



Implementing “The Race to the Top”

Lord Sainsbury’s Review of
Government’s Science and
Innovation Policies

Unlocking talent



Contents

Foreword	4
Executive Summary	6
Chapter 1: The Race to the Top	8
Chapter 2: The Innovation Ecosystem	9
Chapter 3: The Technology Strategy Board	12
Chapter 4: Knowledge Transfer	17
Chapter 5: Intellectual Property, Standards and Metrology	22
Chapter 6: The Supply of Venture Capital	25
Chapter 7: Educating a New Generation of Young Scientists and Engineers	27
Chapter 8: Government Departments	35
Chapter 9: The Science and Innovation Strategies of the Regional Development Agencies (RDAs)	41
Chapter 10: Global Collaboration	47

Foreword



In a globalised world, with ever intensifying competition, we face new challenges as an economy and a society. It is important that we move faster on our science and innovation journey.

In *“The Race to the Top: A Review of Government’s Science and Innovation Policies,”*¹ Lord Sainsbury set out a challenging agenda. This document sets out the excellent progress the Government has already made in delivering the recommendations of the Review. I am pleased to say that almost all the recommendations have been implemented, or are in the process of implementation.

I would personally like to thank David for his support and his work on the Review, which has been a catalyst for a number of important developments. To pick just a few highlights: the Technology Strategy Board has grown into its new leadership role; the formula for allocating

the Higher Education Innovation Fund is now in place, supporting those universities collaborating closely with business; there is an invigorated agenda to educate and enthuse young scientists and engineers; and plans are being put in place for a new model for the Small Business Research Initiative. I could mention many more and we will continue to work to implement all David’s recommendations.

However, nothing stands still and I believe it is also now time to see what more we can do. We must continuously strive to be ambitious, agile and creative in our approach to science and innovation. We have to recognise the changing face of innovation. We should be proud of our excellent performance in science and technological innovation; but our strong history of invention provides us with a springboard to do more. We must look at innovation in its broadest sense, considering the full range of inputs and sources of inspiration. For example, we must be innovative in design, services and the public sector as well as within

manufacturing. Innovation can help us develop a strong, sustainable economy, but it can also help us address social problems and public policy challenges.

Building upon the package of recommendations in Lord Sainsbury’s report, with the Secretary of State, John Denham, I have been leading on the development of our thinking on what further steps we need to take as a nation if we are going to excel in the future. I am pleased that the science and innovation strategy – *Innovation Nation*², is published alongside this progress report.”



Ian Pearson
Minister of State for Science and Innovation

¹ “The Race to the Top: A Review of Government’s Science and Innovation Policies,” Lord Sainsbury of Turville, October 2007

² “Innovation Nation,” Department for Innovation, Universities and Skills, March 2008

Executive Summary

Introduction

On 5 October 2007, Lord Sainsbury published his Review of the UK science and innovation system. The Review examined the role of science and innovation in ensuring the UK remains competitive in our increasingly globalised economy. It was commissioned by Gordon Brown, as Chancellor of the Exchequer, as part of the Comprehensive Spending Review (CSR) 2007.

The Prime Minister accepted Lord Sainsbury's recommendations in full, and asked the Secretary of State for Innovation, Universities and Skills to take forward its implementation. This report outlines the Government's progress and future plans.

Implementation of the Sainsbury Review forms an integral part of the DIUS science and innovation strategy³ – *Innovation Nation*. Building on Lord Sainsbury's review, this strategy sets out the key steps we need to take across the public and private sectors, to make Britain a society of innovation. Further details on this can be found at: www.dius.gov.uk.

Implementation Progress

The Race to the Top

The Government accepts the challenge and the analysis set out in the Sainsbury Review. Six months later excellent progress has been made in delivering the 72 recommendations. Of these, over 20 have already been implemented and the rest are in the process of implementation."

The National Innovation Ecosystem

As the Sainsbury review highlights, the UK has a complex national innovation ecosystem and excellent progress has been made against the recommendations outlined in this area. In particular funds were made available in Comprehensive Spending Review 2007 to continue supporting research, in line with the 10 Year Science and Innovation Investment⁴ Framework, and increase funding to the Technology Strategy Board.

Policy Recommendations

Progress has been made in implementing the recommendations across all the key areas identified in the Review:

a new leadership role for the Technology Strategy Board – This is happening and is enabling the Technology Strategy Board to use its investments to create critical mass and coherence so that UK business has greater clarity and is better able to access the most relevant support available;

building on our success in knowledge transfer – Key achievements since the Review's publication include an entirely formulaic approach to the Higher Education Innovation Fund and plans to expand Knowledge Transfer Partnerships;

using intellectual property rights, standards and metrology to improve knowledge transfer – The UK Intellectual Property Office is using a variety of patent analysis techniques to develop a set of key "success indicators" for spotting new and emerging technologies with disruptive market potential which will feed into the Technology Strategy Board's Emerging Technologies strategy;

³ "Innovation Nation," Department for Innovation, Universities and Skills, March 2008

⁴ "Science and Innovation Investment Framework 2004-2014," HM Treasury, DTI, DfES July 2004

targeted support for early-stage high-technology companies – As a result of Lord Sainsbury’s recommendations in this area DIUS is now coordinating agreement of a national specification for proof-of-concept (PoC) funds for business support;

a major campaign to improve the uptake of science, technology, engineering and mathematics – Since publication of Lord Sainsbury’s Review DCSF has appointed Professor Bill Harrison as the STEM Careers Co-ordinator and begun a three year communications campaign to inform pupils, parents, schools and colleges of the wide range of exciting opportunities that are open to students when they choose to study STEM subjects;

a key role for government departments – The Sainsbury Review explored the role of Government Departments in progressing science and innovation policies. The role of the Regional Development Agencies in raising the level of R&D and innovation in their regions was also covered. Further to Lord Sainsbury’s review DIUS will publish the first Annual Innovation Report in autumn 2008. It will be the first comprehensive report on the innovative performance of the UK across both the public and private sectors;

increasing regional focus and resource on science and innovation – Since publication of the Review a key achievement is the establishment of the Strategic Advisory Group to the Technology Strategy Board which has membership from each regional Science and Industry Council and representation from the Devolved Administrations. This will develop complementary activity and a greater strategic relationship between the regional and national level;

linking up with centres of excellence around the world – 90 per cent of the world’s scientific output is produced outside the UK. If we are to stay at the leading edge of world-class science and innovation we must collaborate internationally. A key achievement against the recommendations set out in this area is the extension of the Science Bridges scheme to cover UK links with China and India.

A Global Leader in Science and Innovation

Good progress has been made on strengthening collaboration with the key strategic research partners of China, India, the US and Europe. We have established Research Council Offices covering China, India and the US which will co-ordinate UK research activities in these countries. The Technology Strategy Board is currently developing a strategy which will include participation in the European EUREKA and Framework programmes as well as wider international activities.

Conclusion

Six months on, solid progress has been made on implementation. But there is more to do and some of the Sainsbury Review recommendations will only be implemented in the longer-term.

Progress against each recommendation is set out in this report. It is intended that there will be a further update on progress in autumn 2008.

Chapter 1: The Race to the Top

This chapter of the Sainsbury Review focuses on the opportunities and challenges presented by globalisation and, as such, does not make specific recommendations.

The challenge for the UK is to continue to upgrade knowledge and skills and move into new high-value-added goods, services and industries. To do this and compete in an increasingly globalised knowledge economy, science and innovation has to be at the top of the agenda. The Government accepts this challenge and the supporting analysis set out by Lord Sainsbury.

The Department for Business Enterprise and Regulatory Reform (BERR) published “Globalisation and the changing UK economy” in February 2008. The document sets out how many UK firms are successfully responding to the challenge of low-wage competition by investing in innovation and skills in order to move up the value chain into more specialised, high-quality goods and services.

Building on this analysis DIUS has published, alongside the science and innovation strategy – *Innovation Nation*, an assessment of the strengths and weaknesses of the UK innovation system⁵. This analysis highlights the key successes in the UK innovation system which we should build on as well as the priorities for improving the evidence base. DIUS is committed to making concrete progress in improving the evidence base in collaboration with other Government Departments, NESTA, Technology Strategy Board, Research Councils and the research community, delivery partners and business organisations.

⁵ “Background Analysis: Strengths and Weaknesses of the UK Innovation System” Department for Innovation, Universities and Skills, March 2008

Chapter 2: The Innovation Ecosystem

The Sainsbury Review recommendations in this chapter focus on the overall support for science and innovation and for innovation within the manufacturing sector.

The science budget has doubled, in real terms, over the past 10 years to £3.4 billion in 2007/08. This increase was supported and reinforced by the Ten Year Science and Innovation Investment Framework 2004-2014. The Comprehensive Spending Review 2007 keeps the Government on the trajectory set out in the Ten Year Framework⁶ up to 2011

The Government has fully supported the Technology Strategy Board, in its new role as an arm’s length body. In October 2007, the Government announced a £1bn package of investment to be led by the Technology Strategy Board in partnership with Research Councils and Regional Development Agencies. Further information on the work of the Technology Strategy Board can be found in Chapter 3.

