Northern Ireland Executive
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Innovation Strategy for Northern Ireland
2014-2025

innovateNI

September 2014

Strengthening international collaboration

Cannot compete in every global market

Celebrate our successes

Encourage our young people to be entrepreneurs

Innovation allows firms to stay ahead of their competitors

Public Sector Information - driver of economic growth and innovation

Concentrate on our key strengths

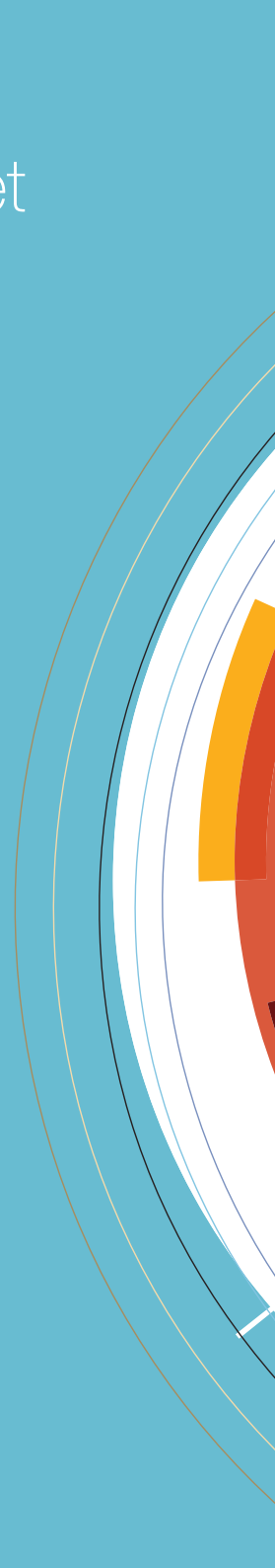
Companies who collaborate are more productive

Innovation is more than R&D

Enhancing our world class research base

Grow more indigenous high tech companies

Innovation distinguishes between a leader and a follower



Contents

Ministerial Foreword

Innovation has become something of a buzzword – but what is it and why is it so important?

Innovation is the successful generation and exploitation of new ideas. It is about transforming creative thinking into new products, new and improved processes and technologies to support new ways of doing business.

Innovation is critical because it is an integral part of a virtuous circle. It drives research and development, which in turn leads to economic growth. Companies who are innovative are more productive, growing sales and employment twice as fast as their non-innovating competitors.

Innovation is also essential in our collective efforts to address key societal and environmental challenges, whether that be an aging society and supporting people to stay healthier and live independently for longer or limiting the effects of climate change and the development of new technologies to support sustainable manufacturing. The Northern Ireland Executive has therefore placed innovation at the heart of its efforts to transform our economy into one that is truly knowledge based and export focused.

Northern Ireland can become one of the most innovative regions in the UK. We have a rich history of innovation whether it's from an earlier era with the design and construction of the Titanic - the biggest ship of its generation - or the Ferguson Tractor – the machine which underpinned the modernisation of farming practice - to more recent times with Wrightbus buses on the streets of major international cities or First Derivatives software used to support financial transactions across the globe.

We need to significantly increase our efforts to build on this success because while we have seen record expenditure in recent years in Northern Ireland on Research and Development, and are now above the UK average in terms of percentage spend, we are still at the bottom of the UK Innovation league table.

Quite simply, not enough of our companies are engaging in innovation. This Strategy sets out the key actions necessary to support businesses in all areas of the economy to become more innovative and has been developed following extensive consultation. I was very encouraged and pleased that so many organisations and individuals, from across all sectors, took time to contribute. Their input has helped us focus on key priorities, identify new actions, including the need for cultural change and the role that the Executive has to play in driving that change – whether through the education system and encouraging greater levels of creativity and entrepreneurship or by using the public sector to incentivise innovation, through for example pre commercial procurement, open data or innovation competitions.

Similarly, the consultation reinforced the role that the Community and Voluntary Sector have to play within our innovation ecosystem. It can act as a driver of innovative thinking, for example in the way public services are delivered and how we address social disadvantage and wider societal challenges. As a result of the consultation we have also increased our targets, particularly around employment levels in the knowledge economy and also success in EU R&D and Innovation programmes such as Horzion 2020. The input from the consultation has strengthened the Strategy and gives me greater confidence that we can deliver our Vision that by 2025 *'Northern Ireland will be recognised as an innovation hub and will be one of the UK's leading high-growth, knowledge-based regions which embraces creativity and innovation at all levels of society'.*

There is no doubt that there will be challenges going forward, not least addressing the necessary cultural change required to improve our levels of innovation. But this challenge presents significant opportunities for us all to explore new ways of working. We must continue to build new partnerships at home and abroad and it is only by working together towards our common goal that we can deliver prosperity for all of our citizens.

Innovation - it's anything but business as usual.

Arlene Foster MLA
Minister of Enterprise, Trade and Investment

1 Introduction

"Innovation is the successful generation and exploitation of new ideas"

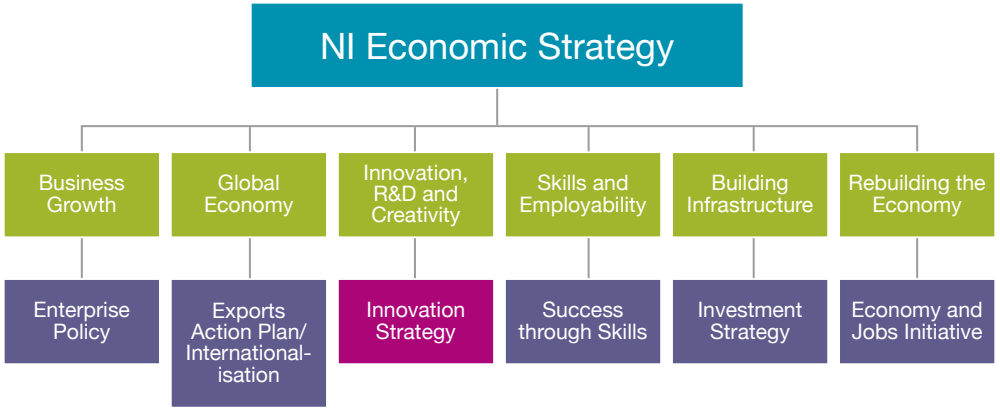
Innovation is one of the primary drivers of economic growth, underpinning the growth of the best performing regional and national economies across the world. Innovation enables firms to stay ahead of competitors, and with global economic conditions remaining challenging, the focus on innovation is now more important than ever.

Strategic Context

The Northern Ireland Economic Strategy[1] sets out a vision for 2030 to have an economy 'characterised by a sustainable and growing private sector, where a greater number of firms compete in global markets and there is growing employment and prosperity for all'.

The Economic Strategy outlined a range of actions designed to increase employment and wealth through building a larger and more export-driven private sector. This Innovation Strategy seeks to expand upon and refine the priority within the Economic Strategy to stimulate Innovation, R&D and Creativity, and the linkages are set out in Figure 1.

Figure 1: Innovation Strategy Linkages



[1] Northern Ireland Economic Strategy 2012

Cliff Mason, AFBI Photography Unit

Innovation Vision

If innovation is to play its full part in realising the vision of our Economic Strategy, then Northern Ireland needs a complete step change in its culture, priority and performance in respect of innovation. The challenge of such a transformation should not be underestimated since, for too long, we have languished at the bottom of just about every UK league table on innovation. However, there is renewed confidence that this step change can be achieved. In just a few short years, Northern Ireland has made huge strides in its R&D performance with total expenditure by businesses in R&D increasing by 150%. However, R&D is only one part of innovation and going forward we will need to replicate this sort of transformation in all the other areas of innovation, across all sectors within the region.

This Innovation Strategy sets out the key long term actions necessary to make that transformation and so ensure that innovation plays its full part in realising the vision of our Economic Strategy. Thus this Innovation Strategy aims to stimulate a step change in innovation, across the economy and in doing so deliver a vision that:

Northern Ireland, by 2025, will be recognised as an innovation hub and will be one of the UK's leading high-growth, knowledge-based regions which embraces creativity and innovation at all levels of society.

In tangible terms this sort of transformation by 2025 will mean:

- Many more of our companies engaging in innovation, collaboration and exporting;
- Doubling the number of knowledge economy businesses and increasing their employment to over 54,000; and
- Expenditure of over £1.2 billion per annum on R&D.

Innovation in its Widest Sense

There is a frequent misconception that innovation means scientists and R&D. Innovation is much more than R&D. It includes changes to products and processes, introduction of new business models, organisational changes and entering new markets. Research by NESTA suggests that less than 20% of investment in innovation by UK firms is in the form of R&D.[2] If firms invest in skills, leadership, design, branding, training or marketing – they are investing in innovation.

[2] NESTA (2009) Innovation Index

CASE STUDY: AMAZON

In 2013, Amazon was voted the second most innovative company in the world by Fast Company magazine. Amazon introduced same-day shipping in seven major U.S. markets in 2010, but the e-commerce giant's significant 2012 expansion of its next-day and same-day delivery services was a surprise for its competitors. The entire retail industry seemed to realise its power. Rivals such as Google, eBay, and Walmart could only attempt to catch up, launching modest pilot programs and making investments. Even shipping services UPS, FedEx, and USPS upped their game. To achieve their innovation, Amazon acquired additional companies which specialised in order-processing time reductions and invested heavily in increased distribution centres in high population areas. They also introduced the idea of delivery locker service in '7 Elevens'.

The Importance of Innovation

Evidence shows that innovative companies, defined as those that have introduced a new product or process, grow nearly twice as quickly in terms of both employment and turnover as non-innovators.[3] The same research also shows that the 6% of all UK businesses with the highest growth rates generated half of the new jobs created by existing businesses. In addition, following the financial crisis, economic recovery has been substantially stronger in countries which had previously invested the most in R&D and Innovation.[4]

For Northern Ireland, with a relatively small business base engaging in Innovation and R&D, it is of paramount importance that our firms, across all sectors, government departments and public sector bodies embrace innovation in all its forms. While many of our companies are innovative and compete on a global basis, we need more companies across all sectors engaged in innovation because Northern Ireland firms have among the lowest levels of innovation activity amongst the UK regions.

Barriers to Innovation

To realise our vision, this Strategy needs to address the main barriers to innovation. For Northern Ireland, these include factors such as skills issues, knowledge and cost (Table 1). To successfully overcome these barriers, particularly for our SMEs and Micro Businesses, support from the public sector is critical and delivery of the actions within this Strategy will therefore overwhelmingly fall to the public sector. However, to realise the transformational change required to deliver the goals set out in this Strategy, we will require a collaborative approach across all sectors.

Table 1: Barriers to Innovation

Knowledge	Absorptive capacity, IP, user knowledge, lack of communication, lack of information
Access to Capital	Availability of finance, cost of finance
Incentives	Lack of competition, lack of inducements, lack of ambition
Markets	Identifying opportunities, understanding opportunities, regulation, standardisation, access to markets, and language barriers
Skills	Lack of Leadership, technological, R&D and creative thinking skills
Cultural Changes	Risk aversion, low levels of entrepreneurship, lack of understanding innovation, managing change, reluctance to collaborate

[3] NESTA (2009) The Vital 6%

[4] State of Innovation Union (2011) Com 2011,849

Innovation in the Public & Third Sectors

Increased innovation is also required in the public sector to assist with improving services. In addition to becoming more innovative in how it operates, whether as a customer or as a partner to drive change, the public service can play a powerful role in encouraging innovation. Through procurement and policy development to address societal challenges, it can also incentivise innovation in companies and its suppliers.

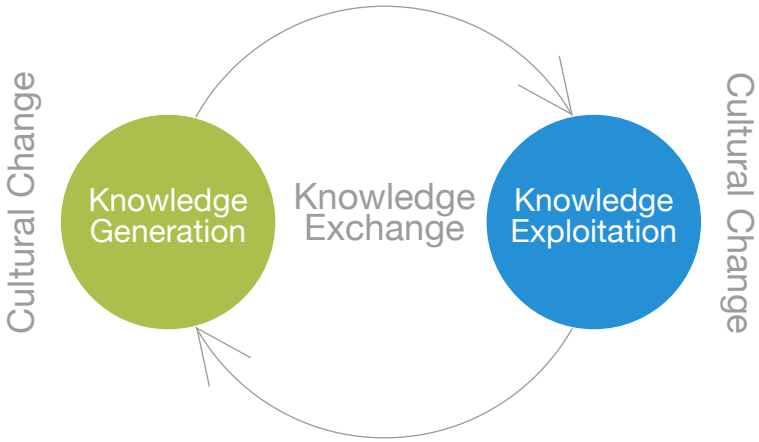
The third sector is also important within our innovation ecosystem and can act as a driver of innovative thinking. Initiatives such as NESTA's Neighbourhood Challenge Initiative have shown that the third sector can play a major role in driving innovation in public service delivery and in addressing societal issues such as reoffending, care of those with mental health issues and care of the elderly.

Key Themes

The focus of this Strategy is primarily on companies and how they can be better supported to engage in innovation in order to achieve our wider economic objectives. Within the innovation ecosystem, knowledge is generated in the form of ideas and exchanged through various interactions between individuals, companies, academics, government agencies and so forth. By definition, however, innovation does not occur until this knowledge has been exploited to add value, which is ultimately the key objective for Northern Ireland's economy.

These themes are underpinned by cultural change, which reflects that a step change in approach and behaviours is needed. Cultural change does not sit alongside knowledge generation, exchange and exploitation – it is a cross-cutting area which must be achieved across all three. An overview of the Strategy themes is shown in Figure 2.

Figure 2: Innovation Strategy Key Themes



Finally, it is important to note that this Strategy aims to be exactly that – a Strategy. It does not detail all our existing innovation interventions, research and evidence. Neither does it seek to replicate Programme for Government (PfG) commitments nor repeat what has already been said in other Strategies. This Strategy is purposely focused on identifying Northern Ireland's strategic innovation priorities, along with key actions to deliver these through to 2025.

Where reference is made to 'we' in the strategy that should be read as the NI Executive in partnership with relevant stakeholders.


Pressure Test
Pressure Test
They fly safely
when you make it
F.I.S. & Free !

2 Cultural Change

Overview

What is Cultural Change?

Changed attitudes and behaviour towards collaboration, and openness towards the use of new ideas, innovation and risk taking.

What do we want to achieve?

- Strong leadership highlighting the importance of innovation for growth
- A more innovative and open public sector
- A coordinated approach to science across government
- More collaboration
- A more balanced approach to regulation and oversight that encourages more risk-taking
- Celebrate innovation
- Improved communication about the importance of innovation
- Improve the culture of leadership within organisations
- A sustainable social innovation ecosystem
- Stimulate social innovation to drive the third sector

What are we going to do?

- Examine the feasibility of establishing an Innovation Council
- Appoint 'Innovation Champions' within all government departments
- Develop a new public sector reform programme, including a programme of work for the newly established Public Sector Innovation Laboratory
- Look at new ways to showcase innovation
- Appoint a Chief Scientific Advisor for Northern Ireland
- Increase focus in leadership training for SMEs
- Remove unnecessary regulatory burden for business
- Establish social innovation accelerators
- Increase investment in supporting / stimulating collaborations

How will we know that we are on target?

While indicators specific to the underpinning requirement for cultural change have not been identified, engagement at the highest level through delivery of key actions detailed in the strategy will be evidence of progress.

Why is Cultural Change Important?

Transforming our innovation performance requires sustained commitment and long-term focus. It will require changes in culture and behaviours that must be embraced across all aspects of society. To become embedded, and truly irrevocable, these changes will require a long-term, sustained, level of visible commitment at the most senior levels in Government, business, the third sector and academia.

