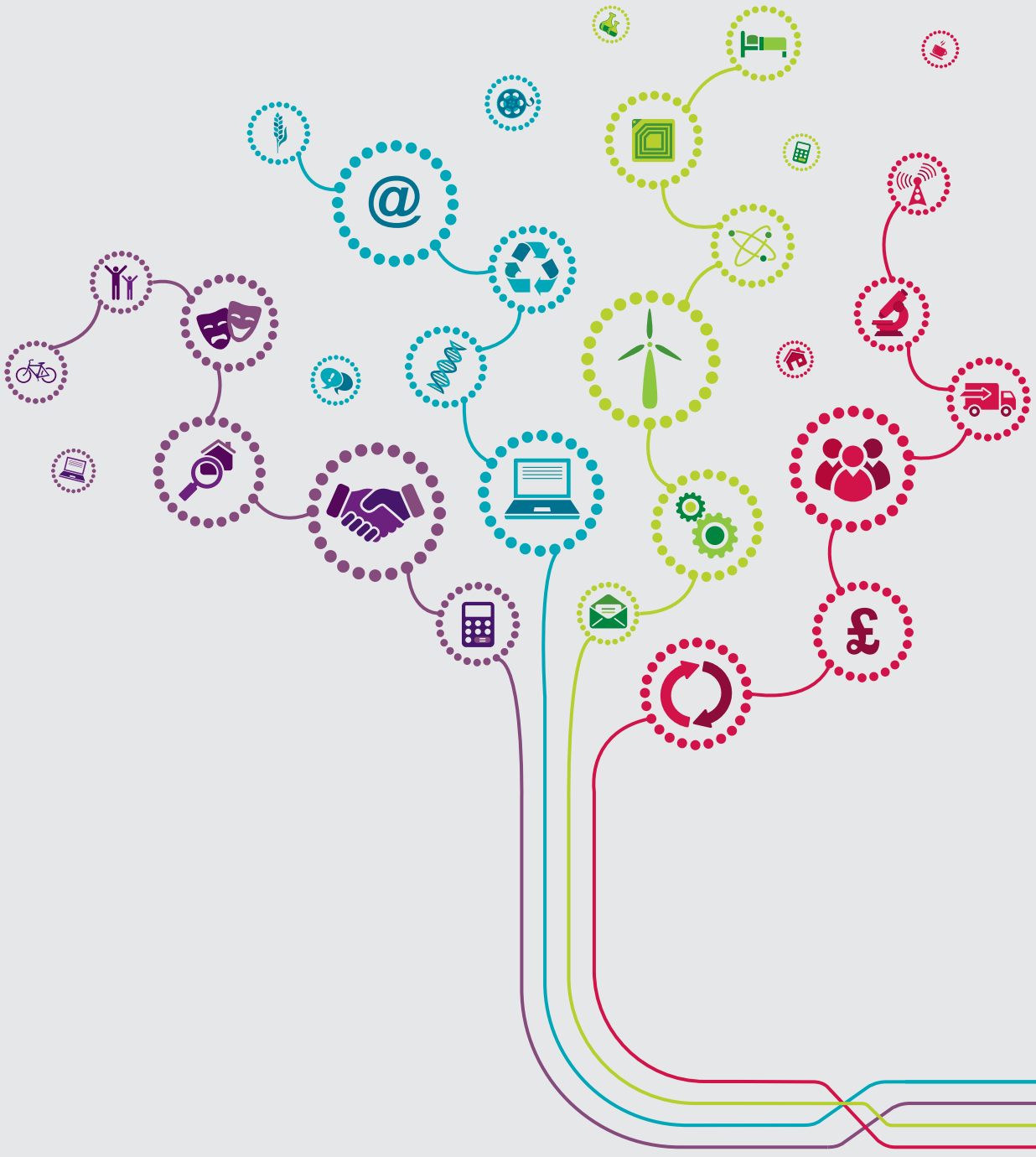
Technology Strategy Board

Driving Innovation

Concept to Commercialisation

A strategy for business innovation, 2011-2015



Innovation: the successful exploitation of new ideas

The Technology Strategy Board is the UK's national innovation agency. Our goal is to accelerate economic growth by stimulating and supporting business-led innovation.

We understand business; our people come mainly from a business background. We work across government, business, and the research community - removing barriers to innovation, bringing organisations together to focus on opportunities, and investing in the development of new technology-based products and services for future markets.

Our vision: for the UK to be a global leader in innovation and a magnet for innovative businesses which can apply technology rapidly, effectively and sustainably to create wealth and enhance quality of life.

Everything we do is driven by one question - will it help UK business bring new ideas and technologies to market?

In its first three years as an agency, the Technology Strategy Board has:

- Together with partners and with business, invested over £2bn in UK innovation
- Built programmes around the challenges that will shape future markets, as a focus for innovation - such as stratified medicine, sustainable agriculture and food, and the environmental impact of buildings
- Invested in over 3,000 businesses on projects to move ideas and technologies closer to market.
- Joined forces with the research councils, regional development agencies, devolved administrations and other partners, to promote innovation and business growth
- Brought more than 110 universities to engage in business innovation projects
- Cut bureaucracy, making programmes more streamlined and easier for business to use.
- Developed and launched the SBRI process to solve government needs through innovation, with over £35m of contracts awarded to more than 500 small and medium-sized companies
- Worked with businesses to create large-scale technology demonstrators in low carbon vehicles, low impact buildings and digital services
- Re-focused the 30,000-member Knowledge Transfer Networks to promote open innovation and created **_connect**, the online collaboration resource for innovation networks.
- Built up our annual *Innovate* event to attract over 2,000 delegates from business and research, creating new contacts, partnerships and innovation.

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Foreword

Our world has changed in many ways since 2008 when I introduced the Technology Strategy Board's first strategic plan. We are in a new economic and political environment. The after-effects of the economic downturn are still with us, and budget pressures in the public and private sectors have altered the business landscape.

However, the need for innovation has not reduced – in fact, given the economic situation it is greater than ever before. Growth is a central government priority, and innovation is a key enabler of growth.

This is why, in autumn 2010, the Government reinforced the Technology Strategy Board's role as the primary public body in the UK for business innovation.

Since 2007 we have worked with business, government and the research base, to help create a far-reaching programme of technology-enabled innovation. We have learnt the power of making connections between people and organisations and, through investment or support, providing a catalyst for new solutions. We call this approach *connect and catalyse* – the title of our first strategic plan, and a principle that still holds true.

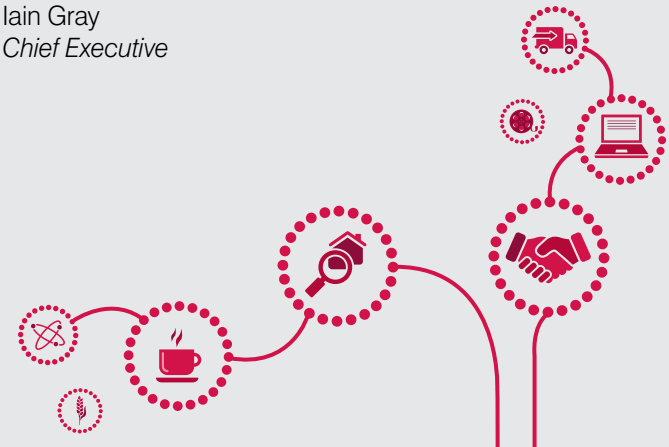
We are entering the new spending review period with a strategy to help drive economic growth through innovation. Our new strategy - *Concept to Commercialisation* - supports the Government's ambitions and reviews on growth and focuses on helping business navigate the difficult territory after a concept or idea has been initially developed, but before it can enter the market and be fully commercialised. The strategy builds on the approaches we have developed to accelerate the pace of innovation in business - and takes new directions.

