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R&D and Innovation – strategy and support in the UK, Scotland, Wales and Republic of Ireland

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This paper examines the R&D and innovation strategy, funding and support mechanisms in operation at a national level in the UK and Republic of Ireland, and at a regional level in Scotland and Wales

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Key Points

- In all four regions examined R&D and innovation are viewed as key drivers of economic development and productivity growth.
- The UK and the Republic of Ireland have bespoke R&D and Innovation strategies. In Scotland and Wales these elements are woven into their current economic recovery strategies.
- Scotland and Wales have identified key sectors with which to secure economic growth.
- All regions offer, at regional level, a range of research funding and support. This is generally tailored to businesses size (i.e. whether SMEs or large companies) and targeted towards different stages in the R&D and innovation process – feasibility studies, pre-production development, prototype development and commercialisation.
- The national and regional policies of the areas examined also prioritise business-to-business and business-to-academia collaboration.
- Scotland targets research funding to SMEs in its Highlands and Islands through the Highlands and Island Enterprise R&D funding scheme. In Wales, local authorities fund SMEs through its Local Investment Fund.
- Scotland and the Republic of Ireland both use enterprise agencies to deliver aspects of their R&D and innovation programme. In Wales these functions have been taken over by the Department for Economic Development and Transport
- Investment finance is available in the UK through the Enterprise Capital Funds which is jointly funded by public and private money. Businesses in Wales may secure private investment through Finance Wales.
- In the UK the combined level of research grant funding by the seven Research Councils in the academic year 2011/12 is £1.2bn. The largest proportion of funding (£409m) is delivered through the Engineering and Physical Science Research Council. Five out of the seven Councils target approximately 50% of their total funding towards research grants.
- A key aspect of the Republic of Ireland's current policy is to encourage cross-border linkages and synergies, with a view to collaboration on EU funded projects (FP7). This may provide opportunities to businesses and academic institutions in Northern Ireland.

Executive Summary

UK

The UK's R&D and innovation strategy Innovation and Research Strategy for Growth (2010) is targeted at addressing the twin challenges of reducing the deficit and promoting growth'.

The strategy contains an array of actions which focus on: discovery and development, innovative business, knowledge and innovation, global collaboration and innovation challenges.

There are a wide variety of support mechanisms available to UK businesses:

- Knowledge transfer support;
- Virtual support networks;
- The Enterprise Europe Network;
- Business Innovation Centres;
- Science Parks; and
- Business Clusters.

Funding schemes open to all UK businesses include:

- The SMART Grant Programme offers three types of grants – Proof of Market; Proof of Concept; and Prototype development;
- Collaborative R&D – The Technology Strategy Board funds collaborative research under four themes – Challenge led innovation; technological-inspired innovation; the innovation climate; and working with partners. This scheme offers grant based, competitive funding.
- The Small Business Research Initiative funds SME s wishing to carry out feasibility studies and/or develop prototypes. This scheme offers grant based, competitive funding.
- Enterprise Capital Funds – provide equity finance to SMEs jointly funded by the public and private sector. The scheme is not directly targeted at R&D and innovation, but at encouraging enterprise and productivity growth.
- R&D Tax Credit - tax relief for R&D.

Academic funding in the UK is distributed by the seven Research Councils:

- The Arts and Humanities Research Council;
- The Biotechnology and Biological Sciences Research Council;
- The Engineering and Physical Science Research Council;
- The Economic and Social Research Council;

- Medical Research Council;
- The Natural Environment Research Council; and,
- Science and Technology Facilities Council.

The combined level of research grant funding for the seven councils in for the academic year 2011/12 is £1.2bn. The largest proportion of funding (£409m) is delivered through the Engineering and Physical Science Research Council. Five of the Councils target approximately 50% of their total funding towards research grants. The Science and Technology Facilities Council will target 25-30% of its funding over the next four years and the Natural Environment Research Council 40% over the same period.

Scotland

The current Scottish Economic Strategy (September 2011) has R&D and innovation woven into its strategic objectives. It seeks to:

- Support the development of innovation and its commercialisation;
- Invest in universities and the creative industries, and tailor Scottish life sciences to assist in the development of key sectors – creative industries; energy (including renewables); financial and business services; food and drink (including agriculture, and fisheries); life sciences; sustainable tourism; and universities;
- Develop a skills base that is responsive to the needs of business; and
- Support innovative low carbon technology to assist transition to a low-carbon economy.

The Scottish Department for Enterprise, Energy and Tourism 2011 revenue budget totalled £410.7m, including an allocation of £45.2m for the industry and technology grants, part of which was allocated to the SMART Scotland grant scheme (see below for further details). The same budget included £283.4m allocation to the region's enterprise bodies and an Innovation and Industries budget of £5.8m.

Delivery of R&D and innovation policy is facilitated by a number of agencies – the Scottish Science Advisory Council (SSAC), Scottish Enterprise (SE), Highlands and Islands Enterprise (HIE), and the Scottish Funding Council (SFC).

The role of the SSAC is to:

- Advise the Scottish Government's Chief Scientific Officer on specific issues and science related policy with a view to promoting economic growth; and,
- Ensure that its membership is drawn across a wide spectrum on stakeholders, including science, business and academia

SE is a Scottish development agency. The agency earmarked £22.3m funding for innovation during 2011/12. Further funding is also targeted to this area through the

'RSA and SMART support' (£43.2m) and the 'Commercialisation – Development & Exploitation of Intellectual Assets' (£16.3m) in the same year.

SE offers a range of grants and supports:

- SMART Scotland;
- R&D Grants;
- Seven Framework Programme ;
- R&D Tax Credits; and
- Advice; and
- Access to the Winning through Innovation Programme.

HIE is a development agency with a specific focus on the Highlands and Islands regions of Scotland. It offers the following finance and support:

- The HIE R&D funding scheme which funds fundamental research, industrial research and experimental development;
- The Small Business Research Initiative (SBRI);
- Grants of up to £5000 are available to businesses in the Highlands and Islands area to support collaborative projects between businesses and academia; and
- Supporting businesses to maximise the impact technology can have on their operations.

The Scottish Funding Council (SFC) is the main funding body for Scottish universities and colleges

University allocation for the academic year 2011/12 was £1.12bn. This funding was distributed across Scotland's 16 universities. The total funding consisted of:

- £129.5m of Horizon funding - which supports strategic initiatives in universities including research activities; and,
- £994.1m in general funding for core teaching activities

Wales

Current Welsh Assembly Government policy on R&D and innovation is outlined in the 2011 policy document *Economic Renewal: A new direction.*

Priority 4 includes a range of measures that are intended to encourage innovation and move Wales *'towards a more R&D intensive and knowledge-based economy where the right conditions exist for innovation to flourish'.* It contains commitments to:

- Address under-used business incubation capacity; and
- Adopt a more focused approach, talking barriers to investment in R&D and innovation.

The Welsh Government's 2011 budget contained a revenue allocation of £3.16m for *Encouraging Innovation*. The budget for 2012 allocates £5.785m of revenue to *Encouraging Innovation*, representing an 83% increase on the previous year.

In 2006 the Welsh Development Agency was merged with the Welsh Assembly Government, with the responsibility for business support measures transferred to the Department for Economic Development and Transport.

The main funding stream for R&D in Wales falls under the banner of repayable finance, it is however, not repayable. Funding supports industrial research, experimental development, and exploitation.

Funding is also available at a local level through the Local Investment Fund, tailored toward SMEs. Private investment is facilitated through Finance Wales. Early stage finance is focussed upon technology businesses.

The Higher Education Funding Council for Wales distributes funding amongst the 11 Welsh universities

Funding for the three main areas of work is broken down as follows for the financial year 2011/12:

- Teaching – £284m;
- Research – £71m; and,
- Postgraduate Research - £5.2m.

Republic of Ireland

There are a number of actors involved in the setting of the RoI's research and innovation policy; the Department of Jobs, Trade and Innovation; Department of Education and Skills; the sub-departmental Office of Science, Technology and Innovation; the Cabinet Sub Committee on Science, Technology and Innovation; the Inter-departmental Committee on Science, Technology and Innovation; Chief Scientific Advisor; the Advisory Council for Science, Technology and Innovation; and the Innovation Taskforce Implementation Group.

The key strategy document *Science for Technology and Innovation*, published by the Department of Jobs, Trade and Innovation in 2006 contains measures which seek to promote:

- Academic research;
- Graduate schools;
- Commercialisation;
- Industrial research;
- Public sectoral research;
- Public awareness; and

- Cross-border and international cooperation.

In the RoI 50% of R&D funding is drawn from business enterprises, with the government providing 31% of funding.

Government funding of R&D, since 2000, peaked in 2008 when €942m was allocated, falling to €872 in 2010.

The largest share of Government funding in RoI (33.1%) is allocated to the higher education sector through the Higher Education Authority – €288.7m in 2010, made up of €136.2m (47%) through the HEA block grant and €49m (17%) through the Programme for Research in Third Level Institutions (PRTLI).

