brochure with media services • Led onto another KTP
Other	**Summary of the 1 Responses**
University	QUB (x1)
Project Description	Knowledge Acquisition Visits to Japan and Korea
Approximate date	March 2009
Impact on project /business	Developed important links with key industry players in my area - led to £4M collaborative research agreement with ETRI
Note: Respondents could provide more than one response. Source: FGS McClure Watters, December 2009	

9.5 Impact and Assessment of Knowledge Transfer Activity

9.5.1 Impact Overall

Respondents were asked to rate the impact the universities' KT services / support have had on them since the 2007. 60% of respondents stated that the universities' KT services / support have significantly impacted on their involvement in technology transfer, while 59% state that it has significantly impacted on their awareness of commercialisation processes. Four respondents stated that the universities' KT services / support had significantly impacted on an 'other' aspect; only one respondent elaborated on this, stating that it had increased awareness of funding opportunities.

Table IX.7: Overall, what impact would you say the Knowledge Transfer services / support have had on you since August 2007?

	No Impact		Some Impact		Significant Impact		Non Response	
Metric	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Greater awareness of benefits of working with businesses	6	13%	19	42%	20	44%	0	0%
Greater awareness of commercialisation process	4	9%	14	32%	26	59%	0	0%
Actively seeking opportunities to work with businesses	5	11%	22	50%	17	39%	0	0%
Greater involvement in technology transfer	2	4%	16	36%	27	60%	0	0%
Collaborative research with business	4	9%	25	58%	14	33%	0	0%
Developed new technology	15	35%	14	33%	13	30%	1	2%
Networking / Collaboration with others	6	14%	14	32%	23	52%	1	2%
Other	0	0%	0	0%	4	57%	3	43%
Source: FGS McClure Watters, December 2009								

9.5.2 Satisfaction with University Offices

Respondents were asked to rank their levels of satisfaction with the University KT Offices and/or Units they had used in terms of helping the respondent meet their project objectives, providing appropriate knowledge and experience and timeliness of response. The QUB Regional Office and Knowledge Exploitation Unit scored consistently high in terms of satisfaction. The UU Business Liaison Office and Technology Transfer Office scored slightly lower, but levels of satisfaction were still high. The average rate for each is shown in Table IX.8 below.

Table IX.8: Using a 5-point scale where 1 = 'Very Dissatisfied' and 5 = 'Very Satisfied', please rate the universities' Knowledge Transfer supports.

	Meeting your project objectives		Providing appropriate knowledge & experience		Timeliness of response	
Supports	**No.**	**Average Rate**	**No.**	**Average Rate**	**No.**	**Average Rate**
QUB Regional Office	20	**4.0**	20	**3.9**	20	**3.9**
QUB Knowledge Exploitation Unit	30	**4.2**	30	**4.1**	30	**4.1**
UU Business Liaison Office	4	**2.8**	4	**3.3**	4	**3.3**
UU Technology Transfer Office	8	**4.0**	8	**3.6**	8	**4.1**
Other	0	-	0	-	0	-
Source: FGS McClure Watters, December 2009						

9.5.3 *Satisfaction with Services / Supports*

Respondents were asked to rank their levels of satisfaction with the University KT Services/Supports they had used in terms of helping the respondent meet their project objectives, providing appropriate knowledge and experience and timeliness of response. The average rate for each is shown in Table IX.9. One respondent rated 'other' Knowledge Transfer services but did not specify what this was.

Table IX.9: Using a 5-point scale where 1 = 'Very Dissatisfied' and 5 = 'Very Satisfied', please rate the universities' Knowledge Transfer services.

Services	Meeting your project objectives		Providing appropriate knowledge & experience		Timeliness of response	
	No.	Average Rate	No.	Average Rate	No.	Average Rate
Patent Support Service	31	**4.2**	31	**3.9**	30	**4.4**
Licence Support	5	**4.0**	4	**4.0**	4	**4.3**
Facilities and Equipment	10	**4.3**	10	**4.1**	10	**4.1**
Research	14	**4.0**	14	**3.9**	14	**4.0**
Consulting	15	**3.9**	14	**3.8**	14	**3.8**
Knowledge Transfer Partnerships (KTPs)	17	**4.8**	17	**4.8**	17	**4.9**
Student work placements	8	**4.5**	8	**4.3**	8	**3.9**
Participating in Continuing Professional Development (CPD)	5	**3.8**	5	**3.8**	4	**3.3**
Investment	5	**4.0**	4	**3.8**	4	**3.8**
Knowledge Club (UU)	1	**2.0**	1	**2.0**	1	**2.0**
Marketing and Sales Support (QUB)	2	**4.5**	2	**4.5**	2	**4.5**
Other	1	**5.0**	1	**5.0**	1	**5.0**
Source: FGS McClure Watters, December 2009						

9.6 Additionality

Respondents were asked if they would have been able to achieve the same outcome if the KT support from the University had not been available to them. The majority (98%) of respondents indicated that they would have been able to achieve the same outcome, either immediately, over a longer timescale or on a smaller scale. The respondents' explanations for each of these are shown in Table IX.10 for each of the Universities' supports.

One respondent indicated 'other' Knowledge Transfer support, ConnectED Knowledge Acquisition Visit, and stated that they would have been able to proceed with developing their project but on a smaller scale.

Table IX.10: If the Knowledge Transfer support from the universities that you used had not been available to you, would you have been able to proceed with developing your project?

	Yes, immediately		Yes, but over a longer timescale		Yes, but on a smaller scale		No	
Metric	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Patent Support Service	0	0%	8	24%	3	9%	1	3%
Licence Support	0	0%	2	25%	0	0%	0	0%
Facilities and Equipment	1	8%	2	17%	2	17%	0	0%
Research	3	19%	4	25%	2	13%	0	0%
Consulting	2	12%	9	53%	2	12%	0	0%
Knowledge Transfer Partnerships (KTPs)	0	0%	4	25%	2	13%	0	0%
Student work placements	1	14%	2	29%	2	29%	0	0%
Participating in Continuing Professional Development (CPD)	4	67%	2	33%	0	0%	0	0%
Investment	0	0%	1	17%	2	33%	0	0%
Knowledge Club (UU)	0	0%	1	50%	1	50%	0	0%
Marketing and Sales Support (QUB)	1	50%	0	0%	1	50%	0	0%
Other	0	0%	0	0%	1	100%	0	0%

Note: Respondents could provide more than one response.

Source: FGS McClure Watters, December 2009

Table IX.11: If the Knowledge Transfer support from the universities had not been available to you how would you have gone about this?

