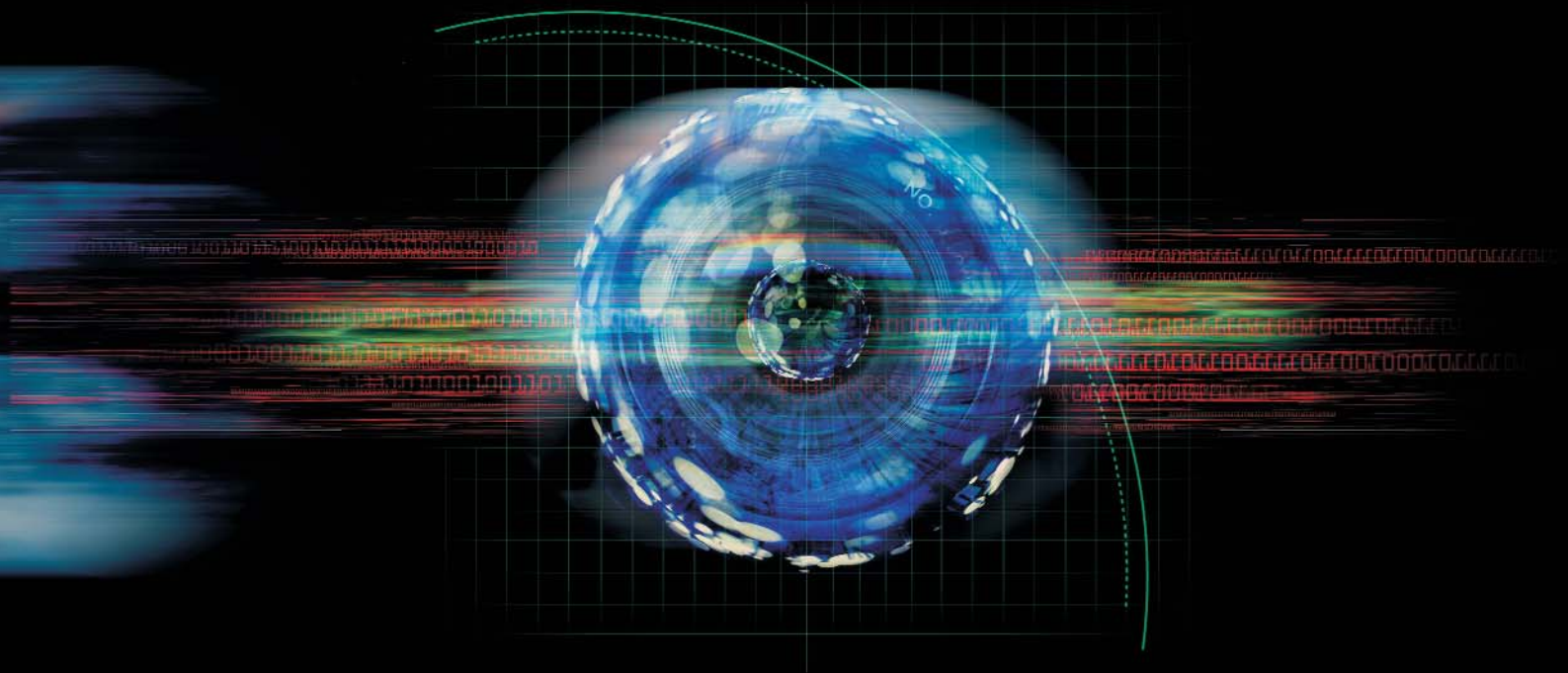

Technology Strategy



TECHNOLOGY STRATEGY BOARD

Developing UK Capability

Technology Strategy

Developing UK Capability

Foreword



The Technology Strategy Board has a vision for the UK to be seen as a global leader in innovation. To achieve the vision we need to focus on those areas where the UK has the greatest capacity to develop and exploit technology. We have a world leading research community in the UK producing excellent research. We need to harness that research effectively and put in place the ecosystem to ensure that UK business is best placed to take advantage of global market opportunities.