2.1 The Review strongly recommends that the Government continues to fund increases in basic science in line with the Ten Year Framework, increases funding of the Technology Strategy Board and that civil departments and the MOD are encouraged to seize the opportunities to improve their performance by raising the level of their R&D.

Increasing the funding of basic science is a key recommendation of the Government’s 10-Year Framework for Science and Innovation. The CSR07 settlement delivered the latest stage in this long-term agenda.

The Technology Strategy Board will develop and lead a strategic programme worth £1bn over the next three years, in partnership with the Research Councils and the Regional Development Agencies (RDA). This includes the earmarking of £180m by the RDAs and £120m by the Research Councils to spend jointly on activities with the Technology Strategy Board. The Technology Strategy Board’s budget will increase from £195m in 2007/08 to £267m in 2010/11.

⁶ “Science and Innovation Investment Framework 2004-2014”, HM Treasury, DTI, DfES July 2004

DIUS and the Government Office for Science will continue to engage with departments to promote the benefits of increased R&D and innovation throughout Government, for example by spreading examples of good practice.

2.2 Research into the structure and dynamics of value chains should be supported across the Research Councils. The capability to integrate stages globally may be a major opportunity for the UK to draw on its traditional strengths in innovation and its international outlook.

The Economic and Social Research Council (ESRC) is leading the implementation of this recommendation on behalf of the Research Councils. They will build upon existing ESRC research into the dynamics of value chains. They will report further in 2008.

The Technology Strategy Board has processes in place to inform its decision making with a view to investing in those areas of most benefit to UK business. The processes include the development/evaluation of technology roadmaps (see Recommendation 3.4) and value chain analysis, where appropriate. It is also supporting research, in partnership with the Research Councils, on innovation models and value chains.

2.3 Flexible, integrated mechanisms such as Integrated Knowledge Centres (IKCs) and Innovative Manufacturing Research Centres (IMRCs) should be deepened and strengthened, as they may help match developments in products and services with developments in science and technology.

The Innovative Manufacturing Research Centers were first established in 2001 and have been refreshed since. There are currently 16 Centers with a total Engineering and Physical Sciences Research Council (EPSRC) investment of some £100M. The Integrated Knowledge Centers are a new initiative, launched with two pilot Centres (based around Cambridge and Cranfield respectively). EPSRC funding is up to £7M per Centre over 5 years. A further invited Call for bids has been issued to universities with the plan to fund a further 2 Centers in 2008/09. The Technology Strategy Board and Biotechnology and Biological Sciences Research Council (BBSRC) have indicated that they are willing to provide complementary funding to that

offered by EPSRC to these new Centers, which will now be known as “Innovation and Knowledge Centres”.

2.4 The Technology Strategy Board should work with the Research Councils to identify the complex, high–value added production technologies that current and emerging industries require and which are likely to flourish in high-cost economies. Research and the development of skills in these technologies can then position the UK to be a leader in these fields.

Over the Comprehensive Spending Review (CSR) period, the Research Councils have committed £120m for collaborative work with the Technology Strategy Board.

An early outcome of this collaboration has been a new £23m call for Collaborative R&D proposals in High Value Manufacturing Technologies.

The Research Councils have also identified areas of priority activity and the Technology Strategy Board is currently consulting on its strategy for High Value Advanced Manufacturing. This will be published alongside the Technology Strategy Board’s overall strategic and delivery plans in April 2008.

Chapter 3: The Technology Strategy Board

The Sainsbury Review recommendations in this chapter focus primarily on the Technology Strategy Board and the need for greater coordination across the public and private sectors.

The leadership role assigned to the Technology Strategy Board will enable it to use its investments to create critical mass and coherence so that UK business has greater clarity and is better able to access the most relevant support available.

Joining up the activities of the main funders of innovation is vital to the future success of the UK if we are to compete globally. The technology and innovation priorities the Technology Strategy Board identifies, in conjunction with its stakeholders, will provide a focus to co-ordinate activity across the UK. This will include not only support for research and innovation, but also the use of other levers of the innovation landscape such as standards, innovative regulation and procurement. The Technology Strategy Board's Innovation Platforms also have an important role to play in joining research to procurement opportunities to address major societal challenges.

Furthermore, by working across the whole of the economy, opportunities are opened up to transfer knowledge between different sectors. This helps develop an understanding of how innovation differs across the economy and sectors. Approaches can then be tailored to suit differing needs.

Significant progress in implementing many of the recommendations has already been made. It is expected that the majority of the recommendations will be fully implemented during the next 12 months.

3.1 The Technology Strategy Board should be given a new leadership role, with more formal relationships with the RDAs, Government Departments and Research Councils.

Formal relationships are already in place between the Technology Strategy Board and the Research Councils and Regional Development Agencies (RDAs). For the CSR07 period, Research Councils have committed £120m and RDAs £180m for collaboration with the Technology Strategy Board.

To enable swift progress in terms of achieving the Research Council targets an RCUK-TSB Transition Group was established in August 2007, chaired by Allyson

Reed (Technology Strategy Board, Director of Strategy & Communication). Early examples of where a firm commitment to new collaboration has been made with the Research Councils includes the £23m call for collaborative research in High Value Manufacturing with the Engineering and Physical Sciences Research Council (EPSRC); a £10m call for research in Cell Therapy with the Biotechnology and Biological Sciences Research Council (BBSRC), EPSRC and Medical Research Council; AIM Fellowships with EPSRC and Economic and Social Research Council; and the call for two Innovation and Knowledge Centres with EPSRC and BBSRC.

A Strategic Advisory Group (SAG), chaired by Iain Gray (CEO, Technology Strategy Board), and comprising the Chairs or senior figures from each of the RDA’s Science and Industry Councils or Devolved Administration equivalents, together with representatives from other key partner organisations, has also been established. The SAG, meeting 2-3 times a year, will focus on strategic and long-term issues and take a strategic overview of Technology Strategy Board regional relationships and engagement.

An Operational Advisory Group (OAG) has also been established. This will meet regularly and will comprise key operational staff in the Technology Strategy Board, the RDAs and Devolved Administrations. The focus of the OAG will be operational – agreeing, putting in place and overseeing mechanisms and processes to align and deliver Technology Strategy Board and RDA funding and to ensure an effective two-way channel of communication between the Technology Strategy Board and the regions.

An alignment process is also underway. Under this, RDAs will set out their plans and proposals for aligning their activity and funding with the Technology Strategy Board. Each RDA is currently drawing up a Regional Prospectus, which will set out clearly the activities to be undertaken, how and where these will fit with Technology Strategy Board programmes, and the amount of funding expected to be aligned. In doing so, regions are being encouraged to work closely with the Technology Strategy Board to ensure a strategic fit, avoid duplication, and identify potential areas for cross-regional collaboration.

More formal relationships are also being developed across Government, building on previous successes. For example at a strategic level with the Head of Science UK Engagement team in the Department for Environment, Food and Rural Affairs.

3.2 One of the Chief Scientific Advisers (CSAs) should be actively involved with the Technology Strategy Board, attending regular meetings. This should typically be the CSA of the Ministry of Defence, given the size of the Department's R&D budget, but he/she would also represent views from other CSAs.

The Government Chief Scientific Adviser, Professor John Beddington, is already working together with the Technology Strategy Board's Chief Executive to engage with the Chief Scientific Advisers' (CSA) network and involve them in the work of the Technology Strategy Board.

In light of the role currently played by Departmental CSAs in identifying and developing the Technology Strategy Board's Innovation Platforms, there is a clear appetite to build on earlier success. Whilst agreeing with Lord Sainsbury's recommendation, the Technology Strategy Board believes that an optimal approach is to have a rolling programme of engagement with relevant CSAs. The Technology Strategy Board's Strategy and Delivery Plans will offer a clear statement on the way forward.

3.3 Regulators should be involved from an early stage in Innovation Platforms, so that they better understand the impact of their regulations on innovation, and can bring valuable knowledge to the members of the Innovation Platforms.

Regulators such as Communities and Local Government and the Department for Environment, Food and Rural Affairs are already engaged in Innovation Platforms, such as Low Impact Buildings. The Technology Strategy Board is in ongoing discussions about further involvement – this would include Government Departments and independent economic regulators such as OFWAT and OFCOM with whom it has held exploratory discussions. Early indications suggest there is enthusiasm for greater integration.

3.4 The Technology Strategy Board should encourage the production of technology roadmaps by all fast-growth, high-tech industries as a way to raise their level of innovation and to align technology capability with consumer demand.

The Technology Strategy Board is currently developing technology roadmaps in a number of areas. From April 2008, the Technology Strategy Board will publish strategies in a number of technology and market areas. Each strategy will identify priorities where the Technology Strategy Board will focus its resources. These priorities will be identified through the use of technology roadmaps and through discussions with key stakeholders. The process of identifying technology priorities is an ongoing one, and the Technology Strategy Board will therefore look to develop roadmaps on an ongoing basis as and when priorities are identified.