Enterprise Ireland offers a range of funding and other mechanisms to support R&D and innovation in businesses and academia. Industry targeted funding includes:

- R&D Stimulation Grant;
- R&D Fund: Small Projects;
- R&D Fund: Large Projects;
- Innovative High Potential Start Up support;
- Funding for collaborate on Research and Development Projects with Colleges and/or Companies;
- Innovation Vouchers;
- R&D Advocates Scheme;
- Innovation Partnership Programme;
- Applied Research Enhancement;
- Technology Centres; and
- Support accessing FP7 funding and other EU streams.

IDA Ireland offers grant aid for RD&I projects including grants for RD&I Feasibility Studies and Training. Total funding for IDA R&D funding for 2010 was €82m.

IntertradeIreland's Fusion programme offers €33,150 to companies to enable them to recruit *'a talented graduate to lead a business improvement project'.* The agency's Innova programme offers companies a grant of up €285,000 for carrying out an innovation programme in partnership with a company from Northern Ireland.

In addition, companies in RoI can avail of a 25% R&D tax credit.

Contents

1 Introduction

The following paper examines the R&D and innovation strategy, funding and support mechanisms in operation at a national level in the UK and Republic of Ireland, and at a regional level in Scotland and Wales. The paper's central focus is on support to business, although academic funding is also examined.

2 UK

2.1 Policy

The *Innovation and Research Strategy for Growth*, published by the Department for Business, Innovation and Skill (December 2010), *'builds on the UK's recognised strengths, and sets out how* [it] *will work with business and the knowledge base to underpin private sector led growth'*.[i]

The strategy aims at building on measures previously introduced by the coalition government:

- £4.6bn ring-fence for science and research programme funding;
- A rebranding of Technology and Innovation Centres as Catapult Centres which will act as a *'bridge between academia and business and to support the commercialisation of new technologies in sectors such as high-value manufacture, cell therapy and offshore renewable energy'*; and,
- Increasing the Small Company R&D Tax Credit from 175% to 225% (note: the tax credit provided over £1bn in support in 2009/10, making it the largest single innovation support scheme in the UK).

Before outlining the measures which will build on the above the strategy outlines what the government view as the *'the twin challenges of reducing the deficit and promoting growth'*, the strategy states:

> *We have limited resources to invest, and must prioritise our investments into emerging technologies on the basis of rigorous criteria, and an independent assessment of UK capability to exploit their potential and succeed in global markets.*

Additional challenges are also identified in creating government policy which *'stimulates, rather than hinders, UK innovation'* in the areas of:

- Public procurement;
- Increasing access to public data; and
- Accepting the recommendations which arise from the Professor Hargreaves review of intellectual property.[ii]

The key action outlined in the strategy, including lead agents of delivery and significant targets are outlined in Table 1. Key actions are divided into five broader categories: discovery and development, innovative business, knowledge and innovation, global collaboration and innovation challenges.[iii]

Table 1: UK Innovation and Research Strategy for Growth – key actions, agencies and dates

Action	Lead agency	Timescale
Discovery and development		
Invest over £200m between 2011-15 in Catapult centres (note: three Catapult centres have been announced in High-value manufacture, Cell Therapy and Offshore Renewables	Technology Strategy Board (TSB)	Three further Catapult Centres will be announced in 2012, with all six being operational by 2013
Identify priorities for investment in emerging technologies through the TSB, initial focus will be on synthetic biology, energy efficient computing and energy harvesting	TSB	During 2012
Invest £50m in the development of the Graphene Global Research and Technology UB	Engineering and Physical Sciences Research Council (EPSRC & TSB	To be fully operational by 2015

Innovative Businesses		
Raise the rate of tax relief for SME R&D to 225% of qualifying expenditure	BIS, HM Treasury (HMT)	By April 2012
Increase take up of tax credit by: working with HMT, HM Revenue and Devolved administrations to increase awareness and take-up of SME scheme; working with the design sector to raise awareness; and simplify the scheme by piloting a pre-approval scheme for small companies	HMT	Increase of SME scheme by 2014, begin pre-approval scheme 2011
Introduce an 'above the line' tax credit to encourage R&D activity in larger companies	HMT	Consultation at Budget 2012, with implementation 2013
Increase funding of the Designing Demand programme to £1.3m	Design Council (DC)	Up to 100 SMEs per year receiving design mentoring April 2012
Invest £25m in enabling large-scale demonstrators in areas such as integrated systems for cities	TSB	Demonstrators established by 2014
Deliver a Major conference in London 2012 around the Olympics to ensure investment for 'leading' innovative UK companies	BIS, US Dept of Commerce, British Venture Capitalist Association, National Venture Capitalist Association, NESTA, UK Trade and Industry, TSB	By July 2012
Establish, within the TSB, a team focussed on maximising support from the European Regional Development Fund (ERDF) to support innovation	TSB	Operational by 2012
Intellectual Property Office (IPO) to adapt training courses for advisors increase accessibly and to develop an online training tool	IPO	By March 2013
IPO to consult businesses, business advisors and Intellectual Property specialists on providing lower cost legal advice at paralegal level	IPO	By March 2013
IPO to redevelop its dispute resolution service to be more customer focussed	IPO	By March 2013
Sector Skills Council to improve skill levels including management and leaderships skills	Lantra & Improve Sector Skills Councils	During 2012
Enable innovation in power distribution	TSB	During 2012
Increase innovation in the UK water industry to increase ability to compete in overseas markets	TSB	During 2013
Support agri-food and utilities businesses to innovate including raising awareness of support from TSB and R&D Tax Credit	BIS, HMT, HMRC, Design Council, IPO	During 2012

Action	Lead agency	Timescale
Knowledge and Innovation		
Invest £158m to improve 'e-infrastructure' and 'make the UK a world leader in supercomputing research'	BIS	By March 2012 (for investment)
Implement new innovation voucher programme to support collaboration between SMEs and external knowledge providers	TSB	Invest £1m pa in staged implementation of programme in 2012-13 with first vouchers awarded 2012
Research and Funding Councils, in discussion with individual universities and consortia to develop a principles-based Framework for treatment and submission of multi-institutional funding bids	Research Councils	Published by February 2012
Launchpad support extended to develop clusters throughout UK	TSB	Three Launchpads to run in 2012
Introduce EU VAT cost-sharing exemption to enable universities and charities to ensure VAT is not incurred when services are shared	HMT	During 2012
Respond to the Wilson review of University-business collaboration	BIS	Spring 2012

Action	Lead agency	Timescale
Global Collaboration		
UKTI to deliver measures to assist innovative UK SMES to connect with overseas finance	UKTI	To be announce before end of 2011
Olympic Games to be used as a platform to showcase business research capabilities	UKTI	Programme of events to take place summer 2012
UKTI to launch online platform *'Open Export'* to enable innovative companies to support on another	UKTI	Beta version launched 2012
Review of support system for UK businesses seeking EU funding in preparation for Horizon 2020	BIS and TSB	New system to be in place by Summer 2013
Establishment of an agreement with Chinese Ministry of Science and Technology to fund bilateral research projects	BIS, Research Council, TSB	Details and research calls 2012

Action	Lead agency	Timescale
New Innovation Challenges		
Consider and act on the recommendations of the Dame Janet finch Publications Working Group	BIS	Autumn 2012
Consider and act on the recommendations of the Alan Langlands Administrative Data Tack Force	BIS	Late 2012
Research Councils to develop online 'Gateway to Research' search facility	Research Councils	2013/14
Open Data Institute to be developed	TSB	Implementation plan April 2012
NESTA to develop UK Prize Centre and Prize fund to be directed at areas where innovation is most needed	NESTA	Centre to be established Spring 2012. first prize awarded 2013
Public sector to develop Procurement Centres Expertise for innovative products and services in key areas, initially focussing on sustainability and health care	BIS	At least one centre to be established by Summer 2012
Public Private Procurement Compacts to be developed in catering, heat and power, and low carbon vehicles	BIS	Compacts to be signed in Spring 2012
Design Council to deliver commissioning toolkit for government departments and public sector, as well as a training programme for senior civil servants	Design Council (DC)	During 2012
NESTA and ESRC to advance public sector understanding of *'evidence and the case for backing that works'* via UK Alliance for Useful Evidence	NESTA and ESRC	Alliance launched and work plan in development

2.2 Funding streams and support mechanisms for business

A range of support mechanisms and funding streams are available to UK businesses. Support mechanisms include:

