INNOVATION FOR SCOTLAND

A STRATEGIC FRAMEWORK FOR INNOVATION IN SCOTLAND
INNOVATION FOR SCOTLAND

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Foreword

The Scottish Government has a clear purpose: to create a more successful Scotland with opportunities for all to flourish through increasing sustainable economic growth. Innovation for Scotland is essential to achieving that purpose. Innovation improves productivity, creates new products and services, creates new jobs in existing industries and industries of the future and stimulates greater economic participation. All these are crucial to increasing sustainable economic growth.

Today we are facing many global challenges: overcoming world-wide recession; developing low carbon energy; addressing climate change and environmental security; transformations in technology; providing food and clean water for a growing global population; the rise of new emerging economies. These challenges also represent opportunities. Innovation by business, government and individuals is essential to realizing these and other global opportunities and for making the best use of Scotland’s natural assets and exceptional skills.

In the midst of a recession when financial pressures are greater and margins tighter, the successful businesses are the ones that find smarter, more efficient and effective ways to improve productivity, expand market share and increase profits. In other words they innovate. Surviving an economic downturn and placing ourselves in the best possible position to benefit from the upturn will not be achieved by simply doing more of the same. Innovation is about seeing and seizing new opportunities even in tough times.

_Innovation for Scotland_ describes how a partnership between businesses, Government, enterprise agencies, and academia, is essential to survive the downturn, and to take full advantage of the economic recovery when it comes. Already Scottish Enterprise and Highlands and Islands Enterprise are engaging with over 2500 businesses through their innovation support programmes and initiatives. Government has launched the £10 million _Saltire Prize_, placing Scotland at the forefront of world-leading research and new industries in marine renewable energy technology. The Scottish Funding Council is fostering greater co-operation between business
and science through the Interface match-making service.

It is the private sector that powers economic growth – successful innovation depends on the competitiveness of Scotland’s businesses, many of them SMEs. We are working with the private sector to increase the competitiveness of our most important industries. Private sector Industry Advisory Boards, working in partnership with the public sector, are at the heart of developing and implementing action plans to transform the competitiveness of key industries, and in enabling technologies that will underpin many of Scotland’s key sectors.

Innovation needs investment, a key issue consistently raised by businesses. Practical steps have been taken, including the support through our enterprise agencies to help businesses become ‘Investor Ready’, and with the recent announcement of a Scottish Investment Bank.

Our Economic Recovery Programme\(^1\) shows how we aim to help business and the economy to get back on track so that we are best placed to take advantage of the economic upturn. The Growing Innovation document, published by the enterprise agencies, gives details of how we will give the practical help that will make a real difference. Innovation in Scotland articulates the activities underway by business, academia, Government and its agencies and identifies how we can all play our part to achieve our long-term ambitions for Scotland.

John Swinney

Cabinet Secretary for Finance and Sustainable Growth

June 2009

\(^1\) An updated Economic Recovery Programme document was published by the Scottish Government on 15 June 2009 and can be found at: [http://www.scotland.gov.uk/News/Releases/2009/06/15102302](http://www.scotland.gov.uk/News/Releases/2009/06/15102302)
INNOVATION FOR SCOTLAND

INTRODUCTION

The Government Economic Strategy (GES), published in November 2007, set out its Purpose – “to focus the Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth”.

Bringing together the public and private sectors in a genuine, more productive, collaborative partnership to make best use of innovation – is key to delivery of that purpose. To achieve increased economic growth, we need more than just the creation of new ideas but their translation into new products, new processes and new services that lead businesses to create jobs and wealth. Innovation is the successful exploitation of such new ideas. The GES set out a clear single goal; the National Performance Framework lets us all see the progress we are making; bringing this all together will put Scotland at the vanguard of realising innovation’s benefits.

Along with the Skills for Scotland and Science for Scotland documents published recently, Innovation for Scotland makes the same commitment to a demand-led, outcome focussed approach; one that aligns all our efforts towards that same goal. Together with New Horizons, the report on Scotland’s Higher Education Institutions, the establishment of Skills Development Scotland and the restructuring of Scottish Enterprise (SE) and Highlands and Islands Enterprise (HIE) as Innovation, Enterprise and Investment agencies, we now have the basis of coherent strategy to achieve the kind of innovation driven economic growth that Scotland is capable of.

Private business is the engine of economic growth. Innovation for Scotland outlines how businesses must embrace innovation and the

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opportunities it affords, increasing the "demand side" for innovation. Emerging and rapidly changing global markets, novel and pressing economic and social needs all represent a huge need for innovation, for new products and new businesses. Connecting Scotland"s businesses and skills to these opportunities – and to the sources of innovation support is essential.

_Innovation for Scotland_ outlines how the Government and its agencies must work in close partnership with business to stimulate this innovation "demand", match it to our already strong supply side, and ensure that our support is aligned and geared to meeting it. The enterprise agencies play a crucial role in delivering that support. In _Growing Innovation’_ Scottish Enterprise and Highlands and Islands Enterprise describe how they work with businesses to spread the message of the benefits of innovation and the practical support available to businesses to improve their bottom line profits. Other public agencies such as the Scottish Funding Council and Skills Development Scotland also play an essential role in turning strategic ambition into practical implementation.

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3 Adapted from a presentation by Chad Evans Vice President, Council on Competitiveness to the American Association for the Advancement of Science, February 2005
Whilst this document has not been developed as a direct response to the current economic conditions, surviving the down turn and placing ourselves in the best possible position to benefit from the upturn cannot be achieved by simply doing more of the same. The current economic situation provides opportunities for those businesses that are open to new and better ways of working. These are the businesses that will survive and prosper.

Government’s approach to innovation is based upon four underlying principles that draw upon leading research and practice from across the world:

- a clear focus from public sector agencies on working with business to stimulate greater demand for innovative ways of working and aligning support to meet that demand;
- a support for innovation beyond the commercialisation of science and technology alone to also include the innovation of new services, new sources of innovative ideas from customers and suppliers, the transfer of innovative ideas from one industry to another – all delivering better value and quality of service to customers;
- a systems-based approach that recognises how the public sector, private sector, academia and the third sector, need to be aligned with each other and work together in partnership to achieve greater wealth creation and sustainable economic growth;
- a focus on the outcomes of innovation and how it contributes to increased, sustainable economic growth rather than traditional measures of inputs and outputs.

Our approach is both aspirational and transformational: we want to see Scotland with a vibrant, internationally competitive, high-performing private sector and an efficient, effective, high-value add public sector, aligned to the needs of our people. To achieve this transformation, we need a culture that values innovation, not just as a goal in itself, but because of the way it can improve business
performance, increases economic growth and enhance a sustainable quality of life for all.

A transformation in business attitudes and culture towards innovation is crucial if we are to transform our economic performance and to achieve the Government’s National Purpose. Innovation should be integral to business thinking and planning in a new economic climate.

In this Framework, we set out a new approach to supporting innovation in Scotland. Our challenge is to create, in partnership with all those involved in the innovation system, a shared vision of how we stimulate and increase innovation demand; a recognition of the interdependent roles each of us plays in meeting that increased demand; and how, working together towards shared outcomes, we maximise the innovation capacity of Scotland and its contribution to the Purpose of increased sustainable economic growth.
Innovation and the Government Economic Strategy

The Government Economic Strategy, published in November 2007, outlined a new approach:

“Sustainable economic growth is the one central Purpose to which all else in government is directed and contributes. Our Strategic Objectives - to make Scotland wealthier and fairer; smarter; healthier; safer and stronger; and greener - are all predicated on our efforts to bring more economic success to our country.”