We have shown how demonstrators can pave the way for new solutions to challenges; we are planning new large-scale demonstrator projects in selected areas. We have experienced how public procurement can create innovation; we will seek new ways to unlock this potential. We will pursue new projects to build on the innovation landscape in the UK - setting up world-leading technology and innovation centres; using our **_connect** online resource to develop new models of knowledge exchange and open innovation; and creating a new package of support for early-stage high potential companies.

I am proud of the team we have brought together; dedicated people drawn mostly from business backgrounds, who understand the issues facing business. With an exciting agenda, we are clearly focused on our goals and ready for the challenges ahead.

We act as facilitators and conveners - but it is this country's innovative and dynamic businesses, together with the research base, which do the work of innovation. We look forward to working with these and all our strategic partners to make this plan a reality.

Iain Gray
Chief Executive



Executive summary

Innovation – the successful exploitation of new ideas – is a key driver of economic growth for developed countries[1]

Globalisation brings both opportunities and challenges. To share in global growth, the UK has to compete effectively. This will depend on rapid technological innovation, effective strategic management of knowledge, and a clear focus on higher value-added goods, services and industries.

The world also faces major issues – such as climate change, limited natural resources, and changing age demographics. The need for transition to a more sustainable economy is creating global market opportunities for entirely new solutions.

However, from an economic perspective, UK business investment in innovation has tended to be later, and lower, than is desirable for strong growth. There are risks and uncertainties in investing in early stage technologies, and companies can struggle to find finance or partners. Emerging technologies can disrupt business models, creating opportunities - but also potential threats. Government action can also create both opportunity and disruption. All this takes place in an innovation landscape which for business can be complex, fragmented and difficult to navigate.

Our goal is to address these challenges; accelerating economic growth by stimulating and supporting business-led innovation. We are business-focused, with a Governing Board and staff made up of people with long experience of innovation and the commercialisation of technology.

We tackle the barriers to innovation by working across business, academia and government, striving to create a more effective innovation environment, reducing risk and promoting collaboration, knowledge exchange and open innovation. We build strategic partnerships with key organisations such as the research councils. We connect and create engagement between people and organisations which might not normally work together, and we act as a catalyst to enable developments that otherwise would not take place.

In our first three years we have worked with thousands of businesses from industry leaders to SMEs, to deliver over £2bn of investment in innovation in a wide range of areas. We have introduced challenge-led programmes such as innovation platforms, which create a community around a societal challenge to identify and carry out the actions needed for sustainable UK business growth. We have enhanced knowledge exchange for business through Knowledge Transfer Networks and Knowledge Transfer Partnerships. We have promoted innovation in procurement by launching the SBRI (Small Business Research Initiative) programme.

We have also developed a strong understanding of what works best to stimulate innovation. We have learnt not only how challenges drive innovation, but also how powerful partnerships and collaborations can be.

> ‘The Technology Strategy Board provides a critical link in the innovation chain, helping business in the development stages where research ideas can be taken through to products and services that can be commercialised.’

Dr Neil Bentley, Deputy Director-General, CBI

[1] See footnotes on page 6

We are now building on this foundation for the coming years, with a strategy focused on five main areas.

Accelerating the journey between concept and commercialisation

The journey of an idea from concept to market is uneven and indirect. There are many obstacles and possible entry and exit points, and support for business innovation is too often unconnected. We will work with business and others to build understanding of this journey and accelerate it, providing joined-up support which links with other help available for innovative businesses. We will develop a new package of support for small and early stage companies, establish a network of technology and innovation centres, and promote knowledge exchange and open innovation.

Connecting the innovation landscape

The range of players in innovation – with multiple organisations and initiatives – creates a landscape that is often fragmented and difficult for business to navigate. Broadening our role nationally and internationally, we will build mutually beneficial strategic relationships with other UK organisations, to help join up the landscape and create a more effective innovation environment. We will also help to define EU funding programmes and enable business to benefit from EU and international opportunities.

Turning government action into business opportunity

The actions of government departments and agencies can change markets and create opportunities for innovative businesses. We will work with government to identify areas where policy, standards, and regulation can stimulate business innovation, creating innovation platforms as appropriate. We aim to help unlock the potential of government to act as an 'intelligent lead customer', engaging with business to seek innovative solutions to public sector challenges.

Investing in priority areas based on potential

We have to make choices, prioritising investment in areas or themes most likely to generate sustainable UK economic growth. We will develop our thematic programme to focus on areas which address global challenges and market opportunities, complemented and supported by innovation in competencies and enabling technologies. We will review opportunities for new initiatives where there is potential for UK commercial success, for example using large-scale demonstrators to accelerate the deployment of new technologies.

Continuously improving our capability

We will support and develop our talent, and ensure that our organisation provides a positive and stimulating environment, where our people can thrive and work effectively together. We will continue to develop our business processes to be fast, flexible, and focused on the needs of the businesses that we support, and our benchmarks and impact measures to ensure that we remain highly effective and deliver value for money. Working with all our partners, we will translate this strategic approach into a programme of action to accelerate business innovation.

> "Through initiatives like the Technology Strategy Board's Low Carbon Vehicles Innovation Platform, the UK Government has demonstrated a vision of zero-emission mobility which is very much in line with our own; and played a significant role in our decision to base the production of the 100% electric Nissan LEAF and batteries in Sunderland."

Trevor Mann,
Senior Vice President for Manufacturing, Nissan Europe

> "Thanks to the Retrofit for the Future initiative we have doubled in size, expanded our offering, hired more people and proceeded with R&D projects we wouldn't have dreamed of pursuing beforehand...."

Thomas Lipinski,
Founding Director of SME Green Structures

The need for innovation – and our strategy

UK businesses and their ability to innovate hold the key to economic growth.

Research[2] shows that two-thirds of UK private sector productivity growth between 2000 and 2007 was the result of innovation, and a separate worldwide study[3] confirmed that innovation is central to growth in developed countries.

It is also vital for competition. In a global market, the competitive advantage of UK businesses will depend on effectively managing the knowledge we have, rapidly commercialising technologies and focusing clearly on higher value-added goods, services, and industries. A country rich in innovation will gain a decisive advantage in both trade and inward investment.

The world faces major issues which must be addressed, such as climate change, limited natural resources, and changing age demographics. The need for transition to a more sustainable economy is creating global market opportunities for entirely new solutions. The countries which can innovate most rapidly will be most likely to benefit from these shifts in markets.

As the Government's Growth Review has made clear, strong, sustainable and balanced growth is a central government priority for the coming years. The task of the Technology Strategy Board is to work with business and other partners to stimulate the business-led innovation which will accelerate this growth.