- **Knowledge transfer support –** mechanisms under this category are designed to help businesses benefit from the knowledge and expertise of academia and other businesses. A key aspect of this work is Knowledge Transfer Partnerships (KTPs). KTPs place recently qualified people (at NVQ level 4 or above) with businesses for between three weeks and ten years, to assist with product design, manufacturing, product or management processes, computing or management information. KTPs are part-funded by a government grant. SMEs would contribute approximately one third of the costs of the project (around £20,000, mostly contributing to employment cost). For businesses larger than SME size the costs of a long-term project increase to approximately £30,000.[iv]
- **Virtual support networks –** virtual support networks are online portals which enable businesses to interact and share ideas. There are websites offering mutual support in specific sectors, the Innovators Council and Advisory Service for Scotland for example. However, the equivalent site for Northern Ireland, Business Innovation Link, is down, replaced by email contacts in Invest Northern Ireland.[v]
- **The Enterprise Europe Network –** provides advice and support to businesses throughout Europe on a range of topics – EU legislation, help in finding business partners, access to innovation networks, bringing together buyers and sellers of innovation ideas, and assistance in promoting new technology. The Network partners UK businesses. Their work includes: visiting companies to discuss their needs; identify technologies that could assist businesses; helping companies promote their innovations; helping companies make innovative products available to one another though technology transfer; advising on stages of technology transfer; developing R&D and innovation capacities of SMEs; and help businesses participate in research programmes and avail of funding, particularly Framework Programme Seven.[vi]
- **Business innovation centres (BICs) –** BICs provide support to innovative businesses by providing; information on sharing premises with similar companies; advice management, strategy and planning; technology help; assistance in finding manufacturers and markets for innovative products; training and mentoring; and access to training.[vii]
- **Science Parks –** Science Parks bring together knowledge-based businesses. They offer support including: help with premises; technology expertise; and business services (from advice of intellectual property to cleaning facilities). Science Parks are funded by a mixture of local, regional, national and European funds. The parks differ in their aims, with different types in operation, for example: incubator parks support new businesses; industry specific science parks specialise is a particular sector; and research parks specialise in R&D. The parks have links with centres of

knowledge creation (e.g. universities) in areas such as: technology transfer; sourcing venture capital; student placements; and marketing assistance.[viii]

- **Chambers of Commerce –** Chambers of Commerce throughout the UK provide access to services including: training; information; resources; networking; and saving on overheads. They also offer a conduit to informal networks, often with an industry-specific orientation.[ix]
- **Business Clusters –** the UK government offers support for clusters including: assisting companies to access a skilled workforce; universities; good sites; and investment capital.[x]

UK business may also avail of a number of funding schemes:

- **The SMART grant**, facilitated by the Technology Strategy Board (TSB), is open to UK SMEs in any sector. It has three strands:
  - Proof of Market Grant – enables companies to assess: the commercial viability of a project through market research; market testing and competitor analysis; their intellectual property position; and assistance with the initial planning phases. Projects can last up to nine months, with maximum grants of up to £25,000 or 60% of total costs available.
  - Proof of Concept Grant – enables SMEs to explore the technical feasibility and commercial of a new technology, product or process. The following activities are funded: initial feasibility studies; basic prototyping; specialist testing and/or demonstration to provide basic proof of technical feasibility; intellectual property protection; and the investigation of production or assembly options. Projects can last up to 18 months, with a maximum grant of £100,000 or 60% of total costs available.
  - Development of Prototype Grant – enables SMEs to fund the following activities: small demonstrations; intellectual property protection; trials and testing; and market testing. Projects can last up to two years with maximum grants of £250,000 available, or 35% of project costs for small business, and 45% for medium sized businesses.[xi]

  The grants available are matched funded ensuring that businesses must find alternative funding for the remaining projects. Pre-start-up companies can receive funding, along with university spin-out companies that are less than 50% owned by their academic partner.[xii]

- **Collaborative R&D –** the TSB runs regular competitions for funded collaborative research projects. Between 2004 and June 2007 600 projects had been supported, with an investment in excess of £1bn. Projects are published on the TSB's competition webpage. The level of funding available, project types and lengths vary on a per competition basis. The projects fall under the TSB's four strategic areas:
  - Challenge-led innovation – addressing the challenges facing society and the economy;

- Technological-inspired innovation – supporting core-expertise and leading edge technologies; and
- The innovation climate – fostering national confidence in the innovation to create and provide economic growth; and
- Working with partners – the Board works closely with other bodies, combining and focusing resources; activities are often jointly funded with research councils, government departments, regional development agencies and the devolved administrations of Scotland, Wales and Northern Ireland.[xiii]

- **The Small Business Research Initiative (SBRI) –** The SBRI is also facilitated by the TSB. Through the TSB government departments run competitions to seek solutions to specific problems. Successful applicants receive fully funded development contracts with departments. The business retains any intellectual property rights. Projects receive funding in two phases:
  - Phase 1 – demonstration of scientific, technical and commercial feasibility: projects last six months, with grants of between £50,000 and £100,000 available. Projects are then assessed for Phase 2, not all projects will progress to the second phase.
  - Phase 2 – prototype development: projects last up to two years, with funding of between £250,000 and £1m available. Once Phase 2 is complete, business can commercialise their product and offer it to government departments and others under procurement procedures.[xiv]
  - **Enterprise Capital Funds (ECF) –** ECF funds are designed to address equity gaps. They take the form of public and private money and provide equity finance to SMEs. They are, however, tem porary funds and subject to specific deadlines. The ECF has no specific regional or sectoral targets, nor, is it specifically a research and development/innovation focussed project. Rather it is targeted at encouraging enterprise and productivity growth. The government will contribute up to £25m to a specific fund, or twice the private capital, whichever is lower. There is a limit of £2m for each investment under the fund. An ECF *'may only invest in an SME where the purpose of the relevant investment is, or the application of the proceeds of such investment by the relevant company or undertaking shall be, predominantly related to or for the benefit of the economy of the UK'*. In other words *'investments will need to be in UK based SMEs or to fund the UK operations of SMEs'*. There are nine EDFs in operation, facilitated by the following firms:
  - IQ Capital Fund;
  - 21st Century Sustainable Technology Growth Fund;
  - The Seraphim Capital Fund;
  - The Amadeus Enterprise Fund;
  - The Catapult Growth Fund;
  - Dawn Capital ECF;

- Oxford Technology Management ECF;
- MMC Venture Managers;
- Panoramic Growth Equity; and
- Passion Capital.[xv]

- **R&D Tax Credit -** tax relief for R&D. Two schemes are in operation, one for companies with less than 500 full-time staff (the 'SME scheme') and one for large companies. The 2011 Budget announced that rate of relief for SMEs would increase from 175% to 200% of qualifying R&D expenditure when calculating profit for corporation tax purposes from April 2011. There will also be a further increase to 225% from April 2012. Businesses not in profit could qualify for a cash payment of about 24.5% for every pound of expenditure on qualifying R&D. Larger companies can claim relief of up to 130% of qualifying expenditure.[xvi]

2.3 R&D Funding at UK universities and Research Institutes

Research Councils in the UK invest approximately £3bn per year into university and research institute research. The councils fund within a broad set of subject disciplines:

The Arts and Humanities Research Council's, over the period 2011 to 2015, will focus on:

- History research which improves understanding of intellectual development and of the creative output of the UK's heritage and the heritage of countries with which the UK engages with diplomatically, culturally and economically.
- Research that encourages better communications with partner and competitor nations and with the UK's multi-cultural communities.
- Arts and humanities research that influences public policy and community cohesion;
- Supports and refreshes creative arts traditions; and
- Builds capacity in endangered areas of heritage science and increases the roll of culture in economic regeneration.[xvii]

Table 2 provides a breakdown of funding in the Arts and humanities over the period 2011/12 to 2014/15. In each year research funding accounts for over 50% of total funding. It is notable that actual research grant funding is predicted to fall for four consecutive years.

Table 2: Arts and Humanities Research Council Programme Allocation 2011-2015[xviii]

	2011/12		2012/13		2013/14		2014/15	
	£m	%	£m	%	£m	%	£m	%
Research	51.2	51	51.1	52	51	52	50.9	52
Postgraduate	44.1	44	42.6	43	42.6	43	42.6	43
International Engagement	1.3	1	1.3	1	1.3	1	1.3	1

Dedicated Knowledge Exchange	3.5	4	3.6	4	3.7	4	3.8	4
Resource Income	-0.23	-	-0.23	-	-0.23	-	-0.23	-
Resource Total	**99.9**	**-**	**98.4**	**-**	**98.4**	**-**	**98.4**	**-**

The Biotechnology and Biological Sciences Research Council's (BBSRC) research priorities in the period 2010 to 2015 are:

- Food security – bioscience for sustainable supply of sufficient, affordable, nutritious and safe food;
- Bioenergy and industrial biotechnology – developing biofuels and industrial materials from novel biological resources, reducing dependency on petrochemicals and aiding the development of a low carbon economy in the UK;
- Basis bioscience underpinning health – facilitating advances in fundamental biosciences for better health and improved quality of life.[xix]

Table 3 provides a breakdown of the BBSRC funding for the period 2011 to 2015. Planned research funding is in excess of 50% for each year. It is notable that the research grant funding is predicted to fall for three consecutive years and remain flat for the fourth year.

Table 3: Biotechnology and Biological Sciences Research Council Programme Allocation 2011-2015[xx]

	2011/12		**2012/13**		**2013/14**		**2014/15**	
	£m	**%**	**£m**	**%**	**£m**	**%**	**£m**	**%**
Research Grants	210	57	203	57	198	56	198	56
Institute specific programme grants	57	15	54	15	53	15	51	15
Studentships	51	14	51	14	49	14	49	14
Fellowships	9	2	9	3	7	2	6	2
Multi-user, Council owned or sponsored national facilities	22	6	22	6	22	6	22	6
National infrastructure - Pirbright	6	2	6	2	6	2	6	2
International Subscriptions	1	0	1	0	1	0	1	0
Knowledge Exchange facilities	20	5	25	7	27	8	30	9
Resource income	-6	-	-12	-	-12	-	-12	-
Resource Total	**370**	**-**	**359**	**-**	**351**	**-**	**351**	**-**

The Engineering and Physical Science Research Council's (EPSRC) research priorities for the period 2011 to 2015 including:

- National Capability – support for long-term disciplinary and multi-disciplinary research in engineering and physical sciences;
- Maintaining the flow of skilled researchers – support for the most talented and forward thinking researchers and investment in the next generation of scientists and engineers;
- Large-scale research facilities – ensuring access to *'large-scale infrastructure, facilities and equipment'* to facilitate internationally-leaning engineering and physical science research;
- Global economic and societal challenge themes – sponsorship of research which seeks to address the challenges facing the UK, including building a strong economy, producing sustainable energy, developing an integrated infrastructure and healthy society;
- Cross-council themes – developing partnerships with other research councils to integrate the contribution of research in engineering and physical sciences with cross-council themes: living with environmental change; and global uncertainties.