Driving Innovation Forward

The interaction and dependencies within the innovation ecosystem are complex. For this strategy to succeed in its aims, many different individuals, organisations, sectors and agencies will need to embrace change, refocus their activities and better coordinate their efforts. It will also require a step up in efforts to drive change across the public sector, to provide a supportive environment and to develop enterprising leaders for the modern public sector. Without the appropriate drive and leadership, action will be sporadic, progress slow and the aims of this strategy will only face resistance or even stagnation. To help fill the gap in our innovation ecosystem we will develop a Communications Strategy on Innovation.

Innovation Council

Visible leadership, to drive forward the aims and objectives of this strategy, is therefore crucial. That leadership is not a 'one-off' activity and the changes envisaged will require long-term, sustained leadership at the most senior levels in the private and public sectors. As a result, we will seek to establish a Northern Ireland Innovation Council, chaired by the Minister of Enterprise, Trade and Investment, to include senior representatives from business, the public sector including local government, the third sector and academia to oversee implementation of this strategy.

Innovation within Government

Northern Ireland's public expenditure environment is expected to remain constrained in the short to medium term. Coupled with increasing demands for public services and understandable expectations of ongoing service improvements, this means that it will simply not be possible for the public sector in Northern Ireland to continue providing services in the same manner as it does currently.

Government has a key role in leading and facilitating the development of skills, research and the capacity of business to innovate. Government's role is also to act as a catalyst of innovation helping Northern Ireland become more productive and at the same time improve public services. An innovative and enterprising public sector is thus vital to help address the challenges ahead. With approximately one third of our employment and two thirds of our GVA, Northern Ireland's government is our largest sector and our aim is to become one of the most innovative public sectors in the world. We will therefore ensure that innovation and enterprise within, and reform of the Northern Ireland Public Sector are central to any future Programme for Government.

The public sector needs to be innovative and this will involve cultural change and a break from the past, adopting different ways of doing things. The challenge now for the public sector is to develop an innovation culture underpinned by this comprehensive innovation strategy, to provide a supportive environment to develop 'enterprising leaders' for the modern public sector. To help progress this change we will appoint 'Innovation Champions' at senior staff level within government departments to drive and coordinate the innovation and reform agenda. This will include embedding innovation and enterprise at all levels of departmental business and thinking and to encourage work across organisational and departmental boundaries.

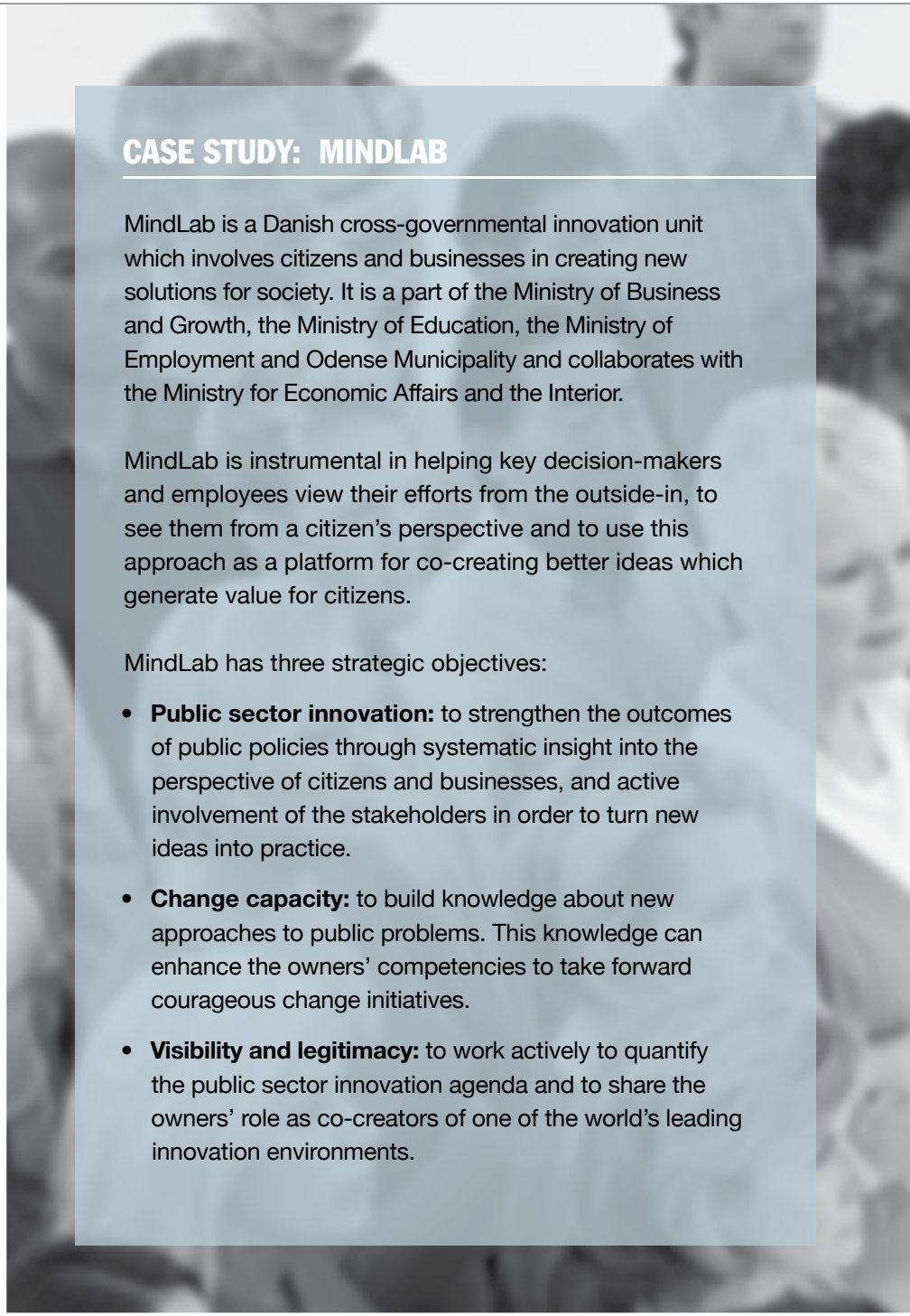
If we are to start to make the NI public sector more efficient, bottom-up incremental innovations are a good place to start. To encourage innovation, staff must feel able to change systems and processes, to stop doing things of little or no benefit, and to break from 'we have always done it this way' and move to 'how can we do this better?' We will therefore ensure that innovation and creativity are incorporated into training and development programmes of public servants and become core competences for managers. We will also introduce a scheme to improve public services by stimulating innovation amongst staff, service users and the wider public. This will include opportunities for innovators to assist in the development and implementation of their ideas.

Open Innovation in the Public Sector

Companies who engage in open innovation benefit from gaining better market and technology insights as well as increased opportunities for collaboration. Such an approach applied to the public sector would allow the importing of knowledge and insights from academia, the private sector, the third sector and crucially from the public. We recognise the need to be better at collaborating and sourcing ideas from outside organisational boundaries across the NI public sector. The public sector needs to embrace the concept of Open Innovation. Therefore we will augment existing public sector innovation capability though significantly greater use of partnerships, secondments and interchanges between public, private and third sectors.

Innovation and Public Sector Reform

The Public Sector Reform Division within the Department of Finance and Personnel has been established to provide support to NI departments in the implementation of reform across the public sector as well as to encourage innovation in policy development and service delivery. This will require significant cultural change, however there are a number of methodologies available to identify, support and develop innovative ideas. There are also opportunities to learn from, and partner with, leading public sector innovation agencies such as OECD's Observatory of Public Sector Innovation, NESTA and MindLab.



CASE STUDY: MINDLAB

MindLab is a Danish cross-governmental innovation unit which involves citizens and businesses in creating new solutions for society. It is a part of the Ministry of Business and Growth, the Ministry of Education, the Ministry of Employment and Odense Municipality and collaborates with the Ministry for Economic Affairs and the Interior.

MindLab is instrumental in helping key decision-makers and employees view their efforts from the outside-in, to see them from a citizen's perspective and to use this approach as a platform for co-creating better ideas which generate value for citizens.

MindLab has three strategic objectives:

- **Public sector innovation:** to strengthen the outcomes of public policies through systematic insight into the perspective of citizens and businesses, and active involvement of the stakeholders in order to turn new ideas into practice.
- **Change capacity:** to build knowledge about new approaches to public problems. This knowledge can enhance the owners' competencies to take forward courageous change initiatives.
- **Visibility and legitimacy:** to work actively to quantify the public sector innovation agenda and to share the owners' role as co-creators of one of the world's leading innovation environments.

To help drive cultural change, we will build the capacity and capability of the new Public Sector Innovation Lab, including the use of Task and Finish groups to improve our business processes and help to address public sector policy challenges. An example of this is already underway involving the Department of Justice through its development of

- Justice Lunches – a series of lunchtime seminars with the theme of problem solving through innovation and partnership; and
- Policy Tool Kit – a review of policy making within the Department to include an emphasis on use of pilots to encourage a focus on "what works".

We will also introduce greater experimentation into the design of public services and will investigate how to embed foresight into the design and reform of public services across the NI public sector. To help take this forward we will develop opportunities within the Northern Ireland Civil Service to showcase and demonstrate how technology can underpin more agile and collaborative ways of working.

Delivering Social Change

With increasing pressure on budgets, it is important that the public sector responds in an innovative way to maximise the impact and value for money of public funds. One such innovative approach is Delivering Social Change.

The Delivering Social Change framework was set up by the Executive to tackle poverty and social exclusion and represents a new level of joined-up working by Ministers and senior officials across Executive departments to drive through initiatives which have a genuine impact on the ground.

The framework aims to deliver a sustained reduction in poverty and associated issues across all ages, and to improve children and young people's health, well-being and life opportunities thereby breaking the long term cycle of multi-generational problems.

In October 2012 the First Minister and deputy First Minister announced that £26 million of central funds would be made available to allow for the development and delivery of six Signature Programmes under the Delivering Social Change framework.

The Signature Programmes were set up to improve literacy and numeracy levels, offer increased family support and to support job creation within local communities - all of which had been identified as being key priorities.

DSD and DETI have joint lead responsibility for the Signature Programme that will see the establishment of 11 new Social Enterprise Incubation Hubs. These hubs will seek to tackle the lack of employment opportunities within local communities and encourage business set-up.

A More Balanced Approach to Risk and Regulation

While there is a need to ensure good governance is maintained over the management of publicly funded projects, there is also a need to ensure that we allow a more balanced approach to risk within the public sector. Risk aversion rather than risk management is one of the greatest threats to innovation. One key sign that the NI public sector is embracing innovation would be by addressing the perception that 'trying to avoid risk by doing nothing' is better than 'trying to do the right thing and failing'. We will continue to explore new portfolio models to support innovation and to manage higher levels of risk in return for higher returns to the economy.

While oversight in the form of regulation is necessary to support economic growth and ensure a fair and competitive market in which companies operate, we will continue to review the regulatory burden on business imposed through government intervention and regulation. While regulations are often perceived as a burden, they can also be a spur to develop new products and services which are capable of export. We will therefore encourage more companies to invest in attaining international standards such as ISO.

Celebrating Innovation Successes

In Northern Ireland we have a tendency to underplay our successes. We have some examples of genuine world class excellence across business and academia and yet people are often not sufficiently aware of these. If we aspire to improve our innovation performance it is essential to inspire and enthuse our young people, our would be entrepreneurs, teachers and wider civic society about what has been achieved by Northern Ireland based companies such as Randox, Bombardier, Wrightbus, Moy Park, Learning Pool, First Derivatives, Seagate and Almac to name but a few.

We will therefore examine new ways of involving businesses, government, academia, and media to showcase excellence in innovation so that we can inspire our young people.

CASE STUDY: GENERATION INNOVATION

Generation Innovation is a programme developed by NISP CONNECT, aimed at celebrating and inspiring the next generation of innovators and entrepreneurs. Each year, 100 or more 16-17 year-olds are selected from personal applications or nominations, as having high potential in the knowledge economy. This one-year membership of Generation Innovation commences with a major event, at which the new members meet local tech company founders and hear from a major global innovator. The focus of the event, and the subsequent programme of networking, events and work experience opportunities, is on exposing members to the potential of entrepreneurship alongside more traditional professions. The programme serves part of the wider need for developing the profile of the knowledge economy, largely through highlighting its role models and impact. In early 2014 for instance, Jack Dorsey, founder of Twitter and Square, spoke to new Generation Innovation members via webcam, seated next to Square's CFO, Sarah Friar from Sion Mills, Co. Tyrone.

Coordinated Approach to Science across Government

To have a systematic and coordinated approach to science within the public sector, and to reinforce its importance in driving economic growth, we will appoint a Chief Scientific Advisor for Northern Ireland. This new position could contribute to providing effective leadership across a range of issues including:

- Coordinating the various strands of science across departments and agencies including, where appropriate, participation in UK-wide initiatives;
- Greater inter-connectivity across all sectors of science capability;
- Demonstrating the value placed on science by Government leadership; and
- Helping to develop a more coordinated approach to R&D, including the increased targeting of EU and other research funding opportunities such as enabling the development of research teams drawn from different NI sectors.

Leadership and Innovation

The role of leaders in creating conditions for greater innovation, within and beyond their organisations, is critical. Values and behaviour can promote innovation and it is 'the Leader' that reinforces this culture. While Northern Ireland has many business leaders successfully growing their companies on a global scale, evidence from our Skills Strategy, 'Success through Skills', demonstrates the need to do more to adopt best practice leadership and enhance management skills.

We need to foster a culture of leadership within the public and private sectors that will drive change. There have already been some significant commitments in this area. The Invest NI Leadership and Management Support Framework (LMSF) for example, has been successful in helping businesses overcome problems or barriers to growth through the development of leadership and management capabilities. But we recognise that more needs to be done. We will therefore introduce a range of new leadership programmes and develop a management strand within Invest NI's Skills Growth Programme.

