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Regional Innovation Systems

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Paper providing an overview OECD Regional Innovation System theory and best practice with comparisons to Northern Ireland's Regional Innovation Action Plan 2008-2011

Key Points

- The OECD views regions as playing a significant role in fostering innovation.
- They argue in favour of regions developing Regional Innovation Systems which include R&D as an integral building block of a broader multidimensional system.
- The policy mix used to develop such a system is likely to be context specific. That is, it will be influenced by a range of factors particular to the region: its institutional arrangements; the interactions with national policy; the challenges and opportunities faced; the stage they are at in the development cycle (building, transforming, or catching-up); a region's goal; and stakeholders input.
- Northern Ireland's Regional Innovation Strategy Action Plan 2008-2001 includes many of these aspects.
- DETI's own assessment of the policy showed that the Department successfully met the majority of targets.
- The *Northern Ireland R&D Statistics 2010* shows that total R&D expenditure and Business R&D expenditure increased between 2009 and 2010, suggesting that the action plan has been successful.
- *Companies with 250 or more employees accounted for 61% of business R&D expenditure in 2010, although they represented only 10% of R&D performing companies'.*
- The statistical bulletin also shows that R&D employment has increased in recent years. According to the bulletin, however, collaboration has decreased slightly between 2009 and 2010.
- The *Northern Ireland R&D Statistics* is the region's key publication assessing R&D performance. Its main focus is R&D expenditure, although it does include data on other measures, notably human capital and collaboration. There may be benefits to extending the scope of this publication to include a wider variety of measures. One suggestion would be to develop a publication that mirrors the EU's Innovation Union Scoreboard.
- In a 2009 assessment of Northern Ireland's Regional Innovation System NESTA has noted that Northern Ireland's policy demonstrates a commitment to improving innovation performance and has created opportunities to undertake more innovation and R&D.
- They also argued, the establishing Innovation Council capabilities to '*analyse, challenge and support developments in innovation capability*', would address Northern Ireland's institutional shortcomings and improve monitoring, analysis and challenge functions.
- The case studies presented in this paper provide an illustration of how specific policy mixes have been adapted to particular contexts, goals and challenges. The policy instruments utilised reflect the different starting points of each region, although there is a degree of overlap.

Executive Summary

OECD – Theory and Practice

The OECD (Organisation for Economic Development) notes that regions have become increasingly significant in innovation policy for two reasons:

- The inclusion of regions within national innovation policy; and
- A paradigm shift in regional development.

OECD literature has a tendency to focus upon innovation systems within which R&D is viewed as an integral building block of the broader systems. The organisation reason that in looking beyond R&D policy makers should consider:

- The interaction of a range of complementary assets, such as software, human capital and new organisational structures;
- Complementary strategies which move beyond *'simplified'* divisions between 'technological' or 'non-technological' innovation;
- Collaboration;
- Multidisciplinary/interdisciplinary research;

This is not to suggest that the OECD no longer views traditional measures, such as business R&D expenditure, as important – to the contrary, it notes that the *'27 "big hub" regions outperform other regions, especially with respect to innovation indicators such as business expenditures on R&D, patenting and collaborative arrangements for innovation'*

The OECD tends to favour the Regional Innovation System (RIS) concept as it expresses the totality of what makes up the *'multiple development patterns and growth models for success'* employed by OECD regions.

A more precise definition is *'a cumulative and non-linear systemic process'* in which businesses play a central role, but are dependent upon the performance of other agencies (universities and research centres), regional frameworks (standards and regulations) and forces influencing demand.

The wider concept of a Regional Innovation System is applied, by the OECD, policy development and policy assessment.

The OECD stresses that there is no *'standard one-size-fits-all" approach around a single model'*. Rather the model of Regional Innovation System adopted by a particular region will depend upon:

- The policy tools available to it;
- How it interacts with national policy;
- The quality of the policy process;

- The evidence upon which policy is based;
- The participation of regional stakeholders in the policy making process; and
- The challenges and socio-economic opportunities particular to a region.

Regions are required to make strategic choices, which will be influenced by their specific context and stage of development. Three development stages are identified:

- Building on current advantages – where a region is already a world leader in one or more areas of innovation and wish to maintain or enhance that position;
- Supporting socio-economic transition – applicable to regions that had previously been successful in one sector but are required to adapt new models of development where older models are failing; and
- Catching-up – applies to regions that lag behind in income per capita, productivity growth and employment generation. Such regions often lack in high value-added economic activities, infrastructure and high-quality services.

Northern Ireland could be considered to be situated between the catching-up and supporting socio-economic transition categories.

A number of policy instruments are available to regions as they seek to develop a Regional Innovation System. How these instruments are used and their value to a region will depend upon that region's institutional arrangements, the stage they are at in the development cycle (building, transforming, or catching-up), a region's goal, as well as the input from stakeholders. Policy instruments are divided according to the area they are intended to impact – knowledge generation, knowledge diffusion or knowledge exploitation. They are also divided into traditional, emergent and experimental instruments. A successful policy mix will also draw upon a number of policy areas:

- Regional development policy;
- Science and technology policy;
- Industrial and enterprise policy, including SME policy; and
- Higher education policy.

In developing a policy mix a region should:

- Avoid negative policy interaction and maintain positive ones;
- Develop a clear understanding of how the current regional system is working and the identification of bottlenecks;
- Set clear objectives and targets which are evaluated enabling policy refinements; and,
- Policy mixes should be focussed on outcomes.

Northern Ireland Regional Innovation System

Examining Northern Ireland's Regional Innovation Strategy Action Plan 2008-2011, in the context of OECD best practice, reveals positive results. The Action Plan fits well within the OECD model:

- It put forward a contextual, multi-dimensional, systemic approach to innovation;
- R&D is an integral feature but not the exclusive measure of development;
- It set out a clear vision, based on opportunities and challenges, and was developed with stakeholder input;
- The policy mix reflected the identified challenges and opportunities, and also Northern Ireland's institutional arrangements;
- The policy mix contained instruments from the OECD three policy areas – knowledge generation, diffusion and exploitation;
- The policy mix contained actions to encourage collaboration at a number of levels;
- Mechanisms for review and benchmarking were also included in the policy; and
- It took a long-term view of innovation policy, leaving room for flexibility and incremental progress.

DETI's own assessment of the Action Plan shows it to be a success with most targets met across the four strategic imperatives.

The publication *Northern Ireland R&D Statistics 2010* shows that total R&D expenditure and Business R&D expenditure increased between 2009 and 2010, suggesting that the action plan has been successful. Although it should be noted that in this period *'Companies with 250 or more employees accounted for 61% of business R&D expenditure in 2010, although they represented only 10% of R&D performing companies'*.

The statistical bulletin also shows that R&D employment has increased in recent years. According to the bulletin, however, coloration has decreased slightly between 2009 and 2010.

The *Northern Ireland R&D Statistics* is the region's key publication assessing R&D performance. Its main focus is R&D expenditure, although it does include data on other measures, notably human capital and collaboration. There may be benefits to extending the scope of this publication to include a wider variety of measures. One suggestion would be to developing a publication the mirrors the EU's Innovation Union Scoreboard.

NESTA's (National Endowment for Science Technology and the Arts) assessment of the Action Plan and of Northern Ireland's innovation in general contains positive and negative points. They see the Action Plan as important as it *'demonstrates the commitment of a wide range of Northern Ireland organisations to improving innovation*

performance'. Furthermore they concluded that the plan exhibited '*a very significant level of support*' and, in doing so, created '*opportunities to change behaviours and to encourage firms to undertake more R&D and innovation*'.

NESTA argued, the establishing Innovation Council capabilities to '*analyse, challenge and support developments in innovation capability*', would address Northern Ireland's institutional shortcomings and improve monitoring, analysis and challenge functions. They also suggested the introduction of a Service Innovation Grant, a requirement of collaboration, and a remodelling of the University funding system towards the Scottish Horizon fund approach.

Case Studies

The three case studies presented in this paper provide details on the Regional Innovation System in practice in regions corresponding to the three development stages identified by the OECD: Building on current advantages; supporting socio-economic transition; and catching-up.

The case studies provide an illustration of how specific policy mixes have been adapted to particular contexts, goals and challenges. The resulting policy mixes have been established to address these factors. The policy instruments utilised reflect the different starting points of each region, although there is a degree of overlap.

In Baden-Württemberg, the region building from current advantages, the policy mix includes actions aimed at:

- Maintaining current advantages in scientific excellence;
- Improving partnership cooperation and developing clusters; and
- Developing the future generation of scientists and researchers.

In the Basque Country, the '*supporting socio-economic transition*' region, the policy mix includes actions aimed at:

- Encouraging business innovation;
- Improving the use of ICT in the business sector;
- Promoting R&D within specific business sectors; and
- Building networks.

In Wielkopolska, the '*catching-up region*', the policy mix includes actions aimed at:

- Encouraging innovative Foreign Direct Investment to enter the region;
- Supporting the development of emerging innovative companies;
- Establishing a modern education and training system; and
- Building networks.

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1 Introduction

The following paper outlines OECD best practice on Regional Innovation Systems, examines Northern Ireland's recent Regional Innovation Strategy from the prism of this best practice and provides case studies of European Regional Innovation Systems.

2 Theory and road-maps

2.1 Why are regions important?

In their 2011 publication, *Reviews of Regional Innovation – Regions and innovation Policy*, the OECD (Organisation for Economic Cooperation and Development) notes the increasing significance regions play in national and supra-national innovation systems. The reasons for this are twofold. Firstly, there has been a trend towards 'the inclusion of regions and their specific assets in national innovation policy' and secondly, because of a 'paradigm shift in regional development policy'.ⁱ

Explaining this further, OECD states:

Many OECD regions are formulating regional innovation strategies to increase their economic competitiveness, with a tradition of institutions supporting innovation for regional growth. For some countries, like the new member countries of the EU, this is a new trend based on increased democratisation, devolution and decentralisation. For others, such as Canada, Germany, Spain and the United States, there has been long-standing regional action in innovation.

In EU Countries, the availability of structural funds has helped regions mobilise their assets for knowledge-based growth. Innovation has become one of the main pillars of EU regional policy. From 1989-1993, approximately 4% of regional policy funds were devoted to innovation (2 out of 50 billion). The share of broadly defined innovation-related spending for the period 2007-2013 is projected to be approximately 25%, totalling around EUR 86 billion. Nevertheless, persistent knowledge, technology and innovation gaps between and within countries demand improved and better targeted policies.ⁱⁱ

2.2 Beyond R&D in a regional context

OECD literature has a tendency to focus upon innovation systems within which R&D is viewed as an integral building block of the broader systems.