Table 4 provides a breakdown of EPSRC's funding over the period 2011 to 2015. Research grant funding is predicted to be above 50% of total funding for three consecutive years, falling to just below 50% for the fourth year. Actual research grant funding allocation is predicted to decrease across the four years of the delivery plan.

Table 4: EPSRC programme allocation 2011 to 2015

	2011/12		2012/13		2013/14		2014/15	
	£m	%	£m	%	£m	%	£m	%
Research grants	409	53.8	385	51.5	382	51.1	372	49.7
Studentships	133	17.5	137	18.3	138	18.4	142	19.0
Fellowships	44	5.8	44	5.9	44	5.9	46	6.1
Multi-user council owned/sponsored facilities (HPC)	11	1.4	11	1.5	11	1.5	11	1.5
International subscriptions	0	-	0	-	0	-	0	-
Knowledge transfer activities (excluding ETI)	152	20.0	156	20.9	154	20.6	154	20.6
ETI	15	2.0	17	2.3	19	2.5	21	2.8
Programme operations	12	1.6	12	1.6	12	1.6	12	1.6
Co-funding	-12	-	-11	-	-10	-	-8	-
Earned income	-4	-	-3	-	-2	-	-2	-
Resource Total	760	-	748	-	748	-	748	-

The Economic and Social Research Council's (ESRC) strategic priorities for the period 2011 to 2015 are:

- Economic performance and sustainable growth;

- Influencing behaviour and informing interventions; and
- A vibrant fair society.[xxi]

Table 5 provides a breakdown of total ESRC programme allocations for the period 2011 to 2015. Total research funding is predicted to above 50% of total programme allocations for the period. The amount allocated to research is set to increase year-on-year for the first three years of the programme period, and flat in the final year. [xxii]

Table 5: ESRC Programme allocation 2011 to 2015[xxiii]

	2011/12		2012/13		2013/14		2014/15	
	£m	%	£m	%	£m	%	£m	%
Responsive Research	48	30.8	48	31.4	48	31.4	48	31.4
Strategic and Collaborative Research	33.4	21.4	35	22.9	37	24.2	37	24.2
Total Research	**81**	**52.2**	**83**	**54.2**	**85**	**55.6**	**85**	**55.6**
Training and Skills	48	30.8	47	30.7	45	29.4	45	29.4
Knowledge Exchange, Impact and Evaluation	8.2	5.3	8.2	5.4	8.2	5.4	8.2	5.4
Methods and Infrastructure	10.3	6.6	7.3	4.8	4.3	2.8	4.3	2.8
Other Programme and International	7.8	5.0	7.8	5.1	7.8	5.1	7.8	5.1
Total	**155.8**	-	**153**	-	**153**	-	**153**	-

The research priorities of the Medical Research Council (MRC) for the period 2011 to 2015 are:

- Resilience and replacement;
- Living a long and health life;
- Bringing the benefits of excellent research to all sections of society;
- Accelerating progress in international health research; and,
- Sustaining a robust and flourishing environment for world-class medical research.[xxiv]

The MRC's budget allocations (excluding capital allocations) are outlined in Table 6. Research grants contribute to just below 50% of total resource allocation in the first two years, increasing to just above 50% for the remaining two years. Actually resource grant allocation increases year-on-year for each of the four years.

Table 6: MRC programme resource allocation 2011 to 2015[xxv]

	2011/12		2012/13		2013/14		2014/15	
	£m	%	£m	%	£m	%	£m	%
Grants	265	49.4	271	49.6	290	51.8	291	50.6
Studentships	23	4.3	24	4.4	25	4.5	26	4.5
Fellowships	59	11.0	61	11.2	65	11.6	65	11.3
Units	214	39.9	210	38.5	210	37.5	210	36.5
International Subs	21	3.9	20	3.7	20	3.6	21	3.7
Restructuring	-	-	-	-	-	-	-	-
LMB Transition	2	0.4	4	0.7	-	-	-	-
UKCMRI Transition	-	-	6	1.1	-	-	14	2.4
Contingency	1	0.2	1	0.2	1	0.2	1	0.2
Net Earned income	-49	-	-51	-	-52	-	-53	-
Total Resource programme	536	-	546	-	560	-	575	-

The Natural Environment Research Council's (NERC) priorities for the period 2011 to 2015 are:

- Increase focus on strategic research;
- Increase economic and social benefit;
- Attract and retain top talent to the UK;
- Transform delivery of national capacity; and
- Shift resources into front line science.

Table 7 outlines the NERC's programme resource allocations (excluding capital funding) for the same period. For the first two years of the allocation period research grants account for below 40% of total resource allocation, rising to 41% in year three and 45% in year four. Total resource allocation rises year-on-year for each of the four years.[xxvi]

Table 7: NERC Programme resource allocation 2011 to 2015[xxvii]

	2011/12		2012/13		2013/14		2014/15	
	£m	%	£m	%	£m	%	£m	%
Research grants	115	38.5	117	39.4	123	41.0	130	45.0
Doctoral Studentships	21	7.0	23	7.7	23	7.7	23	8.0
Masters	2	0.7	0	-	0	-	0	-
Fellowships	10	3.3	10	3.4	10	3.3	10	3.5
Institutes Programme Costs	191	63.9	186	62.6	183	61.0	161	55.7
Multi-user Council Facilities	1	0.3	3	1.0	1	0.3	2	0.7
International Subscriptions	6	2.0	6	2.0	6	2.0	5	1.7
Knowledge Exchange Activities	10	3.3	9	3.0	9	3.0	10	3.5
Organisation Restructuring	0	-	0	-	0	-	0	-
Resource Income	-42	-	-40	-	-38	-	-38	-
Co-funding Income	-16	-	-16	-	-16	-	-14	-
Total Resources	**299**	**-**	**297**	**-**	**300**	**-**	**289**	**-**

The Science and Technology Facilities Council (STFC) strategic priorities for the period 2011 to 2015 are:

- World class research;
- Innovation; and
- Skills.

Its aim is to *'sustain the UK's position as a global scientific nation, by strengthening the potential of the UK's physics sector to provide economic growth, high-value employment and inward investment'.* Table 8 outlines the STFC resource allocations for the period 2011 to 2015. The resource allocation for research grants equates to just above 18% of total resource allocation for the first two years and just above 19% for the remaining two years. Total resource allocation on research grants falls from the first to the second year, but increases in years three and four.[xxviii]

Table 8: STFC Programme Resource Allocation 2011 to 2015[xxix]

	2011/12		2012/13		2013/14		2014/15	
	£m	%	£m	%	£m	%	£m	%
Institute programmes costs	116.65	31.04	93.21	25.12	88.4	23.55	87.21	22.67
International Subscriptions	108.6	28.90	119.52	32.22	121.7	32.43	123.07	31.99
Studentships	19.54	5.20	18.49	4.98	18.11	4.83	18.48	4.80
Fellowships	9.2	2.45	8.7	2.35	8.52	2.27	8.7	2.26
Research Grants	69.38	18.46	67.22	18.12	71.78	19.13	74.9	19.47
Facilities	87.77	23.35	86.78	23.39	87.41	23.29	94.17	24.48
Innovations, Campus Development and Collaborative programmes	13.69	3.64	20.27	5.46	21.69	5.78	20.6	5.35
Income	-49	-	-43.19	-	-42.29	-	-42.51	-
Total resource	**375.83**	-	**371**	-	**375.31**	-	**384.73**	-

3 Scotland

3.1 Policy

The current Scottish Economic Strategy (September 2011), whilst not exclusively or explicitly focussed upon R&D and innovation, does have the two concepts woven into its objective strands. R&D and innovation are situated within a number of broader strategic objectives:

- Developing a supportive business environment;
- Learning skills and wellbeing;
- Transition to a low carbon economy; and
- Infrastructure development.[xxx]

Innovation and commercialisation takes a central role within the *developing a supportive business environment* objective. They are identified as *'key drivers of productivity and competitiveness, particularly in an increasingly interconnected global economy'.* They are also viewed as tools which can *'create new products, new services and jobs in existing industries and industries of the future'.*

Actions to support the development of innovation and commercialisation include the:

- Launch of a Scotland-wide interface to provide business with a central point via which they can access academia;
- Streamlining of support offered by the two enterprise agencies – Scottish Enterprise and Highlands and Islands Enterprise (more details are below);
- Introduction of a new approach to improve leadership and management skills;

- Development of an innovative culture, with a specific focus on the public sector. For example, the Scottish Government will examine ways to encourage innovation within the NHS;
- Further development of research pools – which focus on the sharing of research resources and infrastructure across universities and supporting university collaboration with SMEs;
- Engagement with European Commission to ensure the design of Horizon 2020 *'complements Scotland's research and innovation strengths'.*[xxxi]

A focus on stimulating growth industry sectors is also situated within the *developing a supportive business* objective. The sectors identified as growth areas are: creative industries; energy (including renewables); financial and business services; food and drink (including agriculture and fisheries); life sciences; sustainable tourism; and universities. R&D and innovation measures which fall within this sub-category include:

- Supporting investment in the creative industries through *'Creative Scotland'*;
- Investing in universities;
- Maintaining Scotland's *'world leading position in university research and maximising its contribution to increasing sustainable economic growth'*;
- Tailoring Scotland's life sciences to global trends in health care, wellbeing, demographics.