The innovation challenge

The UK is in a strong position. Our universities and research institutes produce world-leading research and we have a track record of technology commercialisation. In many industrial sectors we are global leaders, ranking second in aerospace and sixth in manufacturing generally. We are front-runners in finance, advertising and the creative industries. We have a wealth of entrepreneurial small businesses. The country is full of potential.

However, innovation is not easy. It does not happen spontaneously. From an economic perspective, UK business investment in innovation is generally later and at a lower level than is desirable for the highest growth. There are many reasons for this:

- In new and emerging markets the timing and levels of return on investment are uncertain; it can be hard to build a business case. Small companies especially, although major contributors to growth, can struggle to find finance for their ideas, or partners to bring their concepts to market.
- New technology in a market can disrupt existing supply chains and business models, requiring new partnerships and simultaneous innovation at multiple points; this is difficult for individual businesses, particularly smaller firms.
- Longer-term trends and business opportunities, such as those generated by the major challenges facing society, are not universally apparent.
- Government has not yet fully realised the full potential of policy, standardisation, regulation and procurement to encourage innovation.
- The help available to businesses needing to innovate is often fragmented and complex.

To accelerate innovation, these barriers must be tackled.

Building on experience

Our experience has confirmed several key principles. The first is that challenges - from global issues or from market needs - can drive innovation. We place a strong emphasis on encouraging challenge-led innovation, supported by the technology development that will enable new solutions to be found. The second principle is collaboration. To tackle the barriers to innovation, businesses need to work with supply chain partners, universities and research institutes, government departments, funders and investors - sharing perspectives and working towards common goals. By bringing organisations and individuals together, and adding support and investment, we can make things happen which otherwise would not. ***Connect and Catalyse***, the title of our first strategic plan, described this approach.

[2] ***NESTA Innovation Index 2009,*** **www.nesta.org.uk**
[3] ***The OECD Innovation Strategy: Getting a Head Start on Tomorrow, 2010,*** **www.oecd.org**

The third principle is the value of being business-led and business-focused. By listening to the needs of business, we take well-informed decisions and make investments that enable companies to move innovative ideas towards commercialisation. We operate in the space after basic research, but before commercial investment steps in to take a product or service into the market.

These principles have helped to define our strategic direction and will continue to guide our work.

A changing context

The world in which we will operate over the next few years is changing in important ways.

As the UK economy emerges from the downturn we need to recognise a new context for our work. The abolition of the regional development agencies means that we will need to find new ways of reaching high growth SMEs who may be able to benefit from our support.

And as our partners in the public sector face ever growing pressure on public spending, we will need to set out more clearly why working with us will create value for them.

Our strategic focus: 2011-12 to 2014-15

Our budget for the period 2011-12 to 2014-15 is over £1bn. In partnership with business and other funders, this will generate investment of around £2.5bn to drive economic growth.

Our strategy for business innovation over these years concentrates on five areas:

- **Accelerating the journey between concept and commercialisation**
- **Connecting the innovation landscape**
- **Turning government action into business opportunity**
- **Investing in priority areas based on potential**
- **Continuously improving our capability.**

These are explained in the later sections of this document, which, together with the specific commitments in each area, make up our strategic plan for UK innovation.

Our plan for innovation: key commitments

Technology and innovation centres

Physical centres of excellence have a powerful role to play in helping business to develop and commercialise good ideas. From 2011, we will establish and oversee a new network of world-leading technology and innovation centres in specific fields and look at how clusters of expertise can create momentum for innovation.

New support for high potential SMEs

Small and medium-sized enterprises will be a major source of the UK's future economic growth. We will create a co-ordinated package of support and investment for SMEs, helping early stage businesses to accelerate their ideas more rapidly to market and, for more mature businesses with potential, to deliver strong growth. We want to make the UK the preferred place to start and grow innovative businesses.

Procurement

Public procurement, at around £220bn per year, offers great opportunities for government to act as an 'intelligent lead customer', encouraging and purchasing innovative products and services which can then go on to further commercial success. We will develop this potential over the next four years, working across government to make public sector procurement a force for innovation.

Demonstrator projects

Large-scale demonstrators help to overcome barriers, bringing partners together to test and validate what can be done, and so move new products closer to wider application. We have enabled highly effective demonstrators in several sectors, and will invest in projects where there is a need and benefit.

New forms of knowledge exchange

Online social networks are a powerful and efficient enabler of connections, bringing people with ideas and resources together. We will develop our new online platform **_connect**, to maximise its impact as a place where individuals and businesses can find partners, build collaborations and work on challenges on the road to commercialisation.

Accelerating the journey between concept and commercialisation

The journey of an idea from concept to market is uneven and indirect. There are many obstacles and possible entry and exit points, and support for business innovation is too often unconnected.

We will work with business and others to build understanding of this journey and accelerate it, providing joined-up support which links with other help available for innovative businesses.

We will develop a new package of support for small and early stage companies, establish a network of technology and innovation centres, and promote knowledge exchange and open innovation.

Understanding the journey and business needs

The path from initial idea to market-ready product or service is uneven, and has many twists and turns. Companies and projects at different stages have differing needs – whether for ideas, capital, partners, suppliers or customers. To realise the potential of an idea, the appropriate help needs to be available at the right time.

The Technology Strategy Board offers a range of ways for business to accelerate innovation in the space between concept and going to market, with different strengths and applications. Some are valuable in reducing risk, some in forming new supply chains, and others in creating collaboration and enabling companies to access knowledge and ideas.

Overall, we need to understand which levers to pull, when and how hard, and to link up the different forms so that they complement each other. We will further build our understanding of the innovation journey and the support needed for different sectors and development stages.

The ways in which business works with us include:

- Gaining funding for single company and collaborative applied R&D and feasibility studies
- Joining Knowledge Transfer Networks (KTNs), which help businesses and researchers share knowledge and collaborate
- Linking with the new national network of technology and innovation centres
- Taking part in the SBRI scheme for procurement of innovative products by government departments
- Developing new capability through Knowledge Transfer Partnerships (KTPs) between businesses and academia
- Getting advice and support for accessing European funding programmes

A full list is on page 26.

Evolving what we do

In continuing to adapt our support programmes, we will analyse and discuss with business what is needed, considering what works best for businesses of different sizes, at different stages, and in different sectors. We will develop our range of innovation support programmes to ensure they work effectively and form a set of complementary and integrated 'tools'. We will make effective links between our programmes such as KTNs, KTPs and collaborative R&D, and look at how they connect with other public and private sector innovation support. We will always aim for best practice in delivering and measuring impact.

The following are examples of new developments already planned or in progress (see opposite page).

Case study

Overcoming barriers to commercialisation

A quality systems project led to Tissue Regenix's dCELL® vascular patch achieving European certification in August 2010. The dCELL®, which can be used without anti-rejection drugs, is already benefiting NHS patients. Vital translation projects such as this can be difficult for an SME to fund privately. Further support, for Tissue Regenix's knee meniscus material, allowed the company to successfully raise £6m through an AIM listing.

