INNOVATION STRATEGY

Purpose

The paper outlines SEEDA's Innovation Strategy which was developed under the guidance and advice of the South East Science, Engineering and Technology Advisory Council (SESETAC). It builds on the agency's current innovation programme which was discussed by the SEEDA Board in September 2009.

The strategy applies national innovation and industrial policy to the strengths of the South East region to inform partnership interventions and contribute to the development of the Regional Strategy. Informed by the SEEDA Board discussion and endorsement of recommendations, delivery against the Innovation Strategy will be accelerated further into an enhanced operational programme of innovation interventions for SEEDA reflected in the current business planning exercise.

The vision of SEEDA's Innovation Strategy is to ensure that the South East becomes ***one of the world's top performing regions by putting innovation support at the heart of our business development programmes.*** A specific goal will be to grow the innovation footprint of the South East – using proximity measures such as private & public sector expenditure on innovation activities, number and quality of Knowledge Transfer Partnerships and Innovation Vouchers, increased business-university interaction and number of foreign direct investment with specific innovation outcomes.

Recommendation

The Board is invited to:

1. **DISCUSS** the overall vision and approach of SEEDA's Innovation Strategy, in particular the emphasis on developing a strong integrated innovation offer to attract inward investment and to develop internationally competitive, scalable businesses;

2. **ENDORSE** SEEDA's key innovation activities to be carried through business planning (2.11), measures of success (2.14) and outline criteria for enhanced investment decisions and prioritisation (2.16); and

3. **AGREE** the six key recommendations for delivery as set out in paragraph 3.3, including endorsement for the forthcoming review of SEEDA's current innovation programmes.

Reputational implications

Innovation should be at the heart of regional economic development and as such core to SEEDA's activities. A clear regional innovation strategy with firm criteria to prioritise and evaluate innovation interventions is essential to maximising opportunities for South East businesses to drive economic growth based on innovation.

Demonstrable delivery against the innovation goals in *New Industry, New Jobs* and *Going for Growth* is a priority for RDAs, building on ongoing work with the Technology Strategy Board (TSB) and SESETAC.

Financial and resource implications

The Innovation Strategy will guide the development of SEEDA's business planning, extent and range of future innovation business support programmes, and engagement with local partners most notably technology partners and the further and higher education sectors in the South East.

Internal resources are in place to maintain delivery of our innovation programmes and priority has been assigned for investment through the current business planning. In addition RDAs may be required to provide funding for national centres of excellence which is anticipated to be outlined in the recommendations of the Hauser Review. This will not only have implications on availability of resource and prioritisation of regional innovation interventions but also – subject to the location of these national centres of excellence – may have major implications of long term SEEDA funding.

Timescale

To be implemented immediately with a review of SEEDA's current innovation business support programmes to be concluded in June 2010 and reported to the Board in the summer. We expect this review to be linked to the proposed review of national Solution for Business Innovation Products as recommended in "The Role of Universities in Raising the UK's Business Competitiveness", a joint report by RDAs and University Vice Chancellors submitted to Lord Mandelson on 5 March 2010.

Justification for recommendation

- **Evidence is that innovative firms generate above average growth in terms of revenue and job creation** (NESTA 2009).

- **Agreement by the Board that the South East must concentrate on its key strengths to provide a world class offer in high growth sectors to regain the region's competitive position in the global market**. SEEDA's work on identifying high growth sectors and clusters combined with an analysis of South East universities' research strengths in these sectors will assist the region to prioritise interventions to deliver high impact and return on investment. This approach is in line with the *New Industry, New Jobs* agenda.

- **Acknowledgement that a strong university-industry-government relationship is vital to bring bright ideas to market**. Focusing universities' collaborative activities with businesses to create, commercialise and bring new and/or improved products and services to market in the context of the Regional Strategy and national frameworks such as *New Industry, New Jobs* and *Going for Growth* can enhance the economic impact.

Necessary background

SEEDA's Innovation Strategy
Annex A: University-Industry-Government Collaboration
Annex B: Innovation Benchmarking
Annex C: International and national examples of innovation interventions
Annex D: The link between innovation and high-growth

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Signed off-by

Robert Crawford, Group Executive Director, Operations, 17th March 2010

SEEDA's Innovation Strategy

1 Context

1.1 Innovation and exploitation of scientific discoveries and new technology are invariably at the centre of long term economic growth and increasing social well-being. Innovation, defined as the *successful exploitation of new ideas*, is a key factor for economic success, business performance and social progress; it directly affects productivity, job creation and it drives economic growth and wealth creation.

1.2 Industrial competitiveness, especially in high-cost locations such as the South East, rests mostly on the successful development and exploitation of unique knowledge.[1] Embracing the virtuous innovation cycle, starting either with a new or significantly improved idea which creates a market or with a significant product enhancement in an existing market, which in turn transforms the economic structure ('creative destruction')[2], is critical to the South East's economy which increasingly has to compete on the basis of international knowledge advantage in ever shortening product life cycles.