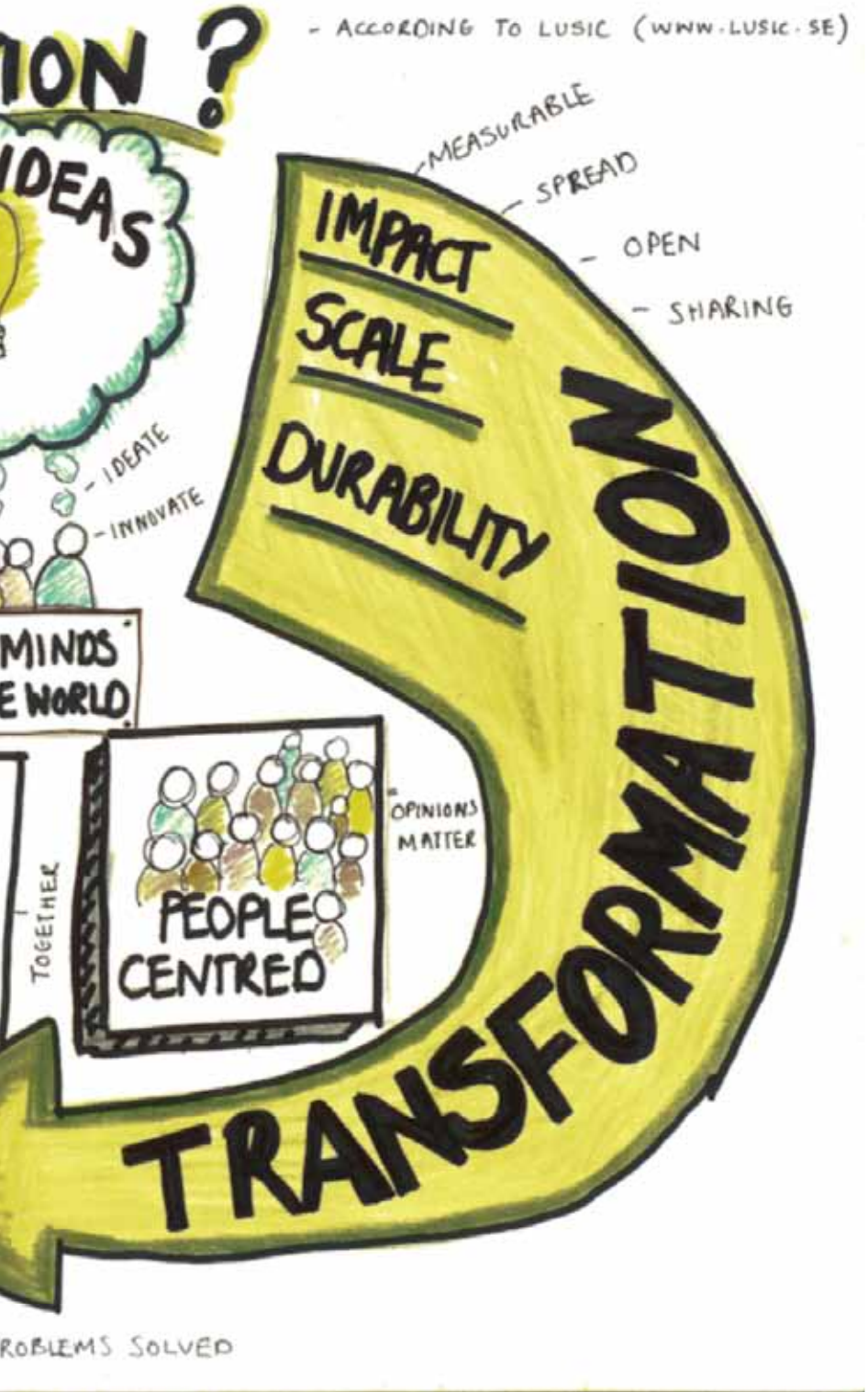
Through Invest NI and with DEL support, we will improve company leadership and management at senior level and cascade best practice throughout the business. Our approach will include:

- raising awareness of the importance of good leadership and management practice;
- delivering tailored development aimed at behavioural changes in the most senior people within SMEs; and
- delivering direct support to Northern Ireland businesses for skills development.

CASE STUDY: BRYSON CHARITABLE GROUP

100+ years of making a real difference to people's lives through innovative services; helping people help themselves. Bryson is Northern Ireland's leading social enterprise using a modern business model to tackle our major socio-economic challenges. Over 800 staff and volunteers deliver almost 23,000 services each day to families and individuals across Northern Ireland, Donegal and Wales.

Bryson Group is committed to *building better futures* through a service excellence approach to social policy priorities that includes: caring for vulnerable people and families, eradicating fuel poverty, getting people back into employment, assisting asylum-seekers, supporting black and minority ethnic families and enabling people to recycle. The group comprises seven individual companies: Bryson Care, Bryson Care West, Bryson Energy, Bryson Future Skills, Bryson Intercultural, Bryson Lagan Sports and Bryson Recycling.



Stimulating Innovation in Micro Businesses

Micro Businesses are currently estimated to make up over 95% of the Northern Ireland business base. However there is currently no data available in NI or at a UK or EU level which examines the level of innovation activity for those companies or indeed the barriers those companies face when trying to innovate. We will therefore conduct a pilot Innovation Survey for Micro Businesses to get a fuller understanding of these issues.

Stimulating Social Innovation

There has been a growing and focused interest in social innovation and a recognition that social innovation is distinct from the social economy. There is currently an opportunity to instil a new way of innovative thinking that will embed social innovation in Northern Ireland. This has the potential to enable organisations across all sectors of the economy to bring about systemic change through applying their respective expertise and resources to resolving some of the most intractable social problems, whilst simultaneously having a positive impact on employment, knowledge retention and export capacity.

The Urban Regeneration and Community Development Policy Framework sets out strategic direction for central and local government and partners from the voluntary and community sector for urban regeneration and community development in Northern Ireland for at least the next decade. Modernisation and promotion of change will continue to be promoted within the local and community sector through delivery of the PfG commitment 'Support Social Enterprise Growth'. To build on this we will develop a new social innovation working group, with public and voluntary/ community sector representation, to identify and report on future opportunities and promote the concept of social innovation widely across the Sector.

In parallel, we are committed to developing a sustainable social innovation ecosystem which will be supported within the context of the Economic Strategy, working collaboratively with organisations such as the Young Foundation, NESTA and the Building Change Trust. Through the establishment of social innovation accelerators and the use of prizes, innovators will be able to identify new opportunities leading to wider systemic change in Northern Ireland society. To drive this forward we will establish accelerator programmes in Belfast and the North West to act as key catalysts for social innovators in Northern Ireland; and develop social innovation challenges and prizes.

Service Innovation

Services and the Service Sector have an increasingly important role in the development of the NI economy. The Service Sector accounts for more than 77% of NI's economic output. However the traditional boundaries between service sectors and others are becoming increasingly blurred. The success of many sectors, such as manufacturing, will depend on innovative services such as design, marketing etc. Service Innovation can therefore be a key enabler of growth. We will therefore examine how Service Innovation can strengthen the design and implementation of our innovation policies. Where appropriate we will make enhancements to existing programmes to attract more companies to undertake Service Innovation activity with a focus on collaboration.

CASE STUDY: B9 ENERGY GROUP

B9 Energy Group within its operations and management arm are adopting higher levels of flexibility in managing capacity and demand. In a blurring of the distinction between production and service provision, B9 Operations and Maintenance are moving beyond the corrective maintenance when faults occur, towards offering 'guarantees' for security availability, yield and more effective revenue management. This brings new challenges in designing and implementing effective business processes. Back office business services such as contract management, accounting and legal services are being introduced to manage delivery and are becoming increasingly important elements in the service offering.

CULTURAL CHANGE KEY ACTIONS

1. We will examine the feasibility of establishing an Innovation Council.
2. We will develop a workstream for the new Public Sector Innovation Lab.
3. We will implement a new Communication Strategy on Innovation.
4. We will develop new Social Innovation accelerator programmes.

3 Knowledge Generation

Overview

What is Knowledge Generation?

Knowledge Generation is the catalyst for growth. Focus needs to be on creating an environment which encourages research and creativity. In doing so we must provide our young people and workforce with the skills and attitudes to succeed – across the public and private sector.

What do we want to achieve?

- More firms engaging in innovation
- More companies, particularly local SMEs, investing in R&D
- Our resources focusing on areas of greatest opportunity
- Universities generating more world class research
- Higher levels of entrepreneurship
- Enhancing creativity and design in everything we do
- Our education system providing the skills needed by innovative companies

What are we going to do?

- Increase focus on companies who are not innovation active
- Encourage more businesses to innovate and carry out R&D
- Prioritise support in areas which will have the greatest potential economic impact for NI
- Support and promote collaboration as an effective way to address the skills requirements
- Use foresight activity to inform government of emerging technologies and future markets and ensure we have the necessary skills base in place to exploit opportunities
- Continue to promote research excellence and meet the needs of industry
- Promote the benefits of design and creativity
- Develop and hone the skills to support innovation
- Continue to embed ICT as a cross-curricular skill in schools and colleges
- Support R&D and innovation infrastructure in HSC organisations
- Examine ways to encourage our young people to be more entrepreneurial

How will we know that we are on target?

- Firms with innovation activity (% of total firms)
- Total R&D expenditure (£m)
- BERD by indigenous SMEs (£m)
- Number of R&D Companies
- Annual STEM graduates
- New business start-ups

Why is Knowledge Generation Important?

Within the innovation system, Knowledge Generation is the catalyst for future economic growth. To grow Northern Ireland's economy we need to create an environment which encourages research and creativity to equip young people and our workforce with the skills and attitudes to succeed.

Encouraging Companies to Invest in Innovation

Although innovation allows firms to stay ahead of their competitors, Northern Ireland demonstrably lags behind the rest of the UK in terms of the number of our firms engaging in innovation. There is a need therefore, to enhance and concentrate our efforts on encouraging more firms to invest in innovation. We will continue therefore to examine how potential enhancements to existing programmes could attract further companies to undertake innovative activity, particularly with a collaborative focus.

Through Invest NI we will work with a greater number of companies to encourage and develop enhanced company capabilities to undertake more advanced forms of innovative activity. As part of the awareness measures, we will investigate the potential to introduce innovation audits within companies linked to the provision of intensive mentoring. In addition, we will incentivise research performers to engage in networking / mentoring to increase the technological activities and capabilities of enterprises.

Use of prizes to stimulate Innovation

Internationally, governments and businesses are increasingly using novel approaches to incentivise technological breakthroughs or to overcome particular challenges. Scotland is using the Saltire Prize - a £10 million challenge fund to accelerate the commercial development of marine energy - to support its efforts to be at the forefront of international efforts to tackle climate change. In Northern Ireland a number of competitions have already been organised, including Invest Northern Ireland's International Export Challenge Fund. This competition was to help local SMEs compete successfully in the global marketplace. Importantly, the competition was also used as a mechanism to celebrate export success and aspirations. We will therefore increase the number of competitions designed to support innovation particularly in key areas where there is potential for Northern Ireland companies to compete on a global basis.

Encouraging more companies to Invest in R&D

Although R&D is only part of the overall investment made in innovation, it remains an important driver in manufacturing and high technology sectors. In a short space of time our R&D performance has improved dramatically. Between 2008 and 2013, business R&D expenditure increased by 150% and our spend (as a percentage of GVA) is now above the UK average. However, the challenge we face is to encourage more companies, particularly our indigenous SMEs to invest in R&D.

With over 60% of R&D spend concentrated in just 10 firms, we are heavily reliant on a small number of firms who invest in R&D[5]. It is large, foreign-owned companies which have been responsible for most of that R&D spend and the substantial increases seen in the last few years. This investment has been tremendously important and we need to build on the success of those companies. We therefore need to encourage those companies to continue to invest and work more collaboratively with partners in both industry and academia. To enable this we will engage on a strategic basis with companies who invest in R&D to encourage business growth, so as to determine their research needs, deepen their R&D capabilities and to develop their technology management capabilities.

In addition, and building on the existing range of interventions already offered, we will intensify our efforts to encourage businesses that have not previously invested in R&D to become active. As part of this we will continue to work closely with HMRC to increase awareness of the generous tax reliefs (up to 225% on qualifying R&D cost) supporting R&D investment.

[5] NI 2012 R&D Survey (2013)

CASE STUDY: DEVENISH NUTRITION LTD

Devenish Nutrition Ltd is an innovative agri-technology company based in Belfast that manufactures mineral and vitamin supplements for pig, poultry, ruminant and companion animals and makes starter diets for pigs and poultry both here and in the US. Devenish deal with some of the largest pig and poultry businesses globally and is known to provide solutions through their range of innovative products.

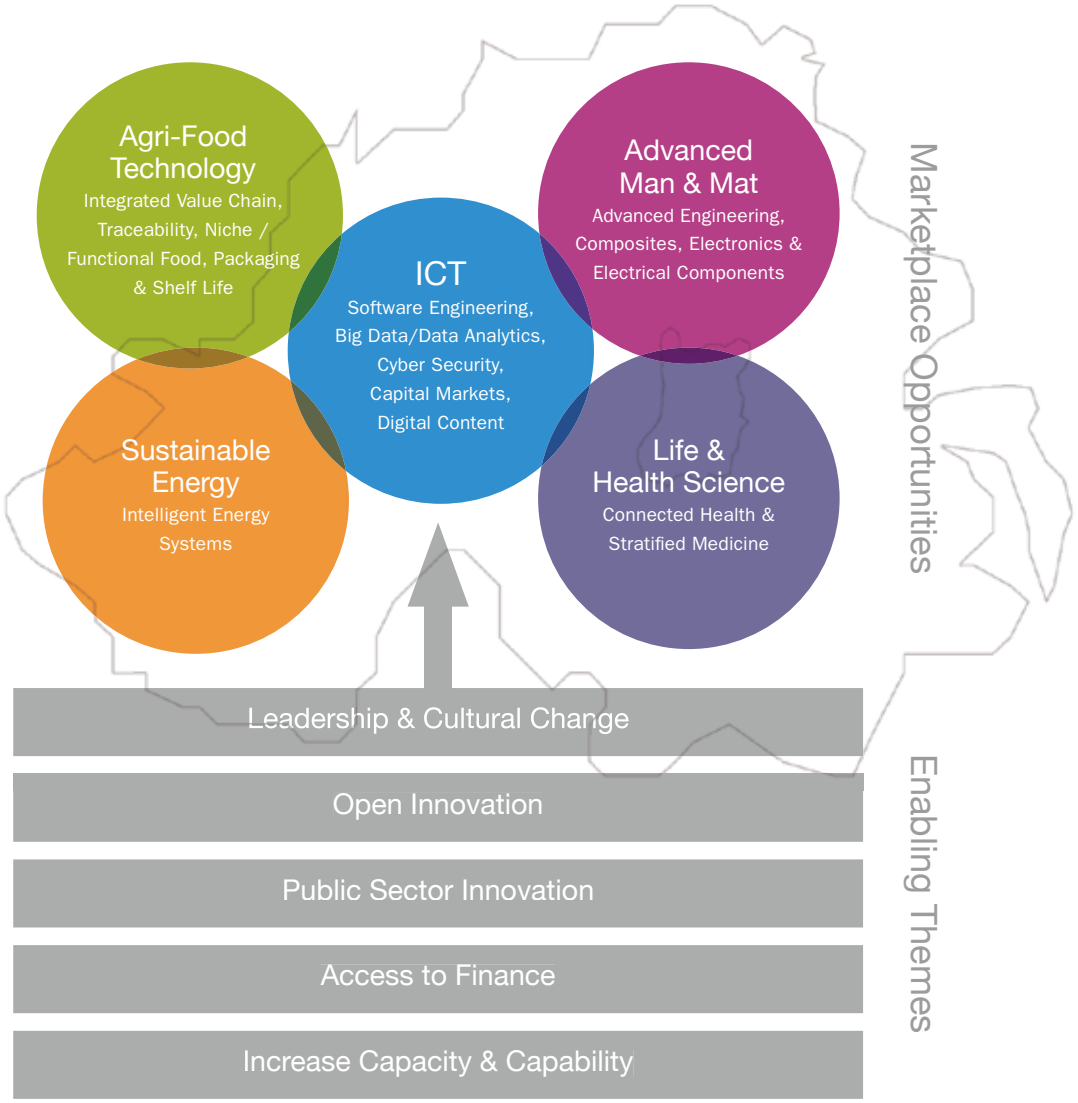
Employing over 100 people and with a turnover of over £60m it is a truly international operation. Investment in R&D and Innovation have been key to the success of Devenish Nutrition. Through product development and developing partnerships with industry, academia and government, they have established themselves as one of the leading companies in their sector.

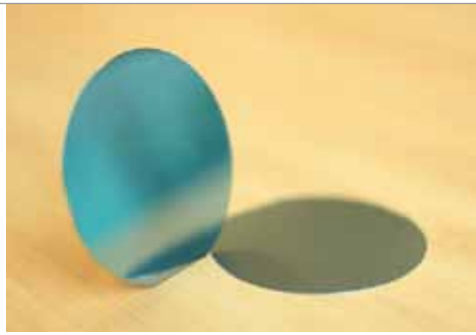
Focusing Resources where we have Greatest Opportunity

In delivering support to industry, we will need to prioritise our key investments in those areas most likely to generate sustainable economic growth for Northern Ireland and in those indigenous businesses with the potential for high growth. We cannot compete in every global market and across all sectors and technologies. This aligns fully with the European Commission's promotion of Smart Specialisation (S3). Building on the initial technology capability study undertaken by MATRIX (the Northern Ireland Science Industry Panel), the Economic Strategy identified the key market sectors where Northern Ireland has both the capability and the potential to compete on a global basis. This has formed the basis for Northern Ireland S3 priorities which include key enabling themes as well as market opportunities. These are set out in Figure 3.