Technology and innovation centres

In October 2010, the Government announced that over £200m would be invested in a network of elite technology and innovation centres, to be established by the Technology Strategy Board. The initiative builds on the 2010 review by Hermann Hauser, *The Role of Technology and Innovation Centres in the UK*[4], which made a strong case for such centres, and their potential was also highlighted in Sir James Dyson's report, *Ingenious Britain: Making the UK the leading high tech exporter in Europe*[5].

Technology and innovation centres are drivers of future economic growth, which create a critical mass for business and research innovation by focusing on specific technologies with strong UK capability and a large potential global market. They aim to achieve global impact in pre-commercial development, which will require coordinated, long-term investment and a competitive element so that they remain relevant and valued by business in the future.

From 2011, the Technology Strategy Board is establishing six to eight world-leading centres, with the first two being in high value manufacturing and cell therapy. The investment further bridges the gap between the research base and businesses, helping to commercialise the outputs of the UK's world-class universities and research institutes and complement existing programmes to promote collaboration between these and industry.

New support for smaller businesses

The Technology Strategy Board works with innovative businesses of all sizes and stages of development, from small start-ups to global companies.

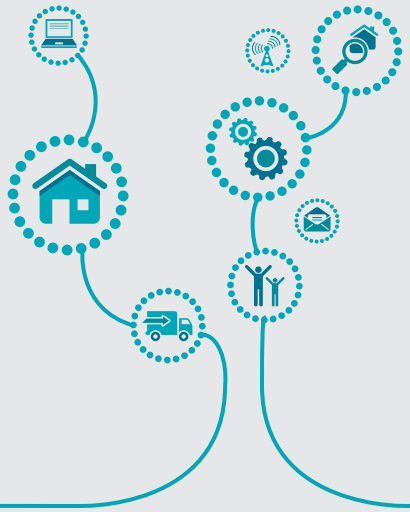
We also recognise that some high growth SMEs can be disproportionately important to economic growth. In 2009, recognising the wealth of potential in our small entrepreneurial companies, we developed a feasibility studies model enabling such businesses to compete for modest funding to demonstrate an idea, prove a concept, or create a prototype. This has proved highly successful.

Many smaller businesses have also had their innovative work supported through our other programmes - but there is more that can be done for high-potential early stage companies.

Beginning in 2011, the Technology Strategy Board will create a package of co-ordinated support targeted at such companies. This package will build on programmes that are already available – including KTPs, SBRI (the Small Business Research Initiative), feasibility studies, and the Eurostars programme. It will also feature new initiatives such as the national successor to the single company Grant for R&D programme, previously run by the regional development agencies. Designed specifically for small and medium-sized enterprises, Grant for R&D increases our ability to respond to business needs without pre-defining a technology area. Such 'open' programmes will become a larger part of our portfolio, complementing the majority of our programmes which will continue to focus on theme areas. This integrated support package will contribute to the Government's goal of making the UK the one of the best places in the world to start, finance and grow a high potential business

Industrial collaboration

The composites 'Grand challenge' competition in 2010 was designed to bring together a consortium of important players in a fragmented industry to work on new manufacturing methods. Helping groups of businesses large and small to work together like this will continue to be an important focus.

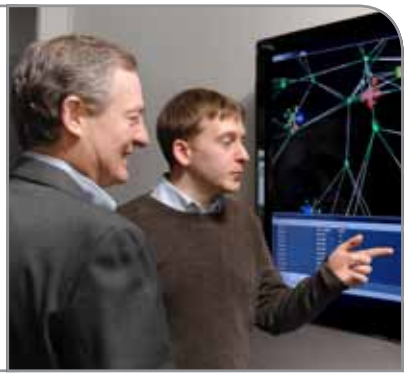


[4] ***The Role of Technology and Innovation Centres in the UK***, Hermann Hauser 2010, **www.bis.gov.uk**
[5] ***Ingenious Britain: Making the UK the leading high tech exporter in Europe***, Sir James Dyson, 2010, **www.conservatives.com**

Case study

Backing spin-out successes

R&D funding at a critical point in development has resulted in Intergence Systems and Geomerics spinning out Real-Status Ltd to commercialise their HyperGlance product. HyperGlance draws from computer games technology to model complete IT and network infrastructures in 3D. Real-Status, which found its first clients while networking at our *Innovate* 2010 event, has created 12 new hi-tech jobs, and is now backed by an oversubscribed private funding round.



Knowledge exchange

Knowledge sharing and open innovation help companies engage with the ideas and opportunities around them. This is the purpose of the 15 business-led KTNs, which have more than 30,000 individual members. We will continue to invest in and optimise these networks.

In 2010, we created an online collaboration and social networking tool, **_connect**[6], which hosts the KTNs together with many other groups. We will develop and grow **_connect**, to maximise its impact as a place where businesses and individuals can discuss challenges and ideas, find partners and build new collaborations.

We will:

- Work with business to build our shared understanding of the innovation journey and the support needed for different business types, sectors and development stages
- Strengthen our range of innovation support programmes to ensure they work effectively and form a set of complementary and integrated 'tools':
  - launch a new package of support for smaller and early stage entrepreneurial companies
  - design, establish and oversee the new national network of technology and innovation centres, and support clusters and other innovation structures.
- Enhance the effectiveness of networking, collaboration, knowledge sharing and open innovation, by:
  - using events and communications to widen our engagement with high growth potential businesses
  - further developing KTNs and exploiting the potential of **_connect** as an online networking and collaboration space
  - growing the Knowledge Transfer Partnerships programme by engaging with more funding partners.

[6] **https://ktn.innovateuk.org**

Connecting the innovation landscape

The range of players in innovation – with multiple organisations and initiatives – is fragmented and difficult for business to navigate. Broadening our role nationally and internationally, we will build mutually beneficial strategic relationships with other UK organisations to help join up the landscape and create a more effective innovation environment, and we will help to define EU funding programmes and enable business to benefit from EU and international opportunities.

Partners in innovation

Our relationships with the other organisations influencing innovation have been critical to progress during the first three years. In the next period, we will further strengthen existing partnerships and make new alliances to continue this momentum, so that by bringing together business, policymakers, regulators and research we create a business environment that enables rapid innovation.

Partnerships with businesses, from the largest to the smallest, are at the heart of our role. We listen to business needs, and business delivers a wide range of innovation projects with our support. We engage directly through our Knowledge Transfer Networks, led by high profile business chairs and steering groups. We also work closely with bodies such as the Confederation of British Industry.

The UK's world-leading universities and research institutes provide many of the advances, ideas, capabilities and people which underpin innovation. Most UK universities have worked with business on projects that we have helped to fund. We have built strong and effective relationships with Research Councils UK and individual research councils, which as strategic partners aligned over £230m of their funding with our programmes between 2008 and 2011. Over 2011-2015, we are committed to further strengthening strategic alignment and increasing collaborative and complementary activities.

We aim to work strategically with other partners and structures with a role in UK growth, connecting the public sector innovation system and working to achieve mutual goals. These include government departments and the devolved administrations, as well as bodies such as the Intellectual Property Office, UK Trade & Investment, BSI Standards, the Design Council, the National Measurement System and NESTA. We will also link with the new Local Enterprise Partnerships and the support delivered through business coaching for growth.

We will also work alongside private sector organisations which invest in and promote business innovation - science parks, venture capitalists, business angels, business coaches and entrepreneur support groups - to help build continuity.