1.3 Whilst the South East of England is one of the top performing regions in the UK it continues to slide down the rankings in a number of global competitiveness indicators[3] which also impacts on the UK's competitive position.[4] The challenge for the region is to regain and sustain its global competitiveness in the face of intensifying international competition. To address this challenge successfully SEEDA will analyse against which particular indicators the South East is losing ground and – as part of the Innovation Strategy Implementation Plan – identify how the region could counter the decline through focused interventions drawn from global best practice and strong partnership working between government, industry and academia.

1.4 To strengthen Britain's industrial competitiveness government launched *Going for Growth*[5]. This document builds on *Innovation Nation* and *New Industry New Jobs*, to set out policies and investment in skills, infrastructure, innovation and finance for businesses. A particular emphasis in this strategy was put on the commercialisation of science and research with a vital role for strong university-industry-government relationships driving economic growth based on innovation.

1.5 Focusing on the role of technology and innovation centres the *Hauser Review* is expected to provide recommendations to Government on how to enhance the business benefits, effectiveness and commercial application of technology development. A balance between technology push (i.e. by setting national priorities) and industry pull (demand for applied research and technology-enabled innovation) will help developing a strong and diversified industrial portfolio, with higher shock-resilience.

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[1] Arne Isaksen (2009): Innovation Dynamics of Global Competitive Regional Clusters. In: Regional Studies, Vol. 43 No. 9, November 2009
[2] J. Schumpeter first introduced this economic concept in 'Capitalism, Socialism and Democracy', 1942
[3] World Knowledge Competitiveness Index (2008): the South East of England ranked 74 out of 145 global regions (down from 40th rank in 2004); Regional European Competitiveness Indicator (2006/07): the South East ranked 16 among European regions (down from 12th in 2004).
[4] The latest World Economic Forum Global Competitiveness Report 2009-10 lists the UK at rank 9 (down from 8 in 2008/09).
[5] http://www.bis.gov.uk/wp-content/uploads/2010/01/GoingForGrowth.pdf

2 SEEDA's Innovation Strategy for Delivery

2.1 SEEDA's Innovation Strategy applies national innovation and industrial policy to the strengths of the South East region to inform our business planning and targeted interventions to contribute to the development of the Regional Strategy. Delivery of the strategy will be accelerated through an operational programme of innovation interventions for SEEDA building on evidence from our current activities and feedback from national evaluations.

2.2 The vision of SEEDA's Innovation Strategy is to ensure that the South East becomes ***one of the world's top performing regions by putting innovation support at the heart of our business development programmes.*** A specific goal will be to grow the innovation footprint of the South East – using proximity measures such as private & public sector expenditure on innovation activities, number and quality of Knowledge Transfer Partnerships and Innovation Vouchers, increased business-university interaction and number of foreign direct investment with specific innovation outcomes. The baseline and basket of indicators will be defined by SEEDA drawing on evidence collated in-house and through other sources.[6]

2.3 Successful innovation support provides evidence of leading to growth of GVA, increased level of exports, accelerated growth of industry sectors with integrated supply chains in the UK. The implementation of SEEDA's Innovation Strategy will help to deliver further against these expected outcomes.

2.4 Innovation is essential for South East **businesses to become more effective in achieving their full economic potential in the global market**. Using innovation and science to solve business problems and to develop new products and services will increase the region's international competitiveness.

2.5 To bring bright ideas to market a supportive regional innovation environment with a **strong university-industry-government partnership** is vital (Annex A). The ambition is to create internationally competitive, rapidly growing and internationalising (i.e. scalable) businesses which must be at the heart of our approach.

2.6 **Attracting high value inward investment and establishing global pipelines to new knowledge** which South East businesses could exploit commercially are an integral component of the innovation strategy which is closely aligned to SEEDA's renewed foreign direct investment strategy.

2.7 To achieve maximum impact of SEEDA's Innovation Strategy a coherent business-led approach to **science, innovation and technology interventions focused on high growth businesses and industrial strengths**, building on the region's opportunity base of businesses, research centres and universities, is pursued.

[6] In defining the baseline and indicators at regional level SEEDA will explore the opportunity to collaborate with NESTA who are developing a UK Innovation Index (www.innovationindex.org.uk).

2.8 The strategy in its implementation will further inform SEEDA interventions, aimed at **fostering and exploiting high value innovation and commercialisation of R&D,** as evidence shows they have a disproportionate impact on regional economic performance. These interventions, more often than not, will be delivered in partnership with technology partners, universities and industry. The programme of interventions will be informed by international and national benchmarking (Annex B+C) and SEEDA's current innovation programmes[7].