3.5 A flexible, short-term Knowledge Transfer Partnership (KTP) scheme should be developed and KTP’s be extended more widely into the Further Education sector.

The Technology Strategy Board’s Strategy and Delivery Plans are due to be published in April 2008, and will cover the development of short-term KTPs.

Opportunities for KTPs in Further Education are likely to be available by October 2008.

3.6 The Technology Strategy Board’s activities should be extended into those service sectors where technological innovation is important. The Technology Strategy Board has already started work with the creative industries and there is considerable scope for it to extend its work to other areas.

The Technology Strategy Board has recently launched a £7m call for collaborative research proposals in the Creative Industries, with a focus on the application of digital technologies. It will also shortly launch a Creative Industries KTN and has recruited staff to cover the service sector. Further opportunities for supporting the service sector are currently being assessed.

3.7 The Technology Strategy Board should be made the repository for information about technology’s role in the competitive strategies of different industries and should be responsible for providing this when it is needed by other organisations.

This recommendation will be fully implemented over this Comprehensive Spending Review period.

The Technology Strategy Board is already in discussion with stakeholders to take this work forward. The Technology Strategy Board wants to ensure it provides the right type of information to those partner organisations requesting its guidance and advice.

3.8 The process of evaluation for support from the Technology Strategy Board should cover both the technical and business merit. The backgrounds of evaluation within the Technology Strategy Board should be expanded to include technical specialists with strong commercial backgrounds. As in the Defence Advanced Research Projects Agency (DARPA), a proportion of staff in the Technology Strategy Board should be secondees from industry or academia, with an emphasis on selecting high-calibre candidates whose careers will be enhanced by spending two to four years in the Technology Strategy Board.

The Technology Strategy Board now makes use of external expertise to evaluate both the business and technical merit. Large projects in particular require detailed business plans to be submitted, and due diligence is conducted on these prior to the awarding of grants.

The Technology Strategy Board regularly recruits secondees from industry.

3.9 The Technology Strategy Board should take over support from DIUS for the EUREKA programme, and offer advice and guidance on Framework Programme 7 (FP7) to encourage more UK businesses to take advantage of the significant European research funds available.

The Technology Strategy Board has taken over from DIUS the support functions for the EUREKA programme and for the industry-facing National Contact Points in FP7 as well as the FP7UK website and helpline. The Technology Strategy Board has recently made a commitment to support the UK business participation in Eurostars, a joint initiative between EUREKA and the Framework Programme. More detail on the Technology Strategy Board's international strategy and delivery plan will be available in its strategic and delivery plans, to be published in April 2008.

Chapter 4: Knowledge Transfer

The Sainsbury Review recommendations in this chapter focus on ways of strengthening the UK’s performance in Knowledge Transfer.

Knowledge Transfer (KT) activity is an important way to make the most of publicly funded research and increase innovation in business and public services. Whether through the creation of spinout companies, developing new products for businesses, increasing the efficiency of public services or improving the evidence base for policy makers, universities and research institutes are driving up the impact of their work.

As Lord Sainsbury notes, the UK no longer needs to accept the old criticism that we are good at research but poor at its exploitation. There has been a visible culture change in universities, as they increasingly collaborate more closely with business and public services as a core part of their work. Indeed, many institutions explicitly state in their mission statements that their aim is to generate impact from their research.

The challenge now is to maintain the momentum, strengthening knowledge transfer in universities through a permanent formulaic Higher Education Innovation Fund (HEIF) and expanding Knowledge Transfer Partnerships (KTPs), and building on the Research Councils’ increased focus on economic impact. In addition, there are plans to extend the success seen in university knowledge transfer into the Further Education sector.

4.1 The review believes that there are four ways to strengthen our performance in knowledge transfer: 1. more support through HEIF to business-facing universities, incentivising them to perform more knowledge transfer with small and medium-sized enterprises; 2. drive up knowledge transfer activities of Research Councils; 3. increase the number of Knowledge Transfer Partnerships; and 4. encourage further education colleges to undertake more knowledge transfer.

The Government agrees that these four approaches are important ways of strengthening knowledge transfer. Our response on the specifics of each of these four areas is set out below (4.3 on HEIF, 4.4 on Research Councils, 4.5 / 4.6 on KTPs, and 4.7 on Further Education (FE) KT).

4.2 Universities should initiate pilots with HEIF money for senior industry professionals to be embedded into departments to act in a similar manner to the Principal Scientists in MIT, acting in parallel to the scientific leader of major projects.

The Higher Education Funding Council for England (HEFCE) are planning to disseminate information on the MIT (Massachusetts Institute of Technology) programme, including through an event in April 2008 for Higher Education Institutions (HEIs) led by representatives from MIT. The final decision on whether to undertake such pilots will be for the HEIs.

4.3 HEIF4 funding should be allocated entirely on the basis of a formula, and the formula should be constructed so that the money that last time was allocated on the basis of a competition this time goes largely to business-facing universities.

HEIF has helped lead to a major culture change in universities, leading to far greater engagement with business than in the past.

In October 2007, DIUS announced that the next round of HEIF would see the fund increase in size to £150m per year. In line with Recommendation 4.3, it was announced that the new round of HEIF would be entirely allocated by formula. Also in line with this recommendation, the formula has been updated so that funding is spread more widely across the Higher Education Sector – with more institutions now receiving the maximum allocation – and with an extra incentive for working with SMEs.

HEFCE have informed institutions of the detailed basis of this formula and their allocations. Universities are already planning how they will make use of their HEIF allocation.

4.4 Specific targets in each of the five areas of knowledge transfer should be agreed between each Research Council and the Director General of Science and Innovation as part of the Research Council Delivery Plans. RCUK should take responsibility for common branding and alignment across the schemes ensuring this branding fits with the Business Support Simplification Programme (BSSP).

In their recently published Delivery Plans⁷ (11 December 2007), the Research Councils announced their plans and targets for knowledge transfer over the next three years. The plans incorporate a variety of activities including, for example, Business Plan Competitions, Follow-on-funding, Knowledge Transfer Partnerships, Collaborative R&D and collaboration with the Technology Strategy Board.

The Research Councils and the Technology Strategy Board have worked together for some time but the scale of that collaboration will be boosted significantly by the CSR07 allocation. The Technology Strategy Board and RCUK have now established a joint Transition Group. The Group aims to accelerate the development of shared investment strategies in the next three years.

In 2007 the Research Councils commissioned an independent comparative review of the Research Councils’ portfolio of knowledge transfer schemes. The review determined the scope for harmonisation and rationalisation, and the branding of knowledge transfer schemes. The results of the review were published in October 2007⁸ alongside the Research Council ‘Excellence with Impact’ booklet. The Councils are set to take forward the recommendations of the review over the coming 12 months. They will improve the presentation of knowledge transfer schemes and create a RCUK-hosted KT web portal.

4.5 Based on the BSSP, the Government should build on the success of the KTPs by doubling their number. Responsibility for the KTP scheme was transferred to the TSB from July 2007, but the roll-out and funding of KTPs should be led by the RDAs (see Chapter 9).

4.6 Based on the BSSP, a standard nationwide mini KTP scheme should be introduced in all regions to facilitate shorter, light-touch collaboration (3-12 months). For some time there has been a demand for shorter, less expensive mini-KTPs, and we believe that they could perform a useful function. They may also be of particular interest to the creative industries, service sectors and SMEs.

⁷ Research Council Delivery Plans are available on individual Council websites.

⁸ For more detail see:

<http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/economicimpact/excellenceimpact.pdf>

<http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/economicimpact/ktharmonisation.pdf>

The lead body for implementing these two recommendations is the Technology Strategy Board. It has accepted the KTP-relevant recommendations and is in discussion with a number of key partners such as the RDAs and Research Councils on the detail of implementing an ambitious expansion of Knowledge Transfer Partnerships. This includes the doubling of their number over the CSR period (through a gradual ramping up of activity), and an increase in the breadth of coverage to include, for example, the service sectors where technological innovation is important. Shorter term KTPs are likely to be launched by autumn 2008.

4.7 The Department for Innovation, Universities and Skills (DIUS) should develop a strategy to promote and support knowledge transfer within the wider FE reform agenda. Aligned with the BSSP, it should include: encouraging and supporting staff secondments to and exchanges with businesses as part of the FE workforce reform programme; funding further FE knowledge transfer projects and initiatives through the Regional Development Agencies; incorporating knowledge transfer capacity building in the criteria for the new employer responsiveness standard for Centres of Vocational Excellence; encouraging increased FE participation in Knowledge Transfer Partnerships; raising business awareness of FE knowledge transfer potential through Business Links and other business support routes; promoting FE's knowledge transfer role in advice from Regional Development Agencies and Regional Skills Partnerships to local employment and skills boards; and using existing FE networks to share best practice in knowledge transfer and business support.