The Board, through the Technology Programme, has supported Competitions for Collaborative R&D and established a number of Knowledge Transfer Networks. Individually they will have impact. As the work of the Board progresses, we want to ensure they form part of a co-ordinated package of activities, which includes work on standards, regulation, procurement and global market intelligence.

Together we need to create an innovation ecosystem brigading the elements required for a stimulating and supportive environment where UK business is given the best opportunity to succeed. The key technology strategies are designed to take a more integrated approach closely linked to the needs and priorities of business. The best way to ensure the strategies fully reflect business needs is to ask business. We have already engaged with some of you and we now want to cast the net wider and engage with more.

I would urge all sectors of the business community, including the service sectors, to contact us with your views on the key technology strategies by the end of May 2006. Input from business will help shape the strategies as they evolve and enable the Technology Strategy Board to provide an effective business voice in government.

A handwritten signature in blue ink that reads "Graham Spittle". The signature is stylized and includes a long horizontal flourish underneath.

Graham Spittle
Chairman of the Technology Strategy Board

Our starting point

At the end of 2005, we published the Technology Strategy Board's first Annual Report and its accompanying **A Call to Action** document. This outlined our objectives and the way we proposed to take forward our plans to ensure that the promotion of technology innovation in business is led by business itself.

A Call to Action identified seven key technology areas which underpin the UK economy:

- **Advanced Materials**
- **Bioscience and Healthcare**
- **Design Engineering and Advanced Manufacturing**
- **Electronics and Photonics**
- **Emerging Energy Technologies**
- **Information and Communications Technology (ICT)**
- **Sustainable Production and Consumption**

Our key goals

Our goals are to:

- **Help our leading sectors and businesses maintain their position in the face of global competition**
- **Stimulate those sectors and businesses with the capacity to be among the best in the world to fulfill their potential**
- **Ensure that the emerging technologies of today become the growth sectors of tomorrow**
- **Combine all these elements in such a way that the UK becomes a centre for investment by world-leading companies**

Identifying the issues

The work has enabled us to progress our agenda across all sectors of UK business. In line with the Board's selection criteria set out in the 2005 Annual Report, the work has enabled us to identify:

- **The areas within these broad technologies where the UK has a strong capability, both in terms of research and the capacity for business to capitalise on its knowledge**
- **The market applications for these technologies, with global applications for UK firms**
- **The scope for developing a range of activities, including metrology and standards, to develop the technologies and facilitate their early adoption in important areas of the UK economy**
- **Suggested priorities for action**

Working with you

In support of our key goal of helping leading sectors and business to cope with global competition, we have sought to implement the findings of the Innovation and Growth Team reports in sectors such as aerospace, automotive, bioscience, electronics and environmental industries. Indeed, the National Aerospace Technology Strategy, one of the main outcomes of the Aerospace IGT report, is being funded through the Technology Strategy. This has been reflected in the competitions we have launched to date, not least the Validation of Complex Systems competition held in April 2005, which recognised the challenges faced by firms integrating novel techniques in complex systems.

We recognise the continuing importance of these sectors to the UK economy and the value which they attach to the Technology Strategy. However, an important objective for us is to engage a wider community in the development of the Technology Strategy and to develop our thinking and approach in a transparent manner. As a result, this document and the detailed papers that accompany it online have been prepared with the help of many agencies and individuals.

These include the relevant Research Councils, Knowledge Transfer Networks (KTNs), Regional Development Agencies and Devolved Administrations, UK Trade & Investment (UKTI), consultants and experts in the fields of metrology and standards. We have worked extensively with the business community through a combination of workshops and e-mail input/comment, consulting with over 600 companies.

This document summarises our findings, placing them in the wider context of the challenges and opportunities facing UK business. The topic of renewable energy will be covered separately as part of the Energy Review, which is expected to report this summer.