In assessing and measuring innovation systems, the OECD examines a range of factors:

- **Intangible assets:** the OECD views innovation as the result of the interaction of a range of complementary assets. Significantly, they are of the view that regions should not focus exclusively upon, and should rather look beyond R&D. Significant assets include software, human capital and new organisational structures. The OECD note that investment in these intangible assets is increasing and overtaking more traditional investment in physical capital (machinery and equipment) in states with higher innovation performance; in Finland, Sweden and the United States for example. Furthermore, firms may introduce new products on the market without engaging in R&D. For example, in Australia and Norway the tendency to introduce new-to-market product innovation is similar whether or not the firm performs R&D.
- **Mixed modes of innovation:** OECD data suggest that innovative firms tend toward complementary strategies. Rather than seeing a division between ‘technological’ or ‘non-technological’ innovation, the OECD view such terms simplifications. They note that *‘innovative firms introduce both product and process innovations, as well as marketing or organisational innovations’* and that *‘this is true for firms in both manufacturing and services’* allowing for *‘differences by sector and firm size’* (For example, *a larger share of firms in services than in manufacturing introduce only marketing or organisational innovation’*).
- **Collaboration and networks:** collaboration is, according to the OECD, *‘essential’*. It notes that *‘firms that collaborate on innovation spend more on innovation than those that do not’*, suggesting *‘that collaboration is likely to undertaken to extend the scope of a project or to complement firms’ competences more than to save on costs’*. It adds that in *‘most countries, collaboration with foreign innovation partners is at least as important as domestic co-operation’*. It is noteworthy, that the organisation considers collaboration as significant irrespective of the amount innovation a firm carries out. As such, it holds the view that *‘policies that stimulate collaboration and network initiatives will have an impact on the entire spectrum of innovative firms’*.
- **Convergence of scientific and multidisciplinary/interdisciplinary research:** the OECD notes a trend towards multidisciplinary/interdisciplinary research. It states *‘using ‘science maps’, there is evidence that increasingly, innovations are achieved through the convergence of scientific fields and technologies’*. Adding, *‘for example, nanoscience has arisen from the integration of physics with chemistry and is interdisciplinary in character’*. Successful multi-disciplinary research *‘requires creating spaces for interaction and cross-fertilisation of different knowledge domains’*.ⁱⁱⁱ

This is not to suggest that the OECD no longer views traditional measures, such as business R&D expenditure, as important – to the contrary, they note that the *‘27 “big hub” regions outperform other regions, especially with respect to innovation indicators such as business expenditures on R&D, patenting and collaborative arrangements for innovation’*.^{iv} Rather it is to emphasis the OECD argument that:

... a new generation of innovation policies will need to supplement the traditional emphasis on inputs (such as R&D as a share of policy targets) with broader kinds of intervention. The more comprehensive policy approach considers supporting human resources and talent, creating demand for innovative product through public procurement, offering advanced innovation services for SMEs, and promoting novel forms of support for innovation networks and collaborative arrangements. Such new areas in national policies have been vital in the agendas of regional governments that have successfully mobilised innovation and production capacities for regional development. Interaction between regional and national strategies is crucial.^v

For this reason, whilst recognising that the ‘*growth performance of leading regions is highly associated with investments in R&D and technological development*’, the OECD tends to favour the Regional Innovation System (RIS) concept as it expresses the totality of what makes up the ‘*multiple development patterns and growth models for success*’ employed by OECD regions.

The RIS concept defines innovation as ‘*a cumulative and non-linear systemic process*’ (note: non-linear is used here in contrast to a linear model of innovation, which suggests that innovation progresses in a line – from invention to innovation: basic research > applied research > innovation/diffusion^{vi}). It is a system that relies on interactions (both formal and informal) between stakeholders. Businesses play a central role in the system; they are the primary recipients of *technical knowledge and know-how and the prime agents in the search for innovation*. Businesses do not, however, operate in isolation and are reliant upon the performance of other agencies (universities and research centres), regional frameworks (standards and regulations) and forces influencing demand. Such interactions can, according to the OECD, be of variable value with the ‘*intensity and quality of interactions*’ between agents being a *key determinant of performance*.^{vii}

It is notable that this broad concept, as used by the OECD, is viewed as a policy tool and a mechanism for measuring progress.

The OECD’s emphasis on the RIS concept finds support from other policy makers. European Commission Directorate for Enterprise and Industry comments on role of regional growth places a similar emphasis on the interaction of a variety of actors within a sub-national context:

Growth is increasingly related to the capacity of regional economies to change and innovate. Regions and cities have become the primary spatial units where knowledge is transferred, innovation systems are built and competition to attract investments and talents takes place.

Regions are an appropriate level for stimulating innovation: Many regional governments have important competences and budgets in the field of

innovation. Their geographical proximity facilitates the acquisition, accumulation and use of knowledge. Regions' performance depends not only on that of enterprises and research institutes but also on interactions between different stakeholders, enterprises and organisations, whose knowledge and know-how build up over time.

EU innovation policy has placed a strong emphasis on networks which link the business to the surrounding environment (other firms, universities, research institutes, etc.) and are active mostly at regional level, e.g. in the field of cluster initiatives.^{viii}

The Department for Business Innovation and Skills' (BIS) recent economics paper '*Innovation and research strategy for growth*' also recognises this systematic, multi-actor approach, whilst noting the possible role of both national and regional specialisation (this study has underpinned the current BIS strategy *Innovation and Research Strategy for Growth*):

What does modern research teach us about innovation? Some central robust conclusions are that innovation activity is pervasive across industries, collective in character (involving interactions of many actors), cumulative over time, risky and uncertain, and often rests on national and regional specialisations. Clusters of knowledge and innovation hotspots have emerged in a wide variety of studies as a prevalent feature of competitive advantage. Above all, innovation performance rests not simply on entrepreneurial actors but is powerfully shaped by the innovation system, which is the connected set of organisations (firms, universities, financial actors) and institutions (such as laws, regulations, and infrastructures) that shape the environment within which firms and other actors innovate and produce. The structure and functioning of the innovation system is a central challenge for policymakers.^{ix}

In a similar vein the BIS strategy *Innovation and Research Strategy for Growth* states:

Strong connections between key actors in the innovation system are instrumental to create and disseminate knowledge, and improve our success rate in building high-growth businesses. How businesses access the UK's research and information infrastructure – its facilities and knowledge base – is paramount. We will encourage stronger links through network initiatives between entrepreneurs, researchers and experts in design, intellectual property, measurement and standards.^x

Within the strategy, interaction between actors is seen to be paramount to the development of innovation networks which may in turn lead to the '*clusters of innovative, high productivity businesses which drive economic growth*'. The definition of clusters used within the strategy emphasises their sub-national nature:

Clusters are geographic concentrations of interconnected businesses, knowledge base organisations and suppliers. They exhibit high levels of innovation and collaboration, often involving direct business interactions with the local research base and the application and commercial exploitation of knowledge and Intellectual Property it has generated. Clusters reduce the risks associated with developing and commercialising new and emerging technologies, and supporting wider adoption and diffusion.^{xi}

The strategy also notes that European Commission research has '*identified that clusters and regional specialisation are associated with higher levels of innovation and prosperity*'^{xii}

2.3 What makes a successful regional innovation system?

Whilst there may be significant value in developing a multi-actor, collaborative innovation system at a regional level (along the lines outline above), OECD literature does not support a '*standardised "one-size-fits-all" approach around a single model*'. The group argues instead that adopting an approach that utilises the policy levers available to a specific region and aiming toward a fixed objective – i.e. developing a contextual and targeted strategic framework – is desirable.

The trajectory of a region's innovation system will be largely defined by the policy tools available to it. For example, the extent to which public revenue, spending and investment is decentralised. Similarly, the extent to which decision making power is decentralised will also impact a region's ability implement a successful strategy. Regional policy must also work within the confines of national policy. The latter may set limits on: '*the type and role of agencies responsible for policy design and implementation; their articulation with representatives from different levels of governments; and the mechanisms for co-ordination between different actions*'. Furthermore:

These elements shape the intensity and direction of the national innovation strategy, the extent to which the national vision is an expression of regional priorities and, thus, influences the margin of manoeuvre for regions. Ideally, a high degree of complementarity and coherence would need to be achieved between the two levels of policies.^{xiii}

The above is referred to by the OECD as a region's institutional arrangements.

Other influencing factors include the '*quality of the policy process, the availability of evidence to inform the choice of priorities, and the participation of regional stakeholders*'^{xiv}. In addition, recognising regional challenges and socio-economic opportunities may enable policy makers to prioritise measures that can influence these.

The strategic choices a region will make will depend upon their specific context and stage of development:

- **Building on current advantages** – certain regions may benefit from existing knowledge and technological advantages. For these regions, the key policy question is how to build on these advantages whilst leaving room for future experimentation. Examples of these regions include: Fukuoka, Japan; Noord Brabant, Netherlands; Baden-Württemberg, Germany; and Quebec, Canada.
- **Supporting socio-economic transition** - regions with previously successful development models may require to transition to new pathways when the older models show signs of failing. Examples may include regions like Detroit in the US which had previously been reliant on the car industry but was negatively affected by changes to that industry. A first step for these regions is identifying a new development direction. A second step is to identify *‘possible transformation vectors: attracting human capital; fostering productive use of regional traditions and knowledge; identifying potential partnerships in national strategies, etc.’*. Examples of these regions include: The Basque Country, Spain; Shinshu, Japan; and Nuevo León, Mexico.
- **Catching up** – applicable to regions that lag behind in income per capita, productivity growth and employment generation. Such regions often lack in high value-added economic activities, infrastructure and high-quality services. A key strategic aim for such regions is the *‘need for knowledge absorption capacities and skills in the targeted region’*. A difficulty facing such regions is the danger of creating dual economies, in which one part of an economy is develop, whilst another remains underdeveloped.

A range of policy instruments available to regions are outlined in Table 1. Policy instruments are divided according to the area they are intended to impact – knowledge generation, knowledge diffusion or knowledge exploitation. They are also divided into traditional, emergent and experimental instruments. How these instruments are used and their value to a region will depend upon that region’s institutional arrangements, the stage they are in the development cycle (building, transforming, or catching-up), a region’s goal, as well as the input from stakeholders. Regions generally employ a combination of policy instruments according to their needs, goals and the evidence gathered – often referred to as a policy mix. Policy instruments can be directed a specific sectors (SMEs for example, see Annex 1 for details). Policy mixes may also incorporate policy from a range of policy fields:

- Regional development policy;
- Science and technology policy;
- Industrial and enterprise policy, including SME policy; and
- Higher education policy.

Table 1: Regional innovation policy instruments

	Knowledge Generation	Knowledge Diffusion	Knowledge Exploitation
Traditional Instruments	Technology funds, R&D incentives/supports/grants Support for scientific research and technology centres Support for scientific research and technology centres Support for Infrastructure development Human capital for science and technology	Science parks Technology transfer offices and programmes Technology brokers Mobility schemes, talent attraction schemes Innovation Awards	Incubators Start-up support Innovation services (business support and coaching) Training and raising awareness for innovation
Emerging Instruments	Public-private partnerships for innovation Research networks/poles	Innovation Vouchers Certifications/accreditations	Industrial PhDs Support for creativity & design Innovation benchmarking
	Competitiveness poles Competence centres New generation of scientific and technological parks and clusters Venture and seed capital Guarantee Schemes for financing innovation		
Experimental Instruments	Cross-border research centres	Open source-open science markets for knowledge	Regional industrial policy Innovation-orientated public procurement

The OECD has set out a series of guidelines for regions developing policy mixes:

- *'...avoid negative interactions among various policy instruments and fostering positive ones is the principle challenge'* – policy makers should consider the scope and impact of the instruments they employ. In other words policy makers should monitor to the interaction and outcomes of concurrent policy instruments to ensure they are working together in a way the aids rather than hinders progress;
- *'...finding the right balance between instruments acting on various aspects of a regional innovation system depends on a good understanding of the system'* - one method of enabling this is to identify bottlenecks in the existing system.
- *'...the process of refining policy mixes will be greatly facilitated if all policy instruments benefit from a clear definition of objective and target groups and are evaluated properly'* - the OECD recommends that policy makers steer away from *'generic mission definitions of innovation agency or programmes'* and that they assess the actual impact of the measures they introduce;
- *'... policy mixes should focus on outcomes'* – the OECD recommends that policy makers should begin with *'expected results'* and tailor the policy instruments to

those results. For example, labour market and migration policies could be tailored towards the attraction and retention of talent.^{xv}

3 Northern Ireland's Regional Innovation Strategy Action Plan

Northern Ireland has followed a Regional Innovation Strategy since 2003. The strategy, Think/Create/Innovate, was supplemented by two action plans, published for the periods 2004-2006 and from 2008-2011. This section will examine the latter of those two plans through the prism of OECD's guidance as outlined above.