We will focus funding and support for research and innovation in both our education and company base in priority areas. In addition we will undertake a new research and technology capability study across the public and private sectors.

Figure 3: Smart Specialisation priorities for Northern Ireland





New Global Opportunities

It is important that Northern Ireland pro-actively seeks to identify new and changing global market opportunities so that local companies are at the forefront of these. This will help us grow our high technology, indigenous business base and also enable us to produce a skilled workforce to give our region its best competitive advantage.

It will also help to grow our exports and ensure we capture new global markets and have a research base which attracts new FDI. Therefore, with the support of the MATRIX Panel and in partnership with Innovate UK's Emerging Technologies and Industries Steering group we will develop a foresight programme that will identify new and emerging technologies and key future markets.

CASE STUDY: ENERGY SKILLS TRAINING NETWORK

Supporting the investment by Belfast Harbour in creating a wind logistics and assembly facility, Belfast Met established the Energy Skills Training Network commissioning a scoping report to ensure Northern Ireland benefits from the supply chain opportunities emerging from this growth industry.

Belfast Met is facilitating the development of a strategic framework to extend capabilities collaboratively, combining industrial expertise with high quality vocational training. This collaborative approach demonstrates the benefits of strategic partnerships between local businesses and the FE sector.

Belfast Met is now a key stakeholder in the BIS Offshore Wind Industrial Strategy, which sets out the actions that government and industry will take to promote innovation and investment in the UK offshore wind sector.

ENERGY SKILLS
TRAINING NETWORK

CASE STUDY: SISAF

Better targeting of medicinal drugs has been identified as a major global need. While current medicines offer effective treatment for many specific disorders, the delivery vehicles for those treatments can be inefficient and typically carry side-effects. Targeted drug delivery methods allow the active ingredients to be released in the right area and at the right time to treat the specific ailment where it occurs in the body.

Belfast-based SiSaf and 'spin-in' to University of Ulster has pioneered the use of nanoparticles of the naturally-occurring element silicon to encapsulate drugs and deliver them accurately. SiSaf is able to take existing, proven treatments and make them smarter by providing more accurate, efficient and natural delivery, while reducing side-effects. SiSaf's drug delivery platform could be used for the treatment of many disorders, from cancer to diabetes, and is already being developed for severe skin conditions and the world's first single vaccination for livestock.

Enhancing Northern Ireland's World-Class Research Base

A world-class research base is a key driver in promoting economic growth. We need to continue to prioritise investment in the Northern Ireland research base. Significant investment in the university research base through mainstream Quality-related Research (QR) funding will therefore remain a strategic priority, building upon the introduction by DEL under 'Graduating to Success' (the Higher Education Strategy for Northern Ireland) of a new Higher Education research funding model. This model focuses on current resources and encourages our universities to pursue excellence in R&D, whilst also ensuring that the current and future needs of the economy are met.

This drive to enhance our world-class research base must incorporate all of the Higher Education and Further Education institutions, public sector research institutions as well as in-house company research. Therefore, we will develop further our research excellence in sectors with high growth potential and aim to double the number of funded postgraduate places to 1000 by 2020, with these additional places focusing on areas of economic relevance.

CASE STUDY: QUEEN'S UNIVERSITY BELFAST

Queen's University's ground-breaking research is tackling some of the greatest problems of our time.

It continues to make advances in the treatment of cancer. Along with Almac Discovery it has developed the first novel cancer drug in Northern Ireland, while researchers have also made a breakthrough for women at high risk of breast and ovarian cancer which could mean drug therapy rather than surgery.

Queen's is recognised globally for cyber security research and holds a world cyber summit each year. A new laboratory is being established in partnership with the Indian giant InfoSys.

World-leading research on food safety is making an impact at the Institute for Global Food Security, under Professor Chris Elliott, who is heading the Government review of the UK's food supply.

CASE STUDY: UNIVERSITY OF ULSTER

The University of Ulster has a focus on world-leading research that is shaping society and the economy.

Ulster is at the forefront of both revolutionary connected health research and medical research into chronic degenerative diseases. Magee's £5.3m Brain Mapping Facility is conducting research into pharmaceutical efficacy into neurological conditions such as Alzheimer's and Depression.

Jordanstown's Centre for Sustainability Technologies is leading the field in sustainable, renewable technology development with pioneering projects in wind energy storage and management.

Coleraine's Professor Gerard Parr advises the UK and US Governments on ICT research and leads the India-UK Advanced Technology Centre, an important foundation for research collaboration and technology transfer between UK and India.

Ulster places a high priority in the translation of research into the economy having completed over 5,000 collaborative projects with businesses and started 21 new 'spin-out' companies, generating 280 new jobs and a combined turnover of £26m.

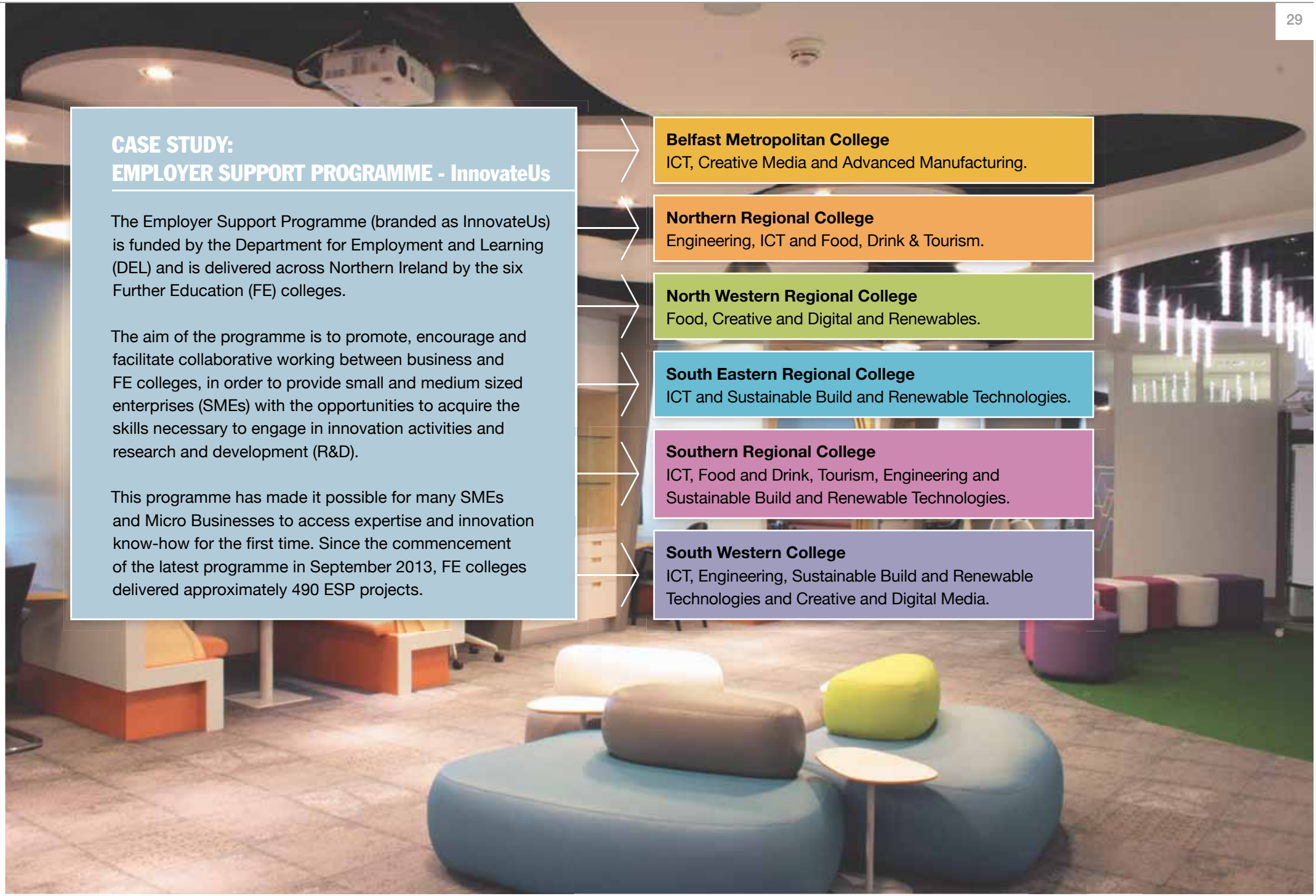
Invest NI's Proof of Concept (PoC) programme funds early stage research emanating from NI's research base and accelerates its development to "proof of concept" stage where it can be commercialised through spin-out creation or licensing deals. Achieving Proof of Concept involves adding commercial value to a discovery by generating evidence that the invention or technology actually works and could lead to a commercially viable product, service or process. It bridges the gap between curiosity driven research and the stage when private sector funds can be attracted to commercialise a technology. We will therefore work more closely with university technology transfer offices to accelerate the translation of research in order to maximise commercial impact.

CASE STUDY: CATAGEN

Catagen Limited, a QUB spin out, was established in May 2010 following Proof of Concept funding from Invest NI to develop testing equipment for the automotive industry. The Catagen technology simulates real life ageing of catalysts without the need for a vehicle or an engine in a test cell.

Catagen's largest product, the Maxcat, enables automotive companies to free up much in demand test cells as well as significantly reduce the costs of operation. The emissions produced by the Catagen range of catalytic testing equipment are extremely low, 90% less emissions than equivalent engine based testing.

In February 2014 it announced a deal worth £700,000 with MAHLE Powertrain in the USA.



CASE STUDY:
EMPLOYER SUPPORT PROGRAMME - InnovateUs

The Employer Support Programme (branded as InnovateUs) is funded by the Department for Employment and Learning (DEL) and is delivered across Northern Ireland by the six Further Education (FE) colleges.

The aim of the programme is to promote, encourage and facilitate collaborative working between business and FE colleges, in order to provide small and medium sized enterprises (SMEs) with the opportunities to acquire the skills necessary to engage in innovation activities and research and development (R&D).

This programme has made it possible for many SMEs and Micro Businesses to access expertise and innovation know-how for the first time. Since the commencement of the latest programme in September 2013, FE colleges delivered approximately 490 ESP projects.

Belfast Metropolitan College
ICT, Creative Media and Advanced Manufacturing.

Northern Regional College
Engineering, ICT and Food, Drink & Tourism.

North Western Regional College
Food, Creative and Digital and Renewables.

South Eastern Regional College
ICT and Sustainable Build and Renewable Technologies.

Southern Regional College
ICT, Food and Drink, Tourism, Engineering and Sustainable Build and Renewable Technologies.

South Western College
ICT, Engineering, Sustainable Build and Renewable Technologies and Creative and Digital Media.

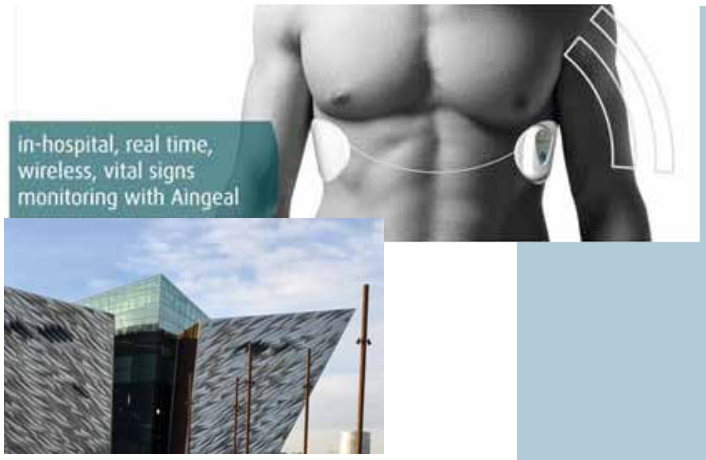
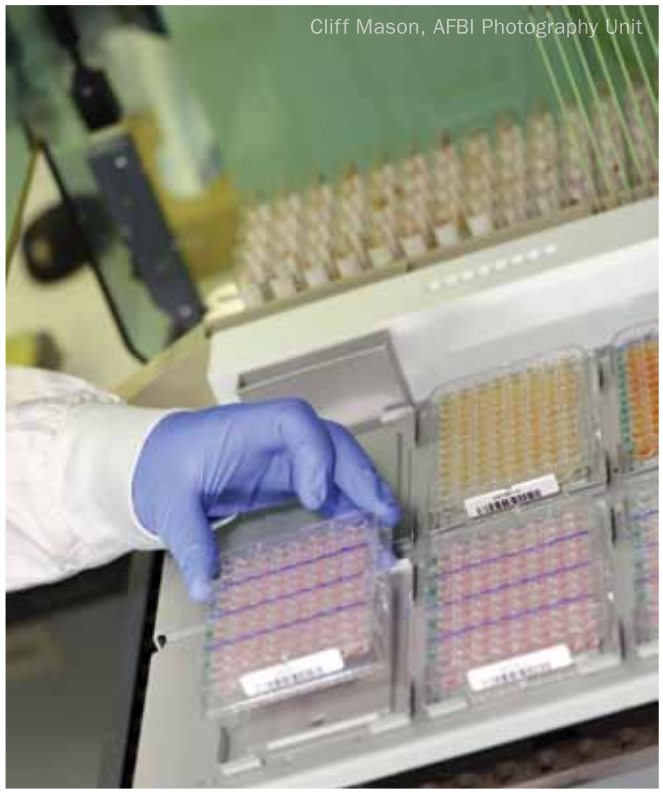


Photo: Intelesens, a University of Ulster 'spin-out'

CASE STUDY: CONNECTED HEALTH INNOVATION CENTRE (CHIC)

An aging population, coupled with changes in disease prevalence, have led to shifts in health care demands. The Connected Health Innovation Centre (CHIC) aims to provide Northern Ireland with a world-class, industry led organisation and facility, within which high-quality R&D, networking, Intellectual Property (IP) generation and brokering can be conducted on connected health applications. CHIC targets research in areas such as e-Health, digital health, tele-health, tele-monitoring, disease management, and home based care. The Centre will showcase Northern Ireland's skills and work alongside health providers, international companies and academia to provide growth and collaboration opportunities.



Competence Centres

To further promote industry priorities within the world class science and technology capabilities of our academic research base, we will roll out the Invest NI Competence Centre programme. Concentrating on the key MATRIX market opportunities, and driven by specific industry needs, the Competence Centres will support companies to bring new products and services to markets that otherwise would not have been possible. We will therefore establish Competence Centres in strategically important areas where a clear industry need or emerging market opportunity is identified.

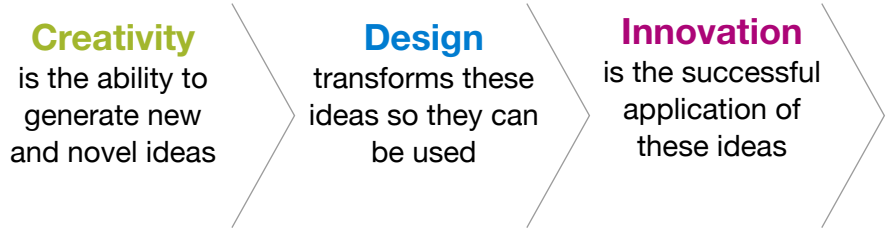
In addition, building on our growing reputation as an emerging region in Precision Medicine research, which is one of the key market opportunities identified by MATRIX, we will lead in the efforts to have an industry-led world-class research centre located in Northern Ireland. In pursuance of this goal, we will lead efforts to have the UK Catapult[6] in Precision Medicine located in Northern Ireland, but other avenues may also be pursued to build on the "all-island" innovation and research capability in this key sector.