DIUS have developed a strategy to support and promote FE knowledge and technology transfer, which is set out in *Innovation Nation*. The strategy is deliberately positioned within the wider Talent and Enterprise programme being taken forward by the Number 10 Task Force. It will evolve over time as we engage the FE community in a dialogue about how to unlock the creative talent of the FE workforce. Working with the Learning and Skills Council we will pilot an FE Specialisation and Innovation Fund (FESIF) in 2008-09 to support a small number of pathfinder projects. These will be designed to identify the most powerful ways to build capacity in FE knowledge and technology transfer (FE KTT). We expect these projects to engage with a wide range of stakeholder interests, including the Commission for Employment and Skills, National Skills

Academy, Sector Skills Councils, Regional Development Agencies, Regional Skills Partnerships, Higher Education and employers.

4.8 The Government should continue to support PSRE commercialisation. To increase the impact of the PSRE Fund, the Government should require PSREs with strong track records of commercialisation to lever in additional funding from other sources.

DIUS continue to support commercialisation of research in Public Sector Research Establishments and in December 2007 launched a fourth round of the Public Sector Research Exploitation Fund.

The fund will provide up to £29m over three years to help Public Sector Research Establishments increase their capacity to commercialise their research and to provide early stage venture capital. In line with this recommendation, those PSREs with a strong track record of commercialisation which receive funding from the fourth round of the Fund are required to leverage in co-funding from other sources.

Chapter 5: Intellectual Property, Standards and Metrology

The Sainsbury Review recommendations in this chapter focus on how effective knowledge transfer requires specific institutional arrangements to pass knowledge from research establishments into wealth creation and public-policy making, and an infrastructure of intellectual property rights, standards and metrology. Such an infrastructure enables scientific and technological advances to be translated into new innovations and inventions. As Lord Sainsbury comments, *“Intellectual property rights (IPR), standards and metrology oil the wheels of the UK’s innovation system.”*⁹

Many of Lord Sainsbury’s recommendations in this area are concerned not so much with what the framework ought to be, as with the action needed to make it effective. The Government welcomes this focus. Our resources and infrastructure in this area offer opportunities, from making better use of information in patent databases to developing International Standards in areas of UK strength. The Government recognises the need for it to be proactive in ensuring that we realising these opportunities and, looking ahead, to deepen its understanding of, for example, how intellectual property is used in the economy in order to make sure that every support is given to effective commercialisation.

5.1 Government and business should be encouraged to make greater use of the enormous amount of technical information contained in patent databases to further innovation, avoid duplication of research and support informed decision making. It is also recommended that UKIPO should continue to develop its expertise in patent informatics to provide information that can aid Government and commercial bodies in strategic planning.

The UK Intellectual Property Office (UK-IPO) provides free online access to over 20 patent databases including those of the European Patent Office and World Intellectual Property Organization. UK-IPO also supplies expert commercial searches of its patent databases both to commercial customers and government customers such as RDAs, and demand for searches during 2007/08 has remained high. UK-IPO is examining whether there is scope to

⁹ *“The Race to the Top: A Review of Government’s Science and Innovation Policies”*, Lord Sainsbury of Turville, October 2007 p67

adjust these services to increase their usefulness to customers. A well-established customer visit programme allows the UK-IPO to review feedback and implement changes to the services it provides.

The UK-IPO is also continuing to develop its expertise in the field of patent informatics – that is, software-based techniques for interrogating patent databases to extract relevant data for more detailed analysis and interpretation. The Patent Informatics Team is working closely with the Technology Strategy Board and Knowledge Transfer Networks (KTNs) to evaluate emerging technologies. The Team are currently using a variety of patent analysis techniques to develop a set of key “success indicators” which could be used to spot new and emerging technologies with disruptive market potential, and to feed into the Technology Strategy Board’s Emerging Technologies strategy. Discussions are ongoing with a number of the KTNs on the use of patent informatics to review technology in key areas including energy from waste and sustainable technologies. This aspect of UK-IPO’s work has also generated interest from private sector companies seeking to improve their commercial intelligence and market awareness.

5.2 DIUS should fully endorse the setting up of a new, world-class incubator facility on the National Physical Laboratory’s Teddington site (AIMtech) to help measurement and instrumentation start-ups.

The National Physical Laboratory (NPL) is currently studying the steps needed to develop the AIMtech concept. NPL is already in discussions with operators of similar facilities and DIUS is pressing ahead with preparatory work, for example by recently obtaining planning permission to retain a building suitable to accommodate the facility.

5.3 In developing its strategy for supporting the development and dissemination of key technologies, the Technology Strategy Board should systematically consider the role of metrology and standards as part of its portfolio of targeted interventions and ensure that this strategy is widely communicated through the relevant KTNs. In allocating resources to these activities, the Technology Strategy Board will clearly wish to develop management metrics of successful outcomes and maximum impact.

The Technology Strategy Board already considers the role of metrology and standards in developing strategies for key technologies and it is likely that the communication options will include, but also go wider than the KTNs. Furthermore, the Technology Strategy Board will, with input from DIUS, develop management metrics to help it understand the success and impact of its interventions.

5.4 Working with the Technology Strategy Board, DIUS should take a more proactive approach towards the development of European and international standards in areas of UK strength.

DIUS and the Technology Strategy Board are working together with the British Standards Institution, in its role as the UK National Standards Body, to take forward this recommendation. The Technology Strategy Board is working towards the establishment of a more formal co-ordinating committee in June 2008.

5.5 An Emerging Industries Co-ordinating Committee should be established by DIUS to bring together representatives from the Technology Strategy Board, the Research Councils, National Measurement System, UK-IPO, and British Standards Institution to co-ordinate support for emerging industries, such as regenerative medicine, building on the work that has been done with the nanotechnology industry.

This recommendation will be delivered by the Technology Strategy Board who has already established an Emerging Technologies workstream as part of its strategy and is progressing these discussions with interested parties. The Technology Strategy Board is working towards the establishment of a more formal co-ordinating committee in June 2008.

Chapter 6: The Supply of Venture Capital

The Sainsbury Review recommendations in this chapter focus on the availability of finance for high-tech firms.

Availability of finance is critical to the UK’s innovation system. Venture capital (VC) is often the most appropriate form of funding for small and medium sized high-technology and other innovative firms. These firms can have high capital requirements, much-delayed returns and few physical assets to use as collateral for loans. Government therefore bears some of the risk of early-stage investment through, for example, tax-favoured investment vehicles such as the Enterprise Investment Scheme (EIS) and Venture Capital Trusts. Via Enterprise Capital Funds it also seeks to ensure the supply of capital for smaller VC deals.

While the Sainsbury Review found the UK VC market to be in good health generally and did not recommend major new initiatives, it nonetheless made three recommendations for boosting investment in early-stage high-technology companies to complement those on HEIF (Chapter 4), SBRI (Chapter 8) and the RDAs (Chapter 9).

6.1 The conditions of the EIS scheme concerning the time constraints for the start of trading and the expenditure of money raised should be reviewed.

HM Treasury with DIUS will assess by the end of 2008 whether the EIS scheme can do more to encourage investment in those smaller innovative companies with long development cycles, where their time to market exceeds the thresholds for the EIS.

6.2 Consideration should be given by Government to utilising the Young Innovative Enterprises (YIE) definition to provide targeted support for investment in new high-technology businesses.

The Government will consider the use of YIE criteria in relevant business support products as part of the Business Support Simplification Programme (BSSP). Detailed specifications for the new products will be available by the end of 2008 and the new products introduced by 2010.

6.3 A nationally agreed specification for proof-of-concept funds should be developed subject to the Business Support Simplification Programme (BSSP), drawing on current best practice. It should cover:

- rigorous project management and budget control over funded projects;
- well-defined outcomes and objectives for the fund;
- carefully specified application criteria and independent assessment of commercial potential;
- a strong focus on strengthening “investor readiness”, for example, access for entrepreneurs to managerial and investment expertise through a dedicated mentor; and
- awards to bring access to facilities (e.g. linked to Enterprise Hubs and Centres of Excellence) to support concept development.

DIUS will co-ordinate agreement of a national specification for proof-of-concept (PoC) funds for business support as suggested by Lord Sainsbury. This will draw particularly on the RDAs who will follow the specification (as recommended in Chapter 9) and on representatives of the businesses, universities and others who will make use of the funds. The Technology Strategy Board and Research Councils will also be invited to contribute. Alignment of funds with the national specification will be co-ordinated within the BSSP timetable.

The specification will be compatible with the new business support products under development by the BSSP rather than a new product; the needs of PoC will be taken into account in drawing up detailed criteria for the BSSP products. The national specification will be agreed by the end of 2008, whilst the products that will underpin it will begin to be phased in from March 2008 and should be fully introduced to meet the BSSP target of a simplified portfolio by 2010.

Chapter 7: Educating a New Generation of Young Scientists and Engineers

The Sainsbury Review recommendations in this chapter focus on improving the teaching and learning of Science, Technology, Engineering and Mathematics (STEM) subjects in schools, further and higher education.

Increasing the supply of STEM skills in a global climate where the UK’s competitive advantage will depend increasingly on innovation and high-value products and services is a challenge facing the Government and its partners. It is not just business that needs such skills; the Government too needs creative young scientists and engineers for policymaking across many areas.