We urge all sectors of the business community to comment on the work to date and the priorities for action evolving so far.

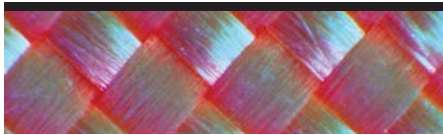
Find out more

We have prepared detailed discussion documents on the key technology areas and would welcome your comments. They can be found on the Technology Strategy website www.dti.gov.uk/technologystategy

Adding value

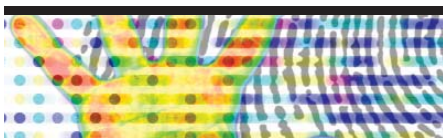
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Our research has revealed many areas where the UK has potential to generate significant value added in global markets. These are summarised in the Key Technology Area insert sheets at the end of this document, and further detail for each technology area is available on the Technology Strategy Board website where you are invited to comment and join the discussion. Particular points arising from each area will inform our thinking as we progress.



Advanced Materials

Analysis of this technology identified a range of important applications for advanced materials which will leverage the UK capability to exploit its knowledge globally. Two particular priorities are materials to support developments in energy supply and distribution, and materials for sensing and diagnostics. The report also recommends the establishment of an advanced materials network. This would signpost UK experience and provide access to equipment by business. It could also promote the value of materials modelling in terms of scale and lifecycle analysis.



Bioscience and Healthcare

Our insights and the wider societal context show the healthcare industries are faced with enormous challenges over the coming decades. UK strengths in the early identification and targeted treatment of disease, reflected in the Detection and Identification of Infectious Diseases Foresight report and by the development of the leading bio-pharmaceutical sector in Europe, offer tremendous opportunities for UK firms in both the developed and developing world. Our analysis also highlights the UK's capability to develop biosciences for wider business applications, outside the healthcare field, in energy, biorenewable feedstocks for industry, the water industry, food processing and environmental remediation.



Design Engineering and Advanced Manufacturing

Despite competition from emerging economies, the UK retains a strong capability in the fields of precision engineering, high value process manufacture and in the design of buildings and other structures. Our study has highlighted the importance of design, simulation and modelling. This is not just in the development of new products and processes, but also in identifying new business models and modes of working in collaborative or networked environments. To remain globally competitive, UK firms will need to collaborate with the academic research base in continuing the development of advanced manufacturing techniques. These should include intelligent process control, advanced joining technologies, and the development of special surfaces and other properties using nanotechnology. Validation is also important to reduce product development risk.



Electronics and Photonics

With around 40% of Europe's independent electronic design houses in the UK, this area of technology is one of UK strength. The sector's increasing potential lies in the demand for improved functionality of electronic products in ever smaller dimensions. Similarly, the need for sensors and sensor systems has become widespread as

'intelligence' is incorporated into virtually everything (including the modern built environment) to monitor and control environmental factors, manufacturing processes, vehicles, consumer durables, healthcare and security devices. In novel areas, such as organic electronics, the strength of UK research has led to a whole new industry developing around plastic electronics, which has the capacity to transform the markets for displays and radio frequency identification, which in turn will transform supply chain management. Thus, our analysis reveals the UK's capacity both to develop the new technology, and to capitalise on its early adoption in a wide range of markets. Our consultation also revealed strong interest in more effective business research networks to enable firms to keep abreast of developments and identify opportunities for collaboration.



ICT

The study has revealed the strength of the UK capability in this area, particularly the ability to collect, transmit, store and analyse large amounts of data in a secure environment. Achieving this in a way which gains consumer trust has become a critical component of competitiveness, particularly in the service sector and in the delivery of high quality public services. This ICT capacity is complemented by innovative financial, business and retail services which have the capacity to exploit this potential globally. Modelling and simulation have also become increasingly important for manufacturing and service industries alike. UK strengths in high performance and grid computing offer opportunities for exploitation in aerospace and defence, healthcare, transport logistics and financial services. However, our workshops revealed again that, in a fragmented and diverse market, one of the key business demands is for improved business research networks.