6 Innovate UK's Catapult Centre programme provides a physical centre where the very best of the UK's businesses, scientists and engineers work side by side on late-stage research and development - transforming 'high potential' ideas into new products and services to generate economic growth.

Enhancing Creativity and Design

Creativity and design are important features of a well-developed knowledge economy. They are essential for a company to grow and innovate, as shown in Figure 4.

Figure 4: Creativity and Design for Innovation



"Imagination is more important than knowledge"

Albert Einstein

Creativity is essential for a company to grow and develop novel ways of looking at existing problems or realising new opportunities and connections presented by changes in technology and society. To promote creative thinking and the use of digital technologies by pupils, teachers and youth leaders, we will increase the capacity of the region's Creative Learning Centres and maximise the potential of our cultural base to provide inspirational learning experiences that support the curriculum and the eSTEAM[7] agenda, and which add value to teachers, students and lifelong learners.

To further nurture a culture of creativity across the public, private and third sector, we will develop a Creative NI Framework. This will catalyse and enhance collaboration, creativity, design and innovation within and across business, academia, the third sector and government. It will support broader-based innovation by generating and exchanging ideas across sectors and disciplines and by connecting multiple networks and sources of insight and inspiration. This aims to help creative people, ideas and businesses to emerge and flourish.

Design as an Innovation Tool

Research has consistently shown a link between the use of design and improved business performance[8] and many leading European innovative economies have placed design at the centre of their innovation strategies. We also recognise that design is a key enabler and driver of innovation. Through Invest NI and other Government interventions we already support companies to improve the competitiveness of their products and services through design support. Invest NI's Design Service for example, through awareness, advice and capability development encourages SMEs to use design as a business tool and an enabler of innovation. Using a strategic approach, Invest NI will continue to promote design as a driver to support businesses increase their potential in existing and new markets through creating compelling customer experiences via products, services and systems. Therefore, we will look to increase our efforts in this area to drive behavioural change and encourage more companies to incorporate design into their business planning processes.

[7] Enterprise, Science, Technology, Engineering, Arts, Maths

[8] Eden Partners (2011) Evaluation of Design Demand

CASE STUDY: BOMBARDIER FLIGHT COMPETITION

The Bombardier Flight Competition is an annual event in the STEM calendar and challenges pupils from Key Stage 2 (KS2) upwards from across Northern Ireland to harness their creativity and STEM skills by becoming aeronautical engineers, designing and building their own aircraft to compete in this fantastic competition at W5. Working to a design brief, specifying the maximum and minimum specifications of the aircraft and the type of the materials that can be used, pupils present their aircraft and methodology to a judging panel, volunteers from a diverse range of business and industry such as Bombardier, Thales, RAF, universities and many more, before launching their planes to see just how far they can fly.

Use of design in public policy making

Design can be a key driver of user-centred innovation across all sectors including government. Properly applied, design is a holistic and multidisciplinary problem-solving approach that takes *user* needs, aspirations and abilities as its starting point. Integrating design thinking into public policy making and public service development can lead to more efficient and effective decision making and delivery. To support this aim, we will build on efforts to introduce the strategic role of design thinking in Government as a joined-up approach to problem solving and stimulating innovative and integrated solutions.

Skills and Education to Support Innovation

To transform our economy into one of the UK's leading high-growth regions, we need to have a better educated and more highly skilled workforce. This will in turn, enhance the innovation performance of our local companies. Encouraging more SME's and Micro Businesses to engage in innovation is particularly important. Through the DEL Employer Support Programme (ESP), £6.9m has already been allocated to our Further Education (FE) Colleges to support companies to develop the skills capability of their employees. However, it is recognised that more can be done. Working with the FE sector and other stakeholders, we will increase the focus of the ESP to provide targeted support to SMEs and Micro Businesses for the skills required to engage in innovation, R&D and entrepreneurship.

STEM

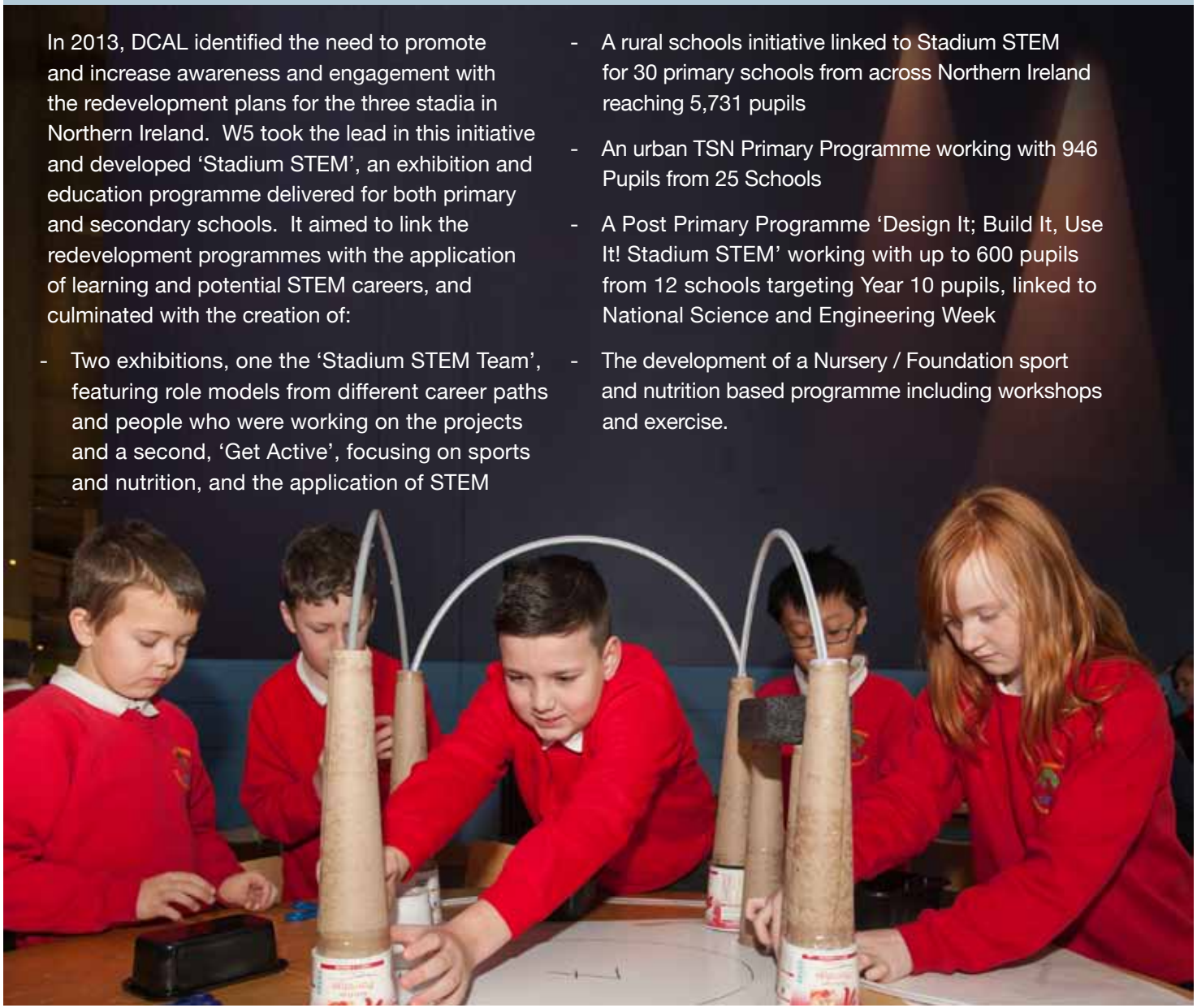
Qualifications in Science, Technology, Engineering and Maths (STEM) are particularly relevant for the knowledge economy, but this is an area where NI has had limited growth in annual student numbers (using the narrow definition of STEM) in recent years from Higher Education Institutions (HEIs). This has the potential to limit the flow of skilled labour for knowledge-based businesses and therefore, with the support of business, we will continue to progress the implementation of the Northern Ireland STEM Strategy, 'Success through STEM', and, in particular, fund an additional 1,200 undergraduate places in STEM areas.

Research within our HSC Trusts and organisations is essential for the development of more effective medicines, devices and other treatments. We will therefore ensure that professional staff have the opportunity to acquire and deploy research skills within their clinical workplaces and we will invest further in clinical research careers.

CASE STUDY: STADIUM STEM

In 2013, DCAL identified the need to promote and increase awareness and engagement with the redevelopment plans for the three stadia in Northern Ireland. W5 took the lead in this initiative and developed 'Stadium STEM', an exhibition and education programme delivered for both primary and secondary schools. It aimed to link the redevelopment programmes with the application of learning and potential STEM careers, and culminated with the creation of:

- Two exhibitions, one the 'Stadium STEM Team', featuring role models from different career paths and people who were working on the projects and a second, 'Get Active', focusing on sports and nutrition, and the application of STEM
- A rural schools initiative linked to Stadium STEM for 30 primary schools from across Northern Ireland reaching 5,731 pupils
- An urban TSN Primary Programme working with 946 Pupils from 25 Schools
- A Post Primary Programme 'Design It; Build It, Use It! Stadium STEM' working with up to 600 pupils from 12 schools targeting Year 10 pupils, linked to National Science and Engineering Week
- The development of a Nursery / Foundation sport and nutrition based programme including workshops and exercise.



ICT

Another core component of a knowledge-based economy is ICT skills. These need to be embedded into the culture of our schools, and into the training of our teachers. An ICT Future Skills Action Plan has already been produced by DEL, and ICT is now embedded into the revised curriculum as a skill across all Key Stages. However, we need to ensure there is continued good communication between industry and academia to ensure that the ICT skills supplied match those demanded by industry. There are already a number of successful initiatives underway to address this such as the 'Software Testers Academy'. We will however continue to work with industry to ensure that the necessary skills pipeline is in place to meet their needs.

CASE STUDY: RASPBERRY PI BAKERS

The 'Raspberry Pi Bakers' was a pilot collaboration between W5 STEMNET, Farset Labs and Digital Circle. Over a twelve week period, volunteer ICT teachers from nine post primary schools attended six twilight sessions at W5 with mentors from business and industry. The aim of the initiative was to provide support and create tutorials for ICT teachers who want to use the Raspberry Pi as a teaching tool within ICT classes. Funding was secured from the Department of Culture, Arts and Leisure and Northern Ireland Screen which enabled equipment to be provided to participating teachers.

Entrepreneurship

It is not just formal qualifications which are important for innovation, but also skills such as entrepreneurship, risk and creativity which can be developed throughout the education lifecycle. Maximising impact of youth entrepreneurship support in different contexts,[9] identifies 'entrepreneurship education at primary, secondary and post-secondary level as (one of) the basic requirements, that need to be met to facilitate entrepreneurship'.

Employability is a key theme underpinning the revised curriculum at primary and post primary level. At post-primary, the Employability strand consists of Work in the Local and Global Economy, Career Management and Enterprise and Entrepreneurship. Schools receive delegated budgets to enable them to deliver all aspects of the curriculum, however, the Department of Education also provides annual funding for business education activity which is mainly delivered via a number of third party partners delivering front line engagement programmes directly to pupils. The framework takes the form of a twin approach through delivery of regional generic employability, enterprise, entrepreneurship and work experience programmes, and a local focus to address particular needs of pupils in a cluster of schools in a particular area.

The European Commission report on Mini-Companies in Secondary Education[10] highlighted activities where students run a mini-company at school. This is seen as an effective methodology for spreading entrepreneurial mindsets, as it is based on learning through direct experience of entrepreneurship, and supports the effectiveness of these programmes in tangibly promoting the entrepreneurial spirit of young people. An excellent example of this is through the 'Company' programme, run by the charity Young Enterprise NI and funded by the Department of Education. Young people set up and run their own business whilst at school, providing them with the opportunity to develop entrepreneurial skills and explore their creativity.

Developing this entrepreneurial spirit will be important in achieving our vision of Northern Ireland becoming a highly innovative region, we will therefore examine how we can increase the support offered to our young people to engage in entrepreneurial activity.

9 2011 Overseas Development Institute report on 'Maximising impact of youth entrepreneurship support in different contexts'

10 European Commission: Mini-Companies in Secondary Education, Best Procedure Project: Final report of the Expert Group - http://ec.europa.eu/enterprise/policies/sme/files/support_measures/training_education/doc/mini_companies_en.pdf

CASE STUDY: STEP 'N' ZONE GLOBAL ENTREPRENEURSHIP WEEK

Invest NI works with a number of organisations in the youth and education sectors to promote an entrepreneurial culture and raise awareness of starting a business as a career option.

Step 'N' Zone involved a series of events with a target audience of Key Stage 3 (KS3) school students (age 11-14) from all NI Schools. Six events were held across Northern Ireland (Belfast, Ballymena, Armagh, Enniskillen and Derry-Londonderry) which attracted over 1300 pupils from 40 schools.

The students were challenged to develop a business idea during a three hour session. They worked together in groups of 6 to identify a business idea / product and were guided on how to brand, research, cost and develop this idea / product. Each event was structured around 4 core zones (Ideas and Research, Branding and Customers, Resources and Finance and Our Business). The zones were facilitated by key enterprise partners and stakeholders such as W5, Young Enterprise NI, Advantage NI, Sentinus and private sector graphic designers.

St Louis Grammar, Ballymena were the competition winners with a business idea for football boots with deployable studs that can be used on any surface. The judges were particularly impressed with the team's presentation skills, attention to detail and financial planning.

CASE STUDY: YOUNG ENTERPRISE NI COMPANY PROGRAMME

Matthew Gibson completed the Company programme with Young Enterprise NI in 2012/13. He states, "Along with the real business experience, I gained a huge amount from my participation in the Young Enterprise NI Company Programme. I gained confidence, business knowledge, motivation, inspiration along with presentation, business and team work skills." Now in his final year at school, he has already set up his own business called Party Props, supplying party equipment and entertainment. He says, "As I am still studying for my A Levels, the business will remain small until I have completed my studies. After that I will be able to expand and diversify, making the business bigger and more successful."

KNOWLEDGE GENERATION KEY ACTIONS

1. We will undertake a new research and technology capabilities study across the public and private sectors.

2. We will prioritise R&D funding towards opportunities identified in the Economic Strategy.

3. We will develop a foresight programme that will identify new and emerging technologies and key future markets for local companies.

4. We will develop a Creative NI Framework to foster and nurture a culture of ‘creativity and design thinking’.

Cliff Mason, AFBI Photography Unit

4 Knowledge Exchange

Overview

What is Knowledge Exchange?

Knowledge exchange is about facilitating the exchange and access to quality information across all sectors in order to support economic growth.

What do we want to achieve?

- More firms engaging in open innovation
- Increase business to business collaboration
- Increase business to academia collaboration
- More international partnerships and collaborations
- Greater funding success from external R&D funding sources

What are we going to do?