How respondents would have proceeded in developing their project in the absence of the Knowledge Transfer support from the universities	
Support	***'Yes, immediately'***
Facilities and Equipment	▪ Readily available
Research	▪ Applying for external funding to support our research ▪ Through university research office
Consulting	▪ I would have proceeded with contacting the company, pricing the work and drafting an agreed plan of work and deliverables
Participating in Continuing Professional Development (CPD)	▪ This is independent of QUB participation ▪ Would not have engaged in these activities ▪ Another provider
Support	***'Yes, but over a longer timescale'***
Patent Support Service	▪ Use of outside patent office ▪ Would not bother with patent application - however this could possibly

How respondents would have proceeded in developing their project in the absence of the Knowledge Transfer support from the universities	
	have a negative impact on the funding bids ▪ With private organisations and websites ▪ We would have made more mistakes without support received.
Facilities and Equipment	▪ By sourcing other facilities and equipment from external bodies to assist. ▪ Sub contract to external sources
Research	▪ External national (out of NI) or European research grant source. These are very time consuming and with little success rate, in the case for NI (far from London). ▪ Make contacts themselves ▪ Done that themselves, made contacts eventually
Consulting	▪ Would require my time to be given to negotiations ▪ Difficult and time consuming ▪ Personal network ▪ Had their own contacts ▪ Progressed through local industry ▪ Took longer; more work for him ▪ Do in private time, a bit slower + cheaper
Knowledge Transfer Partnerships (KTPs)	▪ Apply to another funding ▪ The product development team would have developed the next generation trigger sprayer themselves but due to time constraints they would have had to concentrate on fewer designs. It is unlikely that a new design process would ever have been developed and formalised without the work done by the KTP Associate, and so all future designs would still have been developed using the old, inefficient design process. ▪ Contact KTP directly would take a lot of more time
Student work placements	▪ I would have had to carry out all the work completed by the student myself, which would have taken much longer and would have impacted on deadlines both in this project and others. ▪ DEL or DEL-CAST PhD studentship, but with limited success and almost none for a qualified foreign nationals (these are more available and are good and well dedicated workers).
Participating in Continuing Professional Development (CPD)	▪ QUB course offered intensive programme of business training. Other courses may not have been as relevant or may have taken a greater time commitment.
Investment	▪ Might not have got the award; would have not completed the application themselves
Knowledge Club (UU)	▪ Through national and international conference meetings and external industrial expositions, but there is lack of information service for the latter one for NI.
Support	***'Yes, but on a smaller scale'***
Patent Support Service	▪ Would have had to do more admin work ourselves ▪ Through an external IP management agency, e.g. British Technology Group Ltd
Facilities and Equipment	▪ External PhD Student grant source ▪ Charge people for using equipment

How respondents would have proceeded in developing their project in the absence of the Knowledge Transfer support from the universities	
Research	▪ We would probably have become aware of the POC scheme from mail shots, but our application was facilitated by QUB
Consulting	▪ Not sure as consulting can only be provided using the universities services ▪ Direct contact with the clients
Knowledge Transfer Partnerships (KTPs)	▪ Through Scheme advice or not proceeded ▪ I would have got involved with companies as I used to work in industry
Student work placements	▪ Taken longer to do work without students, but could still have done it
Investment	▪ Investigate funding opportunities elsewhere
Knowledge Club (UU)	▪ Would have had to seek out more business contacts directly myself - this would have taken a lot more time
Marketing and Sales Support (QUB)	▪ Would have done it themselves
Other	▪ I would have had to obtain funding from other sources to support my visit, and perhaps would not have been able to visit all the companies I wished to visit (ConnectED Knowledge Acquisition Visit).
Support	***'Yes, but over a longer timescale and on a smaller scale'***
Patent Support Service	▪ Through commercial agents
Note: Respondents could provide more than one response. Source: FGS McClure Watters, December 2009	

9.7 Future Knowledge Transfer Services

9.7.1 Improvements for Future KT Services

Respondents were asked to recommendations on how to improve the universities' KT services. Their responses are shown in Table IX.12. The main areas relate to: information / awareness; structure / culture; support offered; funding / finance and timing.

Table IX.12: What future improvements would you recommend for the universities' Knowledge Transfer services?

Metric	Number	Percentage
Number of respondents giving 1 response	28	61%
Number of respondents giving 2 responses	20	43%
Number of respondents giving 3 responses	10	22%
Total	**46 respondents**	**100%**

Improvements	Number	Percentage*
Information / Awareness	**17**	**61%**
More information on structures, personnel and services / support offered.	7	25%
Case studies as a benchmark	2	7%
Improve website	2	7%
Marketing of investment opportunities / consultancy	1	4%
Marketing of the information available	1	4%
More information on local industries (established and emerging) and national priorities	1	4%
Regular seminars in Centres/Schools to highlight the importance of IP and the	1	4%

opportunities available.		
Provide training workshops on IPR, real patenting procedures timing and costs, advantages, disadvantages and non-IPR based alternatives.	1	4%
Identify clearly to academics schemes and opportunities for collaboration with industrial partners	1	4%
Structure / Culture	**13**	**46%**
Staff with more / clearer knowledge of exploitations of technology	4	14%
Change culture within universities in regard to KT promotion opportunities + career progression	1	4%
Clearer structures	1	4%
Continuation of liaison with staff	1	4%
Create specialised departments within the UUTech, with real scientists and engineers as coordinators/advisors in the particular field of technology; not just by business managers, legal experts and market analysts.	1	4%
More joined up approach between different university departments to deliver a better service to industry.	1	4%
Broader outlook beyond regional focus	1	4%
Strategic development on a longer term	1	4%
Wider expertise to a greater range of academics	1	4%
Office need to take on all business responsibilities	1	4%
Support Offered	**8**	**29%**
Improve ability to identify potential licences.	1	4%
Increase practical assistance.	1	4%
More commercialisation support	1	4%
More effort on consultancy and making contacts	1	4%
Patent service - searches are not very good.	1	4%
Patent service not good	1	4%
Pro-active engagement with the wider Biotech industry with regular presentations from relevant companies.	1	4%
Discuss periodically with academics their research and help them to identify possible industrial application of research carried out in the university. For some types of research possible industrial links are self-evident from the start, for other areas s	1	4%
Funding / Finance	**8**	**29%**
More funding (including: encourage collaboration UU and institutions within NI/UK/RoI; model for company & university; patent development; for small companies.	5	18%
More funding	2	7%
Encourage more academics to participate in e.g. consultancy by providing a larger financial reward than currently available. Some companies are approaching academics independent of the traditional route as it is seen as being expensive as the University adds overheads to the base revenue sought by the academic.	1	4%
Timing / Speed of Response	**4**	**14%**
Ability to do rapid searches of the patent/application literature	1	4%
Faster response	1	4%
Grant applications - more help, takes too much time	1	4%
Rapid decision- making on all levels	1	4%
Other	**8**	**29%**
Increase tangible benefits to customers	1	4%
Master student would help encourage more business to engage	1	4%
Meeting more often	1	4%
More understanding and training within the universities on how to help industry.	1	4%
Name key , wrong connecting with industry. "Exploitation" is bad (Exploitation centre)	1	4%
Reduction in administration and project management	1	4%
Stigma over working with small industries/business	1	4%
Workload depends on 1-TO-1 relationships. With more help there would have been a bigger turnover	1	4%
Total	**58 responses/ 28 respondents**	**100%**