The 2008-2011 plan utilises the concept of a multidimensional, interconnected regional innovation system as put forward by the OECD. The action plan states, for example:

Building an effective regional system depends not only on the actions of each stakeholder, but on the connectivity and flow information between stakeholders to achieve something greater than the sum of its parts.^{xvi}

It puts forward a systematic approach in innovation. Within this R&D development and expenditure is viewed as an integral but not exclusive part of a wider system.

The action plan presents a clear vision of what it wants to achieve, recognising opportunities to build upon:

- The previous phase of research and innovation policy (the 2003 to 2006);
- Existing knowledge and talent;
- Expertise from the business community and representative bodies through stakeholder engagement; and
- Economic growth and job creation in the years leading up to 2008.^{xvii}

But also recognises the challenges faced:

- Closing the productivity gap with the rest of the UK;
- Promoting higher-value added activity through innovation and the commercial exploitation of R&D;
- Increasing business expenditure on R&D;
- Competing in a global economy;
- Reversing economic underachievement; and,
- Creating jobs and wealth^{xviii}.

The action plan outlines a range of policy imperatives and sub-objectives within those imperatives, as outlined in Table 2.

Table 2: The Northern Ireland Regional Innovation Strategy Action Plan 2008-2011 – Imperatives and objectives^{xix}

Imperative	Strategic Objective
<p>1 To establish Northern Ireland as an outward-focused & competitive region in the global knowledge economy - with an international reputation for innovation excellence.</p>	<p>1.1 Ensure that Northern Ireland is playing its full role in the UK, all-island, European and global innovation arenas;</p> <p>1.2 Enhance and promote the development of an innovation culture in Northern Ireland (across all sectors of business, government & academia/education);</p> <p>1.3 Encourage Northern Ireland business and universities to be more outward focused and raise their profiles internationally.</p>
<p>2 To encourage Northern Ireland's businesses to become more innovative and creative in order to compete in the global market.</p>	<p>2.1 Ensure that Northern Ireland business (and the business representative organisations) become more proactive in leading and informing the innovation agenda;</p> <p>2.2 Promote an increased level of Innovation and R&D activity within Northern Ireland businesses (including encouraging businesses to invest more in innovation and R&D);</p> <p>2.3 Encourage and support Northern Ireland businesses in building the capacity to take forward innovative ideas into new products, services and processes;</p> <p>2.4 Create the context in which Northern Ireland businesses become more independent of public sector support.</p>
<p>3 To encourage Northern Ireland Government and the wider Northern Ireland Public Sector to lead by example in championing and exploiting innovation and R&D.</p>	<p>3.1 Ensure that the public sector realises the (commercial) value of its R&D for the wealth of the region;</p> <p>3.2 Encourage the public sector to lead the adoption of best practice in innovation and R&D and to champion the use of innovation and creativity as business critical in service delivery and process development;</p> <p>3.3 Use the Northern Ireland Sustainable Development Strategy as a mechanism by which the public sector can drive the innovation, creativity and design agenda;</p> <p>3.4 Ensure Northern Ireland Government addresses risk management issues and adopts an appropriate outcome-based approach to procurement;</p> <p>3.5 Ensure that Government interventions to promote and support Innovation and R&D exploitation become more streamlined and targeted in order to assist innovation and R&D practitioners.</p>
<p>4 To ensure that the Northern Ireland education system adopts an enhanced role in developing a culture of innovation and creativity and enables people to recognise opportunities in the knowledge economy.</p>	<p>4.1 Encourage the tertiary education sector to take appropriate steps to realise the commercial opportunities of its research to enhance the wealth of the region;</p> <p>4.2 Create the circumstances in which industry can take more responsibility for informing and supporting the education sector in preparing people for work in the knowledge economy;</p> <p>4.3 Ensure that more people are encouraged to recognise career opportunities through science, technology, engineering and mathematics (STEM).</p>

The strategy also contained an extensive series of policy instruments for achieving these imperatives and objectives. Each action was ascribed to a lead department or agency, with target dates and levels of investment clearly defined. These actions are included in Annex 2. The policy instruments employed show a mixture of actions which fall into categories outlined in Table 1. Examples of this include (not exclusive, please see Annex 4 for a full range of actions):

- Knowledge generation – the strategy included actions intended to: provide access to R&D funding and support (from DARD and Invest NI, for example); offer support for scientific research and technology centres (for example, a target to establish seven Science and Technology Exploitation centres was included); and develop human capital development for science (actions to increase STEM uptake among students);
- Knowledge diffusions – the strategy contained actions which sought to exploit the NI Science Park; introduce a scheme of Innovation Vouchers (via Invest NI); utilise technology and knowledge transfer offices (through Queen's University Belfast and the University of Ulster); and to develop clusters (through the Further Education sector) and,
- Knowledge exploitation – the strategy included actions intended to: increase the number of economically relevant PhDs (with collaboration of business and academia); offer support and coaching to business (through Invest NI's Business

Improvement Service); introduce a venture capital initiative; and encourage innovation-orientated public procurement.

The actions also contained a range of traditional (e.g. R&D funding and support), emerging (e.g. venture capital) and experimental (innovation-led public procurement) policy instruments.

Collaboration is a key element of the strategy with actions designed to encourage cooperation between businesses, businesses and academia, and on a cross-border basis.

The 2008 to 2011 plan was based upon an '*evaluation of the Regional Innovation Strategy*'. It recognises that progress '*is an iterative process*' and includes mechanisms to establish and monitor '*indicators against which performance will be benchmarked on an annual basis*', through a review process.

In summary, an analysis of the 2008 to 2011 action plan shows it to contain many elements of OECD theory and guidance. It puts forward a contextual, multi-dimensional, systemic approach to innovation, in which R&D is an integral feature but not the exclusive measure of development. It sets out a clear vision, based on opportunities and challenges, and was developed with stakeholder impact. The policy mix reflects the identified challenges and opportunities, and also Northern Ireland's institutional arrangements. The policy mix also contains instruments from the OECD three policy areas – knowledge generation, diffusion and exploitation. The policy mix contains actions to encourage collaboration at a number of levels. Mechanism for review and benchmarking were included in the policy. Significantly, it also took a long-term view of innovation policy, leaving room for flexibility and incremental progress.

The Department's own assessment of the plan demonstrates that it was successfully delivered. A summary of the assessment's findings is as follows:

- Imperative One: "*To establish Northern Ireland as an outward-focused & competitive region in the global knowledge economy – with an international reputation for innovation excellence*" - All 17 actions falling under Imperative One have been progressed with many targets achieving positive results;
- Imperative Two: "*To encourage Northern Ireland's businesses to become more innovative and creative in order to compete in the global market*" - 37 of the 38 actions are well on target with many already achieving positive results;
- Imperative three: "*To encourage Northern Ireland Government & the wider NI Public Sector to lead by example in championing and exploiting Innovation and R&D*" - The majority of the 19 actions met their targets.
- Imperative four: "*To ensure that the Northern Ireland education system adopts an enhanced role in developing a culture of innovation and creativity and enables people to recognise opportunities in the knowledge economy*" - Progress on the 28 actions was very positive.^{xx}

It is also worth noting that the *Northern Ireland Research and Development (R&D) Statistics 2010* show that, coinciding with the period covered by the plan:

- There was an increase of £38.6m (8%) in cash terms in Northern Ireland total R&D expenditure between 2009 and 2010, driven almost equally by Businesses and the Higher Education sector;
- Total business R&D expenditure in 2010 was £344.0m, up £20.3m (6%) in cash terms on the previous year; and,
- Between 2005 and 2010, overall Business R&D expenditure increased by 123% in cash terms (from £154.3m).^{xxi}

Whilst the above certainly points to success, it should be borne in mind that in the same period:

Companies with 250 or more employees accounted for 61% of business R&D expenditure in 2010, although they represented only 10% of R&D performing companies. Small firms (i.e. those with less than 50 employees) represented some 69% of R&D performing companies and accounted for just under a fifth (17%) of total business R&D expenditure while R&D expenditure by Small and Medium-sized companies (SMEs) accounted for 39% of the total business expenditure. Total SME expenditure fell by £10.9m (-8%) from 2009 to 2010, in cash terms. However, since 2005 SME expenditure has increased by 78% to £133.4m.^{xxii}*

Between 2001 and 2008 the proportion of R&D expenditure attributed to large companies fell, although it has increased in the last two measure years (59% in 2010, 57% in 2009, 41% in 2008, 49% in 2007, 44% in 2006, 47% in 2005, 44% in 2004, 46% in 2003, 60% in 2002 and 69% in 2001).^{xxiii}

Also in 2010:

- The majority (71%) of R&D expenditure was from within the manufacturing sector;
- 68% of Business R&D expenditure was carried out externally owned companies, representing 13% of all R&D performing companies;
- 54% of SME expenditure on R&D came from their own funds, 17% from government funding;
- 50% of Business (non-capital) expenditure on R&D was on experimental development, 42% on applied research and 8% on basic research; and
- 94% of expenditure was on in-house R&D, 6% was on purchased R&D (71% of in-house expenditure was non-capital);
- The number of companies receiving R&D tax credits increased for the fourth year in the row (52 in 2007, 57 in 2008, 77 in 2009 and 80 in 2010);
- Collaborations between business and academia fell slightly from 50 in 2009 to 46 in 2010 (of which 11 were with Higher Education, 21 with other businesses, and 14 with both).^{xxiv}

Furthermore employment in R&D has increased over recent years, in 2010 3,950 employees (on a Full-time Equivalent (FTE) basis) were engaged in R&D work –8.2% of all employees of companies involved in R&D. Comparable figures for 2009 were 3,520 employees or 5.8% of all employees of R&D companies (2008:5.7% 2007: 5.7%, 2006: 5.9%, 2005: 5.2%, 2004: 5.2% and 2003: 6.3%). In 2010, salaries and wages per R&D FTE was £35,000, a decrease of 1.7% from £35,600 in the previous year.^{xxv}

The data presented in the *Northern Ireland Research and Development (R&D) Statistics 2010* retains a focus on R&D expenditure as primary measure of progress. Although other measures are included – measures of human capital and collaboration – there may be scope to provide a more holistic approach. As recommended by the OECD the following measures may aid a better an understanding of Northern Ireland’s innovation landscape:

- Tertiary educational attainment;
- Students in tertiary education;
- Patents per x inhabitants;
- High-technology and knowledge intensive service employment as a percentage of total employment;
- Co-inventions within region, co-inventions within country, and co-inventions with foreign regions.^{xxvi}

Whilst such statistics are available in other Northern Ireland publications, collecting this data together could benefit the quantitative understanding of the region’s innovation landscape. One possible suggestion would be the development of a data series that is similar to the EU’s Innovation Score Board (see Box 1).^{xxvii}

Box 1: European Innovation Scoreboard

The EU Innovation Scoreboard examines 25 innovation indicators to rank country performance. Indicators are divided into three categories:

- "Enablers", i.e. the basic building blocks which allow innovation to take place (human resources, finance and support, open, excellent and attractive research systems)
- "Firm activities" which show how innovative Europe's firms are (firm investments, linkages & entrepreneurship, intellectual assets); and
- "Outputs" which show how this translates into benefits for the economy as a whole (innovators, economic effects).