As we work to help join these elements in a connected landscape, it will also be important to communicate effectively how these organisations complement each other.

More widely, we will use communication strategically to ensure that we work effectively with partners, reach the businesses that can contribute most to innovation and growth, listen to their perspectives and needs, and communicate the outcomes of the projects we support and their economic and societal impact.

Case study

Independence matters

We are working with the Design Council on a £1.1m programme to find the most innovative ways of helping people live independently for longer. The £600k strand of the Independence Matters programme - Home and Away - will generate new business opportunities in the nutrition and mobility of older adults through SBRI development contracts. Designers and businesses will work with older adults and third sector organisations to develop and test new services that can then be marketed.

The international environment

The UK innovation system extends beyond our borders. Through the EU, business can gain innovation support on a scale not available within the UK. This can bring UK companies new R&D funding, the chance to collaborate with other world-class companies and institutions, and reach into the world's largest 'home' market.

An important role of the Technology Strategy Board is to help business to take advantage of these opportunities - such as the R&D funding available from Framework Programme 7.

The direction of European innovation policy[7], such as the Commission's move to address 'grand challenges', promises further opportunity for UK business benefit. We are making EU alignment a key consideration in all our themed programme strategies, focusing initially on assisted living, high value manufacturing and integrated transport systems.

It will also be important to ensure the newly-established technology and innovation centres play a role in helping to shape and engage UK business in European Union funding opportunities.

We also collaborate with other EU bodies on innovation where it can help UK business, for example our work with the European Space Agency to explore new commercial applications of space technology and data from space systems.

To maximise these benefits we will further develop our role in the EU, and help business take advantage of the opportunities which European innovation programmes such as Eurostars present.

Beyond Europe we will work with UK Trade & Investment to align our activities and support for companies seeking to expand and co-operate abroad, as well as companies looking to make inward investment. We will also work with the Science and Innovation Network which provides information and facilitates collaboration globally.

[7] See Innovation Union at **ec.europa.ec/research/innovation-union**

Case study

Joined-up thinking and support for UK manufacturers

Jaguar Land Rover is working with Lotus and Nissan, among others, on a two-year project to develop improved performance range extended electric vehicles (REEVs).

'Projects like REEVolution show how government, bodies like the Technology Strategy Board, and industry are now much more joined up, allowing everyone to align with a common long-term vision for the UK automotive industry.'

Martin Dowson, Advanced Hybrid Manager, Jaguar Land Rover.

We will:

- Join up the landscape and create a more effective innovation environment, and specifically:
  - further develop strategic relationships with the research councils, the wider research base, UK Trade & Investment, the Intellectual Property Office and other relevant bodies
  - ensure our ability to connect to businesses across the UK, working with devolved administrations, emerging sub-national bodies, and other public and private sector organisations
  - map and build understanding of the innovation landscape, using communication strategically to work effectively with partners and business.
- Maximise the benefits of EU engagement to:
  - ensure that we take into account all relevant EU activities in developing our strategies, playing an active role in defining the new Common Strategic Framework and linking to developing European Innovation Partnerships
  - strengthen help for companies accessing EU innovation funding and support for SMEs through the Eurostars programme.
- Work internationally to benchmark our activities and develop best practice.

Turning Government action into business opportunity

The actions of government departments and agencies can move markets and create opportunities for innovative businesses. We will work with the Government to identify areas where policy, standards, and regulation can stimulate business innovation, creating innovation platforms as appropriate. We aim to help unlock the potential of government to act as a 'lead customer', engaging with business to seek innovative solutions to public sector challenges.

Working across government

A key strength of the Technology Strategy Board is its ability to work across government with other departments and public sector bodies. By understanding their policy and innovation objectives, and adding the perspective of technology and business capability, we are able to form strong partnerships and work together to define specific programme activities. This combination of resources can result in the leverage and alignment of significant public sector funding to create greater momentum for innovation. One example is the Office for Low Emission Vehicles' investment of around £30m to date in projects under our Low Carbon Vehicles Innovation Platform.

We will continue to work closely with government departments to identify opportunities for developing joint programmes, aligning funding and identifying areas where policy, standards, regulation or procurement can play a part.

We will:

- Continue to develop our innovation platforms and programmes, working across government on areas where government action and/or societal challenges will create business opportunities for UK companies
- Act as an effective, pro-active and trusted delivery partner helping other government organisations to maximise the impact of their innovation interventions
- Ensure that the roles of policy, standards, regulation and financial incentives are considered in the design of our thematic programmes and strategies
- Help unlock the enormous innovation potential of government acting as a lead customer by:
  - scaling up the use of SBRI and creating a central support fund to engage other government departments
  - developing other support structures and programmes.

Policy, standards and regulation

Government **policy and action** can change market dynamics and create opportunities for business.

For example, the legal commitment to reduce UK carbon emissions by 80% by 2050 is prompting the exploration of new and better solutions to the challenges of low carbon energy generation, travel and building construction.

Such a policy target presents a major challenge for government and at the same time a range of potential business opportunities. Innovation can both address the challenges and unlock the opportunities.

In areas with the most potential we set up innovation platforms. The innovation platform approach brings industry, academia and government together to focus on the challenge, and gives UK business visibility of the opportunity. It then offers business the support it needs to develop new solutions, products and services - which can compete not only in domestic markets but on the world stage. As the Government addresses these societal issues, we work to help define the future market opportunities and help business to profit from them.

Innovation platforms have proved a highly effective approach. Two platforms which have been working to meet the challenge of carbon reduction focus on low impact buildings and low carbon vehicles.

In the building sector, this work has created a programme of R&D for zero-carbon building technologies, projects focusing on how to design buildings for our future climate, and a major UK programme of pilot projects to retrofit housing with new technology for dramatically improved environmental performance.

The Low Carbon Vehicles Innovation Platform has brought hundreds of electric cars onto the UK's roads in real-world demonstrator trials. By bringing together manufacturers, the supply chain, government bodies and universities, and by co-funding the technology development and the trials, we and our partners in the programme have facilitated an important step forward by the automotive industry - demonstrating how low carbon vehicles perform in real life and informing future development.

Standardisation also has a role in innovation. It can ensure that best practice - such as innovative building technology – becomes standard practice. There is also a great opportunity to use the role of standards in early stage technology development to help create UK competitive advantage.

For example our investment in nanoscale technologies is framed firmly in the context of environmental, health and safety issues and the standards which BSI Standards has created in this area.

Below the broad policy level, innovation can also be accelerated by specific **regulations** – such as the phasing out of incandescent light bulbs. An SBRI competition in ultra-efficient lighting, launched in 2010, is helping a number of small businesses to develop high-quality, compact lighting solutions which will improve on the current alternatives. Funded by the Department for Environment, Food and Rural Affairs (Defra) and the Technology Strategy Board, the projects will give government cost-effective products for its own use and develop UK capability in lighting technology to meet wider demand.

We will continue to search for ways in which government policies and needs can be connected to innovation and business can capitalise on the resulting opportunities, creating economic growth.

Procurement

Government is the single largest customer in the UK, and public sector procurement, at around £220bn per year, is a significant part of the UK economy – with the potential to be a major stimulus for innovation.