Sustainable Production and Consumption

The rapid and sustained growth of economic activity in China and India has resulted in considerable upward pressure on energy and raw material prices, coupled with growing concerns about the environmental consequences. Our work was carried out in close collaboration with Defra, and identified four key areas in which the UK had the capability to capitalise on growing world markets. They are: energy efficiency; resource efficiency and the management of waste; technologies to promote a sustainable food chain; and technologies for the water industry. Analysis indicates that an integrated approach is required to address these topics: a more demanding regulatory environment will also need to be complemented with support for technology development.

An overall perspective

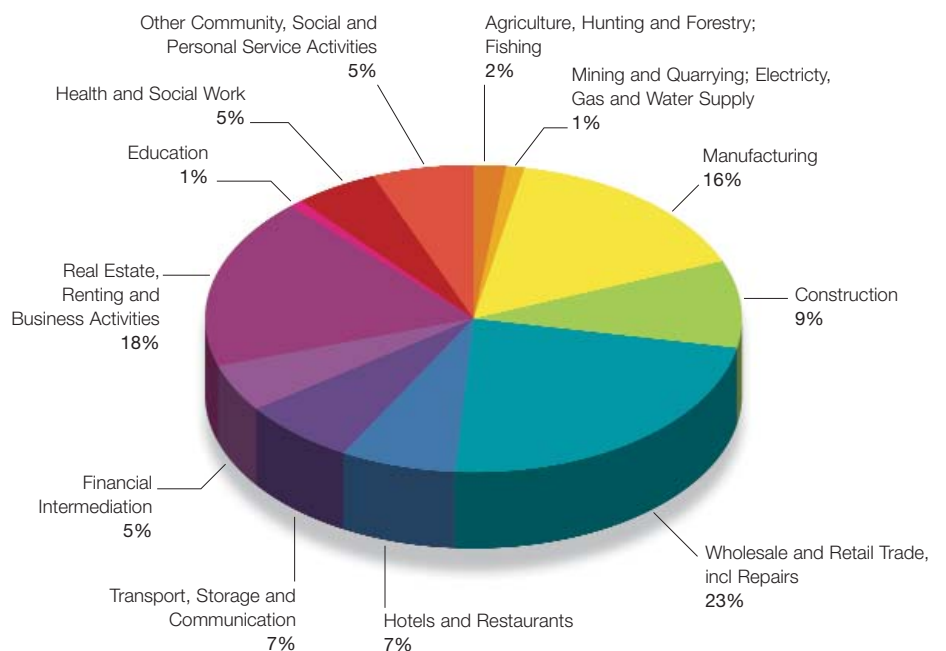
Across all areas, the studies identified the need for a more holistic approach, including the development of standards and metrology. This will create a climate of confidence in the performance of new technologies, so broadening their application and speeding up adoption. In the globally competitive market, early adoption of new technology is paramount. Our research has confirmed the importance of developing effective networks to achieve this goal.

The wider context

The findings from our research need to be considered in a wider context which takes account of the challenges faced by business, the economy and society. The need to focus on ‘market pull’ – rather than ‘technology push’ – has become the driving force of the Technology Strategy.

How is our economy changing?

There are real challenges to the seven technology areas we have identified and to the wider business community. Trade liberalisation and global competition have led to increasing specialisation in the UK around high value manufacturing, such as aerospace and pharmaceuticals, and a range of tradeable and non-tradeable services. As the chart below illustrates, the latest employment statistics indicate that manufacturing now accounts for around 16% of UK employment.



Source: ONS

This trend towards a service-oriented economy is likely to continue, not least as firms in manufacturing seek to add services to their product offerings. We will measure the success of the Technology Strategy by the extent to which we have enabled companies to move up the value curve, regardless of sector, and to provide them with the capability to meet customers' needs more innovatively and more effectively than their international competitors.