2.9 This strategy will thus help in delivering:

- Growth of indigenous companies into internationally competitive businesses;
- Higher productivity and profitability of existing businesses;
- Increased flows of globally mobile capital into the South East;
- Creation of new businesses, new jobs and careers;
- Continuing professional development of the region's workforce;
- Increased university-industry collaboration to create, commercialise and bring new products and services to market; and
- Commitment to and prioritised investment in centres of excellence with key enabling technologies and facilities to translate core strengths into economic benefits.

2.10 The strategy and its supporting programme of interventions is strongly **aligned but not exclusive to the six priority sectors** identified by SEEDA, accounting for 42% of regional GVA and 35% of regional employment:

- Advanced Engineering & Marine
- Aerospace & Defence
- Environmental & Energy Technologies
- Financial & Professional Services
- ICT and Digital Media
- Pharmaceuticals, Life Science and Health Technologies

2.11 SEEDA's key innovation activities will focus on (<u>for discussion and decision</u>):

- **Exploitation of clusters around centres of excellence**, e.g. Harwell Science and Innovation Campus, particularly with a view to creating and/or attracting international businesses and building a strong regional supply chain;
- **Creation of centres of excellence with global significance**, building on existing and emerging research excellence and industrial strengths, to encourage open innovation and stimulate collaboration with international partners;
- **Identifying and targeting support for high growth companies** (Annex D), aligned but not exclusive to SEEDA's focus on priority sectors & clusters drawing on the market intelligence from the Innovation & Growth Teams (IGTs) and Sector Consortia by tracking revenue and employment growth; and
- **Enhancing knowledge exchange between businesses and between businesses and the knowledge base** to develop internationally competitive, scalable businesses whether these are start-ups or existing companies.

[7] http://www.seeda.co.uk/_documentbank/item4_innovationAnnex2Technology.pdf

2.12 SEEDA's innovation activities will be closely integrated with and reinforce other aspects of the agency's strategic agenda to support sectors & clusters, inward investment and trade as well as business critical infrastructure and enterprise support. A critical mass of targeted interventions to support growth-orientated innovative firms will result from this focused approach.

2.13 To retain and further develop the region's competitive edge an **essential link needs to be sustained between innovation, foreign direct investment and exports** as innovation activities are enhanced by being exposed to demanding customers in export markets as well as enriched by the migration of capital and ideas ('brain circulation'). Interregional and international relationships and knowledge flows are crucial for innovation with empirical evidence outlining that firms receive much information and knowledge from extra-regional actors. Firms and organisations well linked to external knowledge sources can act as global pipelines to new knowledge for other parts of regional clusters.

2.14 Measures of success could be (<u>for discussion and decision</u>)[8]:

- At **global level** the South East of England is recognised by businesses, universities and governments as a leading innovation region with a particular expertise in **Pharmaceuticals, Life Science & Health Technologies**[9] and **Aerospace & Defence**[10], in particular **space related applications**[11], measured through increased foreign direct investment, increased concentration of international companies associated to these sectors and increased international collaboration and commercialisation of research in these areas.

- At **national level** the region is collaborating with others in sectors of particular strengths to the regional economy (based on NINJ analysis), in particular within the Greater South East where collaboration might focus on **life sciences**, **low carbon** (including **environmental and energy technologies**) and **digital industries** (potentially also ageing society). Collaboration with other regions will also include **advanced manufacturing and marine**.

- At **regional level** the acceleration of delivery against the innovation strategy will lead to increased levels of business investment in innovation (including potential for increase in R&D tax credits by businesses) and improved effectiveness of ideas commercialisation, in particular with a view to creating more scalable businesses.

2.15 Defining target audiences for SEEDA interventions:

- **Fast growing businesses** (building on the top 50 fastest growing businesses identified in the six priority sectors and in addition those businesses which represent good prospects for long term growth in other industries);

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[8] All of these success measures would need baseline data to be defined.
[9] Pharmaceuticals, Life Science & Health Technologies is the third largest priority sector in the South East with higher than national average growth projections (1.6% in 2010; 2.5% per annum over the next decade).
[10] The Aerospace & Defence sector in the South East is forecasted to expand by 2.2% in 2010 and by 1.5% per annum over the next decade which is below the UK average.
[11] The UK space sector is set to grow on average by about 5% a year until 2020. With a 75 per cent share (£4.5bn in 2008) of the UK space market turnover the South East sits at the centre of this industry.

- **Large businesses in target sectors** where SEEDA can add value to companies' efforts in the South East to deepen innovation in all its forms;
- **Higher and further education colleges** committed to working with our target business audiences; and
- **Venture and sovereign wealth funds, angel investor networks and banks** providing essential funding to drive innovation.