- Support more companies to engage in open innovation
- Support the creation of new networks, such as European Connected Health Alliance, which have the potential to exploit global market opportunities
- Develop and support greater international collaboration between business and academia
- Improve facilitation of knowledge exchange through teaching, consultancy and community based activities
- Increase Local Government and business collaboration
- Forge and strengthen strategic partnerships with emerging and high growth economies
- Strengthen engagement with EU and secure greater success in Horizon 2020
- Deliver increased core investment in the universities' knowledge exchange infrastructure (Higher Education Innovation Fund - HEIF)
- Complement HEIF with a new round of the 'Connected' programme to support more open innovation projects
- Develop the innovation capacity of HSC organisations

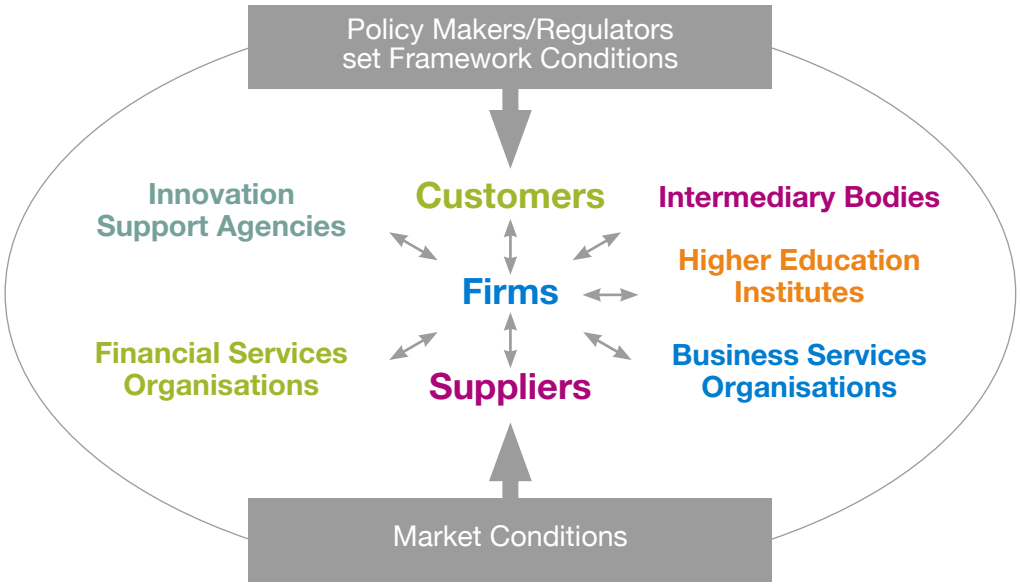
How will we know that we are on target?

- Co-operation and collaboration on innovation activities (% of innovators)
- HE income from collaborative activities (£m)
- Drawdown from Horizon 2020
- The increase in collaboration and cluster development on an international basis

Why is Knowledge Exchange Important?

Innovative economies are outward-focused, collaborative and have structures which can fully exploit the benefits of knowledge exchange. Success, therefore, will be strongly dependent on our ability to identify and develop effective private, academic and public sector collaborations that can deliver economic growth. We must incentivise collaboration, encouraging companies to develop their capabilities to exchange, access and absorb knowledge, technology and skills in order that they can exploit opportunities. An overview of the main actors in the innovation ecosystem is shown in Figure 5 below.

Figure 5: Overview of Innovation Ecosystem



Source: InterTradeIreland (2012) 'Leveraging the Innovation Ecosystem for Business Advantage: A Cross Border Study

Encourage Companies to Engage in Open Innovation

Companies which engage in collaboration are more productive than those that do not. Currently, NI firms are less inclined to collaborate than their counterparts in the rest of the UK. Encouraging collaboration and accessing external knowledge are central to moving towards a modern open innovation system and to increasing productivity and growth.[11] There is, therefore, a need for more of our companies to be open to collaboration, as this is often the best way of accessing new ideas.

We want to encourage a greater number of companies to look outside their own environment for new knowledge and ideas. Often described as 'open innovation', it can involve formal or informal collaboration with a wide range of organisations including other firms, suppliers, customers, colleges and universities.

The success of open innovation is dependent on a change in culture and attitudes to innovation in which trust, collaboration and knowledge exchange are integral. A recent report[12] indicates that our firms have much more limited connections than businesses in other UK regions. Northern Ireland needs to move to an enhanced model of open innovation where collaboration and commercialisation is accelerated across businesses.

We will therefore enhance our support to companies to enable them to engage in open innovation activities within and outside the Northern Ireland innovation eco-system. Work is underway to determine if this can best be delivered by the creation of a new Open Innovation Centre or the provision of a new innovation support service.

11 Love, JH, Roper, S & Bryson, J (2011) Knowledge, Openness, Innovation and Growth in UK Business Services

12 Roper S. (2012) Developing an Open Innovation Centre for Northern Ireland

Increasing Business to Business Collaboration

Collaboration capitalises on opportunities for innovation. In its pure form it can help businesses to compete in larger markets and strengthen their capacity to compete in global markets. Encouraging local businesses to coordinate and aggregate their resources, acts as a 'building block' for the potential creation of Industry Innovation Communities (IICs).

A number of organisations work with businesses to support collaboration and open innovation. Invest NI works with a wide range of sectors to deliver projects by providing facilitation support to enable effective working within collaborative networks. This support allows and encourages a cross-sectoral approach, which bridges the boundaries between traditional sectors and exposes companies to new markets, technologies and research opportunities. Working with nascent networks to help form the scope of projects, Invest NI will ensure all projects are industry-led and we will increase our investment in establishing industry-led collaborative networks, particularly those focused on market opportunities identified in the Economic Strategy.

Increasing Business to Academia Collaboration

Our Universities and Further Education colleges have vital roles in supporting business to access new ideas and knowledge. Northern Ireland currently ranks as the best performing UK region in terms of interactions between academics and the business, public sector and wider community,[13] whilst collaborative activities are a more important part of universities' income here than elsewhere in the UK.

Since the publication of FE Means Business, the strategy for further education in Northern Ireland, Further Education colleges have developed and strengthened their links and relationships with employers, business and industry both on a local, regional and international basis. Colleges have improved their services and products in response to industry demands and are increasingly working in partnership with the business community. The partnership will develop a more comprehensive, economically relevant curriculum which meets the specific needs of employers in terms of providing highly skilled, knowledgeable and competent people who can add significant value to employers when they enter the workforce. Provision within the colleges therefore remains very closely aligned to the Programme for Government (PfG) and the Economic Strategy.

Initiatives such as DEL's Higher Education Innovation Fund (HEIF) and the Connected Programme already provide invaluable roles in helping companies engage in innovation. While HEIF underpins the core business and community-facing activities of Queen's University and University of Ulster, Connected adds a further dimension. It enables the Universities and Further Education colleges to come together to identify and meet the knowledge exchange needs of businesses in a fully joined-up, holistic fashion, taking companies through the entire innovation process. However, we want to build on the success of these programmes, and therefore as set out under 'Graduating to Success', we will provide increased funding for the latest rounds of both the Higher Education Innovation Fund and Connected Programme.

13 UK Innovation Research Centre (2009)

We will also increase our investment in other existing programmes which support collaboration between our universities and colleges and companies, including:

- **Knowledge Transfer Partnerships (KTPs):** These facilitate the transfer of knowledge and the spread of technical and business skills through joint projects between third-level education establishments and local companies, undertaken by high-calibre, recently-qualified graduates. We will look to increase the scope of KTPs through strengthening our engagement with Innovate UK's (formerly the Technology Strategy Board) Knowledge Transfer Networks (KTNs) in its delivery of a series of KTP-themed 'calls'. We will also liaise with Innovate UK to agree on the scope and budget for a number of NI specific calls with a focus on priority sectors.
- **Knowledge Transfer Network (KTN):** These provide an over-arching network bringing businesses, technology organisations and academia together to enable the exchange of knowledge and encourage innovation. The Networks can help companies find out about new opportunities in key research and technology sectors and provide them with the opportunity to meet and network with individuals and organisations, in the UK and internationally. We will continue to work with Innovate UK to strengthen and develop KTN in Northern Ireland.

CASE STUDY: HUGHES INSURANCE

Hughes Insurance is a leading Northern Ireland insurance broker, with a product range including all personal insurance products and a range of commercial insurance products. Through a KTP with Queen's University, an astrophysics graduate working with the School of Mathematics and Physics was tasked with helping the company to develop financial and mathematical models. Astrophysicists gain advanced skills in mathematics at Queen's that are easily transferable to the world of business, in particular to financial modelling. The KTP Associate's work in researching and building regression models has shed light on customer behaviours, and has served to embed new technology and expertise in the business that has contributed to an increase in customer retention figures.

CASE STUDY: ELMORE FISH

Elmore Fish in Dunmurry used an innovation voucher to work with Loughry Campus CAFRE College to develop an innovative range of easy to cook fish dishes. The family owned and managed company, which has been supplying fresh and frozen fish since 1894, has launched its restaurant-branded range of ready fish dishes that can be oven cooked in just 15 minutes, enabling families to enjoy the health benefits of seafood.

The company used an innovation voucher in the initial development of the new meals and Invest NI provided further support to the company in the development of the new range, the associated branding and in marketing the range to key retailers particularly in the Republic of Ireland.

- **Innovation Vouchers:** This scheme provides SMEs with a voucher for £4,000 which can be exchanged with academia in FE colleges, universities or research institutions. They can be used to help develop important links, introduce new products or processes into a business. Importantly they encourage collaboration capacity and are of critical importance in our efforts to encourage firms to engage in innovation because they can 'de-risk' the first step for many businesses to become more innovative. Building on our recent extension to cover all SMEs, we will seek to increase investment in the Innovation Vouchers Programme.
- **Creative Credit Vouchers:** These have been piloted in the UK and enable businesses to access expertise and knowledge to develop new products, services and new markets. We will work with stakeholders to introduce a Creative Credit Voucher Programme.
- **Specialist Provision for Industry using College Expertise (SPICE) Centres:** FE colleges continue to drive excellence within FE provision in priority sectors and by developing good practice and expertise in specialist areas. Colleges are committed to contributing to this vision by developing centres of excellence, which will be known as Specialist Provision for Industry using College Expertise (SPICE) Centres. We will encourage FE colleges to create and establish SPICE centres, in order to provide bespoke support for all businesses in Northern Ireland, which will help them innovate and grow.
- **Knowledge Transfer Awards:** These support the embedding of results from R&D into HSC organisations. We will encourage clinicians and other HSC staff to become more efficient innovators by providing routes to the implementation of new products or practices that emerge from R&D, normally undertaken jointly with academics and/or business.

CASE STUDY: BELFAST MET'S e3 CREATIVE HUB PROGRAMME

Belfast Met's e3 Creative Hub Programme was initially funded through The Art Council's Creative Industries Innovation Fund. The programme was designed to stimulate entrepreneurship for early-stage start-up creative businesses; through the delivery of Belfast Met's FRESH (Creative Thinking) training and bespoke technical mentoring. The potential for exporting was explored through networking, best practice opportunities and the creation of a virtual cluster through the facilities at Belfast Met's e3 Campus.

Programme participants availed of one week's design thinking training, which encouraged new product/service development and provided specialised local support for innovators and entrepreneurs from within the Creative Industries.

On completion of the training, participants took the opportunity to gain further mentoring support to develop their innovative business idea. Participants were able to access funding enabling them to attend events/meet customers outside NI to support the sustainability of their business through export opportunities.

The participants also had the opportunity to pitch their business idea plans to a panel of Business Angels to seek further support.

The Programme offered creative industry events to encourage export activity and cross-sectoral collaboration. Topics covered by guest speakers were 'Clustering Creative Industries', 'Effective Gamification', 'Selling Digital Content in a Global Marketplace' and 'Inspiring Innovation in the Creative World'.

Increasing Local Government Collaboration

The introduction of Community Planning, combined with the transfer of additional responsibilities such as planning, urban regeneration, local economic development and local tourism will change the way we plan our cities, towns and rural areas, and will place a sharper focus on sustainable local economic development. Councils will have a greater opportunity to work with the private sector and the third sector to improve the local economy and will have an enhanced role in ensuring that the local investment climate fits the needs of local businesses; supporting small and medium size enterprises, encouraging the formation of new businesses, attracting external investment and generally supporting the growth of business in their local areas. They can also facilitate partnership applications for EU innovation funding under elective funds such as Horizon 2020.

Creating a supportive and enabling an environment for sub-regional innovation is an important role for our new councils, through new Community Planning functions, in regenerating communities and helping to create a balanced economy. With local councils, we will explore the development of a sub-regional profile/map to indicate sectoral strengths across Northern Ireland.

Supporting International Partnerships & Collaborations

Innovation is an international process where knowledge, resources and personnel freely move across borders. Local researchers, businesses and officials need to more actively engage and collaborate at UK, EU and global levels. Through greater collaboration, Northern Ireland can enhance knowledge and build networks by forging strategic partnerships which will help local businesses access new markets and improve the quality of commercially-focused research. Invest NI will utilise the Enterprise Europe Network (EEN) to enable SMEs in particular to collaborate internationally and to build, enhance and measure their innovation management capacity. EEN will deliver (for high-growth potential SMEs) a review of their innovation management capacity, followed by relevant advice and support.

These collaborations are essential if we are to establish a global reputation for excellence in key markets and technologies. Our strategic approach will include:

- Promoting our research and high technology sectors overseas to attract FDI;
- Promoting NI as a great place to live, work and invest;
- Supporting our businesses and researchers to access international markets and collaborative research networks;
- Ensuring Northern Ireland continues to attract globally mobile capital, technology and highly-skilled people;
- Strengthening our engagement with initiatives within the European Union; and
- Building strategic links with high growth economies.

Developing new international partnerships will give Northern Ireland access to new markets and increase our collaborative research partnerships. When considering the markets of focus, there are a number of criteria used:

- Opportunity match to sector expertise
- Stage of market development
- Rate of market growth
- Complexity of market
- Strategic importance to NI
- Company interest
- Resources

An example of such a partnership is the signing of a Memorandum of Understanding (MOU) between Kurdistan and Northern Ireland. The MOU covers seven strands:

- Investment advice
- Chambers of Commerce
- Higher education
- Police training
- Parliamentary contacts
- Tourism/Marketing
- Agriculture

We will therefore continue to forge strategic partnerships at the highest level with emerging economies in areas where there are alignments with Northern Ireland's capabilities and future market opportunities. In particular, we will support our key research institutes to develop international agreements. In addition, we will remain fully committed to the development of the US/Ireland R&D Partnership, working closely with our partners in the Republic of Ireland and the United States.

CASE STUDY: C-TRIC

C-TRIC, based in Altnagelvin Hospital, is a clinical translational research and innovation centre with an international reputation for excellence. C-TRIC has assisted Nova Biomedical, in the research and development of state of the art monitoring technologies for diabetes.

Nova Biomedical, headquartered in Waltham, Massachusetts, US is a world leader in the development and manufacturing of state-of-the-art medical devices, diagnostic equipment and specifically in vitro diagnostics. Nova Biomedical is widely known as the world leader in whole blood critical care technology to hospitals.

Since 2012 C-TRIC has undertaken a range of studies including technical evaluations, clinical evaluations and focus group work involving a well defined cohort of 200 patients with diabetes. A particular strength of C-TRIC's contribution has been the ability to obtain the relevant ethics and research governance approvals within a very short time frame, with the most recent study achieving a 70 day turnaround from point of contact to project completion.


TRIC

Increasing NI Success in Horizon 2020

EU funding for R&D and innovation not only provides an invaluable source of new funding but also helps establish sustainable, international collaborations. While Northern Ireland has exceeded targets for the Framework Programme 7 (FP7), the increased scope of Horizon 2020 with a budget of nearly €80 billion, presents an opportunity to significantly improve on recent performance.

In preparation for Horizon 2020, new measures to help applicants have already been introduced including the appointment by DETI of a Horizon 2020 Manager and the establishment of a new £1.8m Fund for the creation of a network of research experts. These experts, known as 'Northern Ireland Horizon 2020 Contact Points' work directly with researchers in companies, research institutes and HSC organisations supporting them to develop better quality applications in cooperation as appropriate with the Northern Ireland Executive Office in Brussels. We will, however, continue to enhance support so that more Northern Ireland companies and researchers are successful in Horizon 2020 and that we can secure at least €145m.