Note: Respondents could provide more than one response. Percentages have been calculated taking 28 respondents as the total.
Source: FGS McClure Watters, December 2009

9.7.2 Future Use of KT Services

Respondents were asked if they would use the university KT services again. One respondent stated that they would not work with the university Knowledge Transfer services but did not provide any reasons. The majority (87%) stated that they would; the following explanations for this statement were provided:

- They provide expertise and contacts outside the normal academic comfort zone.
- Satisfied with outcomes to date.
- It is core to the services we offer.
- It is nearly impossible to do research and setting up patents and marketing at the same time. Also lack of in-depth knowledge on patenting and marketing, require me to use these services.
- All assistance welcome.
- They are helpful to process the application.
- I think this is an important service which offers opportunities of which we are not fully aware.
- Efficient service provided by KTU.
- Very helpful and understanding approach in what turned out to be a difficult project.
- Responsiveness but we are still on a learning curve.
- Projects are now ongoing.
- Future patent applications and potential licensing.
- The knowledge transfer services provide valuable assistance in delivering projects and enhancing capabilities of university employees and clients.
- My time is better spent on knowledge generation.
- Excellent service.
- Always found them to be very helpful.
- It is an essential part of modern academic research. My interactions with the KEU have been very informative and helpful.
- I have found this to be a very important and useful means of creating links with local businesses which in turn has provided significant benefits to projects with which I am involved.

- They do provide good services in applying for patents and also signposting companies to individuals with sought areas of expertise.
- It works in my case and there is room for improvements on this service at UU.
- Invaluable.
- Need patent support service.
- Patent service is invaluable.
- Invaluable in patent + licence support.
- Excellent service on the whole needs to be exploited.
- Their help/support was invaluable.
- Very useful to have them, Legal support.
- Make things happen faster.
- Too much to take on without them, a long time ago without them. Funding critical.

Table IX.13: Would you work with the university Knowledge Transfer services again?

Metric	Frequency	Percentage
Yes	40	87%
No	1	2%
Non Response	5	11%
Total	**46**	**100%**
Source: FGS McClure Watters, December 2009		

9.7.3 KT Services as a Catalyst

The majority of respondents (83%) indicated that their experience of the universities' Knowledge Transfer services acted as a catalyst for them to undertake other activities with businesses. The following explanations for this statement were provided:

- ***Yes, independently:***
  - Technology potential has led to further collaboration
  - Had connections in industry as he used to work in industry
  - Networking: they've made a lot of contacts through previous KT work and this has led to further collaborative work
- ***Yes, in a further partnership with QUB:***

- The 'day job' is demanding. It would not be feasible for me to engage with business any other way.
- The activities funded by NI HEIF 2 have led to further work with industry in a number of areas - for example the use of digital engineering technologies to help business improve their competitiveness.
- May apply to another KTP or get involved in consulting.
- Currently investigating a number of other research agreements in conjunction with QUB KT services.
- Would very much like to work with QUB KEU in further projects as they were very supportive, friendly and helpful.
- I will continue to explore avenues for business development with appropriate assistance from the Knowledge Transfer Services.
- Experience gained in working with several companies
- We are always looking for the best opportunities to link with Biotech/Pharma. The KT/KEU services allow us to do that in a way that protects QUB IP.
- Works on the Polymer Processing Research Centre.
- Has giving the knowledge + confidence to do more work.
- Looking at other project.
- Follow up KTP was Macrete under consideration.
- Facilitated relationships with industry.

- ***Yes, independently and/or in a further partnership with QUB:***
  - Because of change in KT because they are more proactive.
  - First project with ARMAC led into 2nd one with Breast cancer care (who she met independently).
- ***Yes, in a further partnership with UU:***
  - Undertaking consultancy with an outside company. Also involved with working with a company in ROI on a large scale solar thermal application.
  - Yes, provided seed funding to allow me to prepare for an Invest NI Proof of Concept (PoC) project. As a result I was successful in securing the Invest NI PoC funding.
  - Thanks to UU Knowledge Transfer services I will be involved with two other NI based companies: Heartscape Technologies Ltd. and Intelesens Ltd.

- ***Other:***
  - Not yet.
  - Join QUESTOR on research side.
- ***Yes, in a further partnership with QUB and/or other:***
  - In connection with DEL + INI + other groups.

10 respondents indicated that their experience had not acted as a catalyst for them to undertake other activities with businesses. The reasons provided included:

- Contact with industry/partners established directly.
- I think this service has worked well for areas of research which are already close to a final product/application and have already an "embedded" link with possible partners. In the case of my research, which is maybe not as close to industrial/business opportunities from the start, exploring a possible link would require more effort. Support for patent licencing however has been prompt and effective, and may lead in the future to some business opportunity.
- Not sure it has made me do more of what I try to do anyway.
- It would have happened without KT Services - particularly through PHD students.
- Originally worked in industry so had a number of contacts already.
- his contacts with industry, he would have been doing it anyway.
- Not Yet, Hopes to in future. Early days.
- Time limited.

Table IX.14: Has your experience of the universities' Knowledge Transfer services (funded by NI HEIF 2) acted as a catalyst for you to undertake other activities with businesses?

Metric	Frequency	Percentage
No	10	22%
Yes, independently	9	20%
Yes, in a further partnership with QUB	22	48%
Yes, in a further partnership with UU	7	15%
Other	3	7%

Note: Respondents could provide more than one response.

Source: FGS McClure Watters, December 2009

9.8 Summary

A total of 46 academics were surveyed, 35 from QUB and 11 from UU. Respondents were asked to rate how important they believe it is for the University to get involved in KT activities. All respondents believe that it is important with 83% rating it as very important. Respondents were asked to rank the critical barriers to engaging with business and the wider community in terms of significance. The most commonly cited significant barrier was lack of time followed by lack of finance.

Respondents were asked to rate the impact the universities' KT services / support have had on them since 2007. 60% of respondents stated that the universities' KT services / support have significantly impacted on their involvement in technology transfer, while 59% state that it has significantly impacted on their awareness of commercialisation processes.

Respondents were asked to rank their levels of satisfaction with the University KT Offices and/or Units they had used in terms of helping the respondent meet their project objectives, providing appropriate knowledge and experience and timeliness of response. The QUB Regional Office and Knowledge Exploitation Unit scored consistently high in terms of satisfaction. The UU Business Liaison Office and Technology Transfer Office scored slightly lower, but levels of satisfaction were still high. Satisfaction levels with the University KT Services/Supports were also consistently high and the majority of respondents (87%) stated that they would use the University KT services again.