NESTA’s assessment of the action plan (2009) noted that the plan ‘*demonstrates the commitment of a wide range of Northern Ireland organisations to improving innovation performance*’ and that this ‘*broad-based commitment to an innovation agenda provides*

a strong basis for future development'. The also concluded that the plan exhibited 'a very significant level of support' and, in doing so, created 'opportunities to change behaviours and to encourage firms to undertake more R&D and innovation'.^{xxviii}

In a more general sense NESTA noted:

Institutional structures in Northern Ireland also mean that policy co-ordination for innovation in Northern Ireland is limited with responsibility for delivering on Northern Ireland's regional innovation strategy residing within a single department (DETI). Albeit supported by an inter-departmental working group, this structure limits the group's influence over other departments' and agencies' policies which might influence Northern Ireland's innovation capability. Finally, with the Northern Ireland system no-one currently has responsibly for 'innovation-proofing' proposed policy developments, again weakening the challenge function. In the area of Science and Technology MATRIX is a notable exception but this addresses only an element of the broader innovation agenda.^{xxix}

Concluding:

In terms of innovation, Northern Ireland therefore currently has something of an institutional deficit compared to its leading international competitors.

A key recommendation from the paper was that Northern Ireland establish an innovation council with capabilities to *'analyse, challenge and support developments in innovation capability'*. One suggestion was extending MATRIX *'towards a more holistic and system-wide innovation agenda and combining it with the existing Inter-departmental Working Group on Innovation within a single non-departmental government body'*.^{xxx} The belief being that such a body would improve Northern Ireland's monitoring, analysis and challenge functions, enabling *'systematic or regular monitoring of Northern Ireland's innovation capabilities'*.^{xxxi}

Other recommendations arising out of NESTA's assessment of Northern Ireland's Regional Innovation System included:

- A Service Innovation Grant Scheme to support non-technical innovation – to directly benefit innovation in the service sector;
- A requirement for collaboration to encourage co-operation on innovation and R&D; and
- Northern Ireland Government should work to implement a two-tier funding system to encourage stronger regional alignment of the universities. This funding system could be based on the Scottish two-tier model outlined in Box 2.^{xxxii}

Box 2: New Horizons – The Scottish Approach

The Scottish approach to university funding comprises of two funding streams. The General Fund for Universities (GFU) provides formula-based, mainstream funding for universities with fewer restrictions and more flexibility on how this money can be spent. The Horizon Fund for Universities (HFU) will provide additional funding but this will be linked to outputs or outcomes related to key government strategies and priorities. The overarching aim is to ensure that public funding for universities is supporting “activities which are well aligned with the Scottish Government’s Purpose, its economic and skills strategies and its other policy frameworks”.

4 Case studies

The following section provides four case studies of regional innovation strategies, on from each of the OECD groupings - building on current advantages, supporting socio-economic transition, and catching up.

4.1 Baden-Württemberg, Germany – building from current advantages

Baden-Württemberg’s regional economy based upon its automotive, mechanical and pharmaceutical industries.

Statistically, the region is one Europe leading sub-national areas for R&D and innovation:

- In 2007 the region’s R&D expenditure was €15.7bn, equivalent to 4.38% of national GDP;
- In excess of 80% of R&D activities are accounted for by business sector, with 10% emanating from the University Sector and 9% from the non-university research institutes;
- In 2009, 32% of patents applications submitted to the German patent office (total applications 15,532) came from Baden-Württemberg; and
- In 2007, 116,234 personnel (full-time employed) were engaged in R&D in the Baden-Württemberg region, 23% of the national total.^{xxxiii}

The region is a Federal state and has legal and economic power to ‘*run a comprehensive and ambitious research and innovation policy*’. The Ministry for Science, Research and the Arts has responsibility for research policy and support, focussing on higher education institutes non-university research institutions. The Ministry for Economic affairs is responsible for the business-orientated technology policy and support.^{xxxiv}

In addition to teaching and research, Baden-Württemberg’s universities also take part in technology transfer, and offer training and qualifications. The universities have a

considerable level of autonomy and are responsible for their own profiles and areas of focus.

Baden-Württemberg's higher education research infrastructure includes:

- nine universities;
- 23 state universities of applied sciences, six colleges of education;
- 10 colleges of art and music;
- eight professional academies; and,
- numerous state-accredited private higher education institutions.^{xxxv}

In addition, the non-higher education sector comprises a large number of research institutions that are active in the areas of basic and application-oriented research.

Technology transfer is supported by a decentralised network of Steinbeis Foundation transfer centres. The region also has technology-specific and sector-specific institutions which coordinated networks, including: BIOPRO Baden-Württemberg GmbH, Photonics BW e.V., Baden-Württemberg: Connected (bwcon) and Medien- und Filmgesellschaft Baden-Württemberg (MFG), a media and film company.

Baden-Württemberg research and technology policy is characterised by cooperation between people and institutions in the science, business and political sectors. The government's research policy prioritises innovation support, education and further training. Policy priorities include:

- Scientific excellence – which seeks to maintain the region's international position in this area. Policy instruments include:
 - profile formation via local setting of priorities and inter-location competition;
 - creation of performance incentives for top research;
 - promotion of framework conditions conducive to research; and,
 - intensification of quality assurance measures for public research, taking account of international standards.^{xxxvi}
- Enhancing science-industry cooperation through partnership. Policy instruments include:
 - promotion of technology transfer and science-industry networking; and,
 - ensuring that industry-oriented non-university research institutions can provide the performance they need to provide in order to serve as innovation drivers for industry.^{xxxvii}
- Targeted support for young researchers – which seeks to ensure future staffing needs at research institutes and innovative companies can be met. Policy instruments include:
 - young researchers' opportunities for independent research are being enhanced; and,

- a broad spectrum of programmes is being offered for promoting doctoral-degree projects, especially within the framework of structured doctoral research groups and graduate schools, as well as for promoting post-doctoral work and junior professorships.^{xxxviii}

Support measures offered within the region include:

- Innovation vouchers ;
- Patent application support;
- Innovation assistance;
- Funding of joint research projects;
- Young innovators (funding science-based start-ups from universities)
- Cluster policy providing financial support and assistance to those wishing to create clusters;
- Technology funding programme – provides R&D grants and loans to business and supports the creation of an *'innovation climate'*; and,
- Innovation coaching – programme aiming to foster innovation amongst SMEs.^{xxxix}

4.2 The Basque Country – socio-economic transformation

The Basque Country successfully repackaged a former industrial manufacturing area. New technologies and R&D are rising in prominence, with government promoting bioscience, nanoscience, alternative energy and electronic transport in particular.

- R&D expenditure is equivalent to 1.96% of GDP, just below Spain's leading region Madrid (which spends the equivalent of 2% of GDP on R&D);
- Basque companies have financed almost 59% of the total expenditure and have executed 81.1%;
- Today, seven Basque companies are placed among the 1,000 European companies with the highest investment in R&D;
- 30.5% of SMEs have developed technological innovation;
- Medium and high-tech exports represent 51.5% of total exports;
- In 2009, 16,684 people were working in R&D and 10,374 were working as researchers;
- In 2009, 190 Patents and 107 Utility Models were published; and,
- 42% of the population aged between 25 and 64 are graduates of higher education.^{xl}

The Basque government Department for Industry, Trade, and Tourism, is responsible for regional innovation policies, alongside its agency the Society for Industrial Promotion (SPRI). The SPRI's work covers a number of areas:

- Grants and services;
- Infrastructure solutions;

- Financial solutions;
- Entrepreneurs;
- Internationalisation;
- Innovation and technology; and,
- Training and awareness.^{xi}

In 2009 the agency has a budget of €137m to support innovation activities.

Current policy instruments fall under five headings:

- Innovation and Competitiveness Support, which includes:
 - Encouraging the improvement of companies competitiveness, facilitating partnerships and networks.
 - Itinerary of innovation and competitiveness. To support the development of competitiveness and Innovation routes in companies based on developing strategic analysis for the future.
 - Developing innovation projects in the areas of: Rethinking the Strategy of the Organisation; Market Innovation and Organisation; Development of Innovation Capacity.
- ICTs for competitiveness, which includes:
 - Promoting the digitisation of the internal processes of SMEs and the relationships with customers, suppliers and governments.
 - Encouraging the incorporation of ICT through the support of collaborative projects developed by a group of companies, promoted by associations of companies and lead by SMEs which innovate in the use of ICTs.
- R&D Support, which includes:
 - Improving the competitiveness of enterprises through the promotion of R&D projects to develop new products.
 - Supporting integrated industrial research projects in strategic sectors and promoting public-private partnerships in research and technological development and innovation.
 - Promoting R&D actions oriented to the use or generation of marketable knowledge to create new businesses in new scientific and technological based companies.
 - Technical reports qualifying for tax purposes.
 - Supporting the noneconomic activity of Technology Centres and Technology Corporations.
 - Supporting Science, Technology and Innovation Dissemination projects.
- Modernisation and renovation of manufacturing equipment, which includes:
 - Achieving a high degree of modernisation of production equipment for small and medium industrial enterprises.

- Entrepreneurship, which includes
 - Supporting new innovative industrial projects, protected by a Business Innovation Centre (BIC), in the maturation of the idea and the starting up stages.^{xii}

The Basque Country government has promoted the *Basque Science, Technology and Innovation Network* to develop markets, build smart technology infrastructure, coordinate networking.