Whether government procurement inhibits innovation or encourages it depends largely on the way that the public sector behaves with suppliers. Many innovative companies, particularly SMEs, find it difficult to engage with the public sector or to get support for the creation and deployment of new products and services.

There are many ways in which government can stimulate innovation – whether indirectly, by being open to procure solutions which are new to the market or to the public sector, or directly, by acting as a lead customer in the creation of new products and services.

Acting as a lead customer means working closely with business in the pre-commercial stages of product development; sharing challenges and objectives, guiding specifications and testing prototypes before purchasing the resulting solution. In this way the public sector can not only generate better solutions for its own needs, but also support future economic growth by helping business – especially early stage, high growth SMEs which may have limited resources – to develop new products and services which can become globally competitive.

One approach to unlocking the innovation potential of government procurement is SBRI - the Small Business Research Initiative - which we launched in 2009. This competition-based scheme provides a process for public sector bodies to offer R&D contracts to innovative SMEs, as a way to solve specific challenges. SBRI helps government to engage with business to find solutions to its needs, and gives companies a way to engage with government, a source of funding for product development, a lead customer and a route to market.

Effective public sector use of SBRI is an important part of our strategy in this area, and we will continue to champion its use across central government, support departments and agencies.

There is much more that can also be done to harness government procurement to stimulate innovation.

> ‘The SBRI process was streamlined and focused, helping us accelerate the development of new healthcare products to meet urgent needs in pathogen detection and hand care. We awarded development contracts to innovations aiming to save thousands of lives and lower the associated NHS costs by reducing healthcare-associated infections.’

William Maton-Howarth,
Chief Research Officer for Public Health,
Department of Health

Case study

Supporting business to safeguard patients

Healthcare-associated infections cost £1bn per year and even a 10% reduction could save 500 lives. Through the Department of Health SBRI competition on hand hygiene, Creo Medical has developed HandiPlasma™, which has now been proven to kill *C. difficile* spores.

'SBRI has been a breath of fresh air. Although horror stories abound about endless red tape when applying for government support, nothing could be further from the truth with the SBRI initiative. We were awarded a contract direct with the Department of Health.'

Steve Morris, Co-founder, Creo Medical Ltd

Areas that we propose to address include:

- Working with the Office for Government Commerce and other government departments to create better links between innovation activity and full scale procurement of new products and services
- Engaging more closely with departments and agencies across government to understand the challenges and issues that could be addressed by business innovation, and using SBRI or other approaches to help solve them – with benefit to business
- Looking at how we might help departments use information technology to manage engagement and gain suggestions from innovative businesses.

Over the next four years we will increase our activity in this area, developing dialogue across government, working to identify operational and policy challenges to which business could provide innovative solutions, and looking at other mechanisms and structures which could use public procurement to encourage business innovation.

Investing in priority areas based on potential

We have to make choices, prioritising investment in areas, sectors and themes most likely to generate sustainable UK economic growth. We will develop our thematic programme to focus on areas which address global challenges and market opportunities, complemented and supported by innovation in competencies and enabling technologies, and will review opportunities for new initiatives where there is potential for UK commercial success. We will use large-scale demonstrators to help de-risk new ideas and accelerate deployment of new technologies.

Making choices

There are many challenges – and associated opportunities – so we select areas for our activities using clear criteria, which focus on business strength and potential.

Every area where we could potentially apply our resources is analysed in the same way, with wide consultation across relevant business communities, universities and government departments including input from government such as *The Plan for Growth*[8]. From these inputs we build a picture of:

- how the market is developing within the UK and globally
- where the capability to answer the challenge lies along the development path
- who we could support to develop products and services that answer the challenge
- what enabling technologies and competencies may be needed.

This analysis is widely shared with the communities who contributed, including contributing to the Government's sectoral growth reviews, and used to create a roadmap of the potential activities required to achieve success.

We then map onto this picture the R&D competitions and other programmes which we could use, and assess their likely ability to overcome blockages or speed up development of the capability that is needed.

Some competitions focus on the development of areas of technology, some test the integration of those technologies in demonstrators, and some seek to build the supply chains of the future.

Whichever model of funding competition we use, proposals from companies or groups of companies (often with a research base partner) are independently assessed and monitored for progress towards the agreed goals. Once finished, projects are assessed to check that they had their desired impact.

Both through the lifetime of the project and after, consortia or companies who seem to be developing complementary ideas are put in touch with one another. In our innovation platforms in particular, communities of interest are encouraged to share ideas and work together to achieve success for the whole community as well as for the individual companies.

[8] ***The Plan for Growth***, HM Treasury & Department for Business, Innovation and Skills, 2011, **www.bis.gov.uk**

Challenge-led areas

The starting point for defining challenge-led priority themes is the market need and how it is perceived. Many of these areas are globally recognised as problems – climate change, the ageing population and the increasing scarcity of resources – but the ownership of the response is often complex.

Many governments take action to address these issues, and their actions can profoundly change the direction or rate of development of the market. Our innovation platform approach works closely with UK government departments to understand their intentions and actions, and enables the relevant communities to address the evolving market needs. Success also depends on uptake of these solutions by the wider community, and so we seek to understand what influences the target market at the personal level.

We have developed strategic assessments of innovation potential in the challenge-led areas of healthcare, energy, transport, environmental sustainability, built environment, creative industries and financial services; we will update and continue to implement these strategies.

Competencies

In our work to date, we have recognised that some areas are immensely influential in setting the rate of change. They are neither markets nor specific technologies but rather a fusion of the two, where technological developments or market insights can rapidly propagate through many areas of application. These areas of competency can define a national capability and have impact on many markets, if properly developed and connected to both the academic base at one end and the market at the other. We will maintain and develop our programmes in the competency areas of high value manufacturing and digital services.

> ‘Our programme would never have happened without the Technology Strategy Board’s involvement. Working alongside the Stratified Medicine Innovation Platform has also helped us attract vital partnerships and funds from industry partners such as AstraZeneca and Pfizer. Partnership is essential if we are to recognise the huge potential of personalised medicine to save lives from cancer.’
>
> *James Peach, Director of Cancer Research UK’s Stratified Medicine Programme*

We will:

- Apply the four Technology Strategy Board criteria to ensure our investments are in areas most likely to generate sustainable UK economic growth
- Develop our overall portfolio to ensure synergy between programmes focused on demand-side global challenges, cross-cutting competencies and supporting enabling technologies
- Ensure a balance of investments in new products, new processes, new services and new business models
- Take into account the Government’s sectoral growth reviews, evaluate and, where appropriate, launch new initiatives in areas with significant potential for UK commercial success
- Use demonstrators to help de-risk the evaluation of new ideas and accelerate deployment of new technologies. Following the successful low carbon vehicles and home retrofit programmes, we will continue to invest in other large-scale demonstrators, including in independent living.

Space

Innovation in the space sector involves, and benefits, businesses in many other areas. The Technology Strategy Board plays an important role in promoting innovation in the high growth UK space industries, and in the exploitation of space capabilities for open innovation more generally.

We plan to be a highly effective delivery partner for the UK Space Agency in delivering European Space Agency programmes for telecommunications, navigation and integrated space applications. We will build on this role to generate the maximum potential for exploitation of space capabilities across our major challenge areas, engaging the space business community in these programmes.