The drive to create an education system *'that is responsive and aligned to demand',* which forms part of the *learning skills and wellbeing* objective, is, although not directly targeted at encouraging R&D and innovation, likely to have a positive impact on its development. A key goal within this sub-objective is:

> *…to support employers by better understanding and assessing the skills required for future success and ensuring that the supply of skills, training and qualifications is sufficiently responsive.*

To achieve this, the strategy sets out a range of actions which are targeted at up-skilling the population. These include:

- Working with Scotland's colleges and universities to enable them to respond quickly and flexibly to employer demand;[xxxii]
- To prioritise skill development based on key sectors which support growth – these sectors are aligned with the growth industries identified above: creative industries; energy (including renewables); financial and business services; food and drink (including agriculture and fisheries); life sciences; sustainable tourism; and universities. Skill development is underpinned by the recognition that skills are *'essential to innovation'* and that a *'better education and skills base has the potential to translate into more scientists, analysts, technicians, and inventors; working to increase the stock ledge via the development of new processes and technologies*';[xxxiii]and

- Ensuring Scottish colleges and universities can respond quickly and flexibly to employer demand and new economic challenges and opportunities.[xxxiv]

Within the broad objective *transition to a low carbon economy* the strategy highlights the importance of:

> *…supporting innovative low-carbon technologies and funding innovation (in particular in the energy, transport and building, waste, water and environmental management sectors)…* [in]…*providing the Supportive Business Environment that is required to make the most of these growth opportunities.*

Furthermore the action outlined in the *learning, skills and well-being* objective are viewed as a way in which to facilitate the growth of these technologies.

In addition to the above measures, the infrastructure development measures outlined in the strategy include a range of measures for enhancing Scotland's digital infrastructure in order to (amongst other reasons) support innovation in the digital economy.

3.2 Policy delivery and funding to business

The Scottish Department for Enterprise, Energy and Tourism 2011 revenue budget totalled £410.7m, including an allocation of £45.2m for the industry and technology grants, part of which was allocated to the SMART Scotland grant scheme (see below for further details). The same budget included £283.4m allocation to the region's enterprise bodies and an Innovation and Industries budget of £5.8m.[xxxv]

The enterprise body budget is intended to encourage Scottish enterprises to:

- Internationalise, invest in innovation, and commercialise innovation;
- To provide finance through the Scottish Investment Bank; and,
- To support businesses in developing their leadership and workforce.[xxxvi]

The Innovation and Industry budget funds Scottish Executive Expertise, Knowledge and Innovation Transfer and Knowledge Transfer Partnerships, and the Innovators Counselling and Advisory Service for Scotland. [xxxvii]

In 2012, the industry and technology grants budget was transferred into the Enterprise Bodies budget line. The total budget for Enterprise Bodies for 2012 is forecast at £320m. The Innovation and Industries budget will remain at £5.8m for 2012.[xxxviii]

Delivery of R&D and innovation policy is facilitated by a number of agencies – the Scottish Science Advisory Council (SSAC), Scottish Enterprise (SE), Highlands and Islands Enterprise (HIE), and the Scottish Funding Council (SFC).

Scottish Science Advisory Council

The role of the SSAC is to:

- Advise the Scottish Government's Chief Scientific Officer on specific issues and science related policy with a view to promoting economic growth;
- Ensure that its membership is drawn across a wide spectrum on stakeholders, including science, business and academia.[xxxix]

The work of SSAC is conducted through two sub-groups the Science Education sub-group and the Innovation sub-group. The Science Education sub-group is currently engaged in work which is aimed at enhancing the links between schools, universities and businesses. Current work by the Innovation sub-group seeks to investigate ways in which the Scottish economy might grow through innovation investment. In 2009 the SSAC published *'Business R&D in Scotland – A missing link'* which contained the following recommendations:

- Business should be encouraged to recognise the value of R&D;
- The Scottish Government should incentivise business R&D and *'strengthen the pipeline of support mechanisms'* to business;
- Constraints on knowledge-transfer partnerships between universities and businesses should be removed;
- Proof of concept support should be expanded to include business innovation;
- The Government and Scottish Enterprise should introduce measures to enhance management skills in business R&D;
- A toolkit which supports business R&D manager in their decision making process should be introduced;
- Research should be carried out to enhance the understanding of R&D in the service sector; and
- Develop a public forum for information dissemination and consensus building to encourage greater investment in business R&D.[xl]

Scottish Enterprise

SE is a Scottish development agency. The agency earmarked £22.3m funding for innovation during the first year (2011/12) of its current business plan (the plan will run from 2011 to 2014). Further funding is also targeted to this area through the 'RSA and SMART support' (£43.2m) and the 'Commercialisation – Development & Exploitation of Intellectual Assets' (£16.3m) in the same year. The business plan set the following targets under the broad category of innovation over its lifespan:

- Between £65m to £75m of additional business R&D investment from SE-assisted projects (R&D and SMART grants);
- 350-450 companies introducing new products/services/process that generate significant value;

- Increased leverage of collaborative R&D funds from other public sources (Technology Strategy board, Framework programme 7 and Small business Research Initiative); and
- Number of companies accessing key sector market intelligence initiatives.

SE offer specific support and funding for innovation and R&D through a number of instruments:

- SMART Scotland – programme which offers support of up to 75% of project costs for technical and commercial feasibility studies (projects should last between six and 18 months, an upper limit of £100,000 is placed on grants) and up to 35% of project costs for R&D projects which seek to develop pre-production prototypes of new products or processes (projects should last 6 to thirty-six months, a maximum grant of £600,000 is available and projects must have projects costs of above £75,000). SMEs meeting the eligibility criteria may apply for a R&D grant irrespective of whether they receive feasibility study support. Between April 2008 and September 2011 approximately £16.7m in funding has been issued by SE to businesses through the SMART programme. In the six months between April and September 2011 £1.975m was provided to companies through the SMART programme.[xli]
- R&D Grants – grants are provided in two categories – industrial research and experimental development. Projects receiving funding last between six to 36 months. Funding levels are differentiated by company size and project cost: 45% of project cost for SMEs with a maximum of grant of £40,000; 35% of project cost for SMEs with grants in excess of £40,000; and, 25% of project cost for large companies receiving all grant sizes. A positive impact on R&D jobs most be demonstrated in order to receive a grant in excess of £40,000. All companies receiving grants (of any size) must demonstrate the commercial prospects of the end product, that they have the necessary managerial and technical expertise (either bought-in of in-house) and that financial assistance is essential. In the six months between April and September 2011 £2.5m was provided to companies through the R&D Grant.[xlii]
- The Technology Transfer Board (TSB) – proposals are currently being sought for a TSB/SE £15m fund for enabling technology. Funding of £250k to £500k is available for collaborative projects led by business;
- Seven Framework Programme (FP7)– SE can offer advice to client on accessing FP7 funding; and,
- R&D Tax Credits – UK wide tax credits are available to Scottish firms engaging in R&D.

SE also offers companies:

- Advice on: funding high-risk and speculative projects; evaluating ideas and examining potential markets; support to deal with ideas regulation and protection; and, developing new approaches to processes and improve productivity;[xliii] and

- Access to the Winning Through Innovation Programme, a series of events designed to aid companies in bringing their products to market – event topics include using social media as a marketing tool, how to get customers to endorse a business, and inbound marketing.[xliv]

Highlands and Islands Enterprise

HIE is a development agency with a specific focus on the Highlands and Islands regions of Scotland.[xlv] The agency has a client base of 350 companies deemed to be high-growth companies with a view to developing trade on a national and international level. The also support high-growth start-ups.[xlvi] HIE act as a conduit to SMART Scotland, TSB and FP7 funding offering advice on how to access the scheme and promoting them with their region. In addition, HIE offer funding through the following streams:

- The HIE R&D funding scheme: a scheme which funds fundamental research, industrial research and experimental development.[xlvii] In the past year approximately £385k has been provided to businesses through the schemes. Over the last three years the total is £1.4m[xlviii]; and,
- The Small Business Research Initiative (SBRI): a scheme that provides SME's with greater access to Research and Development opportunities by facilitating access to Government departments procurement (see section 2 for further details).