The Government has implemented a wide-ranging programme of activity to tackle this challenge, as set out in the 10-Year Science and Innovation Framework¹⁰ and Next Steps¹¹ document. These were followed by a DfES and DTI STEM Programme Report published in October 2006¹² which set out a series of actions involving the Government and its stakeholders, a new STEM governance structure and appointment of John Holman as National STEM Director, to ensure delivery. Much of the action has only recently been set in train or is planned so it is too early to see a significant impact; although as Lord Sainsbury acknowledges there are emerging signs of progress.

Whilst evidence suggests a need for greater STEM skills, the response of where best to focus efforts requires a greater understanding of the differing demands from sectors. The Government has just begun a programme of work to develop such evidence.

Increasing the supply of STEM skills is also dependent on widening the engagement and participation of all aspects of society. The Government supports activities towards the end goal of a diverse science workforce. A debate was initiated in the autumn 2007 about the Government’s science and society strategy, with a consultation document planned for March 2008, and a publication later in 2008. This strategy will explicitly focus on the relationship between the scientific community, the wider public, policymakers and the needs of each of their groups.

¹⁰ “Science and Innovation Investment Framework 2004-2014”, HM Treasury, DTI, DfES July 2004

¹¹ Science and Innovation Investment Framework 2004-2014: Next Steps”, HM Treasury, DTI, DfES, DH, March 2006

¹² STEM Programme Report, DTI and DfES, October 2006. <http://www.dfes.gov.uk/hegateway/uploads/STEM%20Programme%20Report.pdf>

7.1 Progress in achieving this plan is monitored by the Department for Children, Schools and Families (DCSF) on an annual basis and corrective action is taken if it looks as if the targets will not be met. This Review recommends that this could include financial incentives being offered to teachers during their first five years to address critical retention issues.

This recommendation relates to continuous monitoring of progress against targets to be met by 2014. DCSF continuously monitors progress in relation to the targets for 25% of science teachers to have a physics specialism, 31% of science teachers to have a chemistry specialism and for 95% of mathematics lessons in schools to be delivered by a mathematics specialist by 2014. It is taking a range of recruitment, retention and retraining measures, including incentives to become a science or mathematics teacher and courses to give existing teachers a specialism in one of these subjects.

7.2 The national roll-out of a mentoring scheme along the lines of the Institute of Physics scheme to increase support for Newly Qualified Science Teachers.

DCSF has discussed this recommendation with the Training and Development Agency for Schools and is awaiting a costed proposal from the Agency for taking forward this recommendation in 2008/09 in the context of other support for new teachers.

7.3 This Review supports the recommendation of the STRB (School Teachers Review Body), and recommends that financial incentives should be introduced to encourage the take-up of conversion continued professional development (CPD) courses to help meet stretch targets for teacher recruitment.

DCSF accepted the School Teachers' Review Body's recommendation to pay a financial incentive to teachers who complete the accredited courses. The value of the incentive (£5,000) was announced in October 2007. The first cohort of teachers complete their courses in July 2008. DCSF will pay the first incentives in Autumn 2008.

7.4 This Review suggests that the self-evaluation form that schools complete prior to inspection should prompt schools to set out any difficulties in recruiting and retaining staff, with specific reference to mathematics and science teachers. This will allow Ofsted inspectors to have more informed discussion with head teachers to agree how to tackle any shortages.

This recommendation has been fully implemented. As a result of the Review, changes have been made to the self-evaluation form from autumn 2007 by including a prompt to schools to think about mathematics and science teacher recruitment and retention issues when they are considering barriers to raising performance.

7.5 This Review recommends that DCSF commits to the long-term funding of the science learning centre network, that the National Science Learning Centres should be given a leadership and co-ordinating role for the network, and that resources are made available so that the pilot bursary schemes to pay for supply cover costs for schools can be extended to schools that have a shortage of science teachers or whose science teachers lack experience. Industry and the professional scientific institutes, as well as the Wellcome Trust, are keen to provide support for the network of Science Learning Centres, and we also recommend that a Board is set up to run the network. Industry, the professional scientific institutes and teachers should be represented on it as well as Government and the Wellcome Trust.

DCSF is currently negotiating the contract with the regional science learning centres for the next spending review period. The negotiations should be completed by the end of March 2008.

From April 2008 the centres will offer continuing professional development provision, provide the infrastructure to co-ordinate regional science continuing professional development and subsidise supply cover and course costs by offering bursaries targeted at schools with the greatest need. The National Science Learning Centre will be responsible for the strategic leadership of the network.

7.6 The Review welcomes this decision (entitlement for those achieving level 6 at KS3 to do triple science) and recommends that the Government should continue its drive to increase the number of young people studying the three sciences as separate GCSEs.

As well as opening up opportunities to take triple science GCSE, it is important to ensure that the teaching of triple science is high quality and captures pupils' imagination and enthusiasm. To support these aims DCSF has contracted with the Learning and Skills Network to provide the Triple Science Support Programme. This programme aims to support the take up and teaching of triple science through a range of resources including consultancy support, bespoke continuing professional development, networks of support publications and a dedicated website. DCSF is currently negotiating a contract for the next three years to support triple science in schools.

7.7 The school profile, which provides valuable information for parents, and the accompanying guidance should be amended to encourage schools to provide information about whether they offer triple science.

This recommendation has been implemented. From October 2007 onwards, the guidance to secondary schools about what to include in their profiles states that they should include (among other things) information on curriculum options, such as separate science GCSEs.

7.8 STEM careers advice should be built into the school curriculum. To support this, teachers need to be given greater support in delivering careers advice and therefore we further recommend that careers advice is built into CPD for teachers. The new programme of study at key stage 3 underlines the need for pupils to consider career opportunities.

7.9 When the National STEM Careers Co-ordinator takes up the new post in April 2008, he or she should be attached to the Science Learning Centre network and be responsible for driving forward the careers advice agenda and co-ordinating activities to ensure that a uniform approach, which is accessible to all, is adopted.

7.10 The policy advice from the DfES (now DCFS) to schools should indicate the sort of careers advice and timing that students should expect to receive.

DCSF has contracted with the Centre for Science Education at Sheffield Hallam University and the Centre for Education and Industry at Warwick University to develop best practice in delivering STEM careers awareness in schools and colleges. They will work closely with a range of stakeholders including the National Science Learning Centre. Professor Bill Harrison took up his post as National STEM Careers Co-ordinator in January 2008.

In addition to this DCSF has commissioned a STEM communications campaign to inform pupils, parents, schools and colleges of the wide range of exciting opportunities that are open to students when they choose to study STEM subjects. This three-year campaign was launched in February 2008 and involves cinema, radio, TV and print advertising.

7.11 DCSF and DIUS, in partnership with stakeholders in other sectors, should adopt and develop the framework of the 10 schemes (which provide STEM support to schools) and the associated infrastructure, including: the network of national and regional Science Learning Centres; STEMNET, with its team of Science and Engineering Ambassadors; the National Centre for Excellence in Teaching Mathematics (NCETM); the science and mathematics strands of the National Strategies; the network of Specialist Schools with STEM specialisms; the STEM Community Portals.

The National STEM Director has held a meeting with key stakeholders to launch the framework and discuss how it will work in more detail. A key role for the National STEM Director over the next year will be to embed the schemes.

The Government is continuing to support these organisations, which are key partners.

DCSF has discussed with the British Educational Communications and Technology Agency (BECTA) how to take forward the work on STEM Community Portals and will be going out to tender for a pilot in summer 2008. The pilot will take place over the following 12 months.

7.12 Subject to detailed evaluation of the pilot science and engineering clubs, we would like to see a science and engineering club in all secondary schools within the next five years.

There are currently 250 science clubs and the Government plans to double this number from September 2008. We will look at the recommendations of the independent evaluation being undertaken by the Centre for Science Education at Sheffield Hallam University, to see how this programme will be developed in the future. An interim evaluation report has been published in spring 2008, with the final report in autumn 2008.

7.13 A National Science Competition should be established as part of Science Week, bringing together existing contests to maximise their impact, with a well-publicised (ideally televised) final taking part during Science Week. All school clubs should be eligible for entry.

Ideas for a National Science Competition are being discussed within the science community. As a first step, existing competitions (particularly BA CREST and Young Engineers) are combining their finals and awards celebration on 7 March 2008 at a new Young Scientists and Engineers Fair on the first day of NSEW. 2008 is seen as a stepping stone to a larger event in March 2009, with awards for UK Young Scientist and Young Engineer

7.14 All pupils who would benefit should have the option to study the second mathematics GCSE and schools should find ways to make it available to them.

The second mathematics GCSE will be introduced into schools for first teaching from September 2010.

7.15 The remit of the (HEFCE) Strategic and Vulnerable Subjects Advisory Group should be extended to include responsibility for publishing an annual report which describes the trends in the subjects that undergraduates are taking, the jobs and the salaries they are getting when they leave university and the subjects in which employers and Government Departments believe that there are, or are likely shortly to be, shortages of graduates with key skills. This Review welcomes the extension of the Group's membership to include an industry and a STEM business representative.