Enabling technologies

Enabling technologies are the key to flexibility when addressing market needs. Each may impact on the products or services required by many markets, and often any single market may require a combination of different technologies. This area links strongly back into the research base, where many technologies are first developed, but we also need to monitor early development in some areas for potential crossover into others.

We will update and continue to implement our strategies in the enabling technology areas of bioscience, information and communication technologies, electronics, photonics and electrical systems and advanced materials.

Sustainability

The effective use of resources, energy and social capital is a pre-requisite for long-term economic success. In promoting innovation we take account of the 'triple bottom line' of environmental, social and financial sustainability.

Many of our programmes have a clear theme of environmental or resource sustainability as a driver of innovation, but beyond these we consider wider sustainability principles in everything we do.

In setting our priorities, we will continue to emphasise the importance of challenge-led and competency areas, while continuing to invest in key enabling technologies. The diagram on pages 22-23 explains the theme areas on which we have chosen to focus.

We have published strategies for most of our thematic areas. These documents are available on our website at **www.innovateuk.org**

Case study

Co-ordinating large-scale collaborations

We have brought together seven national organisations, collaborating on an unprecedented scale, to develop medicines targeting smaller subgroups of patients, and to establish the UK at the centre of a revolution in the diagnosis and treatment of disease. The Stratified Medicine Innovation Platform involves: Medical Research Council, Department of Health, Scottish Government Health Directorates, National Institute for Health and Clinical Excellence, Cancer Research UK and Arthritis Research UK. Together we are investing over £75m.

Investment criteria

Is there a large market opportunity?

- What is the size of the global market opportunity?
- Is the market opportunity sustainable?
- Will it create added value in the UK, taking account of the global market potential?
- Will innovation in one company or sector transfer to others, boosting the overall returns?

Does the UK have the capability?

- Do we have the capability to research, develop and exploit the technology or innovation?
- Do we have - or can we build - a strategic presence or a UK centre of gravity in this area?

Is the idea 'ready'?

- Is there a clear opportunity to which this is a timely response?
- Is the science or the creative application of technology developed far enough to underpin the innovation?
- Will bringing it to market make enough impact quickly enough to be commercially rewarding?
- Will it speed progress towards more sustainable economic growth?

Can the Technology Strategy Board make a difference?

- Is there a clear Technology Strategy Board role? Can we add value?
- Will our investment promote sustainability and quality of life?
- Can we bring partners or programmes together to create more than the sum of the parts – for example in cross-government co-ordination?
- Will our involvement limit or spread risk, or enhance opportunities? Are there gaps that we can bridge? Can we create challenges to which others will respond? Can we address barriers to progress?

Innovation programmes: focus areas and themes

Energy

Energy security, environmental sustainability and economic growth, especially the opportunities created by the 2020 and 2050 low carbon energy targets. Focus areas:

- Fuel cells & hydrogen
- Carbon abatement
- Offshore renewable
- Nuclear (under evaluation)

Built Environment

Enabling UK industry to supply the emerging market in low-impact buildings and solutions driven by the 2016 and 2019 targets for new build, and emerging government policy on refurbishing existing building stock. Focus area:

Low impact buildings*

Food

Stimulating the development and adoption of new technologies to help improve the productivity of the UK food and farming industries, while decreasing their impact on the environment. Focus area:

Sustainable agriculture and food*

Sustainability

Helping UK industry to secure market opportunities driven by sustainability challenges across the economy.

Transport

Developing vehicles and systems for an integrated, sustainable and economically efficient transport system. Focus areas:

- Aerospace
- Road – low carbon vehicles*
- Marine (under evaluation)
- Integrated transport
- Rail (under evaluation)

Healthcare

Disease prevention and proactive health management, earlier and better detection and diagnosis of chronic and acute disease and therapies tailored to patients' needs. Focus areas:

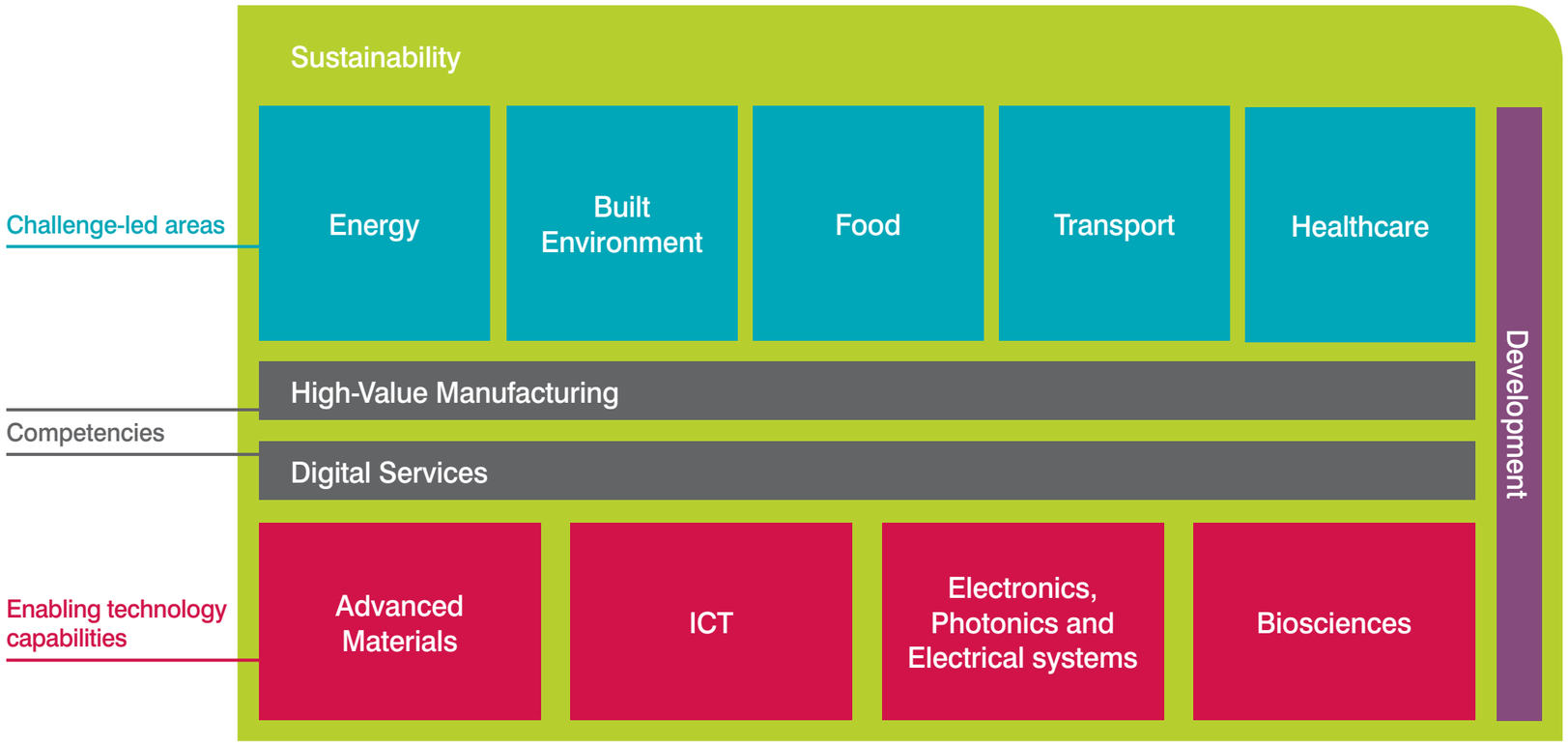
- Assisted living*
- Detection & identification of infectious agents*
- Stratified medicine*
- Regenerative medicine

High-Value Manufacturing

Maintaining or enhancing the international competitiveness of UK-based manufacturing industries, including aerospace, automotive, chemicals, pharmaceuticals and foods, through the development and application of innovative manufacturing technologies in product and process areas within and across sectors.