The agency provides support to businesses wishing to access knowledge transfer networks, through the Interface matchmaking scheme and by facilitating partnerships between academia and business. Grants of up to £5000 are available to businesses in the Highlands and Islands area to support collaborative projects between businesses and academia. [xlix]

In addition HIE has developed partnerships with Massachusetts Institute of Technology's Sloan School of Management to deliver a Business Growth Programme and a new Sectoral Acceleration Programme in order to embed a culture of innovation amongst businesses and business support organisations.[l]

The agency also supports businesses in maximising the impact technology can have on their operations.[li]

3.3 Policy delivery and funding to academia

Scottish Funding Council

The Scottish Funding Council (SFC) is the main funding body for Scottish universities and colleges. It provides funding for teaching, research and other activities to 41 colleges and 19 universities and higher education institutes.

The SFC delivers approximately £1.5bn directly to universities and colleges annually for teaching, learning, research and other activities in support of Government priories.

University allocation for the academic year 2011/12 was £1.12bn. This funding was distributed across Scotland's 16 universities. The total funding consisted of:

- £129.5m of Horizon funding - which supports strategic initiatives in universities including research activities; and,
- £994.1m in general funding for core teaching, research and knowledge transfer activities.[lii]

College funding in the period totalled £564.1m, spread across 41 colleges. The total fund consisted of:

- £421m – teaching grant;
- £78.7m – bursary support; and
- £16.9m – discretionary funds and childcare.

4 Wales

4.1 Policy

Current Welsh Assembly Government policy on R&D and innovation is outlined in 2011 policy document *Economic Renewal: A new direction.* Priority 4 includes are range of measures that are intended to encourage innovation and move Wales *'towards a more R&D intensive and knowledge-based economy where the right conditions exist for innovation to flourish'.* A number of desired outcomes have been identified with specific commitments made which are designed to meet these outcomes.[liii]

Commitments made to *'address under-used business incubation capacity'* include:

- Reviewing the Technium approach (note: the Technium refers to innovation centres);
- Close Tecnium facilities that are not securing a *'good return overall'*;
- Encourage academia to build capacity to meet the needs of business, with a focus on six key sectors – ICT, energy and the environment, advanced materials and manufacturing; creative industries; life sciences; and financial services and professional services.
- Encourage collaboration between researchers across Higher Education (HE) institutes, and to increase the capacity of the Welsh HE sector as a whole to participate in higher value research contracts and increase the quality of competitive bids;
- Promote Wales as a place for innovation and as a destination for knowledge based business;
- Work with business to develop their innovative capacity;
- Encourage HE institutes to put review mechanisms in place to ensure more successful research bids;
- Build on existing centres of expertise and specialist facilities to develop pan-Wales research collaborations (including HE and business);
- Facilitate greater involvement in the Small Business Research Initiative.[liv]

Commitments designed to *'encourage businesses to invest in R&D and to harness the commercial opportunities of innovation and research'*, include:

- Promoting the importance of business innovation (R&D, product and service innovation); and
- Increase awareness of support available to business and academia for collaborative R&D and commercialisation activity – to this end, a pilot web portal Expertise Wales was launched In February 2011.[lv]

Commitments under the heading *'adopt a more focused approach, talking barriers to investment in R&D and innovation'* include:

- Providing specialist facilities (including incubations centres) that will create an environment which will foster the growth of technologically focussed, knowledge based industry;
- Develop the recommendations of the Economy & Ministerial Advisory Group report on R&D and Commercialisation. These recommendations were as follows:
    - Further engagement with UK Research Councils, the TSB, charities, EU Framework Programme and other EU programme as well as with universities applying for this funding. This has included a mapping exercise to align R&D priority measures with key sectors, and to identify strengths in relation to Research Council, TSN and FP7 funding areas.
    - Ensure a *'whole government'*, cross-departmental approach to supporting R&D.
    - Educate, attract and retain scientists, engineers, technologists and mathematicians and ensure that those who wish to pursue research careers in Wales have the opportunity to do so. Delivery of this commitment involves steps to increase the uptake of STEM subjects at all levels, the establishment of a National Science Academy, and the promotion and development of key sectors (as defined above); and,
    - The introduction of a revised *Science Policy for Wales* (2011) (Note: the policy was intended for publication in autumn 2011, but is still in preparation).[lvi]

4.2 Policy delivery and funding to business

The Welsh Government's 2011 budget originally contained a revenue allocation of £2.16m for *Encouraging Innovation*. This was increased by £1m during the June Supplementary Budget period to bring the final allocation to £3.16m (representing a 46% increase on the original allocation). The same budget included £0.433m of capital allocation under the *Encouraging Innovation* stream.[lvii]

The budget for 2012 allocates £5.785m of revenue to *Encouraging Innovation*, representing an 83% increase on the previous year. The capital allocation for 2012 is £0.357m, an 18% decrease on the previous year.[lviii]

In 2006 the Welsh Development Agency was merged with the Welsh Assembly Government with the responsibility for business support measures being transferred to the Department for Economic Development and Transport.

In addition to the UK wide and EU funding available to Welsh businesses may avail of the Government's *Repayable Finance Scheme.* The scheme is based on the principle that: companies repay funding without interest (except in the case of the late payments) so that it can be *'recycled and continue to benefit more businesses in the*

long term'. Funding is aligned to the six priority areas outlined in the *Economic Renewal* document. Applicants to the scheme must demonstrate that they meet one or more of the following objectives:

- Encourage new investment which increases competitiveness and productivity, especially within the Assisted Areas of Wales;
- Help create, safeguard or maintain better skilled jobs;
- Encourage innovative research and technological development with commercial potential;
- Encourage industrial collaborations to carry out industrial research and precompetitive development;
- Increase entrepreneurship and the development of small and medium sized enterprises (SMEs);
- Increase and improve the modern commercial building stock in Wales; and,
- Develop the six key sectors in Wales.[lix]

As of the 30 September 2011, 20 offers of business support have been made through the repayable finance scheme, totalling £5.7m. The repayment profiles are unavailable as each offer has unique terms and conditions dependent on the repayment mechanism, timing and specific conditions. Commercial confidentiality prevents identification of individual companies in receipt of funding.[lx]

The three major areas of funding have been capital projects, job creation and R&D and innovation. With regard to the latter, R&D and innovation support, while situated within the repayable finance scheme is not repayable. On this, the Welsh Government has stated:

> *There is an integrated package of support for Research and Development and Innovation in sector-aligned Welsh businesses. The Fund will support technologically innovative businesses in the development of new products and processes and technologies to meet the first objective of the Innovation and R&D Strategic Framework.* ***To maximise the participation of appropriate businesses in the Welsh economy the financial support is not repayable. The grant support will be used as an incentive****.*[lxi]
> (Emphasis added)

R&D and innovation funding is available throughout the various stages of development from technical and commercial feasibility exploration to commercial exploitation. There are three types of R&D and innovation funding available:

- Industrial research funding is targeted toward research which aims to develop an early bench top model of process representing a technological advance. Projects should last from three months to one year, with funding of up to £100,000 available.

- Experimental development funding is targeted toward the development of pre-production prototypes. Projects should last from six months to two years, with funding of up to £200,000 available.
- Exploitation funding is targeted at companies seeking to commercially exploit products or process developed through previous R&D. Projects should last from one month to one year, with maximum funding of £20,000 available.[lxii]

Funding is provided to cover costs associated with the project. Eligible project costs include:

- Pay of staff directly involved in the project;
- National insurance and pension contributions;
- Overheads attributed to the project phase;
- Materials and consumables;
- Capital equipment;
- External cost including sub-contracts, consultancy, fees for trials and testing, acquisition of technology, market assessment, registration of new intellectual property and 'buying-in intellectual property rights (external cost should not exceed 30% of total cost of industrial research and experimental development projects).

Funding offered through the scheme is governed by EU state rules. This sets limits on the type of projects which can receive funding. Funding may only be offered to projects which, without funding, would:

- Not go ahead:
- Proceed on a reduced scale; or,
- Take longer to complete.[lxiii]

SMEs applying for support can only do so if the submit an application before work on the project has begun.[lxiv]

Alternative financing is also available to Welsh businesses:

- Finance Wales invests in SMEs. Their investment streams included early stage investment in technology businesses (£50,000 to £1m initial invest and follow on investments of up to £5m). Companies receiving early stage investment must show unique technology, novel intellectual property, an experienced and commercially focussed management team, a commercialisation strategy and an exit plan.[lxv] Development investment, microloans (of between £5,000 and £25,000) and succession deals are also available; and
- The Local Investment Fund, which is available through local authorities, supports SMEs to finance projects that meet specific objectives. Introducing new products to market is one of the qualifying objectives. The grants cover up to 40% of project costs, subject to a minimum grant of £1,000 and a maximum of £10,000. Grants are part funded by the European Regional Development Fund.[lxvi]

4.3 Policy delivery and funding to academia

The Higher Education Funding Council for Wales distributes funding amongst the 11 Welsh universities. Funding is targeted to three main areas – teaching, research and postgraduate research funding. The Council also provides capital funding and *'special funding'.* Funding for the three main areas of work is broken down as follows for the financial year 2011/12:

- Teaching – £284m;
- Research – £71m; and,
- Postgraduate Research - £5.2m.[lxvii]

5 Republic of Ireland

5.1 Governance Structure

There are a number of actors involved in the setting of the RoI's research and innovation policy; the Department of Jobs, Trade and Innovation; Department of Education and Skills; the sub-departmental Office of Science, Technology and Innovation; the Cabinet Sub Committee on Science, Technology and Innovation; the Inter-departmental Committee on Science, Technology and Innovation; Chief Scientific Advisor; the Advisory Council for Science, Technology and Innovation; and the Innovation Taskforce Implementation Group.