The Strategic and Vulnerable Subjects Advisory Group has discussed the issues around recommendation 7.15 at its November meeting and will do so again at its final meeting in May.

HEFCE is finalising a report on the early careers of graduates that describes undergraduate subject trends; recent graduate jobs and salaries; and the subjects where employers and Government Departments believe that there are, or are likely shortly to be, shortages of graduates with key skills. This should be ready for the Advisory Group to consider in May.

Information from the longitudinal Destination of Leavers from Higher Education survey, considers salary information from graduates 3.5 years after graduation. It was agreed by the advisory group as the most reliable (if imperfect) proxy for shortages.

In autumn 2008 HEFCE will update the group’s terms of reference, and expect it to meet annually after that to oversee the early careers of graduates report. In 2011 the group will convene again to review HEFCE policy framework towards strategically important subjects.

In addition, this year, DIUS is planning a programme of analysis on demand for STEM skills.

7.16 SEMTA should liaise with subject associations to ensure that messages about science employment needs and prospects are communicated to students.

The Government has recently set out plans for improving the quality of careers education in schools in the Children’s Plan. DCSF are funding a STEM Careers Awareness and Subject choice programme to explore the impact of early STEM careers interventions at key stage 3 in extending horizons and raising aspirations. Partners such as SEMTA (the Sector Skills Council for Science, Engineering and Manufacturing Technologies in the UK) will be encouraged to undertake relevant action.

7.17 A working group of experts from academia and industry should be established and co-ordinated by the Royal Academy of Engineering to review current approaches to engineering education and to develop, with a number of leading engineering universities, an experience-led engineering degree which integrates technical, operational and business skills.

As a result of Lord Sainsbury's recommendation the Royal Academy of Engineering has, in a leadership role, initiated discussions with relevant parties, including the Government. Terms of Reference for the Steering Group, its membership, and the work plan are currently being considered with a view to the study being undertaken and reported on in 2008/9.

Chapter 8: Government Departments

The Sainsbury Review recommendations in this chapter focus on the role of Government Departments in progressing science and innovation policies; the importance of collaboration between DIUS and the Department for Business, Enterprise and Regulatory Reform (BERR); and the key role that UK Trade and Investment plays. The role of the Regional Development Agencies in raising the level of R&D and innovation in their regions is also covered.

Significant progress in implementing many of the recommendations has already been made, for example a Chief Scientific Adviser’s Committee (CSAC) Issues Group has been established to identify cross-cutting areas of research and the first Annual Innovation Report is due to be published in autumn 2008.

DIUS is working closely with the Technology Strategy Board and participating Departments to develop a reformed Small Business Research Initiative (SBRI). Work on developing and piloting a new model is well underway.

Government is working on activities to raise procurement capability and develop use of procurement practices that stimulate innovation. For example, a programme of Procurement Capability Reviews is in progress and the Technology Strategy Board is considering competitions as a way of supporting innovative companies.

8.1 Business people should play a major role in the new business support management body. This body will evaluate, endorse and manage the business support products, according to Government criteria on the proper expenditure of public money.

The formal Government response to its consultation on “simplifying business support” in December 2007 stated that the Government: “...has decided to ensure strong business representation on the future strategic oversight body for business support” and to ensure they will “have a significant role going forward.”

Work, led by the Department for Business, Enterprise and Regulatory Reform, is continuing to define the role and membership of a management body for the business support portfolio to achieve the 2010 target.

8.2 The Director of Innovation in DIUS should be tasked each autumn to produce an Innovation Report on the innovation activities of DIUS, including the Technology Strategy Board, other Government Departments and the Regional Development Agencies.

The first Annual Innovation Report will be published in autumn 2008. It will be the first comprehensive report on the innovation performance of the UK across both public and private sectors. It will include an assessment of the effectiveness of Government Departments in supporting innovation, through sponsoring for research and development, support for the science base, use of procurement to drive innovation and the use of regulation and deregulation. It will also assess how Departments are improving their own innovative capability and that of the public bodies they sponsor.

In addition the Report will consider the performance of the wider public sector in supporting innovation, including the RDAs, economic regulators, Research Councils and the Higher Education and Further Education sectors. It will also report on the level of investment in R&D and innovation by UK business, and place this in the context of long term trends. It will highlight strengths and weaknesses, and key sectors or technologies where the UK needs to improve performance. The Report will also benchmark UK performance against that of key competitors, drawing on existing and new indicators, which will be developed as part of a new Innovation Index for the UK.

8.3 Innovation should be made a core part of the mission statement of each Government Department, and embedded in Departmental Strategic Objectives. Progress in stimulating innovation should be measured in the Annual Innovation Report produced by the DIUS.

DIUS is in discussions with other Government Departments about this recommendation. The first Annual Innovation Report will report on progress.

8.4 A more robust mechanism should be put in place to identify and protect departmental R&D budgets. Chief Scientific Advisors should work closely with their Departments and HM Treasury spending teams early on in the Spending Review process to agree amounts and priorities for R&D spend. Once this has been agreed, a Department should consult with the Government CSA and HM Treasury if it wishes to reduce its level of spend, and the latter should expect to see sound justification before agreeing to any reduction.

The Government Chief Scientific Advisor is currently exploring options for such a mechanism with departmental CSAs as a first step before wider engagement. There will then be further discussions with the Treasury on how best to take forward this recommendation.

8.5 The Chief Scientific Advisors’ Committee (CSAC) should identify cross-cutting areas of research on an annual basis and appoint a Chief Scientific Advisor to each of the priorities to co-ordinate resources and funding across relevant Departments.

In response to the Sainsbury Review, CSAC set up an R&D Priorities Sub-group that concluded its work in January 2008. They developed a short-list of pressing priority areas in which gaps have been identified for further work. A CSAC Issues Group has been set up to progress specific topics, for example climate change, using sub-groups supported by the Government Office for Science.

8.6 Other Government Departments should follow the MOD’s example in focusing some of their R&D spend on encouraging innovation in the companies with which they interact.

DIUS and the Government Office for Science will help spread best practice, including that of the Ministry of Defence. Progress by Departments will also be encouraged and assessed through the Annual Innovation Report.

8.7 Government should urgently press ahead with the Transforming Government Procurement agenda to improve procurement capability. This would require the OGC to develop an “outcome-based approach to procurement” and to ensure that innovation procurement is placed at the heart of Government purchasing decisions. It would also place a responsibility on the OGC to raise the level of capability of Government purchasing.

The Procurement Capability Review (PCR) programme has been developed by the Office of Government Commerce (OGC) to help Departments drive up procurement capability in order to meet the standards required to deliver *Transforming Government Procurement*¹³. The Review takes a strategic look at Departments' capability based on a robust model containing a standards framework against which Departments are assessed. This involves the deployment of a small team of external high quality experts engaging intensively with Departments. OGC is committed to delivering 18 Reviews by December 2008. The model covers the Department's approach towards innovation, in particular whether they have a robust sourcing strategy, their approach to making and managing markets, and the alignment between procurement and the broader policy goals of the UK Government.

8.8 Government Departments should consider using forward procurement programmes like the Grand Challenge and the Competition of Ideas to stimulate innovation. Early discussions with some Government Departments have indicated that there is an appetite to do this.

Forward Commitment Procurement (FCP) is one of several possible approaches, identified in recently published guidance on how to procure innovative solutions. The FCP model develops and makes practical the principles set out in *Capturing Innovation*¹⁴. It is consistent with public procurement regulations and value-for-money objectives.

FCP has been successfully demonstrated by Her Majesty's Prison Service in procuring cost-effective zero waste prison mattresses. Building on this approach, the Government is planning to use the FCP model to accelerate the market entry and uptake of ultra-energy-efficient lighting.

The Health and Safety Executive (HSE) has used a "Competition of Ideas" (CoI) initiative to provide a mechanism for them to present broad issues to the research community. This encourages a flow of ideas and alternative approaches to tackling identified issues.

The NHS National Innovation Centre (NIC) efficiently mixes online and offline services to enable the optimal development of technologically led innovations

¹³ http://www.ogc.gov.uk/documents/TOR_Skills_and_Capability_Working_Group.pdf

¹⁴ www.ogc.gov.uk/documents/capturing_innovation.pdf

that are likely to meet priority government needs, such as the reduction in the incidence of hospital acquired infections. With a view to focusing on realistic solutions, the NIC commissions a rolling programme of “Wouldn’t it be Great if... (WIBGI)” Incubators within the NHS. The WIBGI Incubators enable healthcare professionals to define clearly their most pressing clinical challenges, as well as describe what an ideal solution might deliver. Through open, fair and transparent commissioning processes, suppliers from industry, academia, and the NHS are able to compete and win performance-managed contracts to design and develop the most compelling ideas.

The Technology Strategy Board is considering competitions as a way of supporting innovative companies. The intention is to work with Government Departments to define a focused challenge and then run a competition to generate new products and services to address that challenge. The Technology Strategy Board is currently planning to pilot this approach.