Figure 1 shows the strategic approach the Government is taking. Innovation has a key role to play in the Strategic Priorities that are internationally recognised as being critical to sustainable economic growth.

In terms of supportive Business Environment, for example, the key approaches the Government will pursue in relation to this Strategic Priority include:

- Responsive and focused enterprise support to increase the number of highly successful, competitive businesses;
• Targeted support to business in the pursuit of opportunities outside of Scotland and the development of internationally competitive firms;
• A broader approach to business innovation in Scotland that moves beyond viewing innovation as the domain of science and technology alone;
• A clear focus on strengthening the link between Scotland's research base and business innovation and addressing low levels of business R&D;
• A particular policy focus on a number of key sectors with high growth potential and the capacity to boost productivity;
• A competitive tax regime which incentivises business growth and attracts mobile factors of production; and
• A planning and development regime which is joined up, and combines greater certainty and speed of decision making within a framework geared towards achieving good quality, sustainable places and sustainable economic growth.

This augments the already existing actions the government and its agencies are taking to help achieve increased economic growth. These include:

• **Proof of Concept.** Administered by Scottish Enterprise, this fund is aimed at helping HEIs take research projects aligned to priority industries towards commercialisation.

• **SMART: SCOTLAND.** Currently administered by the Scottish Government (but delivery shortly to be transferred to Scottish Enterprise), this fund provides grants to SMEs to develop leading-edge products and processes from feasibility through to pre-production prototype.

• **Knowledge Transfer Grant.** Administered by the Scottish Funding Council this fund provides grants to HEIs and Colleges to assist with the dissemination and exploitation of research, knowledge, skills and expertise developed in universities.

• **Interface.** Interface is an SFC funded scheme to provide first point of access for businesses seeking information on HEI

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4 Information on the Knowledge Transfer Grant for HEIs and Colleges can be obtained from the Scottish Funding Council: [http://www.sfc.ac.uk/index.htm](http://www.sfc.ac.uk/index.htm)
access and collaboration.

But a new, fresh approach is urgently needed: as the GES says “For over 30 years, Scotland has suffered because our economy has been locked into a low growth cycle. Successive economic strategies, and successive governments, have tried and failed to lift Scotland's economic performance to where it should be - and, while other small independent countries around us have flourished, Scotland has lagged behind.”

Figure 2: Relative National Performance: Scotland, other small European countries and the UK

<table>
<thead>
<tr>
<th></th>
<th>Healthier Life Expectancy (years)</th>
<th>Fairer Income Inequality (Gini Coefficient)</th>
<th>Wealthier GDP per capita ($)</th>
<th>Smarter Educational Attainment (PISA scores)</th>
<th>Safer Offences per 100,000 population (total)</th>
<th>Greener Municipal Waste Recycled (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scotland</td>
<td>76.8</td>
<td>0.30</td>
<td>30,816</td>
<td>518</td>
<td>9,639</td>
<td>23</td>
</tr>
<tr>
<td>Norway</td>
<td>79.9</td>
<td>0.28</td>
<td>43,200</td>
<td>493</td>
<td>-</td>
<td>52</td>
</tr>
<tr>
<td>Finland</td>
<td>78.8</td>
<td>0.26</td>
<td>31,400</td>
<td>545</td>
<td>10,343</td>
<td>31</td>
</tr>
<tr>
<td>Iceland</td>
<td>81.0</td>
<td>0.25</td>
<td>35,800</td>
<td>501</td>
<td>6,018</td>
<td>22</td>
</tr>
<tr>
<td>Ireland</td>
<td>78.2</td>
<td>0.32</td>
<td>39,200</td>
<td>508</td>
<td>2,634</td>
<td>40</td>
</tr>
<tr>
<td>Denmark</td>
<td>77.6</td>
<td>0.24</td>
<td>34,400</td>
<td>494</td>
<td>9,013</td>
<td>41</td>
</tr>
<tr>
<td>UK</td>
<td>78.8</td>
<td>0.34</td>
<td>32,100</td>
<td>511</td>
<td>11,241</td>
<td>27</td>
</tr>
</tbody>
</table>

Despite our educational achievement scores being higher than all the other countries except Finland, Scotland has the lowest GDP of all the countries in the table, as well as the lowest life expectancy.

To reverse this trend and achieve the Purpose, the Government has highlighted three key components of increased growth - increased productivity, participation and population.
Scotland's economic growth has underperformed relative to both the UK, and other small European countries, in recent decades. Over the last thirty years (1975 to 2005), Scotland's annual average growth in Gross Domestic Product (GDP) was 1.8 per cent, well below that of comparable small European countries, and significantly below the UK average of 2.3 per cent. Scotland's growth has lagged that of the UK, in nine out of the past ten years, as figure 4 shows.
Innovation is vital to the task of reversing this trend: it contributes to growth by driving improvements in productivity and, through creating new products, processes and services, it creates new jobs and encourages greater economic participation, two of the components of increased economic growth illustrated above.

Innovation and Economic Growth

There is a wide range of studies on the links between innovation and growth. Although there are complexities and technical difficulties in measurement and attribution, the general consensus is that there is a positive correlation between the two, both at the firm level and through spillover benefits, at country/regional level. Some examples include:

- **William J Baumol ‘Four sources of innovation and the stimulus of growth in the Scottish economy’**. Part of the Allander series on Innovation & Enterprise, this report notes “the all-too-obvious conclusion that a reliable stream of innovation is the most important requirement of the remarkable long-run economic growth that has been experienced by the industrialized economies in the past two centuries”.

Source: Eurostat, OECD, Scottish Government
• Richard Freeman ‘What does modern growth analysis say about government policy towards growth?’: Discusses how modern economic growth theory puts technical change, and the determinants of technical change, at the centre of the economics of growth and productivity increases. Freeman suggests that at country level, much of the cross-country analyses are inconclusive. However company level studies tend to produce more consistent results showing that investment in knowledge through R&D has a significant impact on growth. 

• Harris et al (2006) discuss various methodological issues in determining the contribution of total factor productivity (TFP, i.e. the output growth due to changes in technical efficiency and technical change) to growth as well as using micro-data to consider what causes differences in TFP across regions and/or sectors.

Innovation and Productivity

There is also a considerable literature and international evidence that investigates the impact of innovation on productivity. Some examples include:

• DIUS white paper ‘Innovation Nation’ background analysis: Discusses OECD research which finds that at least some of the productivity gap between the UK and US (the productivity leader in recent years) is due to lower levels of investment in, or returns from R&D.

• DIUS white paper ‘Innovation Nation’ – Innovation modes and productivity in the UK. Cross country regression analysis investigates the impact of different kinds of innovation on

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5 What does modern growth analysis say about government policy towards growth? [http://www.hm-treasury.gov.uk/d/249.pdf](http://www.hm-treasury.gov.uk/d/249.pdf)
7 Background analysis: Strengths and weaknesses of the UK innovation system.
productivity. The results suggest that in-house/IPR innovating (i.e. innovation based on a company’s development of its own technology which is subsequently highly protected from imitation through patenting, design registration and copyrighting) is positively and significantly related to increases in productivity. This type of innovation is found in the UK and other countries with advanced innovation systems such as France, Canada and New Zealand. The cross country analysis also found that wider innovations (i.e. managerial, organisational and marketing innovations) are associated with higher productivity levels.