The Office of Science, Technology and Innovation, a sub-department of DJTI, has responsibility for the *'development, promotion and coordination of Ireland's Science, Technology and Innovation policy; and Ireland's policy in European and international research activities'*. Rather than solely focusing on R&D, the Office's remit is broader, covering research, technological development and innovation (RTDI).

The Strategy for Science, Technology and Innovation 2006-13 (SSTI), published in 2006 (further details are below), led to the creation a number of new structures – Technology Ireland, the Higher Education Research Group and the Health Research all of which report to the Inter-Departmental Committee on Science, Technology and Innovation. The main role of these bodies is implementation of the SSTI.

In 2009, the Innovation Taskforce was appointed to advise the government on mechanism to position RoI as an international innovation hub. The taskforce published a report in 2010 with the Innovation Taskforce Implementation Group established following this to implement the recommendations of the report (see below).

A further delivery mechanism is Forás, RoI's *'advisory board enterprise, trade, science, technology and innovation'.* Forás provides *'certain corporate services'* for its *'sister agencies'*:

- Enterprise Ireland: responsible for the development and promotion of indigenous business;
- IDA Ireland: responsible for securing overseas investment; and,
- Science Foundation Ireland: investor in academic research.

5.2 Key Government Strategy

The key strategy document covering ROI R&D and innovation policy is the publication *Science for Technology and Innovation 2006-2013* (STI). The main aims and actions of that document are summarised in Figure 1. Greater detail on the specific actions is available here.

Figure 1: Aims and Actions of the Science for Technology and Innovation Strategy[lxviii]

Academic research	Significantly increase the number of research teams led by internationally competitive Principal Investigators; Upgrade existing research infrastructure and develop new facilities; Develop sustainable career paths for researchers; Enhance the mobility of researchers; and Double the number of PhD graduates in science, engineering and technology to nearly one thousand per annum by 2013.
Graduate schools	Establish a number of graduate schools to provide high-quality training of researchers, and equip them with generic and transferable professional skills that are relevant to a modern knowledge-based enterprise economy; and Accommodate industrial placements to facilitate development of enterprise expertise.
Commercialisation	Increase outputs of economically relevant knowledge, know-how and patents from third-level institutions; and Strengthen the Intellectual Property/ Commercialisation functions within Higher Education Institutes and provide them with expertise to translate research into applications.
Industrial research	Transform the quality and quantity of research undertaken by enterprise – both directly and in cooperation with third-level institutions; Grow business annual expenditure on R&D from €1 billion in 2003 to €2.5 billion by 2013; and Develop a number of industry-led research-driven Competence Centres with research facilities in third-level institutes.
Sectoral research	Enhance the contribution of research to economic and social development across all relevant areas of public policy; and Provide a competitive fund to encourage excellent research in areas of social, economic or environmental need, such as sustainable agriculture, treatment of specific medical conditions, and energy security.
Public awareness	Increase public awareness and appreciation of the role of science in society, with a particular focus on schoolchildren and those that influence them; and Increase the number of schoolchildren taking science subjects.
Cross-border and international cooperation	Increase international cooperation in science and technology and participation in transnational research activity; and Encourage Irish researchers to collaborate internationally and to avail of EU Framework Programme funding. Leverage complementary strengths in institutions and enterprises in Ireland and Northern Ireland through increased cross-border cooperation.

In 2008, a supplementary policy, *Innovation Ireland,* was published. The document built upon the STI Strategy. Its central aim was to:

> *In short, our ambition is to put innovation at the core of our policies and strategies for the future, so that Ireland becomes a leader in innovation.* [lxix]

Full details of the strategy are available here.

5.3 Government Funding

Figure 2 illustrates the distribution of R&D funding in RoI by funding sector. The figure shows that 50% of R&D funding is drawn from business enterprises, with the government providing 31% of funding. It is also notable that 16% of funding came from abroad. This section outlines the range of government funding available to those wishing to take part in R&D or innovation in RoI (with a focus on academic institutions, indigenous businesses and international businesses).

Figure 2: RoI – funding of R&D by type of funder

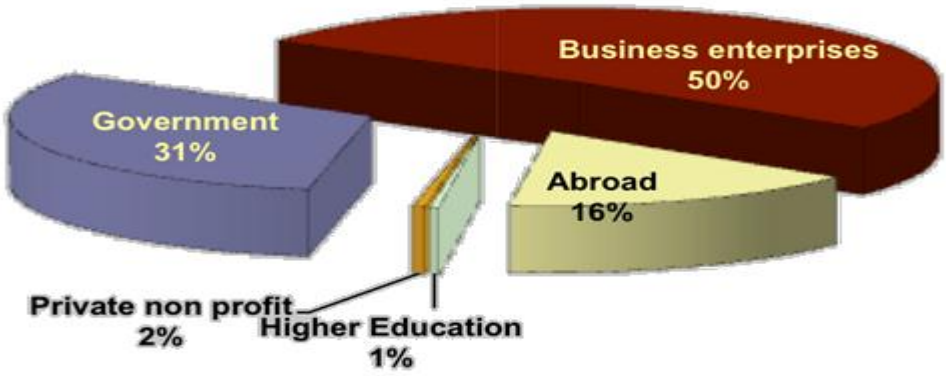

Figure 3, illustrates the level of government funding targeted to R&D since 2000. Funding peaked in 2008 when €942m was allocated to R&D, falling to €872 in 2010. Funding is targeted to three areas:

- Higher education – administered the Department of Education and Skills, the Higher Education Authority and the Science foundation;
- Business sector – administered via state agencies including IDA Ireland, Enterprise Ireland; and
- Funding for the government sector performed R&D – including the Marine Institute and non-teaching hospitals.

Figure 3: Government Budgeting and spending on R&D 2000-2010 (€m, 2010 estimate)

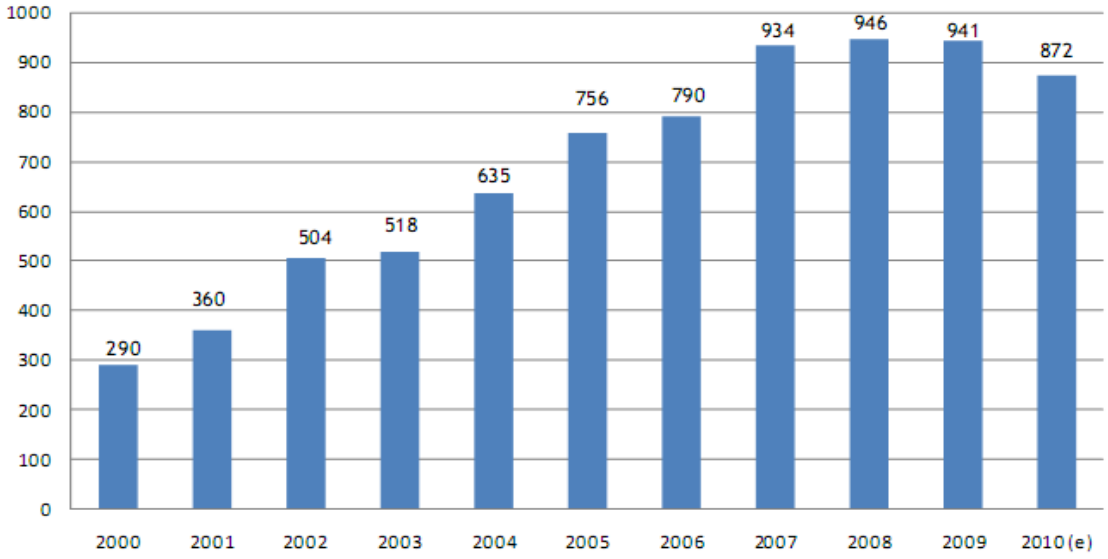

Table 9 outlines funding estimate for the various R&D funders for 2010, the section that follows provides further details on funding to academia, business, and the public sector.