Respondents were asked if they would have been able to achieve the same outcome if the KT support from the University had not been available to them. The majority (98%) of respondents indicated that they would have been able to achieve the same outcome, either immediately, over a longer timescale or on a smaller scale.

The majority of respondents (83%) indicated that their experience of the universities' Knowledge Transfer services acted as a catalyst for them to undertake other activities with businesses. 63% of these indicated that they had done this in partnership with the University while 20% had done it independently.

10 APPENDIX X – STUDENTS – SURVEY RESULTS

10.1 Methodology

A questionnaire was developed for students (Science Shop project students and Work Placement students); this was circulated to the Project Steering Group and agreed by them. The questionnaire was designed to capture information about the respondents' educational background and their experiences of their work placement or working with the Science Shop in QUB and UU, including motivation, satisfaction levels with the outcome of the placement/project and subsequent impact on them. The questionnaires were piloted to ensure that it captured the required data.

We were provided with the contact details of 28 Students who had either used the services of the Science Shop in QUB/UU or been on a Work Placement since the current period of NI HEIF 2 funding commenced (August 2007). We contacted all of the students by phone up to 5 times in order to schedule appointments to complete the survey. Where appropriate, the questionnaire was also emailed to respondents to facilitate completion. A total of 21 questionnaires were completed.

Table X.1: Response rate

	Target to be completed			No. of contacts provided			No. completed***		
	QUB	UU	Total	QUB	UU	Total	QUB	UU	Total
Students	20		**20**	17*	11**	**28**	**12**	**9**	**21**

Note:

** QUB contacts (17) include: 10 placements and 7 Science Shop students.*

*** UU contacts (11) include: 1 placement and 10 Science Shop students.*

Source: FGS McClure Watters, December 2009

10.2 Profile

10.2.1 Profile of Students – University and Degree Course

Respondents' university and course details are shown in Table X.2. 71% of respondents had taken part in a Science Shop project and 29% had completed a work placement.

Table X.2: University Attended and Degree Course

Student Profile	Frequency	Percentage
University		
QUB	12	57%
UU	9	43%
Total	**21**	**100%**
Degree Course		
Mechanical Engineering	3	15%
Civil Engineering	3	15%
Criminology and Criminal Justice	3	15%
Psychology	2	10%
CAM	2	10%
Environmental Health / Management	2	10%
Chemical Engineering	1	5%
CM and PR	1	5%
Food Quality, Safety and Nutrition	1	5%
Landscape, Heritage and Environment	1	5%
Social and Health Care Policy	1	5%
Social Research Methods	1	5%
Total	**21**	**100%**
Source: FGS McClure Watters, December 2009		

10.2.2 Activity in which Students Participated

Table X.3: Which of the following have you taken part in?

Science Shop / Work Placement	Frequency	Percentage
Science Shop project	15	71%
Student work placement	6	29%
Non Response	0	0%
Total	**21**	**100%**
Source: FGS McClure Watters, December 2009		

10.3 Awareness of Science Shop/ Work Placement

Respondents were asked how they first became aware of the Science Shop or work placements. One third (33%) indicated that they were informed by a lecturer/tutor; "word of mouth" was also a common response (24%). 29% of respondents indicated that they first became aware of the university Science Shop and/or the Student Work Placement through a source in the 'other' category. Their responses included:

- Science Shop presentation to lecture (x4);
- Careers Service - employers looking for students (x1); and

- Companies fair (x1).

Table X.4: How did you first become aware of Science Shop or student work placements?

Sector	Frequency	Percentage
Lecturer/tutor	7	33%
Course material/prospectus	1	5%
QUB website	1	5%
UU website	0	0%
QUB 'Queen's Students in the Community' newsletter	0	0%
'The Science Shop - Engage' newsletter	0	0%
Flyer	0	0%
Press Article	0	0%
Direct Contact from Science Shop staff	1	5%
Word of mouth	5	24%
Other	6	29%
Non Response	0	0%
Total	**21**	**100%**

Source: FGS McClure Watters, December 2009

10.4 Previous Knowledge Transfer Experience

10.4.1 Previous use of University KT Services / Support

Respondents were asked if they had taken part in any other KT activities prior to their Science Shop project / Work Placement; respondents could give more than one answer. The majority of respondents (86%) had not taken part in any other KT activities; two had been involved in a KTP. One respondent took part in a KT activity in the 'other' category, which was a placement in Slovenia working in a university.

Table X.5: Prior to undertaking your Science Shop project or student work placement, had you taken part in any of the universities' Knowledge Transfer activities?

Universities' Knowledge Transfer activities	Frequency	Percentage	Approx. Date
None	18	86%	-
Knowledge Transfer Partnerships (KTPs)	2	10%	n/a
Student work placements	1	5%	One year placement, 07-08
Other	1	5%	n/a
Total	**21 respondents**	**-**	

Note: Respondents could provide more than one response.

Source: FGS McClure Watters, December 2009

10.5 KT Activity

10.5.1 Motivation for Participation

Respondents were asked why they chose to take part in a Science Shop project / Work Placement; respondents could give more than one answer. The most common response was to develop skills relevant to undergraduate/ postgraduate degree (76% of respondents); this was followed by wanting to work with the particular voluntary/community organisation (48%) and to gain work experience, to work on the specific project (43% respectively). A total of 9 respondents gave 'other' reasons for choosing to undertake a Science Shop project and/or Work Placement; they were as follows:

- Dissertation (x2);
- I wanted my dissertation to be of practical use to a community group (x1);
- Improve employment possibilities (x1);
- For CV purposes (x1);
- Emma (Science Shop staff member) was very friendly and approachable and the idea of having support through thesis was attractive (x1);
- Way to do primary research - contacts made through organisation (x1);
- Resources (x1); and
- Apply knowledge to charity sector specifically (x1).

Table X.6: Why did you choose to undertake a Science Shop project or student work placement?

Sector	Frequency	Percentage
Compulsory element of degree course	3	14%
To gain work experience	9	43%
To develop skills relevant to undergraduate/ postgraduate degree	16	76%
To work with the particular voluntary/community organisation	10	48%
To work on the specific project	9	43%
Other	9	43%
Total	**21 respondents**	**-**

Note: Respondents could provide more than one response.

Source: FGS McClure Watters, December 2009

10.5.2 Project Details - Type

Students were asked to describe the Science Shop/ Work Placement project they worked on. Over half (52%) of respondents classified their work as a research project. A further 29% stated that the description of the nature of the Science Shop project / work placement project fell into the 'other' category; their responses were as follows:

- Contracting civil engineering work on site (x1);
- Literature review / scoping study / feasibility study / knowledge – technology transfer project (x1);
- Process Safety Management Projects and Drawing Work (x1);
- Six SIGMA projects (x1);
- Flood plains assessment (x1); and
- Evaluation (x1).