A more detailed focus on UK data again finds in-house/IPR and wider innovation positively and significantly related to levels of productivity but also finds that „traditional innovation“ (product and process innovation) is also a significant factor driving productivity.

**ICT and Productivity**

Research indicates that ICT exploitation accounts for approximately half of recent productivity gains in Europe – there is arguably no other single policy area which will be of more practical importance in realising our goals. The extent to which Scotland successfully exploits ICT, relative to our competitors, will be a decisive factor in whether Scotland achieves its economic growth objectives – through raising the productivity of private sector businesses and public sector organisations, and through enabling more people to participate in valuable economic activity.

The Scottish Government has recognised the vital importance of ICT to improved productivity and increased competitiveness by setting up the ICT Forum. The Forum brings together key stakeholders in the public and private sectors in a new, ground-breaking partnership model to look at how best to unlock the potential of ICT to contribute to increased growth. The Forum’s vision for Scotland is one where productivity is significantly improved by continual exploitation of ICT by Scottish businesses in order to innovate and prosper in a global economy; where the efficiency and quality of Scotland’s public services are constantly
being improved, through ever smarter use of ICT; where Scotland"s people are skilled users of ICT, and embrace the changes it brings about in their learning, leisure and work lives; and where a vigorous ICT sector addresses Scottish and global markets with competitive, high quality services and products.

We have reasonably strong foundations in place: relatively high levels of ICT adoption by businesses and households compared with most other nations and UK regions, near ubiquitous first generation broadband infrastructure, and highly rated university capabilities in computing. This in itself creates a valuable context. Our expectation should be quickly to establish a position in the top tier of ICT-exploiting countries in Europe, currently dominated by smaller European countries.

More detail on the reason for and the work of the Forum is contained in Annex C.

Innovation and Businesses

As previously stated, this Framework is not solely about a response to the current economic climate: it is a medium-to-long term approach to improving Scotland"s capacity to stimulate and support greater demand for innovation. But, as pointed out in the Universities Scotland paper, Innovating our way out of recession⁹, innovation is just as important during a period of economic downturn. Evidence from previous recessions suggests that R&D spending during a recession is often one of the first areas to be cut by the private sector. Nevertheless, as mentioned earlier, when financial pressures are greater and margins tighter, it remains vital that businesses find smarter, more efficient and effective ways to improve productivity, expand market share and increase profits. Surviving an economic downturn and placing ourselves in the best

⁹ http://www.universities-scotland.ac.uk/uploads/publications/Innovating%20our%20way%20out%20of%20recession.pdf
possible position to benefit from the upturn will not be achieved by simply doing more of the same. Innovation is about seeing and seizing new opportunities.

The long-term innovation challenge facing Scotland was set out in the Government Economic Strategy: clear strengths and competitive advantages in many areas of research, particularly in our universities; but relatively low levels of demand for innovation, especially among our home-grown businesses. We are determined to bring about a step-change in the aspirations and culture of business towards research and innovation. The Government and its agencies will work in partnership with businesses to enable them to become more demanding and intelligent customers of innovation support, embracing all the different forms of innovation beyond just the science and technology-based. Such an approach will be crucial to long-run business survival and our ability to take full advantage of the economic recovery when it comes.

In the context of responding to the downturn, businesses have been supported at each stage through an integrated Business Innovation Service. This has included the following key elements:

- **We are highlighting the opportunities for, and value of, innovation.** Through the „Now”s the Time to Ask“ campaign of Scottish Enterprise, Scottish businesses have been encouraged to investigate the benefits of an increased demand for, and use of, innovation through a series of innovation-specific events. This has resulted in an increasing use of the innovation services of the Enterprise agencies.

- **We are increasing the incentives for businesses to use and pursue innovation.** Funding is already available through the extensive range of support for businesses pursuing research and innovation. In addition, in December, we launched the £10 million Saltire Prize, the largest innovation prize for marine renewables, while the Scottish Funding Council has introduced an innovation voucher scheme to meet the costs of research collaboration between higher education institutions, colleges and Scottish SMEs.
• **We are supporting match-making.** Support for collaboration between businesses and key suppliers of R&D and innovation is key. One example is *Interface*, a national programme supported by the Scottish Funding Council which match-makes businesses with research resources in Scotland"s universities and research centres. Another good example of collaboration in action in the public sector is the ICT Forum described earlier.

Further details of the crucial messages for businesses are contained in the business call to action, *Growing Innovation*, published by Scottish Enterprise and HIE. In that, they set out how they will provide practical short, medium and long term support to businesses to encourage innovation that leads to greater competitiveness, profitability and sustainability.¹⁰ Some of the key points made in the paper are:

- Businesses that continually create, evaluate and exploit their new ideas are the most likely to survive and prosper in today"s intensely competitive global economy.

- There are wider economy benefits, too. Businesses that are open to new ideas are the ones that deliver additional value, provide high quality jobs, manage better products, processes and services for their customers.

Scottish Enterprise and HIE aim to be valuable allies in this process. They promote innovation, introduce management support and provide funding to build a strong innovative environment in Scotland"s key business sectors.

There are huge opportunities for Scotland – and on a wider business front than might at first be imagined. Innovation is about:

- introducing new products and modifying existing ones
- improving management and production processes to raise efficiency or reduce costs

¹⁰ A table of the various types of support for businesses available from the public sector is attached at Annex A
• adding value and profit for customers with new ways to deliver products and services
• transforming business models to improve competitiveness, and
• exploiting the opportunities in a low carbon economy.

Tailored support is available for existing companies, new enterprises and strategically important inward investors.

SE and HIE want to work with all the businesses in Scotland, both SMEs and large enterprises, but most of all those with ambition and potential. They’re equipped to help these businesses to deliver new successes faster, with greater scale and, critically, with stronger impacts for the business and hence the economy.

Innovation and the Public Sector

• Innovation and Science

As the EU Community Innovation Survey (CIS) points out, Scotland performs well on supply–side measures, and to improve our competitiveness it is absolutely vital that we maintain that advantage. Our science base is world-class and one of our real economic strengths. The recently published Science for Scotland\textsuperscript{11} document sets out a raft of measures to make sure that Scotland maintains that position. It prioritises:

• maintaining our global pre-eminence in science teaching and research, while continuing to attract science-related inward investment;

• encouraging more young people to study science subjects and build careers in science, technology and engineering in Scotland; developing a science workforce which is aligned and responsive to the future needs of the science base and the

\textsuperscript{11} Science for Scotland: A strategic framework for science in Scotland
http://www.scotland.gov.uk/Publications/2008/11/24143207/0
economy as a whole;

- increasing business research and product development capacity and business demand and utilisation of the science base in ways which support economic growth; and,

- improving the international marketing of Scotland's science and seeking broader and deeper international collaborations with existing and new partners.

Science for Scotland recognizes that a key challenge for Scotland is to bring about radical change in cultures and performance to increase business research and development, and business demand for and use of the science base in ways which help support growing businesses because not enough existing businesses use science to solve their problems, develop new products, exceed their customers' needs and increase competitiveness. One of the key points made by Science for Scotland is that there must be an increase in the absorptive capacity of businesses for science-based innovation alongside an improved understanding by the science base of business requirements to help stimulate their growth.