This Network is divided into three sub-systems:

- Scientific and University Sub-system: Universities, Cooperative Research Centres (CIC) and Fundamental and Excellent Research Centres (BERC);
- Technological Development and Innovation: Sub-system: Technology and Sectoral Centres, International Centres for Technological Development and Transfer, Certification Authorities and Laboratories, Public Research Organisations, Business and Health R&D Units; and
- Innovation Support Sub-system: Technology Parks, Business and Innovation Centres, Intermediate Organisations for Innovation.^{xiii}

Financial support measures include:

- GAITEK: aims to improve the competitiveness of business through R&D. The initiative supports R&D actions, such as studies of technical viability prior to the starting-up of the project or other actions taken within the project. In 2011, €37.3m was made available through the fund;
- ETORGAI: supports the implementation of integrated industrial research projects in strategic sectors and promotes public-private partnerships in Research and Development. It is also intended to strengthen SMEs and facilitate application to Framework Programme 7. In 2011, €10m was available through the fund.
- Innovación Excelente Aldatu: aims at encouraging businesses to develop the ability to innovate systematically, by way of innovation in marketing and organisation. Projects focus on key areas, such as Market Innovation, Rethinking the Strategy of the Organisation and Organisation and Development of Innovativeness among Businesses. In 2011, €6m was made available through the fund.
- IKERTU: aimed at strengthen the competitiveness of scientific and economic sectors. The fund supports training and the enhancement of human capital. In 2011, €1.1m was available through the fund.
- ETORTEK: fund supporting regional technology centres. In 2011, €9m was available through the fund (falling form an initial €26.6m); and,
- SAIOTEKL: aimed at supporting members of Basque Science, Technology and Innovation Network to carry out their fundamental research activities. In 2011, €9m was available through the fund (falling form an initial €33.38m in 2006).^{xiv}

4.3 Wielkopolska, Poland – Catching up

Wielkopolska is of Poland's most important industrial centres, accounting for one tenth of Polish GVA. The region is home to large investors in the automotive industry. It produces 7.3% of the domestic car output, 40% of the domestic output of public transport vehicles and 80% of the domestic output of trucks and tractors. The region is known for business process outsourcing and logistics sectors. It is also the destination for a considerable amount of foreign direct investment, estimated at €4.7bn. In 2009, there were 5,713 foreign firms operating in Wielkopolska, 8.7% of all foreign firms in Poland.^{xlv}

Despite this inter-regional disparities remain: Pozan, the region's capital, is the most vibrant area, whereas the northern and southern areas have not been able to exploit their geographic advantages to the same extent as the central areas.

The region faces three major challenges:

- Embedding FDI into the innovation system: improving cooperation between regional public research institutions;
- Supporting the development and emergence of innovative companies – in 2005 approximately one third of companies in the region engaged in innovation. Between 2003 and 2005 innovation expenditure fell by 40%. The OECD has recommended that innovation support should be tailored to specific sub-regional contexts. In Poznan, support for high-tech companies is applicable, but in other regions incremental innovations may be more appropriate; and,
- Establishing a modern educational and training system: the lack of a modern education and training system has ensured that arresting high unemployment difficult. The OECD suggest that the supply of specialised human resources, such as science and engineering graduates, is insufficient to meet the needs of the region.^{xlvi}

Wielkopolska's regional innovation system is governed by a regional parliament, a Board of the Region and the Marshalls Office. The regional parliament is responsible for the adoption of local legislative acts, regional development strategy and regional programmes, election and dismissal of members of the board as well as adoption of the regional budget. The Board of the Regions, with the assistance of the Department of Regional Policy and Department of Implementation of Regional Programme is the managing authority of the Wielkopolska Regional Operational Programme 2007-2013 (WROP).

The budget for developing a regional innovation system in the period 2007 to 2013 is €508m (the average annual funding of innovation support measures is approximately about €72m during the seven-year programming period). The main objective of development policy is to improve the organisation and coordination of business intermediary organisations, improve the quality and facilitate the access to innovation advisory services and training, as well as tailor the services to the company needs

through continuous skills development and exchange of experts. Specific objectives contained in the WROP include:

- Improving investment conditions
- Increasing the *'professional activity'* of inhabitants; and,
- Knowledge and innovation transfer.^{xlvii}

In addition WROP Competitiveness of Enterprises priority includes measures to finance:

- The building of an entrepreneurship incubator to ensure provision of systemic business advisory services
- The purchase of research equipment to increase the Wielkopolska innovation;
- Investment in projects for micro- and small-medium size enterprises; and,
- Cluster initiatives.^{xlviii}

Specific support measures include:

- *Development of the system of financial instruments in support of entrepreneurship:* intended to improve access to finance for micro-businesses and SMEs. The funding is made available to businesses in the form loans, guarantees and other financial instruments. Fund stability is encouraged by ensuring that repayments from business are invested in other firms. In 2011, approximately €17.1m was made available through the fund (made up €4.3m of national funding and €12.8m from EU structural funds).
- *Innovative for Wielkopolska:* awards funding to projects which improve innovation, competitiveness, the flexibility of the labour market and create jobs. €50,000 of regional funding was been available annually.
- *Support to linked to the Regional Innovation Strategy:* Three funding stream are available, for the creation and development of businesses and intermediary organisations, for the construction of new buildings or the development of existing ones, and the Joint European Support for Sustainable Investment in City Areas. A total of €10.1m was made available through these streams in 2011 (comprising of €1.8m National funding, €6.7m EU structural funds, and €1.6m private funding).
- *Science-Industry collaboration:* three funding streams are in operation to promote science-industry collaboration – those aimed developing regional strategies, for the development of networks, and for supporting PhDs. In 2011, €3.9m was made available through these streams (comprising €0.6m National funding and €3.9m EU structural funds).
- *Development of networks and co-operation:* funding is available for the projects aimed at the promotion of clusters/networks, purchase of specialised advisory services, technology/knowledge transfer and infrastructure investments. In 2011 approximately €7m was made available through this stream (comprising of €6m EU structural funds and €1m private funding).

- Support to SMEs development: aims at the socio-economic development of the region through the support for the SME sector with the view to increasing the innovativeness of enterprises, extending their activities, and creating new work places. In 2011 approximately €42m was made available through this stream (consisting of €22m EU structural funds, €18m private funding, and €1m National funding).^{xix}

Annex 1: Innovation policy instruments targeting SMEs¹

Target of support	Reactive tools providing inputs for innovation	Pro-active tools focusing on learning to innovate
Global Connections	<ul style="list-style-type: none"> Experience poles Cross-border technology centres Funding for international R&D 	<ul style="list-style-type: none"> International technology transfer scheme Mobility schemes Support for global networking of firms Cross-border innovation vouchers Lead market initiatives
Regional System	<ul style="list-style-type: none"> Collective technology or innovation centres 	<ul style="list-style-type: none"> Cluster policies Ro-active brokers, matchmakers Innovation Vouchers Support for regional networking of firms Schemes for acting on the culture of innovation
Individual firms	<ul style="list-style-type: none"> Incubators with 'hard' support Traditional 'reactive' technology centres Seed and venture capital funds R&D subsidies or tax incentives 	<ul style="list-style-type: none"> Management advice Incubators with 'soft' support Pro-active technology centres Audits, monitoring of needs Innovation coaches Techno-economic intelligence schemes

Annex 2: NI Regional Innovation Action Plan 2008-11ⁱⁱ

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 1				
Key Objectives	Actions	Lead	Target Date	Investment
1.1 Ensure that Northern Ireland is playing its full role in the UK, all-island, European, and global innovation arenas.	1.1.1 DETI and Invest NI will continue to work with DE TE to explore areas of North/South co-operation in Innovation and R&D including, for instance, building our R&D infrastructure by increasing the number of commercially focused Science and Technology Exploitation Centres of Excellence including the development of industry led Competence Centres. The opportunity for all-island centres will be considered where there is potential to be realised.	DETI/Invest NI in partnership with DE TE & InterTradeIreland	7 New Centres established 2008-2011	£21m over 2008-2011
	1.1.2 Through the US-Ireland R&D Partnership, the DHSSPS, Invest NI and DEL will work with the US Department of Health and Human Services, the National Institutes of Health (US and RoI), the National Science Foundation (US) and Science Foundation Ireland (RoI) to support world class collaborations with potential to deliver new discovery or the creation of sustainable business ventures and/or improved health care provision.	DHSSPS/DEL/ Invest NI	Ongoing throughout 2008-2011	£3m from DHSSPS under the new funding for Innovation budget; £3m from DEL/ Invest NI
	1.1.3 DHSSPS will develop a Telehealth Hospital Links scheme to provide for the use of telehealth technology to monitor remotely, on a daily basis, the vital signs of those patients with long-term conditions who are most at risk of hospital admission. Thus enabling more effective management of disease, maintaining patients' independence at home, maximising the use of healthcare professionals' time and reducing the use of hospital capacity. By 2011, 5000 people will have access to a remote monitoring service for their condition.	DHSSPS	Ongoing throughout 2008-2011	£10m over the period 2008-2011 under the new funding for innovation budget

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 1				
Key Objectives	Actions	Lead	Target Date	Investment
1.1 Ensure that Northern Ireland is playing its full role in the UK, all-island, European, and global innovation arenas.	1.1.4 A new programme of investment support will be developed for the Creative Industries under the EU INTERREG IVA Programme Priority 1: Regional Co-operation for Enterprise to support Creative Industries in NI, the Six Border Counties of the RoI and Western Scotland.	SEUPB and stakeholders including Invest NI in partnership with DETI and DCAL	Programme to go to tender May 2008	The Enterprise Theme of the EU INTERREG IVA Programme has an initial allocation of €70m
	1.1.5 DETI/Invest NI will work with counterparts in the RoI to establish an all-island approach to promote and support SMEs for the mutual enhancement of 7 th EU Framework Programme funds. For Northern Ireland, this will be delivered through an enhanced Invest NI RTD R&D directorate.	DETI/Invest NI, in partnership with DE TE & InterTradeIreland	Ongoing throughout 2008-2011	£1.3m over the period 2008-2011 under the new funding for innovation budget
	1.1.6 DETI will work with its counterparts in the RoI to establish collaborative & strategic arrangements between MATRIX (the NI Science-Industry Panel) and the Irish Advisory Science Council (ASC) for optimising the commercial exploitation of science, technology and innovation across both jurisdictions of the island.	DETI	Commencing April 2008	Resource Neutral
	1.1.7 DETI will work with its counterparts in the RoI to establish collaborative arrangements between the RoI's Inter-Departmental Committee Science, Technology and Innovation (IDC) and the NI Inter-Departmental Working Group on Innovation (IDWG).	DETI	Commencing April 2008	Resource Neutral

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 1				
Key Objectives	Actions	Lead	Target Date	Investment
1.1 Ensure that Northern Ireland is playing its full role in the UK, all-island, European, and global innovation arenas.	1.1.8 DARD and AFBI will work with appropriate science institutions locally, nationally and internationally to develop collaborative research, including: (i) increasing the range, number and extent of MoUs; (ii) organising and managing an international conference on Renewables; (iii) seeking to secure EU Framework 7 funding annually; and (iv) meeting with DEFRA and RoI counterparts as and when beneficial.	DARD/AFBI	2008-2011	Resource Neutral
	1.1.9 In developing applied research proposals for external funding from the EU's Seventh Framework Programme (FP7), the UK Collaborative Technology Programme and similar national and international initiatives Queen's University will be proactive in encouraging participation by local companies and supporting them within the QUB Partnership by: (i) considering the potential for a university-based advisory and support service; (ii) ensuring university participation in more than 12 FP7 contracts; (iii) ensuring that 8 local companies are participating in FP7 contracts.	QUB in partnership with the University of Ulster During 2008 By 2010 By 2010	2008-2011	£250k per annum
	1.1.10 The universities will develop and promote participation in collaborative R&D and innovation in national, all-island and international initiatives, programmes and networks with the aim of establishing up to 10 major research infrastructure investments.	QUB in partnership with the University of Ulster	By 2009	Resource Neutral
	1.1.11 DEL, working with counterparts in the RoI, will establish a focused funding stream to support cross-border university research with the overall aim of strengthening the all-island research base.	DEL	To commence 2008-2009	£10.5m for period 2008-2011 under the new funding for innovation budget