This will require closer interaction between officials implementing the strategy and those sectors which have the capacity to expand their share of world markets. In this way we can address the barriers to innovation and identify the most effective support mechanisms. We expect the newly created KTNs to play an important role in this process. We plan to ensure a service sector focus by supporting the development of KTNs in growth areas – such as digital content – to address the needs of all industry sectors.

Other key factors have emerged from our work, and that of HM Treasury, which highlight how the economic climate is developing. These have been factored in to the context of our strategic proposals:

- **A rapid increase in the old age dependency ratio as ‘baby boomers’ retire**
- **Acceleration in the pace of innovation in technology and increasing knowledge-intensity of goods and services**
- **Global uncertainty with ongoing threats of international terrorism and conflict**
- **Increasing pressure on natural resources and the global climate from rapid growth in the developing world and sustained demand for fossil fuels in advanced economies**

Our strategic framework

In developing the Technology Strategy Board’s strategic framework, we have recognised the importance of these drivers of change. We have also looked at the role that business could play in helping the government to address such challenges.

At the heart of the Technology Strategy is our proposal to develop ‘innovation platforms’ to enable business, the research community and government to work together to tackle the issues. Our innovation platforms should provide a progressive approach, while maintaining the principle of competition in government procurement processes.

Progress so far

In November 2005 we initiated two pilot innovation platforms in the areas of Intelligent Transport Systems and Services, and Network Security, and the business networks are in place taking these forward. These platforms, and future platforms, will draw on the technologies set out in the insert sheets.

We have also encouraged innovation in the form of challenges and competitions, believing this holds strong prospects for spotlighting groundbreaking ideas and solutions for the business community. The challenge approach adopted in promoting the concept of a Zero Emission Enterprise provides lessons for the future. We plan to lay greater emphasis on the market challenge rather than the nature of the technology to be promoted, in order to encourage the widest levels of participation, and would welcome your comments on this approach.

International collaboration

In the global marketplace, UK organisations need to collaborate to develop both new technology and overseas markets. The Technology Strategy is therefore informed by, and implemented in, close collaboration with UKTI, the Foreign & Commonwealth Office Science and Innovation Network and DTI Global Watch Service.

UK research and innovation strengths also create a magnet effect for international firms locating in this country. We will promote this by setting out clear UK strengths and priorities for the Technology Strategy. By fostering communities of interest around the application and early uptake of technology, we will help UKTI develop the more focused approach announced in the March 2006 Budget.

Our conclusions

The seventh EU Framework Programme (FP7) – being negotiated by the European Commission and European Parliament this year – also provides new opportunities for UK research organisations. An important objective is to ensure that UK organisations are able to take advantage of the networks and support available through the Technology Strategy as a springboard to wider European collaboration through FP7.

Before finalising our responses to the in-depth analysis which has been undertaken, the Board will consider the findings carefully. We would like you to do the same and for you to share your thoughts with us. We shall consider your comments, amend the strategy papers accordingly, and define our priorities in the autumn in the light of the responses received and the resources available.

Involvement from business is crucial to ensuring that we develop existing UK strengths in technology over the medium term. As has been highlighted in the papers available on the Technology Strategy website, we will need to work together to develop a more market-oriented, holistic approach to meet the needs of our world-leading industries.

What you can do

Engaging with this strategy is essential for the future of UK business, but individual businesses can also reap great benefits from getting involved. Knowledge transfer, collaboration, innovation, grants, advice and resources all open up when you get in touch and share your thoughts, hopes and fears for your business. So why not...

- **Read more of the research highlighted here at www.dti.gov.uk/technologystategy and contact us with your views on priorities, issues and any gaps in our activities by 31 May 2006**
- **Join Knowledge Transfer Networks relevant to your own activities; find more at http://ktn.globalwatchonline.com/epicentric_portal/site**
- **Participate in the activities, challenges and competitions we have planned, details at www.dti.gov.uk/technologyprogramme**

We look forward to hearing from you!

Key Technology Areas



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