In common with Skills for Scotland and this Innovation Framework, Science for Scotland emphasises that we all need to work together to:

- nurture a culture in which creative, enterprising people are empowered and rewarded within organisations and which attracts creative people to Scotland
- develop systems that support and facilitate interchange of existing ideas, concepts and intellectual property between and within organisations and people
- grow and support networks which facilitate co-creation of economically valuable knowledge and ideas through creative interaction within and between organisations, both public and private sector, and people
To help achieve the Purpose, Science for Scotland also declares that the Government will “Prioritise both research excellence and strategic knowledge exchange by increasing investment in knowledge exchange faster over time in order to support industry-led strategic projects which will help key business sectors deliver increased and sustainable economic growth. Improving the quality and quantity of commercialisation of research will be crucial in this area. Science for Scotland thus addresses the urgent need to progressively adjust the balance of current incentives in academia, promoting further growth in academic participation in knowledge exchange with business in Scotland.

Science and Policy

In addition to the funding provided to Scotland’s Higher Education Institutions and Colleges, there are a number of Scottish Government Directorates, Agencies and NDPBs that undertake and/or fund scientific work in support of Government’s responsibilities. As well as the significant sums invested in Scotland’s universities and colleges there are also two other major policy areas of the Scottish Government that directly fund science and research: clinical and medical sciences, funded from the Health and Wellbeing portfolio; and science and research in areas of biology, agriculture, fisheries and the natural environment (including marine), funded from the Rural Affairs and Environment portfolio. Together with the associated economic, social science and statistical expertise embedded within Government, this investment in science provides a powerful evidence base on which to develop the policies that support the vision of a strong sustainable Scotland.

- In the Health sector, Scotland has pioneered an approach that aligns the clinical skills and resources of our Health service with the mainstream of academic research and, at the same time, helps contribute to economic growth. The Scottish Academic Health Science Centre (SAHSC), to be launched in Summer 2009, brings together our 4 largest medical schools and teaching Health Boards to build upon the academic
partnerships already in place in Aberdeen, Dundee, Edinburgh and Glasgow. The SAHSC will create a world-leading platform attracting external funds for patient-oriented research; and underpin continuous improvement in the NHS by strengthening the evidence-based culture for change that is beneficial for patients and for the economic growth of Scotland.

- In the Rural Affairs and the Environment area, the Scottish Government and its „delivery“ partners Scottish Natural Heritage (SNH), the Scottish Environmental Protection Agency (SEPA), the Fisheries Research Service (FRS) and Science and Advice for Scottish Agriculture (SASA) have come together within a common agenda for science (called CAMERAS). This innovative initiative focuses on enhancing knowledge exchange from support of statutory and regulatory functions along the „pipeline“ to and from the strategic research required to generate new knowledge and understanding that underpins these responsibilities and supports new policy formulation. It will facilitate opportunities to strengthen the linkages between organisations and build effective interfaces between their activities to help ensure that Scotland derives maximum benefit from all the separate science budgets in the Rural Affairs and Environment portfolio.

- **Innovation and Skills**

The Skills for Scotland strategy is another example of Scottish Government alignment, not only in how it dovetails with Science for Scotland and this framework, but also in how it addresses the key issue of making the most of our relatively strong skills base. Skills are the key link needed to translate new ideas into products, processes and business models, and thus to create wealth and improve economic growth. Innovation can drive demand for skills and effective utilisation of skills can stimulate innovation, thereby creating a virtuous circle. Also, workplace innovation – the introduction of better workplace practices – is a vital component of effective skills utilisation.
Scotland's skills profile has been improving faster than that of the rest of the UK with, for example, the percentage of the working age population with a higher education qualification rising by 8% between 1997 and 2004 compared with 6% in the rest of the UK. However, that has not translated into enhanced economic performance. We have the potential as a nation to do much more with the skills available to us by better matching the supply of skills with increased demand from businesses to deploy those skills effectively. This increased demand comes principally from businesses either seeking to achieve more with their existing business strategies or by changing those strategies. Scotland needs a greater number of ambitious businesses that want to develop new or improved products and services, and increase their productivity, competitive advantage, market share and profitability.

In addition, how skills interacts with the other drivers of productivity, such as capital investment and innovation, is crucial. Equally, investment in capital and innovation will be most productive when it is supported by a well trained workforce.

**Unlocking the Opportunity of Scotland’s Skills**

In September 2008, the Cabinet Secretary for Education and Lifelong Learning established the Skills Utilisation Leadership Group which brings together business and trade union leaders with the Government, the Scottish Funding Council, Skills Development Scotland and the Scottish Council for Voluntary Organisations to champion the best use of skills in the workplace. The Group's vision is of a Scotland where:

- confident, motivated individuals are aware of the skills they possess, know how to best use them in the workplace and have the necessary opportunity and support to increase productivity, improve job satisfaction and stimulate investment, enterprise and innovation;
• ambitious and competitive organisations have progressive and innovative leadership and management that adopt high performance working practices affording workers a say in decision making over issues affecting the quality and organisation of the workplace;

• a cohesive learning system centred on the individual and responsive to employer needs supports the lifelong development and use of skills; and

• government policies for investment, enterprise, skills and innovation support the best use of skills in the workplace through social partnership.

Our school system too is playing its part in shaping the attitudes and providing the skills needed for growing prosperity. The Determined to Succeed programme was established to improve the effectiveness of education for work and enterprise in schools, in preparing young people for the world of work and encouraging an enterprising culture in later life. Encouraging enterprising values - a 'can do, will do' attitude - in our school children is the route to a more enterprising Scotland, where all our people understand the contribution they can make as citizens, both to society and the economy, where individuals have the self-confidence and belief in their ability to succeed in whatever they choose.

Curriculum for Excellence, our major programme of reform for the education system, embraces a wider definition of how and what children and young people should learn and experience in their journey through their education, and the need to recognise a broader range of achievements. It includes more skills-for-work options for young people, robustly assessed and helping them to progress into further qualifications or work. By encouraging a broad approach to enterprise in education, the Scottish Government is laying the groundwork for future generations of entrepreneurs, thus
helping to promote more openness to innovation in the workforce and industries of the future.

- **Innovation and Design and Creativity**

One of the key themes that comes out of the recent work by NESTA and others on a new approach to innovation is the crucial importance of creativity and design. Scotland has great strengths in these areas through internationally recognised centres of excellence such as Glasgow School of Art, The Lighthouse Centre for Architecture and Design, and the hugely successful games industry cluster centred mainly in Dundee. In its role of managing the system for optimum effect, the Government has opened up greater potential for creativity and design to contribute to the economy through the establishment of Creative Scotland, bringing together the Scottish Arts Council and Scottish Screen to create a new, more cohesive body.

Creativity provides the inspiration for innovation while design is the key element that transforms ideas into actions. They represent respectively the “new ideas” and the “successful exploitation” that go together to make innovation such a powerful agent for change.

**Design Innovation Scotland**

The Scottish Government is participating in a unique, design-led opportunity for Scotland. Design Innovation Scotland is a partnership of academia, business and the public sector with a common vision of Scotland taking the lead in developing radical, demand-driven solutions to real-world challenges. The partnership is led by The Glasgow School of Art and includes the University of Glasgow, the University of Strathclyde, The Lighthouse, Scottish Enterprise, Highlands and Islands Enterprise, Skills Development Scotland, Gray”s School of Art and British Telecom.