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 1				
Key Objectives	Actions	Lead	Target Date	Investment
1.1 Ensure that Northern Ireland is playing its full role in the UK, all-island, European, and global innovation arenas.	1.1.12 Working with Invest NI, DETI and the Universities, DHSSPS's European Centre for Connected Health will develop by March 2009 an agreed strategy for the introduction of new technologies to health and social care to 2012.	DHSSPS	2007-2009	Resource Neutral
1.2 Enhance and promote the development of an innovation culture in Northern Ireland (across all sectors of business, government & academia/ education).	1.2.1 HSC R&D Office, with support from Invest NI, will support the development of <i>HSC Innovations</i> to raise awareness, provide incentives for innovation and, to pursue the potential of intellectual property assets to generate revenue streams that will ultimately benefit services users in the HSC and beyond.	DHSSPS, Invest NI	Ongoing over period 2008-2011	£1.6m for period 2008-2011
	1.2.2 The NI Science Park, through its tenant businesses and extensive network of contacts, will continue to facilitate and run workshops to highlight innovation best practice and encourage the NI business and academic communities to collaborate and participate in UK, all-island and wider European research initiatives to mutual economic benefit.	NISP with sponsorship from the private sector and through the CONNECT programme	At least 6 workshops each year will be organised directly by NISP throughout 2008-2011	Resource neutral
1.3 Encourage Northern Ireland business and universities to be more outward focused and raise their profiles internationally.	1.3.1 Invest NI will continue to promote NI research by means of outward and inward technology missions.	Invest NI	2 Technology Missions Per Annum	£50k per annum for period 2008-2011

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 1				
Key Objectives	Actions	Lead	Target Date	Investment
1.3 Encourage Northern Ireland business and universities to be more outward focused and raise their profiles internationally.	1.3.2 Queen's University, as a Russell Group member, will establish strategic relationships with the UK Research Councils, major charities, Science Foundation Ireland and the Higher Education Authority in Ireland to ensure that Northern Ireland is linked closely with key national and all-island research and innovation initiatives. This will include: (i) agreement of strategic partnerships between QUB & MRC and QUB & CRUK; (ii) development of strategic partnerships with SFI and HEA.	QUB	During 2007-2008 Academic Year	£25k per annum
	1.3.3 Queen's University will develop further its high quality international R&D and innovation partnerships that complement the outward looking priorities of business and government e.g. US (in particular Georgetown University, Washington), India (in particular the National Institute of Immunology), China (in particular the QUB/BP Ionic Liquids Laboratory at Dalian) and SE Asia (particularly the link with Petronas in Malaysia). This will include: (i) establishing a pilot initiative with research partners in India to promote technology transfer collaboration in ICT and electronics (ii) extending the Strategic Institutional Partnership network to include China.	QUB	During 2008-2009 Academic Year	£200k per annum
			During 2008-2009 Academic Year	£50k per annum

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 2				
Key Objectives	Actions	Lead	Target Date	Investment
2.1 Ensure that Northern Ireland business (and the business representative organisations) become more proactive in leading and informing the innovation agenda.	2.1.1 MATRIX - The Northern Ireland Science Industry Panel (and its related Horizon Scanning Programme) to obtain Executive agreement on the priorities for commercial exploitation of R&D for greatest benefit to the NI economy.	DETI/MATRIX	December 2008	£0.5m over the period 2008-2011 (including £0.1m under the new funding for innovation budget)
	2.1.2 MATRIX will publish at least 5 Horizon Panel reports on NI's opportunities for the commercialisation and exploitation of key strategic technologies.	DETI/MATRIX/ Horizon	December 2008	£0.7m over the period 2008-2011 (including £0.2m under the new fund for innovation budget)
	2.1.3 The Federation of Small Businesses will explore with the Further Education (FE) sector the potential for a joint project to promote innovation to small businesses while also increasing awareness of how FE can work with the business community.	FSB in partnership with the FE Sector	1 event per month	Resource Neutral
	2.1.4 The NI Skills Expert Group will work with MATRIX to address common issues around R&D and science & technology skills.	DEL/DETI/MATRIX	Ongoing throughout 2008-2011	Resource Neutral
	2.1.5 Centre for Competitiveness will design and launch a company innovation process standard based on the EU model of Best Practice with the aim of targeting 500 companies over 2008-2011. Open to all sectors. Process will use an industry-led forum, with representatives from NI Government.	Centre for Competitiveness	Ongoing throughout 2008-2011	2008 - £100K 2009 - £125K 2010 - £175K 2011 - £225K
2.2 Promote an increased level of innovation and R&D activity within Northern Ireland businesses (including encouraging businesses to invest more in innovation and R&D).	2.2.1 By December 2008 DETI working with DFR Invest NI, DIUS, HM Treasury and HM Revenue and Customs will consider how to more actively promote the take-up of the R&D Tax Credit Scheme by Northern Ireland businesses.	DETI/DFP/Invest NI/DIUS/HMT/HMRC	December 2008	Resource Neutral

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 2				
Key Objectives	Actions	Lead	Target Date	Investment
2.2 Promote an increased level of innovation and R&D activity within Northern Ireland businesses (including encouraging businesses to invest more in innovation and R&D).	2.2.2 DARD will establish a fund to stimulate private sector investment in R&D by seeking proposals from agri-food and rural enterprises for relevant, innovative R&D work. A minimum of 20 proposals will be funded by the end of the period.	DARD in partnership with industry	Ongoing throughout 2008-2011	£2.46m over the period 2008-2011 from the new funding for innovation budget
	2.2.3 Invest NI will establish an initiative to increase demand for innovation through awareness raising and promotion on an all-Island basis and, through the recruitment of a range of Innovation Advisors to provide increased levels of hands on professional support and assist companies identify priority areas and develop implementation strategies for innovation that can be supported through a range of innovation programmes. The aim is to attract 300 companies new to R&D.	Invest NI	Ongoing throughout 2008-2011	£4.5m under the new funding for innovation budget
	2.2.4 Invest NI will launch an enhanced innovation vouchers scheme modelled on the Enterprise Ireland Pilot Scheme, to provide SMEs with access to technical support from publicly funded research institutions throughout the island of Ireland.	Invest NI	2008-2011	£0.9m under the new funding for innovation budget
	2.2.5 The Further Education (FE) sector will work with local companies, through workforce development forums and other networks, to develop and facilitate clusters which enhance innovation activities within the local economy.	FE Sector	Core activities ongoing from September 2007-2010	Resource neutral
	2.2.6 Centre for Competitiveness will develop a process for identifying NI Innovation Champions & related Case Studies with the aim of developing over 150 case studies over 2008-2011.	Centre for Competitiveness	Ongoing throughout 2008-2011	2008 - £50K 2009 - £80K 2010 - £100K 2011 - £150K

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 2				
Key Objectives	Actions	Lead	Target Date	Investment
2.2 Promote an increased level of innovation and R&D activity within Northern Ireland businesses (including encouraging businesses to invest more in innovation and R&D).	2.2.7 Centre for Competitiveness will run Quarterly Innovation Seminars - aimed to keep innovation to forefront of business thinking with the goal of addressing over 400 businesses over 2008-2011.	Centre for Competitiveness	Ongoing throughout 2008-2011	2008 - £30K 2009 - £35K 2010 - £40K 2011 - £45K
	2.2.8 The NI Science Park will continue to invest in the innovation infrastructure by increasing the availability of agile, high capacity, fibre networked workspace to circa 270,000 sqft by March 2011 (current baseline 150,000 sqft (gross)) with a view to accommodating knowledge-based, high-technology businesses employing circa 1500 staff, 50% of which will be graduates primarily engaged in R&D.	NISP	Additional 60,000 sqft of workspace by March 2009 270,000 sqft (gross) of workspace by end 2011	£4.25m (Government) and £2m (Private Sector) £6m (Private Sector)
	2.2.9 By April 2009, the NI Science Park, working with Invest NI, Belfast City Council and other stakeholders, will examine the development of a programme that will, through mentoring, networking and business planning support, assist in the creation of new micro-based business starts in the knowledge sector, with a particular emphasis on the young entrepreneur.	NISP in partnership with QUB, UU, Invest NI, BCC and other stakeholders	Annual £25k Awards throughout 2008-2011 Establish NISP-CONNECT by April 2009 Establish panel of 500 mentors by April 2009 Establish programme of 40 school visits to Thompson Dock at NISP	£300k over three years £200k per annum Investment of £1.1m by NITB BCC, EHS and Better Belfast
	2.2.10 The Institute of Directors, working with Business Alliance colleagues and other agencies, will deliver 2-3 events aimed at raising awareness and increasing the application of innovative practices within NI firms.	IoD/Centre for Competitiveness	2008-2011	Resource neutral with sponsorship to cover costs of events and their promotion

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 2				
Key Objectives	Actions	Lead	Target Date	Investment
2.2 Promote an increased level of innovation and R&D activity within Northern Ireland businesses (including encouraging businesses to invest more in innovation and R&D).	2.2.11 DRD will explore potential technical developments identified by MATRIX, in particular by its Advanced Engineering and Advanced Materials Horizon Panels.	DRD	Commencing 2008 and on-going during 2008-2009	Resource neutral
	2.2.12 InterTradeIreland will significantly expand the INNOVA collaborative R&D programme to deliver 17 all-island inter-firm research projects.	InterTradeIreland with Invest NI and Enterprise Ireland	2008-2012	Up to £1m per annum
	2.2.13 Invest NI will deliver a programme of Design activities to 600 companies to ensure that existing and potential clients make effective use of Design.	Invest NI	2008-2011	£2.5m
2.3 Encourage and support Northern Ireland businesses in building the capacity to take forward innovative ideas into new products, services and processes.	2.3.1 Invest NI will support the technology transfer function of the two universities with the aim of securing 100 KTP and 60 PoC projects during 2008-2011.	Invest NI	2008-2011	£3.5m for KTP and £2.5m for HEIF £4.0m for PoC
	2.3.2 Following a successful pilot Invest NI will establish in 2008 a Technical Development Incentive Scheme with the aim of supporting 100 companies during 2008-2011.	Invest NI	2008-2011	£150k for the period 2008-2011
	2.3.3 Within the Joint Departmental Social Economy Interim Action Plan, and the overall action to support & develop performance of the Social Economy Sector, DETI and Invest NI will liaise with SEN to deliver an innovation themed initiative/event in 2008-2009.	DETI in partnership with Invest NI & SEN	2008-2009	Resource neutral

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 2				
Key Objectives	Actions	Lead	Target Date	Investment
2.3 Encourage and support Northern Ireland businesses in building the capacity to take forward innovative ideas into new products, services and processes.	2.3.4 DEL, under "Success through Skills", will lead a 'Skills for Innovation' project aimed at increasing the capacity for more innovation in NI businesses. By November 2008 carry out a literature review on the human facilitators/inhibitors to innovation in N.I. businesses. By February 2009 develop interventions to address recommendations of literature review.	DEL	2008-2009	£20k
	2.3.5 Through the revision of the interdepartmental Unlocking Creativity Strategy DCAL will take the lead in developing support mechanisms for the creative industries commencing with the establishment of a Creative Industries Seed Fund.	DCAL	Commencing 2008-2009	£5m under the new funding for innovation budget over the period 2008-2011
	2.3.6 Building on the Higher Education Innovation Fund 1 (HEIF 1) Programme, DETI/Invest NI and DEL will support the universities' core Knowledge Transfer activities through the second round of HEIF, a permanent "third stream" fund.	DETI in partnership with DEL & Invest NI, and also QUB & University of Ulster	DEL formula allocations commenced Academic Year 2007-2008. Invest NI funding to commence 2008-2009	£3m per year over the period 2008-2011
	2.3.7 Centre for Competitiveness will run an annual innovation conference attracting over 150 delegates per annum.	Centre for Competitiveness	Ongoing throughout 2008-2011	2008 - £50K 2009 - £60K 2010 - £65K 2011 - £75K
	2.3.8 University of Ulster will work with QUB, DEL, Invest NI, and local councils' economic development functions to deliver seminars, workshops and other events aimed at enhancing the absorptive capacity of NI businesses for innovation. This includes: (i) 14 events with FE and QUB; (ii) 30 events under UU Knowledge Club (with average business attendance of 40).	University of Ulster	Over period 2007-2010 During period 2007-2010	£50k per annum 2007-2010