Table X.7: Which of the following best describes the nature of the Science Shop project or student placement that you worked on?

Sector	Frequency	Percentage
Customer survey	1	5%
Literature review	1	5%
Marketing strategy	1	5%
Policy review	0	0%
Scoping study	0	0%
Feasibility study	0	0%
Research project	11	52%
Knowledge / Technology Transfer project	0	0%
Other	6	29%
Non Response	1	5%
Total	**21**	**100%**
Source: FGS McClure Watters, December 2009		

10.5.3 Project Details (including Impact)

Respondents were asked to detail Science Shop/Work Placement project, describing the type of project, the approximate date and the impact on their organisation. Summaries of all responses are shown in Table X.8 for students who undertook Science Shop and Student Placement projects.

Table X.8: Please provide details of your Science Shop project(s) or student work placement(s) since August 2007.

Metric	Number	Percentage
Number of students detailing 1 project	21	100%
Number of students detailing 2 projects	0	0%
Number of students detailing 3 projects	0	0%
Non Response	0	0%
Total	**21**	**100%**
Science Shop Project(s) Details		
University	15 projects: UU (x9) and QUB (x6).	
Project Description	▪ A study of the biodiversity value of disused quarries within the Belfast hills. ▪ Research into the drainage system affecting flooding in Newcastle, Co. Down ▪ Literature review concerning weight gain associated with smoking cessation ▪ Develop a toolkit by which community arts groups can assess the impact of their work. Providing evidence to show to funders. ▪ Evaluation of the intervention treatment services ▪ Research into most appropriate means of gathering recyclable materials (comparing Armagh and Omagh councils). ▪ Study of the effect of fuel poverty on family life in NI. ▪ Evaluation of the effectivity of social networking for community and voluntary organisations. ▪ Interview to 6 women in rural areas about domestic violence. ▪ Study teachers' perception in Omagh and Strabane. Questionnaire to schools. ▪ Citizenship programme evaluation for NE ELB - interview to pupils. ▪ Evaluation of VOYPICS communication strategy and recommendations on drafting new strategy. ▪ Framework for voluntary organisations in health and social care. Development of framework for recruitment and retaining. ▪ Study benefits of CSR - interview staff in Concern on business partnership and contact companies who support Concern. ▪ Enquiries Act of 2005 - detailing public enquiries. CAJ as impartial observer.	
Approximate date	6 projects took place in the academic year 2008/09 and 4 during 2009/10. 5 respondents did not specify the project period.	
Impact on student	9 respondents indicated 12 impacts: ▪ Gained experience (x5); ▪ Improved skills (including communication, surveying and general skills) (x4) ; ▪ Dissertation – good mark (x1); ▪ Gained knowledge (x1); and ▪ Used for research papers, published for CAJ (x1).	
Impact on the organisation	9 respondents indicated 11 impacts: ▪ Outcomes / Recommendations / Research used by the organisation (x4) ▪ Assisted interventions of the organization (x3); ▪ Increase in knowledge (x2); ▪ Spread views of organisation and increased awareness in the community (x1); and	

	▪ Used for research papers, published for CAJ (x1). 4 respondents stated they had not heard anything back from the organisation.
Student Work Placement(s) Details	
University	6 projects: QUB (x5) and Schlumberger (x1)
Project Description	▪ Site engineer on bypass project building roads, culverts and bridges ▪ Monitoring/Running Power Plant ▪ Mechanical Engineer and M&E Design Engineer for a worldwide Generator installation company ▪ Carrying out Process Hazards Analysis on several areas of DuPont Kevlar in Maydown and creating Process Flow Diagrams for training and induction purposes ▪ Flood plain assessment ▪ Manufacturing engineering
Approximate date	Academic year 2008/09 (x5) and summer 2009 (x1).
Impact on student	6 respondents indicated 13 impacts: ▪ Gained experience (x5); ▪ Gained skills (x3); ▪ Completed projects relevant to studies (x2); ▪ Practical knowledge in real engineering world (x1); ▪ More confidence in work (x1); and ▪ Team work (x1).
Impact on the organisation	3 respondents indicated 5 impacts: ▪ Contribution to large project (x2); ▪ Increase in productivity (x1); ▪ Study produced used for training and induction programmes and studies (x1); and ▪ Completed different projects the company is using (x1).
Note: Respondents could provide more than one response. Source: FGS McClure Watters, December 2009	

10.6 Impact and Assessment of Project / Placement

10.6.1 Impact Overall

62% of respondents found that working on the Science Shop project/Student Placement significantly impacted on providing them with practical and relevant work experience, improving their existing skills and in developing new skills respectively.

The aspects where the higher levels of "no impact" were reported related to influencing career choice.

Table X.9: Overall, what impact would you say that working on the university Science Shop project or student work placement had on you?

	No Impact		Some Impact		Significant Impact		Non Response	
Metric	No.	%	No.	%	No.	%	No.	%
Provided practical and relevant work experience	4	19%	2	10%	13	62%	2	10%
Improved existing skills	0	0%	8	38%	13	62%	0	0%
Developed new skills	2	10%	6	29%	13	62%	0	0%
Influenced my career choice – type of role	5	24%	6	29%	8	38%	2	10%
Influenced my career choice – desire to work in private sector	10	48%	6	29%	2	10%	3	14%
Influenced my career choice – desire to work in voluntary & community sector	9	43%	7	33%	3	14%	2	10%
Influenced my career choice – desire to work in academia	8	38%	3	14%	1	5%	9	43%
Other Impacts	3	14%	0	0%	0	0%	18	86%
Source: FGS McClure Watters, December 2009								

10.6.2 Satisfaction

Respondents were asked to rate levels of satisfaction with various aspects of their experience in working with the Science Shop / student work placement. Levels of satisfaction were high with at least 67% of respondents reporting being satisfied or very satisfied with each aspect.

Only 1 student indicated and estimated the level of satisfaction with 'other' aspects of the Science Shop project or student work placement. This was 'making a difference to people's life' and the student was very satisfied.

Table X.10: How satisfied were you with the following aspects of the Science Shop project or student work placement?