We will develop a Northern Ireland Strategy for Horizon 2020 which will identify the areas that will provide Northern Ireland organisations with the greatest potential to succeed. In addition, in recognition of the success of collaboration between organisations in Northern Ireland and the Republic of Ireland in drawing €80m in collaborative FP7, projects we will set a new target for increased success in this area.

Analytics Engines

CASE STUDY: ANALYTICS ENGINES

Analytics Engines, a Belfast-based SME specialising in accelerated big data processing, is currently engaged in a number of FP7 projects. One of these is the 'NANOSTREAMS' project delivering improved real time analytics capabilities for big data workloads in Finance, Healthcare and Enterprise Data. The project has allowed Analytics Engines to develop accelerator products with international companies including IBM and Credit Suisse along with world class research institutes in Switzerland, Netherlands, UK and Greece in a project valued at over €4.75m.

KNOWLEDGE EXCHANGE KEY ACTIONS

1. We will enhance our support to companies to engage in open innovation activities through the development of a dedicated support service.

2. We will increase our investment in establishing industry-led collaborative networks, particularly those focused on market opportunities identified in the Economic Strategy.

3. We will increase our investment in programmes and initiatives that support collaboration between business and academia and business to business.

4. We will increase our support to local companies and research organisations to secure at least €145m from Horizon 2020.

5 Knowledge Exploitation

Overview

What is Knowledge Exploitation?

Transformation of knowledge into products and services which can add value and preferably be exported.

What do we want to achieve?

- More companies accessing finance to exploit their knowledge and IP
- Support businesses with high growth and export potential
- Easy access to public sector data that can be commercially exploited
- Public procurement being used to drive innovation
- Our innovation infrastructure being exploited to its full potential

What are we going to do?

- Increase support for early stage businesses
- Look at new ways to support companies access finance
- Fund a world-class Business Accelerator
- Produce an Open Data Strategy and Action Plan for Northern Ireland
- Make more public data available online
- Exploit the potential for big data/data analytics
- Increase investment in Small Business Research Initiative (SBRI) to drive innovation through pre-commercial procurement of R&D
- Support the expansion of the NI Science Park (NISP)

How will we know that we are on target?

- Increased turnover from innovative goods & services (% of total)
- Firms reporting innovation protection (% of firms)
- Private equity backed firms (per 1000 VAT businesses)
- University spin-offs (per million persons)

Why is Knowledge Exploitation Important?

Within the UK, it is recognised that the current innovation infrastructure is "strong on research but, weak on economic impact".[14] Similarly, Northern Ireland has a solid innovation foundation but we need to work more effectively at exploiting this.

The journey from innovation to commercial success is not an easy one, with mistakes and failures inevitable on the way. We need to be more accepting of those entrepreneurs who have tried and failed, but who have learnt from their experience and are persisting on the entrepreneurial journey with new ventures. In a fast moving technological world, even the smartest teams cannot pick winners every time and it is better to share the stories of what did not work and move on to a new and better venture. We must always support our entrepreneurs and companies along this journey.

[14] The Current and Future Role of Technology and Innovation Centres in the UK, Dr. Hermann Hauser for BIS, 2010

[15] 'Access to finance for growth for SMEs on the island of Ireland' InterTradeIreland, 2013

Supporting Companies to Access Finance and Exploit Knowledge

In recent years, significant investment in terms of finance and research has been introduced to support entrepreneurial growth. This has come from Invest NI Development Funds, InterTradeIreland, NISPO, Halo, NISP, NISP Connect, Co-Investment Fund, Northern Ireland Small Business Loan Fund and Development Funds. Invest NI has already developed a suite of funds under its Access to Finance Strategy and it will promote these to ensure no funding interruption. In addition a range of equity funds are now providing a continuum of growth finance from seed through to expansion capital. To deal with the reluctance of some growth businesses to take the equity route there are initiatives, such as Invest NI's Northern Ireland Small Business Loan Fund and the Growth Loan Fund, providing £55m of debt finance over the next 5 years. Demand for these products will be monitored to ensure a response if this needs to be built upon.

Broadening the diversity of funding options available so that innovative businesses can grow quickly into export-focused enterprises is critical.[15] There is a disproportionate reliance on overdrafts by many businesses, a source of finance which is inappropriate for the growth needs of many innovative firms. Funding to NISPO has been increased and we propose to increase the funding available for NISPO II. We will also continue the development of the business angel market, through management support for the Halo Business Angel Network and the rolling-out of the new co-investment funds, like Co-Fund NI. The Growth Loan Fund and the Northern Ireland Small Business Loan Funds are providing SMEs with alternative financing which will help them exploit opportunities to grow. We will also explore innovative lending options such as crowdfunding, supply chain financing or peer-to-peer lending.

Building on the findings of the Economic Advisory Group's (EAG) review of 'Access to Finance for NI Businesses' we will also continue to look for new innovative approaches to support companies to access finance. We must address issues around SME and lender financial capability and improve the flow of information to businesses about the range of options available. We will therefore organise investor readiness workshops for both bank and alternative sources of growth finance, increase access to finance vouchers and encourage more businesses to use credit mediation or review services.

CASE STUDY: SOPHIA SEARCH

Sophia Search are one of the most successful companies so far to come through Halo, the NI business angels, winning funding of over £0.5m. The Halo EIS Fund also invested in Sophia.

Their semantic search technology searches uncategorised data while understanding the content much as humans might do.

In February 2013 they gained a combined angel and VC round of over $3m and have opened offices in the USA. They are currently poised for exciting growth as they launch their Ambience product which, they claim will revolutionise on-line advertising.

A group of Halo angels invested in Sophia and one of them, Stephen Houston, won the Halo Business Angel Award of the Year 2013 which was presented by Rajat Malhotra, UK Business Angel of the Year. This was at a Halo meeting in Belfast City Hall hosted by Mairtin O'Muilleoir, Lord Mayor and fellow Halo Angel.

Commercialisation of Intellectual Property

There have been significant efforts to improve the commercialisation of Intellectual Property (IP) generated in our HE sector, and the success of these efforts has been reflected in a large rise in IP income since 2003/04. More recently, similar efforts have been made to increase the commercialisation of IP from our public sector research institutions. We need to enhance the management and exploitation of knowledge and Intellectual Assets including IP from our research institutes. As part of this we will work with HMRC to increase awareness of the Patent Box, which enables limited companies to apply a 10% rate of Corporation Tax to profits earned after 1 April 2013 from its qualifying UK/EPO patents and certain other innovations.

Supporting Businesses with High Growth and Export Potential

Now and in the future, job creation will be highly dependent upon fast expanding companies in growth areas and markets such as ICT. Research by NESTA[16] demonstrates that around 6% of innovative, high growth businesses created 40% of new private sector jobs and were responsible for over 50% of the growth in jobs across the UK between 2002 and 2010. To encourage these kinds of businesses, we need to:

- Encourage entrepreneurs to commercialise their innovations and give them the tools to start and grow their businesses to a global level;
- Challenge entrepreneurs to focus as much on the processes of building their businesses as developing their technologies; and
- Work with those businesses that succeed and wish to continue to grow rapidly to help accelerate their growth and scaling.

In addition to the current support available from across the public and private sectors, we will fund a world-class Business Accelerator to foster the growth of early stage high tech start-ups. This Accelerator will provide an intensive and time-bound suite of support to high tech start-ups, including access to mentors and academia, a continuum of capital and a skilled workforce, business support services and global market opportunities. A shared workspace will encourage peer-to-peer learning during the programme. We will also work with businesses to apply the use of Productivity Improvement Tools and Techniques in order to leverage competitive advantage from the innovation process. It is envisaged that the range of support will be extended to include high growth and export potential start up businesses.

16 NESTA (2009) The Vital 6%

CASE STUDY: YARDMASTER

Yardmaster, a Draperstown based SME in the general engineering sector streamlined their manufacturing processes and increased productivity by 38% as a result of applying relevant productivity improvement tools and techniques, this allowed them to target new markets.

Companies exposed to the challenges and competitive pressures of export markets are more likely to be innovative and high performing. More local businesses, particularly our SMEs, need to be encouraged to sell their goods and services outside Northern Ireland. We will therefore focus our support to those businesses with greatest potential to exploit new markets, and particularly those areas identified by MATRIX.

CASE STUDY: WRIGHTBUS

Singapore bus and rail network operator SBS Transit (SBST), which carries more than three million passengers on its network every day, has added Wrightbus vehicles to its fleet in recent years, most recently with an order in 2012 for 550 double deck buses, which are all due to be delivered by mid 2015.

The Double Deck buses supplied to SBST are in Completely Knocked Down (CKD) format and are shipped from Ballymena to Singapore in flat pack format for assembly in Singapore.

Enterprise Minister, Arlene Foster commented that “Wrightbus is an innovative, forward thinking company which invests heavily in research and development. The groundbreaking technology the company is incorporating in their vehicles means they are becoming increasingly attractive to operators right across the globe.

Having already built the now iconic ‘New Routemaster’ which is currently on an international tour as part of the ‘GREAT’ campaign, Wrightbus is becoming an instantly recognisable and respected brand associated with innovation and best practice.

Innovation is a key driver of economic success and the export success achieved by Wrightbus is an example of what can be achieved through continually focusing on staying ahead of the competition.”

Exploiting Public Sector Information

Over the past 10 years there has been a drive to open up public sector information as a driver of economic growth and innovation. Through the 2012 Open Data White Paper, the UK government has committed to make data available in accessible formats and to put in place measures to actively encourage the re-use of public data.

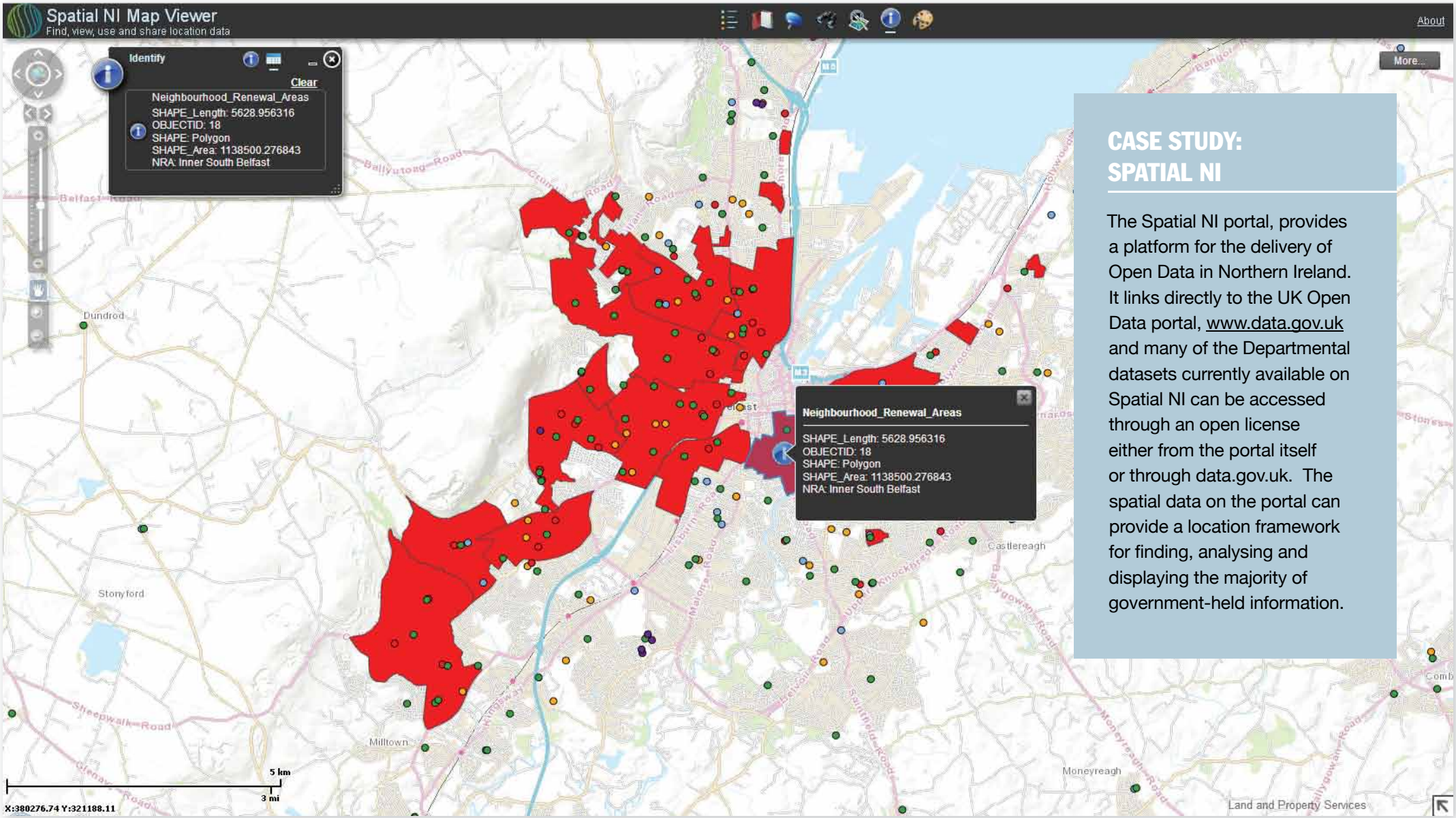
In Northern Ireland, with the development of the Spatial NI portal for our public sector data sets, we are committed to making significant strides to open up our public sector data. As part of this the Department for Regional Development will investigate the exploitation of the data it holds on traffic and public transport movements for the benefit of road and public transport users and the better management of traffic.

On a wider NI Executive level we will develop an Open Data Strategy and Action Plan for Northern Ireland. As part of this and to learn from international best practice, the Northern Ireland Executive will build a closer relationship with the UK Open Data Institute (ODI) and will examine the feasibility of establishing an Open Data Node in Northern Ireland. This will help embed an open data culture in Northern Ireland to bring the economic benefits of new and innovative data-led businesses. To encourage the exploitation of public data we will also run open data competitions to drive idea generation.

CASE STUDY: ADMINISTRATIVE DATA RESEARCH CENTRE

The Economic and Social Research Council has commissioned an Administrative Data Research Centre in Northern Ireland providing £6.3 million, over 5 years, to facilitate better access to government administrative data in a safe and secure environment. The purpose is to enhance the ability to link and analyse anonymised administrative datasets, which should provide potential for understanding population dynamics and the robust evaluation of programmes and policies. Linked data can be used to research the complex multifaceted nature of economic and social policy. This could include the individual, household and area level impacts of such policies. Areas for research include health status, educational attainment, and possibly any wider effects on the criminal justice system and on the residential environment.

Administrative Data Research Centre Northern Ireland



CASE STUDY: SPATIAL NI

The Spatial NI portal, provides a platform for the delivery of Open Data in Northern Ireland. It links directly to the UK Open Data portal, www.data.gov.uk and many of the Departmental datasets currently available on Spatial NI can be accessed through an open license either from the portal itself or through data.gov.uk. The spatial data on the portal can provide a location framework for finding, analysing and displaying the majority of government-held information.

Data Analytics

Data Analytics and 'Big Data' refers to data sets which are beyond the ability of typical tools to capture, store, manage and analyse. There is strong evidence that data can be used to drive productivity and competitiveness as well as to stimulate innovation.