2.16 Our target audiences need to sit alongside the outline criteria for SEEDA investment in innovation interventions (for decision) – based on the South East Strategy for Technology[12] and aligned to the Technology Strategy Board investment criteria:

- **Can the South East do it?** – There is an existing capability (business and/or knowledge base, including centres of excellence) in the South East.
- **Is there a market opportunity?** – There are significant global market opportunities – accessible to UK businesses – for the technology/product/process and/or challenges/societal needs that will drive significant future markets.
- **Is the idea 'ready' for impact?** – The technology/product/process has the potential to build competitive advantage – including UK-based supply chain opportunities – which will lead to wealth creation and sustainable economic growth for the South East Region, and is at a stage where an impact can be made in the near and medium term (i.e. at intermediate Technology Readiness Level or equivalent for process innovation).
- **Can SEEDA make a difference?** - SEEDA investment in the technology/product/process can make a difference and there is potential for leverage of business and university/research funding into the activity.
- **Better together?** – There is an opportunity for cross-regional collaboration with other Regional Development Agencies aligned to New Industry, New Jobs.

3 Implementation of SEEDA's Innovation Strategy

3.1 The implementation of SEEDA's Innovation Strategy will require a partnership approach and highly targeted interventions. In particular a strong university-industry-government relationship is at the heart of the world's leading regional economies. Annex A sets out some key considerations for driving economic growth in close partnership working between South East universities, businesses and SEEDA. These considerations are an integral component of a more detailed report (due to be submitted to Lord Mandelson on 18th March 2010) on how South East universities, in partnership with SEEDA, can deliver Government's *Going for Growth* agenda.

3.2 SEEDA's resources are likely to reduce over time with anticipated cuts in public sector spend. The agency must therefore focus resources where they are likely to have most impact. Whilst recognising the importance of theoretical and fundamental research and ideas generation SEEDA's core mandate is to drive business growth. Therefore our chosen innovation interventions are at the discrete business level whilst working closely with the Technology Strategy Board, key research institutes and universities on more strategic projects. We are also strongly committed to fore-sighting and benchmarking on emerging technologies where the South East might seek a competitive position.

[12] http://www.seeda.co.uk/_documentbank/item4_innovationAnnex2Technology.pdf

3.3 Based on the suggested approach outlined above the **Board is invited to discuss and agree six recommendations for SEEDA** (for decision):

- Recommendation 1: SEEDA allocates the majority of its innovation budget to supporting businesses within the priority sectors and clusters to grow their innovation capacity. To do so we will review the impact and continuing relevance of our existing portfolio of schemes to focus future investment where evidence shows we are having the greatest impact.

- Recommendation 2: In line with *New Industry, New Jobs* SEEDA will continue to collaborate with the TSB and other RDAs specifically on programmes designed to support the deepening of innovation amongst our business base. This collaboration builds on well established partnerships which were encouraged by *Innovation Nation* (2008)[13].

- Recommendation 3: SEEDA's inward investment activities increasingly targets investors with a strong interest in tapping into the research base of the South East and in working to develop a high value supply chain. Close linkages with the research community of the region will likewise inform our inward investment strategy. Through the Economic Development and Skills Board this work will contribute to the development of the South East Regional Strategy.

- Recommendation 4: SEEDA works with universities and businesses to support and focus collaborative activities in high impact areas, such as the six priority sectors, building on current best practice of strong partnership working. The affordability of exploiting collaborative research and other forms of joint working with Higher Education Institutions is a barrier to many SMEs. Therefore SEEDA works with the universities and Further Education Colleges to deepen their engagement with the fast growing businesses by promoting and where possible financially supporting the collaborative innovation services of these institutions. To achieve this we actively encourage the business intermediary organisations to help break down the barriers which may exist between academia and business in their effort to collaborate.

- Recommendation 5: SEEDA will continue to work in partnership with universities to enhance knowledge exchange between businesses and between businesses and the knowledge base to develop internationally competitive, scalable businesses on the back of university spin-outs and/or through collaboration with existing companies. To accelerate growth SEEDA will explore the opportunities of creating and funding a programme designed to make available to university spin-outs professional managers depending on the business needs of the former.

- Recommendation 6: SEEDA works with universities, e.g. through the Higher Education Entrepreneurship Group (HEEG) and STEM-UEN (Science, Technology, Engineering and Mathematics University Enterprise Network; delivered by the National Council for Graduate Entrepreneurship), and with businesses, e.g. through facilitating high quality internships and/or peer-to-peer learning networks, to increase the provision of high quality skills for innovation in the region.

[13] http://www.dius.gov.uk/Policies/innovation/white-paper

4 Next steps

4.1 Subject to the Board's discussion and decision the recommendations will be implemented. The review of SEEDA's current programme of innovation interventions for impact and additionality will be reported to the Board later in the year drawing on both regional and national evaluations of existing innovation interventions.

4.2 SEEDA will define the baseline for the basket of indicators set out in paragraph 2.2 and the measures of success set out in paragraph 2.14 to evaluate the impact of its Innovation Strategy. This will also inform the development of an implementation plan which will be discussed by SESETAC at their strategy workshop in June 2010.

4.3 In light of 4.1 and 4.2, consideration will be given throughout the year on how best to focus our delivery for greatest impact and what tools should be deployed. Partner expectations will need to be managed through this.