Design Innovation Scotland”s partnership will create a unique capacity comprising:
• Research by Scotland’s academic community in applying creativity for social and economic benefit
• Enhanced creativity and innovation in business
• Policy advocacy through Scotland’s civic networks and institutions
• Co-creation of solutions with local communities
• New undergraduate and postgraduate programmes of study and Continuing Professional Development courses
• Access to a world-class research network in innovation and creativity.

The benefits for those businesses that engage in design-led innovation will include improved productivity, increased turnover and profitability, and the creation of new markets, products and services. Communities will be enabled to generate cultural and economic value, and will benefit from enhanced public services.

Sir George Cox, who led the UK Government’s review of design and creativity, has welcomed the new partnership. He commented, “This new proposal would make a substantial contribution to developing a creative and sustainable economy in Scotland.”

The first major project to be undertaken as a result of this process is Design Innovation: The Distributed City, more details of which are in Annex E.

• Innovation and Procurement

Public procurement has a key role to play in supporting sustainable economic growth in Scotland. The public sector spends over £8 billion each year on goods, works and services and it is essential that we make the best use of this significant amount of expenditure. Better procurement can significantly improve the quality of services the public sector delivers to the people of Scotland and can release funds for additional frontline services. How we spend this money is also important for our businesses, who rightly expect that public contracts will be awarded fairly, transparently and on merit.
In his foreword to the Scottish Procurement Policy Handbook, published in December 2008, the Cabinet Secretary for Finance and Sustainable Growth, John Swinney, said that the key policy issues were “the achievement of value for money for the taxpayer through effective competition; the importance of collaboration at a national, sectoral and local level; incorporating environmental and social issues in public procurement; and fostering innovation through procurement.”

Following the publication of the McClelland Review of Public Procurement in Scotland, a number of steps have been taken to reform the Government’s approach. These include the setting up of sectoral and national procurement Centres of Expertise to drive collaborative, advanced procurement. For example:

Scotland Excel – local authorities;
Advanced Procurement for Universities and Colleges (APUC) – HE/FE sector;
Central Government Centre of Procurement Expertise (CGCoPE) – central government and its agencies etc;
NHS National Procurement – health; and
Procurement Scotland – national contracts.

The Review of Public Procurement in Scotland pointed to the spread of best practice, including sharing of market intelligence, as one of the key benefits of collaboration. The development of user intelligence groups (UIGs) by the Centres of Expertise should promote sharing of knowledge between their customers and again, better informed decisions.

We have also established a new national advertising portal, Public Contracts Scotland, which will increase the transparency of public sector markets and contract opportunities. Suppliers are able to access the portal free of charge. It applies to all public sector organisations in Scotland. And we now also have the Scottish Procurement Information Hub which provides detailed spending and
supplier data from a significant number of high-spending public sector organisations in Scotland. Better market information - which may be shared with business - should help companies target new opportunities and gain a better understanding of the opportunities available. The Information Hub will also capture data in relation to the Best Practice Indicators for Public Procurement in Scotland (BPIs). The BPIs have been designed to measure “key processes” including “continuously improving performance and innovation” in support of three core deliverables:

- to provide a value-for-money procurement service that delivers financial savings;
- to provide quality advice and contracts which deliver quality products and services; and
- to procure goods and services in a lawful and ethical manner which encourages participation and sustainable economic growth.

Public sector alignment

A systems approach to public sector policy

A systems approach to aligning public sector policy follows the vision that sees Government’s role as concentrating on management of the design of the system and not micro-management of the activities of the agencies that make up the system. It is outcome-focussed, rejects silo-thinking and values a coherent system that delivers maximum impact and optimum public value. Alignment of objectives and a shared understanding of the outcomes to be achieved are critical.

As the GES indicated, innovation is not invention, nor is it only about new science and technology; ideas that are newly applied to a sector or geography are innovative, changes in business models that are unrelated to science or technology are innovative, witness the Easyjet or iTunes business models or, in the public sector, the

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12See Mark H Moore: Creating Public Value: Strategic Management in Government
introduction of NHS Direct.

Innovation - as distinct from R&D alone - is all about generating customer or citizen value. Value may include better goods and services, reduced environmental impacts, improved health & safety and better provision of public services. Traditionally, most public policy has emphasised technology rather than customer value. In following a systems-based approach, innovation policy-making must focus on changing the core of the innovation system and not just the margins, encouraging the development of an adaptive and learning-based system - restructuring policies to remove barriers to change and streamlining disparate funding sources and mechanisms.

Adopting a systems-based approach means that public policy can be used to align strategies and interventions across stakeholders, allowing resources to be directed towards the points of maximum leverage. By working with the other stakeholders and aligning their respective strategic missions with the needs of the Scottish economy, the Scottish Government can cultivate a self-learning system within which the public sector, universities, colleges, businesses and other strategic partners realise the benefits of working together to develop and grow a flexible, diverse and adaptive knowledge-based economy built on diverse and self-organising partnerships.

An example of how approaches to innovation are changing is illustrated in figure 6. The new approach from Government and its agencies embodies these principles.
Governments in the past have talked about a “pipeline of support” for innovation and R&D. Although this oversimplifies the many and varied routes by which innovation finds its way to new products, processes, business models and the creation of wealth, it is nonetheless useful in helping understand what roles the various public sector agencies play in the process and what the flow might be from one to another.

One of the principal outcomes of the Enterprise Networks Review is a redefinition of the respective responsibilities of Scottish Enterprise, Highlands and Islands Enterprise and local authorities in relation to economic development, giving Scottish and Highlands and Islands Enterprise a very clear remit to focus on priority sectors and on supporting those businesses, of whatever size, that have high growth potential and that are important to the national or regional economy. This is also consistent with the Scottish Funding Council developing a new light-touch and enabling approach to the implementation of key strategic initiatives in partnership with colleges, universities and others. The Scottish Government has also played its part in this process through looking to pass to the enterprise agencies schemes previously delivered at its own hand.
as a means to streamline and simplify the system.

As a demonstration of our intent to streamline public sector support for innovation, the Scottish Government is looking carefully at transferring responsibility for a number of initiatives to its agencies:

Responsibility for the Intellectual Assets Centre (IAC) and the Innovators Counselling and Advisory Service Scotland (ICASS) scheme could move to Scottish Enterprise and Highlands and Islands Enterprise. This would reflect their place in the business-facing section of the system and allow the agencies to improve the coherence of their business support offerings. Responsibility for administration of a new scheme equivalent to Regional Selective Assistance will be the responsibility of Scottish Enterprise, again reflecting the need to be closer to business demand. SE will also take over responsibility for the SMART SCOTLAND scheme which provides support to companies to develop new, innovative products.

Responsibility for the Scottish Government’s SEEKIT knowledge exchange scheme and the UK-wide Knowledge Transfer Partnerships (KTP) scheme could transfer to the Scottish Funding Council (SFC), reflecting their links to universities and colleges and allowing the SFC to align its activities more clearly to the overall goal of increased economic growth.

These changes would reflect the Government’s role as a strategic enabler, focusing on managing the design of the innovation system and allowing agencies the freedom and flexibility to align with the Purpose in the most effective way. In the same way that the Government has worked in partnership with Local Authorities to create local Single Outcome Agreements, freeing up Councils to be more innovative, flexible and responsive to meet local demands, so we will work with our agencies to agree outcomes that will free them to be more innovative, flexible and responsive to the demands of their customers. This customer-demand focussed approach will increasingly be incorporated into each of the agencies’ strategic and corporate plans, setting out who their customers are and how
they will identify and meet their demands.