Table 9: Government department and agencies funding R&D activities (2010 estimates)

Funding Department/Agency	2010 (€m)	% of Total
Higher Education Authority	288.7	33.1
Science Foundation Ireland	150.0	17.2
IDA Ireland	82.0	9.4
Enterprise Ireland	69.6	8.0
Teagasc	48.5	5.6
Health Research Board	44.4	5.1
Department of Agriculture, Fisheries and Food	29.0	3.2
Sustainable Energy Authority	28.3	3.2
Irish Research Council for Science Engineering & Technology	24.0	2.7
Department of Enterprise, Trade and Innovation	15.9	1.8
Department of Communications, Energy & Natural Resources	15.7	1.8
Environmental Protection Agency	13.0	1.5
Irish Research Council for Humanities and Social Science	11.8	1.3
Marine Institute	9.0	1.0
Others	44.6	5.1
Total	**872.0**	**100.0**

5.3.1 Support to Academia

The largest share of Government funding in RoI (33.1%) is allocated to the higher education sector through the Higher Education Authority – €288.7m in 2010, made up of €136.2m (47%) through the HEA block grant and €49m (17%) through the Programme for Research in Third Level Institutions (PRTLI). Block grant funding covers teaching and research within institutions, although it is up to each institution how it is distributed. PRTLI is competitive funding, which provides financial support for *'institutional strategies, and infrastructure projects in key areas of research'.* The programme has three objectives:

- To enable third-level institutes to develop strategies and plans that aid the long-term development of their research capabilities and which are consistent with existing strengths and goals, and with national goals;
- To develop research capabilities in third-level institutes with a view to enhancing the quality and relevance of graduate skills;
- To provide support for *'outlandishly talented individual researchers and teams within institutions'* and for inter-institutional cooperation within RoI, the EU and internationally (note funding is only available to RoI institutions[lxxi]).[lxxii]

Total previous and future funding breaks down as follows:

- Cycle 1: announced 1999 for the period 2000-2003, total funding of €206.1m, €177.5 of which was for buildings and equipment, €28.6m for research programmes and people.
- Cycle 2: announced 2000 for the period 2001-2004, total funding of €78.5m, €48.8m of which was for buildings and equipment, €28.6m for research programmes and people.
- Cycle 3: announced 2001 for the period 2002-2006, total funding of €320.4m, €178 of which was for buildings and equipment, €142.4m for research programmes and people.
- Cycle 4: announced 2007 for the period 2007-20012/13, total funding of €260.7m, €131.3m of which was for buildings and equipment, €129.4m for research programmes and people.
- Cycle 5: announced 2010 for the period 2011-2015, total funding of €347.6m, €248m of which was for buildings and equipment, €99.6m for research programmes and people.
- Total funding over the period is €1.2bn.[lxxiii]

PRTLI applications are judged by *'an international panel of distinguished researchers and scholars'* with awards offered on the basis of: strategic planning and focus; inter-institutional collaboration; research quality; and impact of research on teaching and learning.[lxxiv] In 2010, overall responsibility for PRTLI was moved from Department of

Education and Skills to the Department of Jobs, Enterprise and Innovation on the basis that this would align the work of academia with the needs of enterprise.

The HEA also administers the Strategic Innovation fund, valued at €510m over the period 2006-2013. In 2010 €6m was made available through the fund, which aims to: enhance collaboration between HE institutions; improve teaching and learning; support institutional reform, and develop fourth level education (graduate education[lxxv]).[lxxvi]

A further competitive funding programme available to the higher-education sector is delivered through the Science Foundation Ireland (SFI). SFI funding is prioritised towards science and engineering, a directed to bio-technology, information and communications technology, and sustainable energy and energy efficient technologies, in line with government priorities. The SFI provides grants to Universities and Institutes of Technologies. It also *'strongly encourages research collaboration between SFI funded scientists and engineers and industry'.* Over 30% of SFI funded researchers have established collaborations with industry. The proportion of SFI funded researchers working with SMEs in 2009 increased by 53% on the previous year.[lxxvii] In 2010, the SFI distributed €150m in funding.[lxxviii]

A full breakdown of HEA funding for 2010 is outlined in Table 10.

Table 10: HEA Funding by Stream 2010

Funding Stream	€K
HEA Total	288,715
PRITL	48,996
The Technology Sector Research Fund	6,000
HEAnet	7,500
E journals	5,000
Research Facilities Enhancement Scheme	470
Institutes of Technology	21,608
Strategic Innovation Fund	6,000
Recurrent (Core) funding	136,222
Capital Grant	56,919

5.3.2 Support to Business

Enterprise Ireland offers a range of funding and other mechanisms to support R&D and innovation in businesses and academia. Industry targeted funding includes:

- Direct R&D Funding – Enterprise Ireland's direct R&D funding is spread across five streams ;
  - R&D Stimulation Grant – aimed at assisting companies not involved in R&D to investigate the potential their business holds for embarking on R&D. The programme offers grants of 50% of eligible expenditure up to a ceiling of

€30,000. Eligible spending includes: Salaries and wages of promoters undertaking their own research who can demonstrate a loss of income can claim up to €1,000 per week; consultancy fees of up to €900 per day for the first 20 days and €700 for subsequent days; 25% of feasibility study cost (including prototype design and fabrication expenditure); travel and subsistence costs within RoI and overseas. Scheme is open to Enterprise Ireland client SMEs involved in manufacturing and selected service sectors.[lxxix]

- R&D Fund: Small Projects – targeted toward projects with an expenditure of less than €150,000 provided to companies who wish to: establish or increase R&D activity; demonstrate a connection between business and R&D objectives; develop a culture of innovative thinking; increase R&D capacity and capability; and develop R&D management systems. The fund is open to companies of all sizes that are clients of Enterprise Ireland, Údarás na Gaeltachta and City or County Enterprise Boards. Grants are determined by company size – small companies may receive up to 45% of total project cost, for medium companies this drops to 35% and to 25% for large companies.[lxxx]
- R&D Fund: Large Projects – available on projects with a total cost of up to €650,000 available to all manufacturing or internationally traded services company. The fund targets companies based on the criteria established in the Small Projects R&D Fund. The level of grant is again determined by company size along the same lines as the Small Projects fund.[lxxxi]
- Innovative High Potential Start Up (HPSU) Fund – equity investment to co-fund start-up costs of HPSU companies including R & D costs.
- Collaborate on Research and Development Projects with Colleges and/or Companies – includes pooled innovation vouchers (see below), a 15% bonus as part of the R&D fund (large and small projects) takes place, and other projects (see here) designed to encourage company to company and company to academia collaboration.

- Innovation Vouchers – open to small companies (with less than 50 employees), the voucher scheme is designed to encourage businesses to *'explore a business opportunity or problem with a registered knowledge provider'.* Vouchers valued at €5,000 are available to individual businesses, although up to ten companies can pool together to receive a voucher of up to €50,000.[lxxxii]
- R&D Advocates Scheme – the scheme assists companies to grow through participation in technical innovation. Companies are appointed an innovation advocate who will help the company appraise the business and examine ways to develop innovation. The initial advocate visit lasts for half a day, leading to a further three sessions should the first be deemed successful. The first visit is free, with subsequent visits paid for jointly by Enterprise Ireland (€600) and the client (€300). The scheme is open to SMEs in manufacturing and selected service sectors that are clients of Enterprise Ireland, Údaras na Gaeltachta or City & County Enterprise Boards.[lxxxiii]

- Innovation Partnership Programme – offers grants of up to 805 of project cost or projects that involve RoI based business and college collaboration. The proposal process and administration of the project is managed by the participating third level research institution. To qualify for funding, the research project must outline how the company will benefit in terms of its growth, the evolution of strategic R&D within the company and the creation of new knowledge that can be used by the company to generate commercial advantage. The programme is open to all RoI based manufacturing and internationally traded services businesses. Funding ceilings are set at €9,000 for phase one (feasibility study) and up to €200,000 at phase to (full proposal stage), although funding for early stage companies (pre-HPSU) is capped at €100,000 for this phase.[lxxxiv]
- Applied Research Enhancement (ARE) Centres - research facilities funded by Enterprise Ireland specialising in a number of technology fields including ICT and Software, Bio-life sciences and pharmaceuticals, and bio-medical devices and materials. The centres exist to enable businesses to engage in collaborative research projects. Such projects are funded by companies using innovation vouchers.[lxxxv]
- Technology Centres – government funded centres staffed by researchers who are empowered to undertake market focussed strategic R&D for the benefit of industry.[lxxxvi]
- EU and ESA Research and Innovation Supports – Enterprise Ireland assists companies in accessing FP7 and other EU programmes.[lxxxvii]

A full break down of Enterprise Ireland funding for 2010 is available in Table 11.

Table 11: Enterprise Ireland funding by stream 2010

Funding Stream	€K
EI Total	69,611
R&D Fund	53,220
Applied Research Enhancements	3,552
Industry Led Networks	1,741
Basic Research Grants	-
Innovation Partnerships	7,698
International Collaboration	3,400

IDA Ireland offers grant aid for RD&I projects including grants for RD&I Feasibility Studies and Training. Total funding for IDA R&D funding for 2010 was €82m.

Funding is also available to companies in RoI through IntertradeIreland. The agency's Fusion programme offers €33,150 to companies to enable them to recruit *'a talented graduate to lead a business improvement project'.* The scheme partners companies with a third level institution that offers expertise. The programme partners businesses with a graduate for a 12 month period. According to IntertradeIreland:

> *On average, each company taking part on the programme benefits from over £1 million worth of sales and efficiency savings as a result of cost savings, new product development, increased sales and/or process improvements.*[lxxxviii]

A second programme offered by the agency is Innova which offers companies a grant of up €285,000 for carrying out an innovation programme in partnership with a company from Northern Ireland (the programme works in the other direction, with Northern Ireland companies potentially receiving for working with RoI companies). To receive funding, projects should have *'strong commercial potential'*. Applicants must identify an R&D partner prior to application.[lxxxix]

In addition, companies in RoI can avail of a 25% R&D tax credit – designed to encourage companies to undertake new or additional R&D activity in Ireland. The tax credit covers wages, equipment, buildings and related overhead costs of establishing a R&D and Innovation activity in Ireland.[xc]

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