4.4 SEEDA's Innovation Strategy will contribute to the development of the Regional Strategy, using SESETAC for strategic advice and input and the Economic Development and Skills Board as conduit. Discussions with sub-regional partners will focus on 4.3 and the outcomes of the review of our existing innovation investment. Current business planning activity provides an opportunity for the Agency to disseminate more widely its chosen approach of placing innovation at the heart of its investment choices and activities in 2010/11 and beyond.

4.5 Evidence from our own approach will feed into the Innovation Lead Role work undertaken by the Agency on behalf of the RDA network. While this role focuses heavily on national and international policy matters, drawing on the evidence base of successes from regional interventions provides the policy team with a relevant evidence-based approach to policy making. It is therefore appropriate in discharging our lead role duties that we place an appropriate emphasis on innovation.

ANNEX A: University-Industry-Government Collaboration

A.1 **A strong university-industry-government relationship has a key role to play in driving economic growth based on innovation and the exploitation of unique knowledge advantage**. Understanding the current and emerging global assets of the South East's research and industry base is essential for economic development. Assessing excellence in partnership with industry, benchmarked internationally, is vital to translate core strengths into economic benefits. Only with shared commitment to and prioritised investment in centres of excellence with key enabling technologies and facilities, aligned to the six priority sectors, will the South East be able to sustain and benefit from its unique knowledge advantage in a global market.

A.2 **Universities have a key role to play in helping secure high value inward investments** in partnership with SEEDA, UKTI, Local Authorities and Central Government. An integrated, smart offer for international businesses – reaching from the prospect of recruiting well educated graduates and collaborating in the commercial exploitation of technology and research to finding suitable business premises and facilities, including business critical infrastructure – is essential to attract globally mobile capital.

A.3 **Communication and close collaboration is vital to promote the South East offer in the global market place**. The Regional Strategy is an opportunity to develop a coherent and compelling offer based on the region's research excellence and industrial strengths. Building on existing and emerging clusters and high growth sectors, working with leading companies, developing future technologies and identifying international market opportunities for South East businesses will help the region to reach its full potential. Government can assist with promoting the offer internationally.

A.4 **Leveraging world beating technologies**: The UK has a strong track record in cutting edge interventions (with more than 100 Nobel science prizes; Japan 13, Germany 86, China 5, India 5, France 31) but when it comes to maximising commercial rewards in many cases these have been exploited primarily overseas. Aligning universities' research and commercialisation activities to high growth markets, whilst still providing for new ideas to come forward and be supported as well, is key to maximise the business potential of world leading technologies developed by the UK's research and knowledge base.

A.5 **A skilled, educated workforce is an essential precondition for innovation success**. Economic incentives but also access to quality research infrastructure and to leading researchers drive mobility and influence the flows of the highly skilled. Therefore it is essential for regional economies to identify their global assets attracting an inflow of talent which has positive effects relating to knowledge flows and economic activity. This mobility can also help to link domestic firms to foreign knowledge and to stimulate spillovers from foreign R&D to local R&D units and the economy at large.[14] In this context geographical and relational proximity is an essential enabler for transferring tacit knowledge.

A.6 **Universities are at the heart of supporting skills development and continuing professional development for internationally competitive businesses**. The Regional Priority Skills Statement, articulating business needs for skills at all levels with particular focus on STEM subjects and NINJ priorities, and the new Regional Skills Strategy currently in development are critical tools to enable a strategic dialogue with Universities concerning employer demand for skills. To achieve positive impact the analysis of medium to long term skills requirements should be coupled with a longer term view on funding to allow for strategic planning.

[14] OECD: The Global Competition for Talent: Mobility of the Highly Skilled, 2008

A.7 To realise the opportunities of a strong regional university-industry-government relationship, attracting and developing globally competitive businesses, a number of challenges will need to be addressed. These include:

- **Entrepreneurship and Management Skills**: a lack of professional management skills, including financial and legal expertise, characterises many spin outs and is therefore a barrier to growth. Universities, in particular Business Schools, could have a vital role to play in providing training for business development and governance, including legal/financial, setting up a Board of Directors, Senior Executive Team, and accessing Venture Capital etc.

- **Incubation & entrepreneurship**: in comparison with the US the incubation period for start-ups is shorter in the UK; need to have a planned route for companies from protected business development, including access to venture capital, to open market competition which should include entrepreneurship training and longer term support/advice – also need space and infrastructure for growth.

- **Innovation, incubation and move-on space**: to foster active relationships between businesses and universities innovation centres and incubation space is critical. Increasing demand for incubation space but also move-on space for growing companies needs to be responded to by coordinated public and private sector investment. A lack of planning permissions for suitable business space was identified as major challenge not only impacting on indigenous businesses but also preventing international companies to locate in the South East

- **Finance**: access to start up and development finance has become harder for most companies to secure as venture capital migrates towards the mature end of the market. This is a particular challenge for companies with high growth ambitions in areas such as manufacturing which require substantial capital investment. Exploring potential for tax breaks for companies when collaborating with research base to innovate may attract indigenous and international capital to grow UK business. Investment decisions to support new ideas/technology, however, need to be based on viable business plans including market research to identify potential world market to attract venture capital. Seed or early-stage capital, often provided by venture capitalists through private equity capital investments, is a key stage in the R&D cycle to assess the commercial viability of new ideas and thus bridging the gap between pure research and product development.