	N	Very Satisfied		Satisfied		Neither Satisfied/ dissatisfied		Dissatisfied		Very dissatisfied	
Metric		No.	%	No.	%	No.	%	No.	%	No.	%
The project assigned to you suitably matched your skills and knowledge	21	14	67%	6	29%	1	5%	0	0%	0	0%
Support provided by the organisation you worked with	21	13	62%	7	33%	1	5%	0	0%	0	0%
Support provided by the Science Shop team / university	21	14	67%	4	19%	1	5%	2	10%	0	0%
The outcomes of the project i.e. what was achieved for the organisation	20	11	55%	7	35%	2	10%	0	0%	0	0%

	N	Very Satisfied		Satisfied		Neither Satisfied/ dissatisfied		Dissatisfied		Very dissatisfied	
Metric		No.	%	No.	%	No.	%	No.	%	No.	%
Other Aspects	3	2	67%	0	0%	1	33%	0	0%	0	0%
Source: FGS McClure Watters, December 2009											

10.7 Additionality

Respondents were asked if they would have been able to achieve the same outcome if the Science Shop/work placement project had not been available to them. The majority (76%) indicated that they would have been unable to achieve the same outcome. 19% of respondents indicated that they would have been able to achieve the same outcomes. Of these respondents, 5% reported that they could have done this immediately. When asked how they would have achieved this, the respondent replied that they would have gone to another organisation as they had created their research proposal before approaching Science shop. One respondent reported that they could have achieved the same outcome, but to a lesser extent, by completing voluntary work with other organisations.

14% reported that they would have achieved the same outcome, but it would have taken them longer. The respondents were asked how they would have gone about this and 3 gave an answer; their responses are shown in Table X.11.

Table X.11: If the university Science Shop project or student work placement had not been available to you, would you have been able to get this experience elsewhere?

Metric	Frequency	Percentage
Yes, immediately	1	5%
Yes, but over a longer timescale	3	14%
Yes, but to a lesser extent	1	5%
No	16	76%
Non Response	0	0%
Total	**21**	**100%**
Note: Respondents could provide more than one response.		
Source: FGS McClure Watters, December 2009		

Table X.12: If the university Science Shop project or student work placement had not been available to you, how would you have gone about this?

How respondents would have proceeded in developing their skills in the absence of this project/placement
'Yes, immediately'
Created research proposal before approaching Science shop, would have gone to another organisation with the proposal.
'Yes, but over a longer timescale'
I would have completed my BEng Mechanical Engineering Degree and applied for the job direct after graduation and progressed from there.
Could have found placement herself.
Had worked with Armagh Council before, so would have contacted them directly with research proposal.
'Yes, but to a lesser extent'
Completing voluntary work with other organisations.
Note: Respondents could provide more than one response.
Source: FGS McClure Watters, December 2009

10.8 Future Placements / Projects

10.8.1 Improvements for Future Placements / Projects

Respondents were asked to recommend improvements to the Science Shop/Work Placement projects. The most common recommendation was to improve advertising and awareness, followed by ensuring that placements are directed towards correct students. All responses are shown in Table X.13.

Table X.13: What future improvements would you recommend for the universities' Science Shop projects or student work placements?

Metric	Number	Percentage
Number of respondents giving 1 response	18	86%
Number of respondents giving 2 responses	3	14%
Number of respondents giving 3 responses	0	0%
Total	**21 respondents**	**100%**
Improvements	**Number**	**Percentage**
Improve advertisement and awareness	4	22%
Make sure placements are directed at correct students	2	11%
Creating the research title look too long, held up the project	1	6%
Feedback from organisation	1	6%
Improve website and keep updated	1	6%
Introduce competitions to make students become more involved	1	6%
Involve more organisations	1	6%

More meetings to get to know people better	1	6%
Shorter instalments in different areas	1	6%
(Student) should have more control over the placement	1	6%
Staged progression / interviews, met out different stages to discuss processes / successes.	1	6%
Timescales too long - could have done it a lot quicker.	1	6%
To publish the employer seminar details in paper for smaller companies to get involved.	1	6%
Took a long time to get everyone happy (tutors & organisation).	1	6%
Total	**18**	**100%**

Note: Respondents could provide more than one response.
Source: FGS McClure Watters, December 2009

10.8.2 Future Involvement in Placements / Projects

Respondents were asked if they would get involved in a Science Shop project/ Work Placement again. The majority of respondents (82%) stated that they would get involved in a Science Shop project/ Work Placement again. Six of these respondents provided a rationale for their statement; they are as follows:

- If an opportunity sounded worth while
- I want to gain as much experience as possible before leaving university to increase employability
- I felt the experience was helpful, and the work that the Science Shop does to involve students in matters outside of the University is beneficial
- The staff were friendly and helpful and everything went smoothly
- I think they provide a vital tool to the local community, providing community groups with research opportunities which they would not otherwise have access to while, at the same time, providing students with an opportunities to develop work related skills.
- Engineering

Two respondents stated that they would not get involved in a Science Shop project/ Work Placement again. The reasons provided for this statement were as follows:

- After summer examination I am returning for a two year contract with ASEE Ltd, working towards chartership.
- I graduate this year and I want to go into full time employment. I would like to explore the option of doing a KTP as I enjoyed my time in DuPont and continued research is appealing.

Table X.14: Would you get involved in a Science Shop project or student work placement again?

Metric	Frequency	Percentage
Yes	17	82%
No	2	9%
Non Response	2	9%
Total	**21**	**100%**
Source: FGS McClure Watters, December 2009		

10.8.3 Recommendation of Placements / Projects

All respondents (100%) stated that they would recommend the Science Shop projects/ Work Placements to other students. A total of 13 respondents provided a rationale for their statement; they were as follows:

- It is an excellent way to develop key skills while at the same time completing a project which the organization needs to be studied. In doing so it makes the outcome of the project more worthwhile.
- A brilliant opportunity no one should overlook. Everyone should try and get a placement because it is so useful for your career and your course.
- Worthwhile in long run.
- The knowledge and experienced gained is essential. I have presented my placement presentation to pre-placement year students to provide inspiration.
- Work placements give you experience that you can't get at university. It really improves your C.V. and shows possible future employers that you are enthusiastic about your work.
- As stated in the previous question, the Science shop is very keen to involve students in projects outside their degree courses and may be an advantage to students to make them see what they may be working towards through their work in college.
- Friendly staff made project easier.
- For the same reasons as outlined above.
- Good for Engineers.
- Support through thesis made it a lot easier.
- Good communication skills.
- Very important for dissertation.
- Best support and experience of working outside the university environment.

Table X.15: Would you recommend the Science Shop projects or student work placements to other students?

Metric	Frequency	Percentage
Yes	21	100%
No	0	0%
Non Response	0	0%
Total	**21**	**100%**
Source: FGS McClure Watters, December 2009		

10.9 Summary

A total of 21 students were surveyed; 15 had taken part in a Science Shop project and 6 had completed a work placement.

Respondents were asked how they first became aware of the Science Shop projects/Work Placements. One third (33%) indicated that they were informed by a lecturer/tutor and 19% became aware following a presentation from a member of Science Shop staff.

Respondents were asked if they had taken part in any other KT activities prior to their Science Shop project/ Work Placement. The majority of respondents (86%) had not taken part in any other KT activities; two had been involved in a KTP, while one respondent took part in a placement in Slovenia working in a university.