- All public sector agencies need to play their part in understanding the demand, increasing it and ensuring the support system meets it optimally. For Government and its agencies, this means innovation-based improvements in productivity through re-thinking service systems and operating methods.

- Our education system needs to equip our future workforce with the new skill sets required for the future workplace; communication, literacy, numeracy, problem solving, information technology and working with others.

- Academia needs to maintain our current level of research excellence while increasing the emphasis on knowledge exchange and the translation of knowledge into new products, processes and services.

- Ensuring a supportive business environment where opportunity is maximised and barriers to growth are removed for innovative companies.

This Framework echoes the principles already adopted and being implemented by the Skills for Scotland strategy, the New Horizons report on Universities and the Science for Scotland Framework. To succeed in our Purpose, we need to align our objectives to a common vision and a shared understanding of the outcomes to be achieved. The GES introduced Scotland Performs, which sets out the National Performance Framework, the means by which we identify our strategic objectives and how we will measure progress towards achieving them.

To ensure that the system continues to be aligned as circumstances change and policies develop, the Government will
use the Strategic Forum, an overarching group that brings together the key public sector agencies to discuss their objectives and plans, to monitor progress towards achieving the Purpose.

**Innovation beyond Scotland**

Much is made in this document of a Scottish innovation system: we must recognise, however, that Scotland is part of a wider economic system that encompasses the UK and Europe. The Scottish Government and its agencies have strong links to the rest of the UK through, for example, our universities links with the UK-wide Research Councils, through UK-wide schemes such as Knowledge Transfer Partnerships (KTP) and Knowledge Transfer Networks (KTNs) and through our links to the Technology Strategy Board (TSB) which helps promote innovation and knowledge exchange throughout the UK. We believe that our approach to aligning the work of our agencies and the promotion of increased sustainable economic growth places us in a strong position to collaborate effectively with these initiatives and obtain benefits for all.

Europe is increasingly a significant influence on innovation policy. The ideas set out in this framework place us in the mainstream of European policy and in the leading group of countries taking forward a new approach to innovation. Already, we support our companies and universities in their efforts to link to other European partners through our Scottish Proposal Assistance Fund (SPAF) and Proposal Assistance for Co-ordination of European Research (PACER) schemes which help companies and universities respectively with applications for EU Framework Programme funding for collaborative research and development. We are working jointly with Scotland Europa to strengthen and increase Scottish participation in these programmes and to realise more of their benefits for the Scottish economy. In the spirit of open innovation, we recognise that we have much to learn from working with our UK and European counterparts and, equally, much to contribute.
Monitoring and Evaluation

Measurement of innovation, and its economic impact, is not a simple process. The OECD paper “OECD Work On Innovation - A Stocktaking Of Existing Work”\textsuperscript{13}, published in February 2009 states that:

“much work, both theoretical and empirical, has already been done to identify the policies, institutions and framework conditions that can provide the most effective means of supporting innovation. However, evaluation of specific government support policies and their impacts on innovation is generally sparse and there is a need for more and better evidence on the costs and benefits of government support for innovation. Measurement of innovation is also an area where further work is likely to yield benefits, particularly in better understanding innovation in the service sector and better capturing the increasingly international nature of innovation activities.”

Some of the difficulties raised in the paper include:

“It is clear that aggregate measures of R&D spending are a misleading indicator of innovative activity for two reasons: they are influenced by industrial structures; and much innovative activity is not captured by R&D spending\textsuperscript{14}. In any case, looking at the amount of resources devoted to R&D is not sufficient to assess a country’s innovation outcome, since this depends on how efficiently resources are used. Measures of innovation performance, such as patents, get closer to this. It is also clear that better statistics for services are required. A move from traditional sectoral approaches to definitions that better capture the interaction of services with other industries and the characteristics of innovation in services appears to be required\textsuperscript{15}.

\textsuperscript{13} OECD WORK ON INNOVATION - A STOCKTAKING OF EXISTING WORK, STI WORKING PAPER 2009/2, Science and Technology Policy, DSTI/DOC(2009)2
\textsuperscript{15} OECD (2001a), Innovation and Productivity in Services, OECD, Paris.
The new realities of science, technology and innovation are also challenging the statistical STI indicators' focus on the activities of specialised R&D institutions and the particular national location of such activities\textsuperscript{16}. It is now more difficult to differentiate between “novelty” and “routine”, and improvements are often made outside formal R&D departments. In addition, over time, the complex sectoral origin and nature of innovation has made popular technological classifications of high/medium/low-R&D intensive industries somewhat less useful. A low-R&D industry may be a large user of knowledge generated elsewhere – this holds true for many service sectors, where the introduction of new processes, organisational structures, or product innovations, is unlikely to involve much formal R&D investment. Rendering statistical systems more flexible and responsive to the introduction of new and fast evolving concepts that are typical of the STI field is crucial to keep up with the changing context.

In addition, the link between the location of “national” firms’ private R&D activities and a country’s productivity gains appears increasingly loose, for small and large countries. The largest part of worldwide productivity growth in the last decade has been associated with acceleration in the diffusion of technological change and with global access to codified knowledge. One of the greatest challenges to policy makers is to acknowledge more fully the global public good of STI.”

Service based sectors account for a significant share of Scotland’s GVA and employment: however traditional definitions of „innovation” and measures of innovation (i.e. spend on R&D, patent activity\textsuperscript{17}) have focused on technological innovation. By its nature, technical


\textsuperscript{17} The evidence on these indicators is available at a Scotland level with comparable international data available. These indicators tend to show that while Scotland exceeds UK, OECD and EU comparators on higher education and government spend on R&D, it falls fairly far behind in terms of business R&D spend as a proportion of GDP (with the UK as a whole also falling behind in OECD and EU comparators on business R&D (BERD) spend). See for example statistics on R&D in Scotland available on the Scottish Government website:
R&D is less relevant to the service sectors than it is in manufacturing industries and it is likely that traditional measures of innovation are not capturing the full extent of innovative activity taking place in a heavily service sector based economy such as Scotland’s.

The development of new products and services in service sectors and creative industries often arises from a variety of non-scientific sources, with the role of design, the creative application of existing technologies, experience and feedback from customers are increasingly driving change in the economy. However, indicators to measure these kinds of innovations are not as developed as that for more tangible technological innovation.

However, how we monitor and evaluate progress is crucial to how we behave in achieving our vision and objectives. In the (DIUS) White Paper Innovation Nation, NESTA was tasked with developing an innovation index that would capture the new, emerging view of innovation that goes beyond the science, R&D-push, linear model. This extremely complex task takes in the problem of defining innovation in this new context and producing measures which capture the complexity of the system but still manage to produce outputs that are relatively easily understood, that allow for international benchmarking and for measuring trends in progress. NESTA have been asked to produce an interim report in 2009 and a final version in 2010. The Scottish Government is closely involved in this process.