ANNEX B: Innovation Benchmarking

B.1 According to the World Economic Forum Global Competitiveness Report 2009-10[15] the three leading national economies (Switzerland, the US and Singapore) all share many of the same characteristics: **high levels of R&D investment, strong collaboration between industry and academia, the successful translation of research into marketable products and services and flexible labour markets**.

B.2 In comparative studies[16] of international innovation policies a paradigm shift can be observed away from mainly science and technology based innovation to a broader understanding of innovation drivers in economies. The best performing countries address the implications of this wider definition by including higher education, professional education, research commercialisation and finance in their **significantly broadened innovation policies**.

B.3 A recent study by NESTA compared the UK to leading innovation nations and concluded that the UK performs well in competition and entrepreneurship, with room for improvement in public research and openness, whilst **lagging behind in access to finance, demand for innovation and skills**.[17]

B.4 A key role has been identified for **public procurement** associated with a more activist approach to strengthen lead markets. Whilst tax breaks may be the most effective incentive for innovation the creation of lead markets through targeted public sector procurement may encourage innovation and encourage competition.

B.5 Whilst the UK has an enviable reputation for the quality of its research the **conversion of this world-leading science into world-beating companies lags behind**. Library House compiled a list of all companies spun out from British universities since 2001 and compared the volume of venture capital money they attracted with the amounts backing companies spun out of three US universities (Stanford, Washington and Wisconsin). This survey positioned Cambridge University and the University of Southampton in second and third place after Stanford University (US). In comparison, however, Stanford generated almost double the volume of money that Cambridge attracted.[18]

B.6 A marked difference in comparing business-university interaction in the US and in the UK is the **high number of student internships** in the US **contributing to increased innovation**, which was highlighted by NESTA in their report 'The Connected University'.[19]

B.7 In a recent NESTA study "The Innovation Index – Measuring the UK's investment in innovation and its effects" (November 2009) the following conclusions were drawn about the UK's innovation performance[20]:

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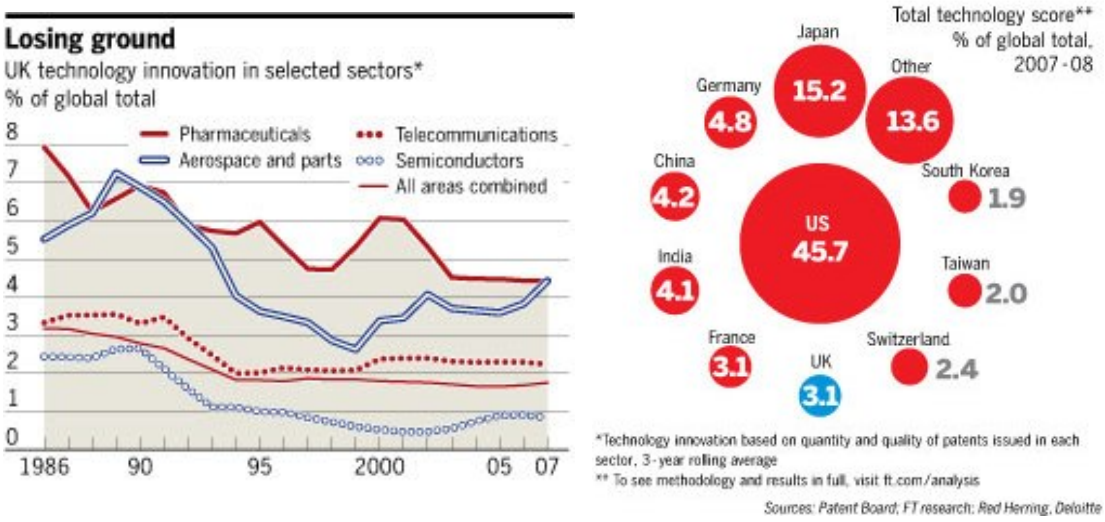
[15] http://www.weforum.org/pdf/GCR09/GCR20092010fullreport.pdf
[16] OECD (2005): Innovation Policy and Performance – a cross-country comparison; European Commission (2008): European Innovation Progress Report 2008.
[17] NESTA (2009): The wider conditions for innovation in the UK
[18] Franklin, Roger, Holi, Martin, Lapinski, Jens, 2007. Spinning out quality: university spin-out companies in the UK. The Library House Ltd., Cambridge/UK.
[19] NESTA: The connected university; April 2009
[20] Successful *innovation performance* is a dynamic process which is difficult to measure; however key economic and social indicators, such as GDP and productivity growth, alongside intermediate and input indicators, such as number of patents, R&D expenditure and finance for innovation, and innovation surveys are commonly applied to arrive at a comparative analysis of countries' and regions' innovation performance.