8.9 The SBRI should be reformed, adopting the following principles of the US SBRI scheme:

- departments should focus on active engagement with innovative businesses and act as intelligent customers to fulfil their departmental objectives;
- departments should specify up front, in a simple and standard format, and update on a fixed and regular basis, the technological areas in which they would like to see projects in a simple and standard format;
- SBRI contracts should adopt a two-phase structure, tendering a second, larger award after successful completion of a smaller, early-stage development so as to minimise risk associated with innovation;
- SBRI awards must take the form of contracts, not equity loans or grants – this will ensure that departmental objectives are clearly identified and met, and will enable the award of an SBRI contract to act as a “seal of approval”, reassuring future investors and customers of the firm’s value;
- SMEs should retain the intellectual property associated with any new technology, boosting incentives for high-quality small businesses to bid for SBRI awards; and
- to maximise the SBRI’s effect, award availability should be restricted to products and services meeting the HM Treasury’s R&D tax credit criteria. This would exclude humanities and social science research and consultancy, for which the scheme was never intended.

8.10 In order to ensure this time that the new SBRI scheme achieves its objectives this Review recommends that a central administrative role be given to the Technology Strategy Board. Government Departments should be required twice yearly to notify the Technology Strategy Board in a standard form of those technological areas where they would like to support projects. The Technology Strategy Board would then be responsible for publishing twice a year, at fixed dates, a list of those projects notified to it by Government Departments so that SMEs are readily able to find them. The awarding contracts should also be administered by the Technology Strategy Board, with assessments of proposals being made jointly with the relevant Government Departments.

8.11 SBRI targets for extramural departmental R&D should build up over three years, from 1.5% in the first year to 2% in the second year and 2.5% in the third year.

Discussions have taken place with participating Government Departments to identify the key issues associated with reforming the SBRI. DIUS is currently working on producing a new model, which will be piloted with key departments during 2008. The new SBRI approach will then be rolled out fully from April 2009.

DIUS is also working with Technology Strategy Board colleagues to ensure the correct processes and resources are in place to enable the Technology Strategy Board to administer SBRI effectively.

8.12 Regulators should review their policies to ensure that the appropriate level of emphasis is given to innovation in their decision-making in the price-regulated sectors, to protect the interests of both current and future consumers. We would like consideration to be given to how innovation could be incorporated into their duties.

DIUS Ministers have met with three of the economic regulators to discuss how innovation can best be incorporated into their approach to regulation. DIUS and BERR will now ask the independent regulators, using existing fora, to consider how their activities could promote innovation.

Chapter 9: The Science and Innovation Strategies of the Regional Development Agencies (RDAs)

The Sainsbury Review recommendations in this chapter focus on the increasing importance of improving regional economic performance through science and innovation. DIUS welcomes the recognition of the regional dimension and is working with RDAs and key stakeholders, including the Devolved Administrations (DAs), to implement the recommendations, reflecting where appropriate the spatial difference between and within regions. The recognition of RDAs as the strategic leaders of economic development and regeneration in their regions provides an important platform to promote the regional dimension to national economic performance.

DIUS will work with other bodies and Government Departments to deliver the recommendations in this chapter, in particular: RDAs, DAs, Technology Strategy Board, Department for Business, Enterprise and Regulatory Reform and Ministry of Defence. Significant progress has been made to date including the announcement by the Prime Minister in November 2007 of the Government’s support for the creation of the UK Centre for Medical Research and Innovation (UKCMRI) in the heart of London.

The alignment of activity between RDAs and the Technology Strategy Board provides an important opportunity for greater collaboration and strengthening of the regional/national relationship. It is important to recognise that this is about more than financial alignment. DIUS and the Technology Strategy Board are working with the RDAs and the Devolved Administrations on complementary activity and developing a greater strategic relationship. Of particular significance is the establishment of the Strategic Advisory Group to the Technology Strategy Board which has membership from each regional Science and Industry Council and representation from the Devolved Administrations. This met for the first time on 8 February 2008 and has welcomed the opportunity to forge a more strategic relationship. DIUS is also working with the Technology Strategy Board, RDAs and DAs to encourage greater collaboration and activity around Knowledge Transfer Partnerships and the development of proof-of-concept schemes consistent with a nationally agreed specification.

DIUS expects further progress over the next six to 12 months including: the purchase of the site for UKCMRI; the development of detailed transition plans for the BSSP and the identification of opportunities for collaboration between the TSB, RDAs and DAs.

9.1 The Review is aware of other opportunities which exist to create major science and innovation campuses in the medical and defence fields, and we recommend that these are actively pursued.

In December 2008 the Prime Minister announced Government's support for the intention to create UKCMRI, the UK Centre for Medical Research and Innovation, in the heart of London. The Centre aims to be Europe's leading centre for medical research. This is a collaboration between Government-funded Medical Research Council, Cancer Research UK, The Wellcome Trust and University College London. The Centre is expected to be ready by the end of 2013 and will be located next to the British Library and Eurostar terminal at St Pancras. Key milestones are the purchasing of the site in summer 2008 and setting up the Joint Venture to operate UKCMRI in spring 2009.

The Ministry of Defence is exploring ways in which to bring investors, Government, defence industry and entrepreneurs together in the process of understanding its capability needs. In particular, it intends to establish a pilot office for a Centre for Defence Enterprise at the Harwell Science and Innovation Campus.

RDAs are also developing campuses in their regions to drive economic growth through science and innovation driven collaboration and investment, for example Daresbury in the North West, Malvern in the West Midlands and Wilton in the North East.

9.2 To raise the impact on the economic performance of their regions, RDAs should shift their resources towards activities which support science and innovation, and that, using business support schemes being developed through the Business Support Simplification Programme, they should concentrate their efforts on four main areas: user driven collaborative R&D; knowledge transfer; cluster development; and the start up and growth of new businesses.

RDAs prioritise the role of science and innovation in their Regional Economic Strategies and invest in activities that support their strategies for science and innovation, informed by the Science and Industry Councils. April 2009 is the anticipated start date for RDAs to begin using the innovation products of

business support which are being developed under the Business Support Simplification Process (BSSP) from the high-level innovation finance and innovation collaboration offers announced in the October 2007 Pre Budget Report. The timeline for delivering this recommendation is driven by the wider BSSP run by the Department for Business, Enterprise and Regulatory Reform.

To ensure delivery an implementation plan for this recommendation has been agreed with the RDAs by the DIUS and SEEDA – led innovation product design team to determine how to align RDA activities with the new portfolio being developed under BSSP. Regional transition management groups will be set up in spring 2008 to ensure transition of business support in regions to the new portfolio of products. DIUS will lead the innovation product design team to agree the detailed product definitions by autumn 2008.

9.3 The RDAs, Technology Strategy Board and Science and Industry Councils will collaborate to support innovation priorities that deliver the National Technology Strategy and Regional Economic Strategies. Utilising the Single Pot and European Regional Development funds, each RDA will earmark investments to match fund Technology Strategy Board programmes on a case-by-case basis or as part of a regional prospectus. This will lead to a total investment from the RDA network of £180m over three years, starting in 2008, subject to appropriate projects being identified that benefit the regions.

Implementing this recommendation requires an alignment of funding over three years from April 2008 and will be achieved at the end of the Comprehensive Spending Review (CSR) period in March 2011. The RDAs, Technology Strategy Board and Science and Industry Councils (SICs) have committed to collaborate and the CSR 2007 settlement enables RDAs to respond positively to this recommendation. A Strategic Advisory Group of regional SIC representatives and representation from the Devolved Administrations (DAs) has been set up and established terms of reference to enable it to inform this national/regional collaborative approach. An Operational Advisory Group of RDAs, DAs and Technology Strategy Board representatives have met formally to begin the operational delivery to build on the detailed preparation that followed the CSR 2007 settlement.

9.4 RDAs should increase their support for the KTP scheme, and invest in and support the new mini-KTP scheme, which will allow for shorter placements and hence increase the flexibility of the programme.

The Technology Strategy Board has responsibility for the KTP scheme as highlighted in Chapter 4. The TSB is leading on doubling the number of KTPs and developing a nationwide mini-KTP scheme for roll out in the regions. There are two key parts to this recommendation: RDAs collectively increasing support for the KTPs; and collectively investing in and supporting mini-KTPs. RDAs support this recommendation and are working with the TSB on the detail of implementation. The Operational Advisory Group to the TSB will also take an advisory role.

9.5 Drawing on the success of the CONNECT scheme in San Diego, RDAs should support services for high-technology entrepreneurs in our world-class universities similar to the CONNECT service.

US Connect is a scheme set up in 1985 by the University of California, San Diego (UCSD) in close collaboration with local business to meet the varying needs of entrepreneurs. The scheme links high technology entrepreneurs with the resources they need for success. Within the context of the Business Support Simplification Programme, DIUS has asked RDAs to examine the US CONNECT scheme in detail. RDAs are to identify lessons learnt from the scheme and how this learning can be applied effectively in the UK. DIUS has asked RDAs to report their findings by April 2009.

9.6 RDAs should review the strength of their high-technology clusters and Science Cities around the world-class research universities in their regions. They should then support them with funds as necessary and make certain there are no barriers to their growth.