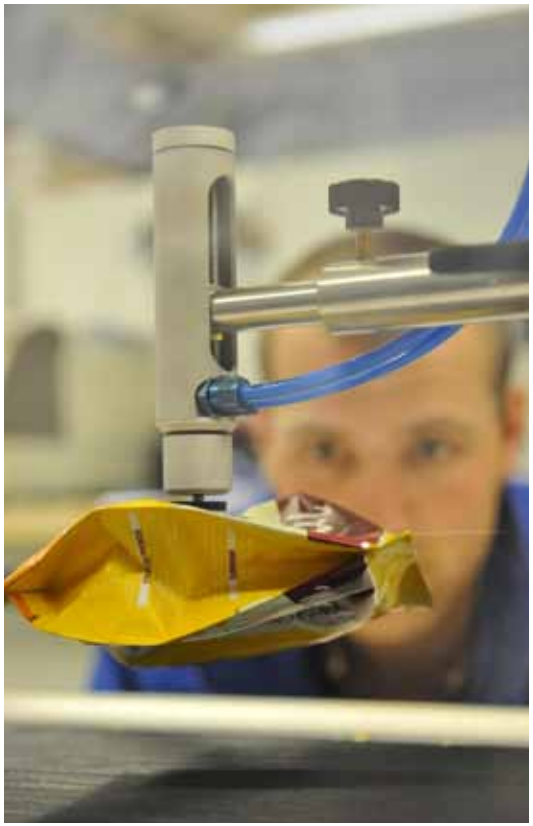
Information technology which was created to manage data within institutional 'silos' is now being harnessed to integrate, interrogate and exploit massive volumes of data. Our public sector generates significant amounts of data that, if properly exploited, could lead to significant efficiencies and also provide 'sandboxes' to allow developers to explore new business opportunities.

In Northern Ireland we have already successfully started to commercially exploit such data sets. In 2012, nine public sector data sets were made available under licence as part of an NI Tourist Board (NITB) competition for tourism apps. By making these data sets available new apps were created by local companies. We will ask MATRIX to conduct a study into the size and nature of the opportunity presented by open data and big data for NI businesses and to advise on the actions required to exploit this.

Using Public Procurement to Stimulate Innovation - SBRI

The Northern Ireland Public Sector spends some £3 billion per annum on the procurement of goods and services. It has been shown that the public sector, as an intelligent customer, can make a major contribution to encouraging innovation. Directing even a small proportion of this towards innovative procurement programmes will help stimulate innovation in the economy by accelerating ideas, products and services from businesses. This approach has been used successfully through Innovate UK's Small Business Research Initiative (SBRI).

Northern Ireland was the first devolved administration in the UK to run a SBRI competition. Since then a number of additional competitions have been launched, including one to develop solutions for the sustainable utilisation of Poultry Litter, one on Medicines Adherence and another to promote the use of electric vehicles. Building on this we will provide further investment into the SBRI model and investigate the development of a central fund, to co-fund SBRI projects across public sector organisations.



CASE STUDY: SMALL BUSINESS RESEARCH INITIATIVE (SBRI)

The Small Business Research Initiative (SBRI) is a structured "pre-commercial procurement" process aimed at driving innovation through the procurement of Research & Development. It provides innovative solutions to public sector challenges and business opportunities to technology-based businesses. By using SBRI the public sector is able to access ideas and technologies that they would not reach through normal channels.

CASE STUDY: REPKNIGHT

Newly-founded Drumbo company RepKnight radically changed its business offer after responding to a SBRI competition from a Whitehall department. The company has since developed the fastest social media monitoring platform of its type in the global market and new customers are being signed up at home and abroad. Staff numbers have risen from just three in December 2011, to 15 by spring 2013.

RepKnight was recently presented the Security Innovation Award 2014 during the Home Office's Security and Policing Exhibition.

'We have been punching way above our weight thanks to SBRI, securing and delivering contracts way beyond what could reasonably have been expected of us.' John Reid, Chief Executive Repknight.

NISP CONNECT

Enhancing and Exploiting our Innovation Infrastructure

The NI Science Park has played a vital role in helping to rebalance our economy. It is home to over 100 companies and one of the biggest research institutes in Northern Ireland, who together employ over 2,000 people. In just a decade of operation, it has become a microcosm of the knowledge economy that we wish to develop for the whole of Northern Ireland. Its continuing success as a key part of our economic infrastructure needs to be fully exploited and built upon. This will further develop its role to support more firms in the MATRIX-identified sectors to engage in open innovation so they can exploit new global market opportunities. We will therefore support the expansion of the Northern Ireland Science Park.

An annual £4.5 billion invested in the Health and Social Care sector also presents huge opportunities to drive innovation in local companies. The HSC R&D Fund enables the development of infrastructure, networks of support staff and research services for clinical trials and other studies across HSC organisations. Positive progress has been made in this area, with a recent 'Task and Finish' group identifying recommendations on how such opportunities can be further exploited. We will take forward those recommendations, and in particular, seek to develop an overarching Health and Life Sciences Strategy in partnership with stakeholders.

The recent 'Going for Growth'[17] report highlighted the importance of innovation to the continued expansion of the Agri-food sector, Northern Ireland's largest manufacturer. The report produced a series of recommendations on how industry, working in partnership with the public sector, can exploit global opportunities. We will work with the Agri-Food Strategy Board and other stakeholders to take forward these recommendations.

[17] Agri-Food Strategy Board, 2013

Exploiting E-commerce

E-commerce continues to provide tremendous opportunities for local companies to compete on a global basis. Through an investment of more than £60 million, we have built one of Europe's most extensive regional broadband networks.

The challenge we face now is how to fully exploit this opportunity. We will continue to improve the competitiveness of businesses through e-business support which will:

- Integrate e-business and digital communications into every aspect of business;
- Increase the e-capability of NI businesses through awareness building and training;
- Increase the volume and value of export sales through e-commerce;
- Target support for businesses, to enable them to both understand the business potential of the digital platform and also ensure they fully exploit the technology; and
- Engage key players across government, industry and academia, to drive forward Pathfinder initiatives, which will result in a step change business performance as a result of exploitation of the digital platform.

CASE STUDY: CHAIN REACTION CYCLES

The Chain Reaction Cycles (CRC) journey began in 1984 as a small family business in Ballynure with a £1500 loan, serving and supporting local cyclists. Their 'adrenaline fuelled' journey from modest beginnings to the 'World's largest online bike store' was

1984: Original bike shop, Ballynure Cycles, established
1989: New larger shop in Ballyclare, Chain Reaction Cycles, was born
1998: Mail order focus began
2000: Launched website *www.ChainReactionCycles.com*
2004: Whole operation relocated to purpose-built premises
2007: Created their first World Cup downhill mountain bike team
2011: Opened Flagship, 10,000 sq ft Belfast store

Today the business is still owned by the Watson family and many of the next generation have active roles in the business, supported by many of the original CRC team.

"We work hard to deliver the best service, range and value so you only have to work hard on your saddle. It runs through our veins - cycling is in our blood."

KNOWLEDGE EXPLOITATION KEY ACTIONS

1 We will fund a new world-class Business Accelerator.

2 We will develop an Open Data Strategy and Action Plan for Northern Ireland.

3 We will increase investment in the use of SBRI.

4 We will support the expansion of the NI Science Park (NISP).

6 Measuring Progress

Targets & Goals

A number of indicators have been identified that can be used to track the impact that the Innovation Strategy is having and, ultimately its success in meeting the overarching vision. These have been split into:

- **Long-term strategic goals** based on regional benchmarking, employment in knowledge-intensive sectors and R&D expenditure. Given the underlying structural changes needed to meet these, goals have been set for 2025 with interim milestones for 2020; and
- **Medium-term targets** in areas where actions outlined in this Strategy should lead to improvements (greater collaboration, more companies involved in R&D, increased knowledge exploitation etc). These targets have been set for 2020 and will also provide a good indication as to whether Northern Ireland is on-track to meeting its longer-term goals.

Details of these goals and targets (along with current performance) are shown in Figure 6 and Table 2.

Monitoring Arrangements

The monitoring of actions, indicators and targets will allow us to gauge the delivery and effectiveness of these actions. This is an interlinked framework where it is expected that achievement of medium term targets and progress under other indicators outlined in the overview (at each section) should mean that significant progress is made towards achievement of our long term goals. It will also allow for any reprioritisation of resources and interventions, particularly given the continued uncertainties in the local and global economy. An Annual Innovation Report will be submitted each year which will include:

- Update of performance against goals and targets;
- Assessment of innovation performance in a wider range of related areas;
- Review of how appropriate goals and targets are in light of emerging data;
- Progress on the actions outlined in this Strategy; and
- Recommendations for future actions and policy direction.

Figure 6: Innovation Strategy Goals and Targets

Long Term Goals	Current	Milestone (2020)	Goal (2025)
European innovation scoreboard ranking	Innovation follower	Innovation follower	Innovation leader
UK regional innovation ranking	12th (of 12)	Top 6	Top 4
Employment in the knowledge economy	33,370	45,000	54,000
Total R&D spending	£624 million	£950 million	£1.2 billion

Medium Term Targets	Current	Target (2020)
Drawdown from EU H2020	n/a (starts in 2014)	€145 million
Business Expenditure on R&D (as a % of GVA)	1.6%	1.8%
Number of R&D companies	496	650
Business start-up rate	7%	14%
Collaboration amongst innovative firms	45%	60%
Private sector turnover from innovation	£11 billion	£22 billion

Table 2: Goals and Targets

	Source	Notes
European regional innovation ranking	European Regional Innovation Scoreboard	• Assesses 190 European regions to provide an annual benchmark of innovation performance • 11 innovation indicators are used to generate an overall score • Each region is benchmarked against the EU average as an innovation leader (>120%), innovation follower (90-120%), moderate innovator (50-90%) or modest innovator (<50%)
UK regional innovation ranking	UK Innovation Survey	• Identifies the percentage of companies that are innovation active • This covers product innovation, process innovation and other wider business changes implemented
Employment in the knowledge economy	NISP Knowledge Economy Index	• Measures employment in high-value knowledge economy sectors • These are areas such as pharmaceuticals, ICT, software, electronics, transport, creative content and technical consultancy
Total R&D expenditure	NISRA R&D Survey	• Includes all expenditure on research and development • Aggregate measure of R&D by business (BERD), higher education (HERD) and government (GOVERD)
Drawdown from Horizon 2020	European Commission	• Level of funding drawdown from Horizon 2020 • Starts in 2014 and runs until 2020
Number of R&D companies	NISRA R&D Survey	• Number of companies identified as carrying out research and development each year
Business start-up rate	NISRA Inter-Departmental Business Register (IDBR)	• Business start-ups are those that exist in the latest year but were not present in the two previous years • Rate is expressed as a percentage of the total active business base
Collaboration amongst innovative firms	UK Innovation Survey	• Proportion of innovative firms that co-operate on their activities • Covers collaboration with supplier, customers, competitors, higher education, private sector and public sector
Private sector turnover from innovation	UK Innovation Survey and NISRA Annual Business Inquiry (ABI)	• Based on the proportion of turnover from goods and services that are new to market, new to company or significantly improved • Applied to private sector turnover in sectors covered by the innovation survey (equivalent to around 77% of total turnover)

Summary of Key Actions

Cultural Change	1. Examine the feasibility of establishing an Innovation Council 2. Develop a workstream for the new Public Sector Innovation Lab 3. Implement a new Communication Strategy on Innovation 4. Develop new Social Innovation accelerator programmes
Knowledge Generation	5. Prioritise R&D funding towards opportunities identified in the Programme for Government and the Economic Strategy 6. Undertake a new research and technology capabilities study across the public and private sectors 7. Develop a foresight programme that will identify new and emerging technologies and key future markets for local companies 8. Develop a Creative NI Framework to foster and nurture a culture of 'creativity and design thinking'
Knowledge Exchange	9. Enhance our support to companies to engage in open innovation activities, either through the development of an Open Innovation Centre or the provision of a new support service 10. Increase our investment in establishing industry-led collaborative networks, particularly those focused on market opportunities identified in the Economic Strategy 11. Increase our investment in programmes and initiatives that support collaboration between businesses and academia 12. Increase our support to local companies and research organisations to secure at least €145m from Horizon 2020
Knowledge Exploitation	13. Fund a new world-class Business Accelerator 14. Develop an Open Data Strategy and Action Plan for Northern Ireland 15. Increase investment in the use of SBRI 16. Support the expansion of the NI Science Park (NISP)

Glossary

BERD	Business Expenditure on Research & Development
CAFRE	College of Agriculture, Food and Rural Enterprise
CHIC	Connected Health Innovation Centre
C-TRIC	The Clinical Translational Research and Innovation Centre is a unique facility promoting and facilitating translational and clinical research, the primary objective of which is to reduce both the time to market and the costs associated with research and development of innovative health technologies, medical devices and therapeutics
DEL	Department for Employment and Learning
DETI	Department of Enterprise, Trade and Investment
EAG	Economic Advisory Group
EEN	Enterprise Europe Network
EPO	European Patent Office
ESP	Employer Support Programme
eSTEAM	Enterprise, Science, Technology, Engineering, Arts and Maths
EU	European Union
FDI	Foreign Direct Investment
FE	Further Education
FP7	EU's Seventh Framework Programme for Research
GDP	Gross Domestic Product
GVA	Gross Value Added
HALO	Halo is the business angel network for Northern Ireland and is sponsored by InvestNI and InterTradeIreland. Its role is to match companies with growth potential with high net-worth individuals – the angels – who may wish to invest in them
HEI	Higher Education Institution
HEIF	Higher Education Innovation Fund
HMRC	Her Majesty's Revenue and Customs
HSC	Health and Social Care
H2020 / Horizon 2020 Programme	Term for a new simplified and focused EU Framework Programme
ICT	Information Communication Technology
IIC	Industry Innovation Community
IP	Intellectual Property
ISO	International Office for Standardisation
KTN	Knowledge Transfer Network
KTP	Knowledge Transfer Partnership
LMSF	Leadership and Management Support Framework

MATRIX	MATRIX, the Northern Ireland Science Industry Panel, is a business led expert panel formed to advise Government on the commercial exploitation of Research and Development, science and technology in N Ireland
MoU	Memorandum of Understanding
NESTA	National Endowment for Science, Technology and the Arts
NICS	Northern Ireland Civil Service
NISP	Northern Ireland Science Park
NISP Connect	NISP CONNECT is an independent, non-profit organization fostering entrepreneurship by accelerating the growth of promising technologies and early stage companies.
NISPO	Northern Ireland Spin Out - supports start-up and early stage businesses in Northern Ireland. The support includes a £5 million venture capital fund, the Invest Growth Fund, which is provided by Invest Northern Ireland and focuses on seed and early stage businesses with high growth potential. NISPO also includes a £3 million proof of concept fund, the Invest Growth Proof of Concept Fund, which is funded by Invest Northern Ireland to provide funding to very early, non-university projects
NISRA	Northern Ireland Statistics and Research Agency
NITB	Northern Ireland Tourist Board
ODI	Open Data Institute
OECD	Organisation for Economic Cooperation and Development
Open Data Node	A node acts as a global focal point to catalyse and connect cross-sectoral organisations i.e. businesses, government, academia and individuals and will provide access to Open Data Institute's (ODI) training programmes
PfG	Programme for Government
PoC	Proof of Concept
QR Funding	Quality-related Research Funding
QUB	Queen's University Belfast
R&D	Research and Development
SBRI	Small Business Research Initiative
SME	Small and Medium Enterprises - Businesses with fewer than 250 employees
SPICE	Specialist Provision for Industry using College Expertise
STEM	Science, Technology, Engineering and Mathematics
Third Sector	Part of an economy or society comprising non-governmental and non-profit making organisations including charities, voluntary and community groups
TSN	Targeting Social Need

Contacting Us

If this document is not in the format that meets your needs please contact the NI Innovation Strategy Team

This document is also available on the following internet site:
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