As already outlined above, however, the GES has pioneered a radically different approach by providing a single clear outcome for the whole of Government: increasing sustainable economic growth. In this Framework, therefore, we concentrate on innovation that has an economic impact. That is why the definition we use mentions the “successful exploitation” of new ideas. All of our efforts are aligned to that end and will be judged on that outcome. The way that we judge the success of those efforts is the National Performance Framework, Scotland Performs. It adopts the Virginia
model of monitoring and evaluation to measure progress towards outcomes rather than a series of micro-level targets which would have the potential to result in perverse behaviours intended to meet the target rather than contribute to the overall outcome. The National Performance Framework (NPF) is how our efforts on innovation will be judged. This new, outcome-focussed approach will allow Government and its partners flexibility and autonomy in deciding how they achieve the outcomes, freeing up their potential to be innovative themselves and encourage innovation in others.

In terms of the NPF, it is likely that innovation will have the closest links with to following purpose targets:

- **Sustainability.** Innovation will be key to developing renewable energy technology and improving energy efficiency to meet targets on greenhouse gas emission reductions through, for example, the *Saltire Prize* £10m challenge for innovative advances in marine renewable energy.

- **GDP growth.** As discussed above, innovation is generally held to be central to raising productivity levels and generating economic growth.

- **Population growth and healthy life expectancy.** While there are a number of other factors involved, including benefits from developments in global research, advances in medicine and treatment of illnesses and disease through research and development may contribute to this target.
Conclusion

This Framework does not introduce brand new initiatives nor announce new tranches of funding. It sets out instead how the Scottish Government has built and continues to build on the new approach outlined in the GES by introducing a restructuring of the enterprise agencies, pioneering single outcome agreements with local authorities and aligning the roles and remits of its agencies. This approach combines a clear single Purpose, a focus on outcomes, a recognition of the ways in which the various actors in the Scottish innovation system, their roles and actions are a complex interdependent system that depends on collaborative, aligned activities to achieve the optimum benefit for Scotland in terms of increased sustainable economic growth. Combined with a robust framework for measuring progress, this represents innovation in action.

We have outlined the principles that guide our approach to innovation and the actions that our agencies are taking to put these into practice. Scotland, like other developed countries, faces a series of challenges in identifying how innovation can help achieve increased sustainable economic growth. These can include:

- The need to extend innovation activity beyond science and technology push to include stimulating demand pull from business
- Changes in our understanding of innovation to include “open” innovation and “user-led” innovation
- The importance of changing attitudes and behaviours so as to increase levels of innovation throughout the system
- Improving innovation capacity by better connecting knowledge to knowledge needs
- Optimising the opportunities to leverage Scotland’s distinct human capital and intellectual assets
Some of these challenges are not new but are given increasing relevance by the new economic climate in which innovation is more, not less, important.

Like any ecosystem, the Scottish innovation system needs to evolve, adapt and grow. This can only happen if all the stakeholders work together to recognise their place in the system and the importance of their interrelationships with other players. Aligning all our activities towards the Purpose helps us to do so. Scotland has great strengths in our science base, the skills of our workforce and our history of invention and innovation. Pulling these together into a coherent and cohesive framework that maximises economic impact is a worthy goal that, working together, Scotland can achieve.
Annex A: Innovation Support in Scotland
<table>
<thead>
<tr>
<th>Support Mechanism</th>
<th>Administrative Body</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Transfer Grant</td>
<td>Scottish Funding Council (SFC)</td>
<td>SFC grants to support HEIs in the dissemination and exploitation of the research, knowledge, skills, expertise and ideas generated in the University to achieve economic, educational, social and cultural benefits for society.</td>
</tr>
<tr>
<td>SEEKIT</td>
<td>SG</td>
<td>Strategic grants from SE to help public sector organisations support knowledge exchange “outreach” activities with business focus. Although support is provided to institutions many of the benefits accrue to business – SEEKIT straddles the pre-commercial/business support areas.</td>
</tr>
<tr>
<td>Interface</td>
<td>Interface/SFC</td>
<td>SFC funded scheme to provide first point of access for businesses seeking information on HEI access and collaboration.</td>
</tr>
<tr>
<td>Proof of Concept Fund</td>
<td>Scottish Enterprise (SEn)</td>
<td>Fund to help HEIs take research projects aligned to priority industries towards commercialisation.</td>
</tr>
<tr>
<td>Royal Society of Edinburgh (RSE) Fellowships</td>
<td>SEn/RSE</td>
<td>Scheme to support graduates/post-graduate in developing commercial propositions and gain business experience.</td>
</tr>
<tr>
<td>PACER</td>
<td>SFC</td>
<td>Scheme to assist HEIs develop proposals for EU Framework.</td>
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</table>
## Pre-commercial support

<table>
<thead>
<tr>
<th>Support Mechanism</th>
<th>Administrative Body</th>
<th>Brief Description</th>
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</thead>
<tbody>
<tr>
<td>Innovators Counselling and Advisory Service for Scotland (ICASS)</td>
<td>Alba Smart Thinking (Glasgow Opportunities)</td>
<td>SE funded scheme involving a network of counsellors providing pre-business development advice to lone inventors.</td>
</tr>
<tr>
<td>SMART:SCOTLAND Programme</td>
<td>SG (Soon to be joint venture with SEn)</td>
<td>SE grants to support SMEs developing leading edge products and processes from feasibility through to pre-production prototype. Delivery will be transferring to Scottish Enterprise.</td>
</tr>
<tr>
<td>R&amp;D Grant For Business</td>
<td>SEn (Soon to be joint venture with SEn)</td>
<td>Grants to assist both large and small companies with R&amp;D projects – innovation criteria less stringent than SMART:SCOTLAND. Work underway to combine schemes to form a general Scottish R&amp;D grant scheme to be delivered by Scottish Enterprise.</td>
</tr>
<tr>
<td>Scottish Proposal Assistance Fund</td>
<td>SEn</td>
<td>Grants to assist companies prepare submissions for EU Framework Programmes.</td>
</tr>
<tr>
<td>Innovation Framework Products</td>
<td>SEn</td>
<td>Programmes operating throughout Scotland to support innovation creativity in business – includes Winning Through Innovation, Electronic Design Support &amp; Tourism Innovation Toolkit</td>
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<td>--------------------------------</td>
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</tr>
<tr>
<td>Intermediary Technology Institutes (ITIs)</td>
<td>SEn</td>
<td>SEn subsidiary with significant level of autonomy over its activities. Set up to commission key R&amp;D programmes in the key sectors of life sciences, energy and techmedia.</td>
</tr>
<tr>
<td>Access to UK-wide Programmes</td>
<td>SG</td>
<td>Technology Strategy Board (Knowledge Transfer Partnerships, Knowledge Transfer Networks, Collaborative Research etc). SE currently supports some of these schemes with limited funding.</td>
</tr>
</tbody>
</table>

**Business Support**

**Investment & Risk Capital Support**

<table>
<thead>
<tr>
<th>Support Mechanism</th>
<th>Administrative Body</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSA</td>
<td>SG</td>
<td>(Being Grants to support capital)</td>
</tr>
<tr>
<td>Risk Capital Programmes</td>
<td>SEn</td>
<td></td>
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<tr>
<td>investment projects in assisted areas – linked to job creation/safeguarding. Not specifically innovation related but seen as integrated part of the business support landscape.</td>
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</tr>
<tr>
<td>SEn run schemes for early stage equity investment – Scottish Seed Fund, Scottish Co-Investment Fund, Scottish Venture Fund. Again, while not specifically focused on innovation, companies supported are generally knowledge driven, R&amp;D intensive firms.</td>
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Annex B

Open Innovation and User-led Innovation:

The concepts of open innovation and user-led innovation were developed by Henry Chesborough and Eric Von Hippel respectively. A brief explanation of each is set out below.