RDAs provide the strategic framework for economic growth and regeneration in their regions and innovation plays a prominent role. The RDAs review regional strengths and priorities as part of development of their Regional Economic Strategies. Moving forward, the Sub National Review (SNR) reiterates innovation as a regional level priority and the leading role for RDAs. DIUS will work with RDAs, the Department for Business, Enterprise and

Regulatory Reform and Communities and Local Government to ensure that a review of strength continues in the context of SNR and in the development of the new Integrated Regional Strategies.

9.7 RDAs should establish proof-of-concept funds making use of nationally agreed specifications and ensure compatibility with the national specification when proof-of-concept funding already exists.

As described in Chapter 6, DIUS will co-ordinate agreement of a national specification for proof-of-concept (PoC) funds. RDAs will work with DIUS to inform the development of the specification drawing on the appropriate parts of the new portfolio for business support (currently under development by BSSP) and their university-based PoC activities.

9.8 Building on the success of Designing Demand Innovate, and subject to the BSSP, RDAs should consider how to support and expand the scheme to include the provision of specialist design support for Higher Education Institutes within key technology clusters. The new element of the programme could be developed and piloted by the Design Council in partnership with selected RDAs and would provide: design training for technology transfer staff and intermediaries, delivered by a national training institute for technology transfer such as PRAXIS; quality-assured Design Associates to advise selected clients on issues such as idea generation, product development, user research, testing and prototyping; and structured design support for postgraduate researchers exploring and shaping commercial outcomes from this research.

The Design Council is leading on the implementation of this recommendation, working with the Higher Education Funding Council for England, RDAs, UNICO (representing universities’ Technology Transfer Offices (TTOs)) and PRAXIS (the training provider for the sector). Good progress has been made in raising awareness amongst Higher Education Institutes about how design could have an impact on their commercialisation activities and the potential benefits of the Innovate programme. A consultation workshop was held in January 2008 between the Design Council, UNICO and PRAXIS on how best to develop a design service for TTOs. This involved 30 Directors of TTOs around the UK and resulted in a positive response.

By the end of 2007/08, an evaluation of the pilot programme with ISIS Innovation, the University of Oxford technology transfer company, will be complete and this evidence will be used by the Design Council to draw up recommendations on how Innovate could be extended into the HE sector. This report will be completed in April 2008 and will identify early adopter regions, evaluate evidence and provide detailed costed proposals for a prototype service. During the first quarter of 2008/09, the content of the design service for universities will be developed by the Design Council, in collaboration with stakeholders. The prototype service will be tested with early adopters in the academic year 2008/09 with a view to rolling out the service more widely in 2009/10

Chapter 10: Global Collaboration

The Sainsbury Review recommendations in this chapter focus on increasing the effectiveness of the UK’s collaboration with key international partners.

Lord Sainsbury emphasised that science had to be a global enterprise. With 90% of the world’s scientific output being produced overseas, to stay on the cutting edge of world science and innovation we need to collaborate globally.

The UK already has a very strong record for international collaboration, through for example the European Framework Programmes and individual bilateral agreements between UK researchers and partners overseas. Examples of successful collaborations include the Edinburgh Stanford link which has developed a collaborative research and commercialisation programme between Edinburgh University and Stanford University in California and Nottingham University being the first European University to establish a campus in China. In addition, the FCO maintains a network of over 90 Science and Innovation attachés in 39 cities in 24 countries, who work to increase the UK’s international collaboration in science and innovation. We are working closely with the FCO to determine an appropriate framework through which to manage and set the strategic direction for the Science and Innovation network.

In addition, there is an international network of over 90 Science and Innovation attachés covering 39 cities in 24 countries. The network works to increase the UK’s international collaboration in science and innovation. DIUS is assuming responsibility for leading and managing the Science and Innovation Network (SIN). In the future, DIUS and FCO will co-fund this network and DIUS will host a management team of DIUS and FCO staff to oversee the network’s operation.

The recommendations made in Lord Sainsbury’s Review focus on increasing the effectiveness of collaboration with key international partners. Good progress has been made on strengthening collaboration with the key strategic research partners of China, India, the US and Europe. We have established Research Council Offices covering China, India and US which will co-ordinate UK research activities in these countries. We are also strengthening our collaboration with these countries through extending the Science Bridges scheme which currently covers links between the UK and US to cover UK links with China and India as well. The Technology Strategy Board is currently developing a strategy which will include participation in the European EUREKA and Framework programmes.

10.1 Research Councils UK (RCUK) should streamline its presence overseas into single points of contact in key countries.

The RCUK Beijing and Washington Offices were opened in October and November 2007. The Prime Minister announced the opening of the RCUK New Delhi office on 21st January 2008 during his visit to India. Funding for Science Bridges competitions, to be operated through these offices, was included in the Comprehensive Spending Review 2007 allocations to the Medical Research Council, Engineering and Physical Sciences Research Council and Economic and Social Research Council. Plans for these competitions are well advanced and an announcement is expected in spring 2008.

10.2 The Royal Society, with support from other National Academies, and Research Councils, should establish a new fellowship scheme to attract the best researchers to the UK from overseas and should run an alumni scheme.

In November 2007, Ian Pearson announced a new international fellowships scheme, with linked alumni engagement, for which £13.4 million has been allocated over the new Comprehensive Spending Review (CSR) period. The new scheme, which aims to make the UK the destination of choice for international researchers and to encourage greater collaboration between the UK and overseas scientists, will be run in partnership by the three National Academies and Research Councils UK. It will be supported by a linked alumni engagement programme, which aims to ensure that potentially valuable collaborative relationships are not lost in the longer term. Membership of the alumni network will not be restricted to the new scheme, which will be launched in 2008/09.

10.3 The Technology Strategy Board should develop an international strategy that considers support for the European EUREKA programme and Framework Programme 7 (FP7) initiatives.

The Technology Strategy Board has taken over from DIUS the support functions for the EUREKA programme and for the industry-facing National Contact Points in FP7 as well as the FP7UK website and helpline. The Technology Strategy Board has recently made a commitment to support UK business participation in

Eurostars, a joint initiative between EUREKA and the Framework Programme. More detail on the Technology Strategy Board’s international strategy and delivery plan will be available in its strategic and delivery plans, to be published in April 2008.

10.4 The Science Bridges scheme should be extended to China and India, and to other key high-tech innovative countries.

The Science Bridges project, which was announced in 2005 and has supported collaborations on research and innovation between leading UK and US universities, will be continued and extended to cover China and India. During the Prime Minister’s January 2008 summits in China and India, agreement was reached on establishing Science Bridges between the UK and these two countries. During the Prime Minister’s China summit it was agreed that the UK will develop with China a substantial new bilateral research and innovation collaboration programme of benefit to both countries. During the India Summit it was agreed that to support the UK India Science Bridge, the Indian Department of Science and Technology will contribute £4m to match the funding which Research Councils UK will provide.

10.5 The Director General of Science and Innovation in DIUS should work with the US science funding bodies to solve the double jeopardy issue for scientists.

Initial efforts to address the issue of double jeopardy – which requires that bilateral research projects have to successfully complete separate peer review in both countries – are being focused on the US National Science Foundation (NSF) where the standard model for international research collaboration involves double jeopardy.

RCUK Chief Executive for Strategic Delivery and the RCUK Office in the US have discussed with the NSF Director the development of a set of principles for running joint peer review and standard models which could be used flexibly by NSF and Research Council staff. Work is being taken forward on identifying topics for future collaboration with the potential for a joint funding call and hence the scope for employing and testing a joint review model.

10.6 A campaign of information should be launched by DIUS through embassies abroad to highlight the UK's role as a global leader in science and innovation.

A campaign of information to highlight the UK's role as a global leader in science and innovation will be launched through our network of embassies from spring 2008. This will be achieved through the publication of a new brochure which presents the UK at the heart of the global knowledge economy, backed by web-based resources.

DIUS will work alongside UK Trade and Investment (UKTI) in the development and implementation of marketing strategies for the UK.

UKTI's five-year strategy recognises the strong links between innovation and internationalisation, and gives the organisation an enhanced role for leading and joining up the professional marketing of the UK economy overseas. The compelling message of the UK as a "springboard for global growth" has been developed to support UK business operating internationally and to attract high value inward investment. One of the unique selling points underpinning this message is the UK's "world class creativity and innovation". This means that UKTI is promoting, inter alia, the quality and performance of our world-class universities and research institutes to promote the UK as the international partner of choice. Feedback from overseas business suggests global awareness of the UK's innovation offer can be "strikingly low" (AD Little, 2006), so there is still work to be done.

UKTI is catalysing the development and implementation of business-led UK marketing strategies for the Financial Services, ICT, Life Sciences, Creative and Energy sectors, aimed at overseas buyers and potential investors. These are sectors of high business innovation (for example the pioneering development of the UK's Islamic banking offer as part of the financial services marketing strategy).

The strategies require the development of new partnerships between business and Government to deliver a collective marketing effort. The strategies will speak as much to the overseas customer of UK products and services as they will to the potential investors looking for a new location, for partners or for joint ventures.



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