Respondents were asked why they chose to take part in a Science Shop project/Work Placement. The most common response was to develop skills relevant to an undergraduate/ postgraduate degree with 76% of respondents stating this; this was followed by 48% wanting to work with the particular voluntary/community organisation.

Respondents were asked if working on the Science Shop project/Work Placement had impacted on them. 62% of respondents found that working on the Science Shop project/Student Placement significantly impacted on providing them with practical and relevant work experience, improving their existing skills and in developing new skills respectively.

Levels of satisfaction were high with at least 73% of respondents reporting being satisfied or very satisfied with their experience of the Science Shop project / Work Placement. The majority of respondents (82%) stated that they would get involved in a Science Shop project / Work Placement again and all respondents stated that they would recommend the Science Shop projects / Work Placements to other students.

Respondents were asked if they would have been able to achieve the same outcome if the Science Shop / Work Placement project had not been available to them. The majority (76%) indicated that they would have been unable to achieve the same outcome, 19% of respondents indicated that they would have been able to achieve the same outcomes. Of these respondents, most indicated that they would have approached an organisation themselves.

Respondents were asked to recommend improvements to the Science Shop/Work Placement projects. The most common recommendation was to improve advertising and awareness, followed by ensuring that placements are directed towards correct students.

11 APPENDIX XI – CASE STUDIES

11.1 QUB Case Study: Macrete Ireland Ltd & The School of Planning, Architecture and Civil Engineering

Macrete Ireland Ltd is one of the few truly independent precast concrete manufacturers within the United Kingdom and Ireland, supplying a range of pre-cast concrete systems to meet the needs of the civil engineering construction market. With over thirty years' experience in the design and manufacture of a wide range of reinforced and prestressed concrete products and systems, Macrete are at the forefront of the precast concrete industry, providing concrete solutions that are designed and supplied to the civil, rail, water, stadia, marine and agricultural markets.

The project was initiated with a two year KTP partnership with the School of Planning, Architecture and Civil Engineering at Queen's and involved the design of a complete modular system for arch bridges, with spans from four to twenty metres, which could be erected within one month of order and transported to site as a 'flat pack' system. Before the Associate, Abhey Gupta began his work, the company only provided large span arches (over twenty metres) which were transported at cost in the arch form as abnormal loads.

This Partnership was tremendously successful and the completion of the project was much more of a beginning than an end. The new arch bridge is an innovative product that makes use of a polymeric reinforcement in the short-term construction phase; it also acts as a masonry arch when in position thus removing the need for steel reinforcement which can corrode and therefore improves the long-term durability of the bridge.

The new design is based on a Queen's invention which was patented with the assistance of Queen's technology transfer staff. The patent was granted in the U.S. and has recently been granted in Europe after an oral proceedings hearing with the Patent Examiners in Germany. The patent is licensed to Macrete Ireland Ltd. It is anticipated that this license will provide a return for the company and for Queen's as Macrete promotes and secures sales in their selected markets.

The completion and successful outcome of this project is extremely timely; a recent EC directive has meant that relatively modern bridges have had to be replaced due to a lack of load carrying ability and it is estimated that over £600M pa is spent on the repair and maintenance of our concrete infrastructure. In Northern Ireland, the total number of bridges is ~6400, of which 65% are masonry structures - the maintenance and replacement of these is an annual exercise requiring significant funding. The UK Highways Agency states that consideration is given to all means of reducing or eliminating the use of corrodible steel reinforcement including the use of plain concrete structural elements. It also recommends the use of the arch form of construction where ground conditions permit. Macrete's arch bridge has structural efficiency combined with aesthetic qualities and when constructed from masonry blocks, either concrete, stone or brick, has proved to be highly sustainable.

It is worth noting that Abhey's work on the bridge has given Macrete a major advantage, not only in the UK and Europe but within the global market; he has been liaising with the National Highway Authority of India to allow them to produce the arch system under licence. Given the size of the country, there is potential for a huge number of bridges to be built using the arch system.

The project has invigorated Macrete's R&D department. Iain Hogg, Managing Director of Macrete says "our staff are much more inclined to offer up new ideas and the project has spawned further R&D work. By working closely with our high end clients, we believe that there are many more opportunities for improvement". He adds "due to highly innovative nature of the project, and the enthusiasm of the Associate from the outset, our market position has been greatly enhanced. Our increased profile will help us to achieve our desired position of preferred supplier to all of the main UK contractors and the improvements made by Abhey to our Quality Management System will ensure success in achieving customer satisfaction".

The academic partners, Professor Adrian Long and Dr Su Taylor have also benefited greatly from their involvement in this project. As a direct result of this Partnership, they have published 20 peer reviewed research papers and an additional presentation paper to the Institution of Civil Engineers Annual (ICE) Conference. Dr Taylor was invited as the guest speaker at the annual ICE Omagh Lunch to present the results of the development of the flexible arch system – this not only raised the profile of research at the University but was a wonderful opportunity to market the novel arch bridge system to the civil and structural engineering community. The University has a joint patent with the company for the arch system in Europe, North America and India and there is potential for further extension in to Australasia and South America.

More recently, this project was awarded the prestigious Construct Award 2009 for Innovation and its Adoption. This is the first time in the history of the award that a team from Northern Ireland has won the trophy and the prize of £5,000. In addition, in the 2009 KTP Awards, the Flexiarch project was awarded the national prize for Engineering Excellence, sponsored by the Royal Academy of Engineering.

The practical knowledge generated in this project has resulted in enhanced teaching material and the Associate has given guest lectures to the University's undergraduate students on the development of the flexible concrete arch and the analysis of arch bridges. This was a tremendous asset and facilitated the dissemination of the results from this Partnership to our future graduate engineers. The company have supplied material and knowledge for eight student projects associated with the development of the flexible arch and the projects have involved the testing of half scale and one-third scale arch models alongside the full scale test at Macrete. These have enabled comparison of different forms of construction and backfill materials. One of the projects in 2005/06 was awarded the School's overall project prize and another resulted in a National Award from the Institution of Structural Engineers. This has, without doubt, raised the profile of teaching at Queen's.

Both Professor Long and Dr Taylor have enjoyed the opportunity to transfer academic research into practice and the exposure to a commercial environment has been rewarding. The Research and Development work at Macrete has generated research income for the University and the Academic Support funds have enabled the academics to access an international platform for the research findings and offered an opportunity to publicise the arch system to a global market.

The partners are continuing to disseminate the development of the arch system via company marketing and at international conferences. Abhey has agreed to continue his guest lectures at Queen's and since the project end, Macrete has sold nine bridges, with orders for several more in the pipeline. The relationship between the University and Macrete continues to flourish with the commencement of two new, Knowledge Transfer Partnerships to develop a new range of products and to further develop the Flexi-arch.