Open Innovation:

“We are now seeing a change in the way in which innovation is occurring, and will occur in the future. A major force within changing models of innovation is Open Innovation. At the core of open innovation is the principle that innovation may come from anywhere, and not just the inventors. Henry Chesbrough defines open innovation as „a paradigm that assumes that firms can and should use external ideas and internal and external paths to market“.18

The central idea is that companies which look outside their in-house resources for ideas and technologies have better access to ideas, expertise and technology than those which rely solely on in-house support.”19

User-led Innovation:

Eric von Hippel20 has identified user-led innovation as the process by which a person or a company develops a personal or in-house

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19 Dames, Robson, Smith, Tumilty: Beyond open innovation: leveraging social capital, The Journal of The Institute of Telecommunications Professionals • Volume 2 Part 3

innovation because existing products do not meet their needs. It is a bottom-up phenomenon that allows a company to identify what its most advanced users are already doing and to understand what their innovations mean for the future of the company. Von Hippel also calls such innovation a "lead-user innovation".
Annex C
ICT AND PRODUCTIVITY:

As mentioned in the body of this document, Research indicates that ICT exploitation accounts for approximately half of recent productivity gains in Europe. Analysing trends in labour productivity across 21 countries, a 2006 OECD economics working paper noted that productivity levels steadily converged over the 20 years from the late 1970s to the late 1990s, but that national productivity levels have been diverging since the ‘emergence of ICT’ (i.e., since the mass adoption of the internet by businesses in the late 1990s). It notes that: At the European level, it is estimated that ICT accounted for almost half of productivity growth in the European Union in the period 2000-2004. Evidence from the US and other countries demonstrates how ICT investment has contributed to economic growth – “Over the past two decades, ICT has contributed between 0.2 and 0.5 percentage points per year to economic growth, depending on the country. During the second half of the 1990s, this contribution rose to 0.3 to 0.9 percentage points per year.” e-skills UK reports that: “A further key factor to deriving productivity gains from ICT, in addition to investment and strategic management capability, is the extent to which employees are IT-enabled. Research by ONS shows particularly striking effects in the manufacturing sector, where there is a 2.2% improvement in productivity for every additional 10% of employees who are IT-enabled, and a 2.9% improvement for every 10% who are internet-enabled.”

1_p.pdf
Authors: Colecchia I.1; Schreyer, Review of Economic Dynamics, Volume 5, Number 2, April 2002, pp408-422(35)
Publisher: Academic Press
24 Eskills UK: Technology Counts, January 2008
In the UK, the London School of Economics\textsuperscript{25} has estimated that ICT capital deepening accounted for \textbf{47\% of productivity growth} in the UK's market sector in the second half of the 1990s. A subsequent LSE paper\textsuperscript{26} found that \textbf{a doubling of IT stock is associated with a 2\% to 4\% increase in productivity}; furthermore, the superior total factor productivity\textsuperscript{27} performance of US-owned subsidiaries in the UK (vs their domestic and other foreign-owned counterparts in the UK) can be accounted for by their higher returns from exploiting IT, and the LSE suggests that superior management practices of US-owned subsidiaries may explain their ability to extract higher returns from IT.

There do not appear to be any studies in the literature specifically analysing the contribution of ICT to Scotland's recent economic growth. However, a 2003 paper from London Economics\textsuperscript{28} estimated that ICT contributed approximately \textbf{0.6 percentage points p.a.} to Scotland's labour productivity growth in the period 1992-2000. Given the scale of these contributions to productivity growth, it is clear that \textbf{the extent to which we successfully exploit ICT, relative to our competitors, will be a decisive factor in whether Scotland achieves its economic growth objectives} (of raising Scotland's GDP growth rate to the UK level by 2011, and matching the GDP growth rate of the small independent EU countries by 2017).

The Scottish Government has worked with public sector agencies and private sector companies to create the ICT Forum which looks at how Scotland can leverage the innovative use of ICT to improve productivity and help achieve increased economic growth. The Forum brings together the Government, Scottish Enterprise, The Scottish Funding Council, Highlands and Islands Enterprise, Strathclyde University and private sector organisations such as BT, Oracle, Sun Microsystems, Cisco, Microsoft, Thus and ScotlandIS.

\textsuperscript{25} http://ideas.repec.org/p/cep/cepdps/dp0681.html
\textsuperscript{26} http://www.statistics.gov.uk/articles/nojournal/sadun_bvr25.pdf
\textsuperscript{27} Growth in total factor productivity (TFP) is the part of productivity growth that cannot directly be accounted for by growth in inputs (labour, capital and materials)
\textsuperscript{28} http://www.londecon.co.uk/Publications/Regional%20implications.pdf
to collaborate on 5 main areas of work:

- **Creating culture change** - the Forum is assisting the Sector Skills Council roll out its business IT guide and video, looking at curricular material for 11-14 year olds, helping the SSC and SFC with a conference, develop some case studies on effective skills learning and draw up a strategic approach over time to joining up the numerous initiatives that exist in this area.

- **Educating for Skilled Exploitation** - the Forum will promote effective utilisation to SME senior managers and finance advisers (including ICASS), develop some specific events and collaborate on existing ones such as the Scotsoft awards to spread the message. Particular emphasis will be on the key sectors in the GES.

- **Vibrant Competitive Supply Side** - Scottish enterprise have already established an ICT Industry Advisory Group, early engagement will be on e-commerce for business.

- **Benchmarking** - the Scottish Government has completed a macro study of Scotland comparing it internationally. This will provide the foundation for the specific actions that the Forum are undertaking as well as identify where further work can be useful, including on SME benchmarking.

- **Public sector** - to deliver an ICT infrastructure to enable more efficient and effective public services to deliver on National Outcome 15; “Our public services [http://www.scotland.gov.uk/221813](http://www.scotland.gov.uk/221813) are high quality, continually improving, efficient and responsive to local people”s needs.
Design Innovation Scotland's first innovation theme is Distributed City and it embodies our way of thinking and working. Distributed City is a way of linking small enterprises together, locally and internationally in micro to macro collectives. Unlike other ideas of distribution or connectedness within actual cities as densely populated urban areas, our city is imagined city, a way to help create new relationships in and beyond a region.

We know that the most of the discussion on distributed enterprises is typically technology-driven, while the determinants of success are social and cultural.

So instead of employing the dominant globalisation narrative which links the individual to the global and the virtual, we instead locate our practice and focus on the levels of collectivities which we believe are needed between the individual and the global, and we therefore include the local, the regional, the national, and the cultural in the mix – distributed local communities and enterprises exploiting their potential in collectives of scale. The idea here is to address a geographical area such as the Highlands and Islands of Scotland and to imagine it as being a distributed city. By doing this, we can look at the ways in which apparently disparate resources – intellectual, physical, social and material - can be usefully related to one another to create motivational, distributed enterprises within a regional ecology of cultural and economic activities.

This approach recognises that “everyone is an expert”, and seeks to fold in community knowledge and culture alongside expertise from industry, academia, design practice and government to create resourceful communities working across distance. And by bringing together people with place-based, indigenous knowledge and skills together with multidisciplinary academic and industrial expertise in
extreme collaborations we think we can generate creative solutions relevant to our context. By recognising and using existing knowledge and skills within new contextual frameworks we propose to make a visible difference to our current economic environment.