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 2				
Key Objectives	Actions	Lead	Target Date	Investment
2.3 Encourage and support Northern Ireland businesses in building the capacity to take forward innovative ideas into new products, services and processes.	2.3.9 University of Ulster will engage on an ongoing basis with industry representatives to understand and capture its requirements for developing an innovative ambition and to support knowledge-based investment. Opportunities for jointly funded projects will be exploited.	University of Ulster	During 2008-2010, 200 requirement sets captured per annum, leading to 50 unique proposals	£1m over 2008-2011
	2.3.10 The Further Education (FE) Sector) with other relevant partners will work with UU and QUB to ensure the successful delivery of the HE-FE Collaboration Fund (Connected) in supporting businesses, especially SMEs, to undertake research and innovation activities. The six colleges and two universities will make 100 added value engagements, deliver 24 projects and 3 joint KTPs per annum.	FE Sector	Over the period 2007-2010	£3m
	2.3.11 University of Ulster - in partnership with DETI & DSD - will develop a strategic framework and supporting programmes to enable the application of knowledge and innovation to the benefit of social enterprises and the community.	University of Ulster	Ongoing over the period 2008-2011	£100k commitment by the University of Ulster
	2.3.12 University of Ulster, as a leading provider of consultancy from academia into industry, will develop clusters of competence to further meet the needs of priority industrial sectors in Northern Ireland.	University of Ulster	Ongoing over the period 2008-2011	£200k over the period 2008-2011
	2.3.13 University of Ulster will deliver an Innovation Promoters Programme (IPP) to encourage and support investment in innovation.	University of Ulster	Ongoing over the period 2008-2011	£250k per annum

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 2				
Key Objectives	Actions	Lead	Target Date	Investment
2.3 Encourage and support Northern Ireland businesses in building the capacity to take forward innovative ideas into new products, services and processes.	2.3.14 QUB will build on its position as the most successful Knowledge Transfer Centre in the UK and seek to develop further mechanisms for increasing the number of graduates and postgraduates employed in NI businesses. This includes expanding KTP schemes to an average of 30 per year employing at least 40 graduates and postgraduates.	QUB	During 2008-2009 Academic Year	To lever £1.8m per annum
	2.3.15 InterTradeIreland's FUSION programme will deliver 180 all-island projects, with a focus on first-time innovators.	InterTradeIreland with Invest NI and Enterprise Ireland	2008-2011	Up to £2m per annum
	2.3.16 Invest NI's Collaborative Networking Programme will support companies working together for a common business benefit with the aim of establishing 18 collaborative networks.	Invest NI	2008-2011	£3m
	2.3.17 Invest NI Business Improvement Services will encourage and support client companies through innovation, to differentiate from their competitors, improve their competitiveness and increase their profitability. 400 companies to be supported over 2008-2011.	Invest NI	2008-2011	£5m
2.4 Create the context in which Northern Ireland businesses become more independent of public sector support.	2.4.1 Invest NI will introduce a new Venture Capital initiative - NISPO - incorporating a follow on to NITECH and including seed funding to support business and university based Spin Out companies.	Invest NI in partnership with private sector and universities	2008-2009	£10m across the 5-year investment period.
	2.4.2 The Institute of Directors will work with the District Councils and the local business angel networks to deliver a series of events aimed at helping NI businesses to better understand private equity finance and to work more effectively with private sector investors.	IoD	2-3 events per year over 2008-2011	Resource neutral

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 2				
Key Objectives	Actions	Lead	Target Date	Investment
2.4 Create the context in which Northern Ireland businesses become more independent of public sector support.	2.4.3 By September 2008 NISIP working with Invest NI and InterTradeIreland, will establish mechanisms to deliver "halo", the business angel network which matches angel funding and support with early stage knowledge based ventures, with the target of an eight-fold return on cost of programme with angel and geared funding.	NISIP Invest NI and InterTradeIreland	Develop and maintain a register of 25 active business angels by April 2009	£520k over 2008-2011

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 3				
Key Objectives	Actions	Lead	Target Date	Investment
3.1 Ensure that the public sector realises the (commercial) value of its R&D for the wealth of the region.	3.1.1 DETI, through Invest NI will provide advice and guidance to Public Sector Research Establishments in developing mechanisms for the commercialisation of public research e.g. the establishment of equivalent schemes such as KTP and Proof of Concept.	DETI, Invest NI	2008-2009	Resource Neutral
	3.1.2 HSC R&D Office, through HSC Innovations, will support the identification, assessment and management of intellectual property with the aim of generating improved technologies and treatments for the benefit of health and social care users and the wider economy.	DHSSPS	Ongoing over period 2008-2011	£1.6m for period 2008-2011 (as at 1.2.1 above)

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 3				
Key Objectives	Actions	Lead	Target Date	Investment
3.1 Ensure that the public sector realises the (commercial) value of its R&D for the wealth of the region.	3.1.3 GSNI will undertake advanced and innovative analysis of the information gathered through the TELLUS project and promote that information locally and internationally with a view to licensing data to, and working with, local and international players in the natural resources exploration, renewables and geothermal energy sectors; and, collaborate with government and industrial partners in the RoI in extending the TELLUS project into the RoI.	GSNI	Ongoing throughout 2008-2011	£1.9m for period 2008-2011 under the new funding for innovation budget
3.2 Encourage the public sector to lead the adoption of best practice in innovation and R&D and to champion the use of innovation and creativity as business critical in service delivery and process development.	3.2.1 DSD will promote innovative solutions within the construction sector through the development of affordable and sustainable housing.	DSD	Ongoing throughout 2008-2011	Resource Neutral
	3.2.2 The Government's Policy 'Toolkit' will promote the inclusion of innovation considerations in policy making.	OFMDPM	Ongoing for period 2008-2011	Resource Neutral
	3.2.3 DRD Roads Service will work closely with private and public sector research bodies (including Northern Ireland Universities) to identify innovative techniques and solutions to engineering and transport challenges.	DRD	Commencing 2008 and on-going during 2008-2009	Resource neutral
	3.2.4 DRD will work with the Achieving Excellence Initiative to promote innovation through public procurement.	DRD	Commencing 2008 and on-going during 2008-2011	Resource neutral
	3.2.5 DHSSPS will produce a strategy to develop N.I. as a connected health economy which will set out its objectives and priorities for the application of new technologies and communication systems over the next 5-7 years.	DHSSPS	December 2008	Resource neutral

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 3				
Key Objectives	Actions	Lead	Target Date	Investment
3.3 Use the Northern Ireland Sustainable Development Strategy as a mechanism by which the public sector can drive the innovation, creativity and design agenda.	3.3.1 The Central Procurement Directorate of DFP will introduce an innovation sub-strand to the NI Sustainable Procurement Action Plan.	DFP	March 2008	Resource Neutral
	3.3.2 Building on the DARD Renewable Energy Action Plan, DARD, DETI, Invest NI and others will underpin knowledge and support exploitation of renewable energy technologies in the rural economy. The Renewable Energy knowledge transfer programme will provide 1000 demonstration places and construct 3 renewable energy infrastructure items.	DARD in partnership with DETI and DOE	Action Plan published January 2007 and target date for review initiation April 2008	£2.55m under the new funding for innovation budget
	3.3.3 DARD will introduce an initiative to exploit natural products e.g. grass silage to produce novel products such as fibre insulation material, biocompounds and biopolymers.	DARD	Ongoing throughout 2008-2011	£1.08m over the period 2008-2009 to 2010-2011 under the new funding for innovation budget
	3.3.4 DARD will establish an initiative to enable CAFRE to deliver demonstrations to food companies around technological developments in food packaging.	DARD	Ongoing throughout 2008-2011	£650k over the period 2008-2011 under the new funding for innovation budget
	3.3.5 DETI will identify and support NI energy research and innovation and contribute to its commercial exploitation, pursue economic growth in the sustainable/renewable energy sector in NI, and support research into geological formations to facilitate innovative energy storage provision. Novel geological modelling techniques will also be considered.	DETI	Ongoing throughout 2008-2011	£3.75m over the period 2008-2011 under the new funding for innovation budget

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 3				
Key Objectives	Actions	Lead	Target Date	Investment
3.3 Use the Northern Ireland Sustainable Development Strategy as a mechanism by which the public sector can drive the innovation, creativity and design agenda.	3.3.6 DETI will establish a range of initiatives to support and promote research into emerging renewables technologies such as Hydro Power, Household Wind Power and Biofuels.	DETI	Ongoing throughout 2008-2011	£1.5m over the period 2008-2011 under the new funding for innovation budget
	3.3.7 DoE will contribute to the delivery of the QUB-led OMNIVORE project to develop a prototype engine that will optimise the combustion of a range of biofuels and fossil fuels.	DoE	Ongoing throughout 2008-2011	£103k over the period 2008-2011 the new funding for innovation budget
3.4 Ensure Northern Ireland Government addresses risk management issues and adopts an appropriate outcome-based approach to procurement.	3.4.1 In taking forward it's policy and legislative work DoE will use innovation and research to guide evidence based policy development and where possible maximise opportunities within the public and private sectors to deliver effective implementation solutions.	DoE	Proposed start mid-2008 with completion by December 2010	Subject to a bid of €12.24m to INTERREG IV
	3.4.2 The Central Procurement Directorate of DFP will produce guidance on procuring innovative solutions and work with Departments to ensure that procurement contracts, where appropriate, are structured in such a way as to allow for innovative tendering.	DFP	March 2008	Resource Neutral
3.5 Ensure that Government interventions to promote and support Innovation and R&D exploitation become more streamlined and targeted in order to assist innovation and R&D practitioners.	3.5.1 Invest NI will streamline and increase the effectiveness of its R&D and innovation support with the aim of engaging 300 companies in R&D for the first time.	Invest NI	2008-2009	Annual Programme budget for innovation, research and technology is currently £43m rising to £48m in 2010-2011
	3.5.2 HSC R&D office, working with Invest NI, will examine the potential for the application of the Proof of Concept programme to the HSC.	DHSSPS in partnership with Invest NI	2008-2009	Resource Neutral