- **The UK invests more heavily in innovation than R&D measures would suggest**. Whilst the UK in 2007 may only have invested some 1.6% of GDP in R&D[21] (compared to 2.8% in Japan, 2.7% in Finland and 2.0% in US) a total of **£133 billion private sector investment in innovation** (product, process, marketing and organisational innovation), or **14 per cent of private sector output**, benefited national productivity in 2007 (higher than most other comparator countries bar Finland).

- **Most of the private sector investment takes other forms than traditional R&D.** Over three quarters of private sector investment was in '*hidden innovation*' (areas other than traditional R&D). The majority of this investment (some 44% of the total) went into 'economic competencies' (organisational improvement, training and skills development) compared to 11% spent on 'classic' innovation investment (R&D) which is about the same amount invested in market research and advertising.

B.8 However, the **UK at large is losing ground in most areas of technology-enabled innovation**, including pharmaceuticals, semiconductors and telecommunications. According to FT analysis[22] of countries' overall technology strengths, using Patent Board data plus other figures related to the numbers of small and big technology companies, the UK's 'total technology score' for 2007/08 was 3.1, placing it in joint sixth position with France. But it is behind China and India, as well as Japan and Germany, while the US is the clear leader with a score of more than 45.



B.9 The UK has a strong track record in cutting edge interventions (with more than 100 Nobel science prizes; Japan 13, Germany 86, China 5, India 5, France 31) but **when it comes to maximising commercial rewards in many cases these have been exploited primarily overseas**. A leading bioscience research funder recently commented: "Britain accounts for 3 per cent of global GDP and it's likely to go down to 1 per cent unless we do more to commercialise spin-offs from science and technology".[23]

[21] This compares to a target of 3% of GDP spend on R&D for EU member states set by the Lisbon European Council.
[22] FT Analysis: A world to scale; 20 January 2010 online: www.ft.com/analysis (print: 21 January 2010)
[23] Sir William Castell in FT Analysis: A world to scale; 20 January 2010; www.ft.com/analysis

ANNEX C: International and National Examples of Innovation Interventions

C.1 The German **Fraunhofer-Gesellschaft** promotes and undertakes applied research in an international context, of direct utility to private and public enterprise and of wide benefit to society as a whole. By developing technological innovations and novel systems solutions for their customers, the Fraunhofer Institutes help to reinforce the competitive strength of the economy in their region, throughout Germany and in Europe. Their research activities are aimed at promoting the economic development of an industrial society, with particular regard for social welfare and environmental compatibility. With more than 80 research units, including 60 Fraunhofer Institutes, at different locations in Germany, the Fraunhofer-Gesellschaft is the largest organization for applied research in Europe24. Two thirds of the research revenue is derived from contracts with industry and from publicly financed research projects. Only one third is contributed by the German federal and Länder governments in the form of institutional funding. The Institutes are the entities responsible for carrying out the organisation's research work and are managed by one or more Institute Directors. The Institutes have an obligation to acquire contract research work and have their own budgetary responsibilities. A key element of the German government's high-tech strategy is to promote cluster initiatives. In the "Pact for Research and Innovation", the Fraunhofer-Gesellschaft has assumed the task of **conceiving and implementing innovation clusters**.

C.2 **Innovation Agencies**: Tekes – the Finnish Funding Agency for Technology and Innovation – is the most important publicly funded expert organisation for financing research, development and innovation in Finland. Boosting wide-ranging innovation activities in research communities, industry and service sectors a broad-based view on innovation is promoted: besides funding technological breakthroughs, Tekes emphasises the significance of service-related, design, business, and social innovations. Tekes works with the top innovative companies and research units in Finland. Every year, Tekes finances some 1,500 business research and development projects, and almost 600 public research projects at universities, research institutes and polytechnics. Research, development and innovation funding is targeted to projects that create in the long-term the greatest benefits for the economy and society. Tekes does not derive any financial profit from its activities, nor claim any intellectual proprietary rights.

C.3 **Innovation Vouchers**: the Dutch innovation voucher aims to stimulate the interaction between small and medium-sized enterprises (SMEs) and public research institutes. Two types of vouchers are available: a 'small voucher' worth EUR 2,500 and 'large vouchers' worth EUR 7,500 of which the SME has to contribute one-third. There is an annual allocation of vouchers and in case of oversubscription vouchers are assigned randomly by means of a lottery. Initially introduced as a pilot in 2004 they became a permanent measure of innovation support in 2006. An early evaluation of the effectiveness25 concluded that out of every ten available vouchers, eight are used for assignments which would not have been commissioned without the voucher, one is used for an assignment that would have been commissioned anyway, and one is not used. The added value and future potential of the contact between an SME and researchers, initiated by the Innovation Vouchers, was not covered in this assessment.