11.2 QUB Case Study: Nano-scale Super-Hydrophobic Coating. The School of Chemistry

A coating with Super-Hydrophobic properties has been developed from an invention discovered in the Queen's School of Chemistry by Professor Steven Bell and his research team. It is anticipated that the invention once proven and scaled up could replace the current technology used for anti-fouling on ships' hulls and / or be utilized to significantly enhance the performance of racing marine hulls by reducing drag. The invention also has potential applications in a number of other sectors beyond marine applications.

With assistance from the Technology Transfer Office at Queen's and patent investment of £96,000, patent protection for two inventions is currently being prosecuted in a number of countries such as the major European states, the U.S., Canada, Japan, Australia, New Zealand, China, Russia, India, Korea and Malaysia.

Commercial discussions are also under way utilising appropriate confidentiality agreements instigated by the Technology Transfer Office at Queen's .

The invention has attracted interest from a high net worth investor from San Diego who has offered to invest further funding in a research and development programme. The Technology Transfer Office at Queen's are working with this investor to define and execute an appropriate aquatic tank drag test programme.

After a series of meetings and with the assistance of the Technology Transfer Office at Queen's, the coating is also going through a six month Proof of Principle bio-fouling test with the leading manufacturer of marine coatings. If the outcome of this test is successful we envisage a deeper engagement with this manufacturer to fully develop and formulate a product for their market from our technology.

In the for-seeable future we will be discussing potential commercial terms for future investment in the technology. Upon completion of Proof of Principle testing it is envisaged that there could be further investment in N. Ireland to establish an R&D project to develop the technology further.

The coating also is thought to have potential in a number of other application areas such as high performance textiles, aquatic sensors, construction materials and industrial structures and products such as pipes.

The development of the nano-material into a prototype coating for marine applications was supported in 2008 by Invest NI Proof of Concept grant.

11.3 UU Case Study: Hutchinson Tiles

Hutchinson Tiles in Coleraine is a family business established for over 40 years and currently employs 15 staff across the key areas of the business. There are 3 key areas to the business: retail (supply only and/or fitting service) to customers, supply of products to other retailers/businesses, and government contracts (supply and fitting service). Over four decades the company has developed an extensive portfolio of wall and floor coverings for the domestic and commercial marketplace.

The Issue

While the company has been in the market for over 40 years, their systems to manage/control stock and pricing structures remain informal and ad hoc in nature. The company recognised that these two key areas of the business have been managed inefficiently and were in urgent need of review. Management viewed improvements in the efficiency in the management/control of stock as paramount given the high percentage of wastage (up to 20%) involved in the stock of floor and wall coverings. In addition, the company had no formal system to determine the cost/profit margins of products and/or service on a business-to-customer (B to C) or business-to-business (B to B) basis, despite operating in a highly competitive market. A detailed review of all prices and implementation of a more formal system was deemed important for the company not only in terms of costs/profits but in order to remain competitive in the market and attract new customers. Within the current company management, there are no personnel employed with the company with the expertise or experience to conduct an efficiency audit in these two key areas.

The Solution

Using the Invest NI innovation voucher, Dr Emma Fleck and Dr Karise Hutchinson, Department of Business, Retail and Financial Services, Ulster Business School at the University of Ulster, conducted an efficiency audit of the pricing and stock systems currently in operation in order to aid the company in streamlining their operations for the transition to a more efficient and effective organisation. Specifically the research covered:

1. Review of current internal systems in operation within the company;
2. Investigation of areas of best practice relating to stock management and pricing systems;
3. An analysis of competitor pricing and range of products ranges in tile showrooms in the local area;
4. Recommendation on appropriate business models for the future implementation of more efficient systems relating to stock management and pricing systems.

In investigating the current stock and pricing practices within Hutchinson Tiles and in developing a process to implement new practices, it was recommended that the company integrate their stock and pricing systems through an appropriate integrated computerised system. In doing so, Hutchinson Tiles will be able to streamline their operations and give all of their staff access to important information thus not relying on one store man for stock control or the administration staff for pricing information.

Company Feedback

Company Director Mr Allison Hutchison was delighted with the outcome of the voucher project: "*The academic stimulus offered through the innovation voucher process provided an invaluable catalyst to implementing grass root change within the firm*."

11.4 UU Case Study: Rapid International

About the Project:

The KTP helped Rapid International Ltd to change to a flexible manufacturing system and put in place logistics and materials management systems to support the new approach to production. The KTP aided the introduction of sub-contractors to ensure work was not turned away, however it has ensured that Rapid's own standard mixers were incorporated into the plant.

The Company

This Craigavon plant is a long established company and is a manufacturer of concrete batching and associated equipment. It is a company concerned with the pursuit of Total Quality making constant improvements in manufacturing methods and productivity. The company entered the KTP to improve product design, introduce new products and make the existing products more amenable to production.

Benefits:

Within months of this KTP it became apparent that it was going to deliver more than anticipated. Because of this the emphasis was changed from design improvement and new product development to innovation. This led to the development of a number of innovative new products which resulted in health and safety and cost benefits for the company along with a significant increase in the throughput of the plant.

Results:

The company has introduced a 5 station CAD system, with one of the stations equipped with finite element analysis software to permit more precise design of new and improved products.

The new Rapid Jetwash was an innovative product designed and developed under the KTP which now accounts for 10% company's sales.

Cost of production has been reduced by 10% due to the standardisation of components, proprietary items and sub assemblies.

The Associate

Two Associates were employed on this KTP.

Benefits:

The KTP gave 2 academics a unique opportunity to participate in the design and development of innovative new products and also they played an integral part in the re-design of the company's standard products.

Results:

Both Associates were offered further employment with Rapid International after the end of their 2 year contract; both accepted. One was appointed the senior engineer/designer and the other was employed in the role of innovation and product development.

Throughout the KTP programme one completed an MSc in Industrial Practice and the other completed an MBA sponsored by Rapid which was awarded with distinction.

One associate worked with Rapid for a further year and has since established their own design and manufacture business specialising in production of predominately rotational moulded products for the equestrian market.

The Academics

Professor Dennis McKeag, Professor of Product Development and Professor Robin Clarke Head of School for Electrical and Mechanical Engineering were the Academic partners on the KTP.

Benefits:

The academic staff have gained first hand experience of re-design of products to incorporate Design for Manufacture and assembly rules as a direct result of having participated in the re-design and development of a complex engineering system, the Rapidmix 400C Transportable and self contained concrete batching plant.

Results:

The University of Ulster research has greatly benefited as a result of this KTP with three Case Studies developed along with three placement student opportunities, two final year and two postgraduate projects.

This has encouraged KTP participation by five other companies, generating 8 KTP posts to date.

The academic partner has benefited from the experience of writing business plans and project plans. This experience was fed directly into the lead academic's final year MEng class on innovation where presentation of a Business Plan is a core element of teaching and assessment.