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 4				
Key Objectives	Actions	Lead	Target Date	Investment
4.1 Encourage the tertiary education sector to take appropriate steps to realise the commercial opportunities of its research to enhance the wealth of the region.	4.1.1 DARD, working with NI's Higher Education Institutions, AFBI and other research providers, will establish a mechanism for a research digest and improved knowledge and technology transfer to rural businesses.	DARD	April 2010	£0.5m per annum
	4.1.2 DEL, working with the universities and industry, will support 3 additional cohorts of 100 DEL funded PhD studentships in areas of economic relevance to NI.	DEL in partnership with the universities and industry	First additional cohort to commence Academic Year 2008-2009	£12.2m over the period 2008-2011 (including £7.1m under the new funding for innovation budget)
	4.1.3 DEL will establish a permanent funding stream for collaboration between the universities and FE Colleges to increase the commercialisation of their research. This will build on the recently established "Connected" pilot initiative.	DEL	Pilot established 2007-2008. To be reviewed 2009 with view to making permanent from 2010-2011	£3m over period 2007-2008 to 2009-2010
	4.1.4 DEL will introduce a new permanent research capital fund, the Research Capital Investment Fund, co-funded by DIUS, to encourage institutions to take a longer-term, more strategic approach to research capital investment thereby promoting institutional financial sustainability.	DEL	Funding to be available from July 2008	£11.4m from DIUS; £1.5m from DEL (£7.5m over the period 2008-2011 under the new funding for innovation budget)
	4.1.5 University of Ulster's Technology & Knowledge Transfer offices (the Office of Innovation) will work with industry to identify and prioritise the investment opportunities of highest potential within their technology disclosure and research pipelines. This will entail 12 unique investments to encourage either spin-out, incorporation or joint ventures.	University of Ulster	Ongoing throughout period 2008-2011	£1m over the period 2008-2011

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 4				
Key Objectives	Actions	Lead	Target Date	Investment
4.1 Encourage the tertiary education sector to take appropriate steps to realise the commercial opportunities of its research to enhance the wealth of the region.	4.1.6 University of Ulster - with DEL & Invest NI - will hold regular events to highlight university knowledge and technology with commercial potential and showcase inspirational case studies from successful entrepreneurs. The target is 50 events with an average of 32 business attendees.	University of Ulster	Ongoing throughout period 2008-2011	To be supported under the Connected Programme, funded at £3m over 2008-2011
	4.1.7 University of Ulster - working with DCAL & Invest NI and with support from NESTA - will establish a facility to encourage knowledge and technology transfer between its School of Art & Design and SMEs, wherever possible, tailoring its support to the explicit needs of the creative industries sector, and to support new product development.	University of Ulster, DCAL/Invest NI, NESTA	2008-2010	£100k for Phase I, £500k for Phase II
	4.1.8 University of Ulster will establish a "Coordinator of Academic Enterprise" who will report to a newly created Innovation Committee. This committee will have responsibility for all policies, programmes, and actions relating to academic enterprise and innovation.	University of Ulster	2008-2010	£120k per annum
	4.1.9 Under the HEIF Programme, the universities will work with the Business Alliance, DEL, DETI, Invest NI and ANIC/FE colleges to develop an innovative and cost effective programme of business and community engagement that will more effectively transfer technology to local enterprises, secure increased BERD and promote innovation in business and industry. This will lead to the establishment of 5 pilot competence centres in Digital Engineering; Environmental Management; High-performance computing; Polymer Technologies; and, Creative Digital Industries.	QUB in partnership with the University of Ulster, DEL, DETI and Invest NI	2008-2009 and 2009-2010 Academic Year	£2.175m

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 4				
Key Objectives	Actions	Lead	Target Date	Investment
4.1 Encourage the tertiary education sector to take appropriate steps to realise the commercial opportunities of its research to enhance the wealth of the region.	4.1.10 The Knowledge Exploitation Unit at Queen's University will provide a 'one stop shop' for innovation support and will facilitate innovation in the business sector with a particular focus on the needs of SMEs and emerging knowledge based companies.	QUB	KEU to be established 2008-09 Academic Year	£1m per annum
	4.1.11 Queen's University will continue to be proactive in seeking opportunities to improve innovation and the exploitation of publicly funded research through enhanced structures and processes to increase consultancy, licensing and the establishment of 'spin out' companies, building upon the successes of QUBIS Ltd. This includes the establishment of 8 new spin-out companies and the negotiation of 20 licenses as a consequence of investments in the QUB research base.	QUB	Ongoing throughout the period 2008-2011	£500k over the period 2008-2011
	4.1.12 The NI Science Park, working with the universities and other public and private sector bodies, will facilitate events aimed at encouraging stronger university-industry research collaboration, with a focus on those sectors of most significance to the growth of the NI economy.	NISP in partnership with the universities	At least one major event each year to showcase a particular area of university-industry importance	£10k per annum plus contribution in kind by senior industrialists and academics
	4.1.13 The Institute of Directors will follow up on its 'Working Together for Profit' event run during Innovation Week 2007 in association with Invest NI, QUB, UU and ANIC to encourage firms to exploit to a much greater extent the resources of FE and HE to undertake R&D that will help grow their business.	IoD	2008-2009	Resource neutral with sponsorship for the production of materials in DVD and hard copy

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 4				
Key Objectives	Actions	Lead	Target Date	Investment
4.1 Encourage the tertiary education sector to take appropriate steps to realise the commercial opportunities of its research to enhance the wealth of the region.	4.1.14 DRD Roads Service will work with Queens University to assist in the development and approval of an innovative prefabricated concrete arch bridge, for use on civil engineering projects.	DRD	Prototype bridge to be built by March 2009	Up to £50k
	4.2.1 MATRIX will use its communications strategy to promote & enhance science and technology innovation and commercialisation not only to industry but also the education system through the production of 4 newsletters per year.	MATRIX/DETI	2007-2008 (2009-2011 pending review of MATRIX)	Resource Neutral
	4.2.2 DEL will establish a programme to ensure that the FE sector has the capacity and expertise to deliver the skilled workforce required by potential Northern Ireland FDI companies (this will include support for the development of 'clusters' in specific sectors identified by DETI and Invest NI as offering potential significant growth and investment).	DEL in partnership with DETI and Invest NI	Ongoing throughout 2008-2011	£9m over the period 2008-2011 under the new funding for innovation budget
4.2 Create the circumstances in which industry can take more responsibility for informing and supporting the education sector in preparing people for work in the knowledge economy.	4.2.3 The Institute of Directors will, working with its membership and the two NI universities, explore the development of a number of bursary schemes aimed at encouraging students to enrol in courses that will service the R&D and innovation skills requirements of the local economy. This will involve: (i) discussions with QUB and UU re funding and logistics; (ii) hosting an event to discuss issues with IoD members; (iii) identification of companies to support 5 initial bursary schemes.	IoD/QUB/UU	By May 2008 By September 2008 During 2009-2010 academic year	IoD Resource neutral plus bursary contribution from companies of circa £1000 per student per company

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 4				
Key Objectives	Actions	Lead	Target Date	Investment
4.3 Ensure that more people are encouraged to recognise career opportunities through science, technology, engineering and mathematics (STEM).	4.3.1 DE and DEL, working with key industrial, educational and public sector stakeholders (including DETI), will complete a review of STEM in schools and Further Education with a view to producing a 10-year strategy for STEM development for the benefit of the economy.	DE in partnership with DEL	June 2008	Resource Neutral
	4.3.2 DE will develop curriculum resources to support growth of STEM take-up in schools including web-based and other links with national bodies for the promotion of STEM-based subjects in GB and the ROI; and a grant scheme to promote STEM curriculum development in the primary sector (within the revised NI Curriculum) via materials and equipment.	DE	Ongoing throughout 2008-2011	£1.9m over the period 2008-2011 under the new funding for innovation budget
	4.3.3 DE working with DEL will develop careers education, information, advice and guidance to improve young people's knowledge and understanding of the opportunity for entering well paid and challenging careers which require a background in STEM subjects.	DE in partnership with DEL	Ongoing throughout 2008-2011	£2.2m over the period 2008-2011 under the new funding for innovation budget
	4.3.4 DE will develop an initiative to promote STEM work in primary and post-primary schools through competitions and exhibitions, including a specialist science week involving the FE colleges and the universities.	DE in partnership with DEL, FE Colleges and the Universities	Ongoing throughout 2008-2011	£600k over the period 2008-2011 under the new funding for innovation budget
	4.3.5 DE will identify, through competition, specialist STEM schools in order to extend strengths in STEM subjects within their schools, collaboration schools and FE partners; build a collaborative network of primary and post-primary schools focusing on aspects of STEM; and disseminate best practice in respect to STEM areas of learning.	DE	10-12 schools over the period 2008-2011	£6m over the period 2008-2011 the new funding for innovation budget

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 4				
Key Objectives	Actions	Lead	Target Date	Investment
4.3 Ensure that more people are encouraged to recognise career opportunities through science and technology.	4.3.6 DEL will establish a Critical Sectors Initiative to increase the number of university level applications for STEM subjects with a view to addressing the lack of skilled individuals capable of taking up positions in high value employment in key sectors.	DEL	Ongoing throughout 2008-2011	£6m over the period 2008-2011 under the new funding for innovation budget
	4.3.7 DCAL will continue to work with DE to promote creativity in teaching and learning.	DCAL in partnership with DE	Commencing 2008	£500k per annum for creative Learning Centres mainstreamed for period 2008-2011
	4.3.8 DEL working with DE and Sector Skills Councils will provide young people with access to impartial careers information, advice and guidance, based on up to date labour market information.	DEL in partnership with DE	Ongoing throughout 2008-2011	To be supported through existing DEL/CEIAG budget
	4.3.9 Queen's University will promote and champion the development of an entrepreneurial culture among staff and students through the operation of NICENT, Roberts' Review, SET funding and HEIF, including the establishment of a Student Enterprise and Employability Unit within the Students' Union. This includes: (i) establishment of the Student Enterprise and Employment Centre; (ii) Commencement of an Enterprise Fellowship Scheme; (iii) Embedding of entrepreneurship in all Arts and Social Science Degree programmes.	QUB	2007-2008 Academic Year 2008-2009 Academic Year 2007-2010 Academic Year	£100k per annum £154k per annum £200k per annum

REGIONAL INNOVATION STRATEGY ACTION PLAN IMPERATIVE 4				
Key Objectives	Actions	Lead	Target Date	Investment
4.3 Ensure that more people are encouraged to recognise career opportunities through science and technology.	4.3.10 By 2009, the NI Science Park, working with DCAL, DE and DEL will develop a programme of activities aimed at educating young people regarding the career opportunities available through studying STEM subjects by showcasing science in action.	NISP in partnership with DCAL, DE and DEL	Ongoing throughout 2009-2012	Resource Neutral
	4.3.11 The Institute of Directors will draw on its membership to identify appropriate business people to work with schools in educating pupils to the career opportunities that are available through the study of STEM subjects. This will include the development of an annual 'IoD Schools Day' (when 100 IoD members go into 100 primary schools to talk to P7 pupils about careers in business) and engagement between IoD members and Sentinus/Young Enterprise.	IoD	During 2008, develop an 'IoD Schools Day' First 'Schools Day' to take place in 2009 50 IoD members per year to engage with Sentinus and Young Enterprise	IoD Resource neutral with sponsorship for promotional material

ⁱ OECD (2011), *Regions and Innovation Policy*, OECD Reviews of regional innovation – regions and innovation policy, OECD Publishing <http://dx.doi.org/10.1787/97892640970803-en> p31

ⁱⁱ *Ibid*

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