[24] The TNO in the Netherlands is the second largest with some 5000 employees and 600m EUR annual turnover in 2008 (http://www.tno.nl/index.cfm).
[25] Maarten Cornet, Björn Vroomen, Marc van der Steeg (2006): Do innovation vouchers help SMEs to cross the bridge towards science? CPB Discussion Paper, No 58, CPB Netherlands Bureau for Economic Policy Analysis

C.4 A similar programme of **Innovation Vouchers** is operated by Invest NI. Small enterprises can apply for these vouchers worth up to £4,000. Applications will be assessed by an appraisal panel and can be redeemed from any of the 38 knowledge providers associated with the programme. The appraisal will check whether there is an existing solution in the marketplace already in which case it is unlikely that a voucher would be awarded. Activities paid for through the voucher system can include innovation/technology audits, training in innovation management, new business model development, new service delivery and customer interface, new service development and efficiency audits, including process change and supply chain management. Until April 2009 more than 260 companies used Innovation Vouchers. Through collaboration of up to 10 businesses working on solving a common problem the value of the voucher can be increased to £40,000.

C.5 Examples of **place-based innovation interventions** are:

- **Edinburgh BioQuarter**, a £600m project over 15 years to attract the world's leading biotech companies. In partnership the University of Edinburgh, Scottish Enterprise, NHS Lothian and a US-science-property developer aim to facilitate the creation of 10,000 high tech jobs on 100 acres combining an international medical school with world class clinical trials centres and a commercial research campus.

- **BioScience Campus in Stevenage**, building on the existing R&D facilities of GlaxoSmithKline (GSK) a new purpose build open innovation campus will be establish to create up to 1,500 jobs for scientists working for early-stage biotech companies. The first phase receives £37m funding from government, GSK, EEDA, The Wellcome Trust and the Technology Strategy Board and will include the Medical Research Council's National Centre and by 2011 an incubator for 15-20 companies. Subsequent phases of the development are planned with no public sector funding and it is anticipated that by 2016 the development will have attracted an investment of £122m.

- National **Science and Innovation Campuses at Daresbury and Harwell** were created to significantly advance collaborative science and technology programmes building on world class facilities and research excellence. In addition the UK designated six Science Cities: Birmingham, Bristol, Manchester, Newcastle, Nottingham and York.

ANNEX D: The link between innovation and high-growth

D.1 In a recent NESTA study "The Innovation Index – Measuring the UK's investment in innovation and its effects" (November 2009) the following conclusions were drawn about the UK's innovation performance[26]:

- **Innovation may be responsible for the lion's share of the UK's productivity growth from 1990-2007.** Two-thirds of UK private sector productivity – 1.8 percentage points of productivity growth per year – between 2000 and 2007 was a result of innovation.

- **Innovation is strongly linked to business growth across a range of sectors.** For example, innovative software firms enjoyed a much faster growth rate than non-innovative ones (13 per cent average revenue growth per year compared to just over zero per cent). But this relationship held true even in sectors like legal services, where innovative firms enjoyed average revenue growth of over 10 per cent, while non-innovative firms' revenues shrank on average.

D.2 **High-growth companies are disproportionately innovative:** Evidenced by a recent NESTA study (October 2009) a small percentage of high-growth companies – those who experience average annual growth in employment of 20 per cent or more over three years – are the driver of UK economic prosperity. The work shows that these companies are disproportionately innovative, and that their innovation appears to cause their growth. Key findings of this research are:

- **High-growth companies are rare, but generate a majority of jobs:** the 6% high-growth companies generated 54% of new jobs between 2005 and 2008 (1.3 million out of 2.4 million).

- **It's not just about start-ups:** Although young firms are more likely to be high-growth, the majority of high-growth firms (70 per cent) are at least five years old. Still, young high-growth firms are responsible for a fifth of the jobs created by high-growth firms.

- **Innovation drives firm growth:** Innovative firms grow twice as fast, both in employment and sales, as firms that fail to innovate. For instance, firms that had introduced a product innovation in 2002-04 experienced a 4.4 per cent average employment growth rate between 2004-07, in contrast to the 2 per cent average growth rate displayed by non-innovators. And the figures are 10 per cent and 5.8 per cent respectively if we consider sales growth.

D.3 The report concludes that understanding this **link between innovation and growth** is essential to develop high impact policies and interventions, whether by ensuring appropriate financial support for growth businesses, effective use of government procurement to encourage innovative businesses, functional technology transfer policies, or support for innovative clusters and networks.

[26] Successful *innovation performance* is a dynamic process which is difficult to measure; however key economic and social indicators, such as GDP and productivity growth, alongside intermediate and input indicators, such as number of patents, R&D expenditure and finance for innovation, and innovation surveys are commonly applied to arrive at a comparative analysis of countries' and regions' innovation performance.