Digital Services

Enabling UK businesses to benefit from rapidly growing availability of fixed and mobile communications infrastructure, data and computing capabilities.



Development

Identifying and evaluating significant new technology-related business opportunities for the UK and, where appropriate, turning them into coherent innovation programmes Focus areas:

- Creative Industries
- Financial Services
- Emerging Technologies and Industries
- Design

Notes:

* Current innovation platforms.

Nanotechnology: the previously identified area of nanoscale technologies is now embedded in all themes where there are such opportunities.

Space: technology innovation for space applications involves a range of other sectors and areas; see box on page 20.

Continuously improving our capability

We will support and develop our talent, and ensure that our organisation provides a positive and stimulating environment, where our people can thrive and work effectively together. We will continue to develop our business processes to be fast, flexible and focused on the needs of the businesses that we support, and our benchmarks and impact measures to ensure that we remain highly effective and deliver value for money.

Our people

Since it was set up as a separate body in 2007, the Technology Strategy Board has become an established agency with a staff of around 130 people who use their skills, knowledge and talent to make a difference and help businesses succeed through innovation.

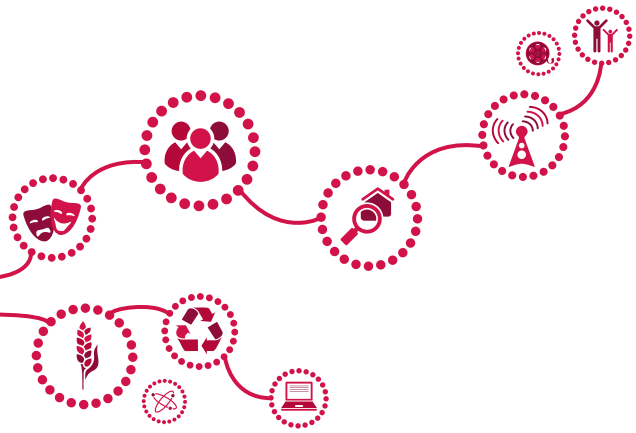
Drawn mainly from business, they understand that the UK must work faster and harder to retain the competitive advantage. It is through their exceptional quality and collective effort that the Technology Strategy Board is able to invest with confidence to stimulate economic growth. Our teams include:

- Technologists and other specialists who provide impartial advice and guidance to business and government, work with UK-wide business to set strategic directions in technology areas, and develop innovation programmes that will help drive business growth
- Relationship managers who build partnerships with other organisations and communities to align activities and energies in the interests of innovation
- Programme managers and controllers focused on the effective running of our programmes, delivering the best outcomes for business
- Support staff who deliver on our promises, maintain and develop our skills, apply sound governance, and ensure that the organisation is a great place to work.

The commitment and dedication of these teams has been instrumental in our success so far. We will continue to develop ourselves as a people-focused organisation which can attract the best, where highly competent people are engaged and committed to delivering our goals, and where we live our core values.

We will:

- **Refine and embed our values ensuring a single organisational culture**
- **Develop our people, internal communications and cross-functional working**
- **Improve our business processes to ensure that they are fast, flexible and focused on the needs of the businesses that we support**
- **Plan our resources to deliver our goals most effectively and create capacity to take on new activities**
- **Further develop our approach to measures and benchmarking to ensure that we are delivering effective results**
- **Enhance management information systems across our programmes.**



Operational and management effectiveness

In 2007 we inherited a number of separate established programmes from government, including collaborative R&D, KTNs and KTPs. By bringing these closer together under in-house management, we have significantly increased overall efficiency. At the same time, we have been able to streamline processes and systems, and help business by, for example, reducing the time it takes to participate in our competitions.

We can now consolidate and build on this, working to improve our capability continuously, planning our resources and introducing organisational change as necessary to deliver our strategy. We will also enhance our business planning and management data systems to enable us to better identify opportunities and track our programmes. We will review and improve our approach to metrics and impact analysis and use this - together with international benchmarking and assessment of best practice - to ensure effectiveness and value for money.

Through these measures, we will continue to build an organisation which is energetic, dynamic, efficient, effective, and focused on results.

Assessing impact

Measuring the impact of innovation activity over time is recognised as highly challenging. We are committed to developing best practice and have, for example:

- Supported an impact measures innovation summit in December 2010 by the UK Innovation Research Centre, which we sponsor
- Worked with NESTA on the evaluation[9] of SBRI
- Commissioned independent research in 2010 to evaluate the economic impact of collaborative R&D projects which took place between 2004 and 2009. Among the initial findings:
  - For each £1 of CR&D grant, there is expected to be an increase in GVA of £6.71
  - 86% of project partners said that products and processes had been or would be developed as a result, and three-fifths said that the project would increase the value of their business
  - Over 80% of businesses believed that the projects would create new jobs or protect existing ones
  - Over 9 out of 10 partners indicated that they would definitely or probably not have proceeded with their project if they had not received a CR&D award.

[9] ***Buying power? Is the Small Business Research Initiative (SBRI) for procuring R&D driving innovation in the UK?*** NESTA 2010
www.nesta.org.uk

How business works with us

Business, rather than the Technology Strategy Board, is the source and delivery agent of innovation. We offer a range of programmes, each with different strengths, to support businesses on the innovation journey.

- **Research, Development and Demonstration**
  Funding for projects from small proof -of-concept grants and feasibility studies through to large multi-partner collaborative R&D and demonstration projects. The businesses we support range from pre start-up, start-up and early stage micro businesses, to large multi-nationals. There are different models depending on the specific needs of companies, sectors and technologies. These include:

  1. **Grant for R&D** – this single-company scheme is open to applications at any time for pre start-ups, start-ups, micro businesses and SMEs
  2. **Feasibility studies and collaborative R&D** – these competitions are open to applications from single companies and business-led consortia for innovative projects in specific technology areas or to meet particular challenges identified as a priority for the UK
  3. **Demonstrators** – these competitions invest in business-led projects to demonstrate new products or services in the real world and at scale such as in low carbon vehicles, social housing retrofits and online services.

- **Technology and innovation centres**
  A new network of physical centres designed to achieve critical mass and global impact, enabling business to use the best technical expertise, infrastructure and equipment to help accelerate the route to commercialisation.

- **European and international activities**
  Help for business to access EU programmes for R&D and innovation, and support for high-tech SME participation in Eurostars with other innovative SMEs from across Europe. We also support opportunities for SMEs in priority areas such as low carbon, digital and healthcare to connect with investors and potential collaborators in the US, with plans to extend to other countries.

- **SBRI (Small Business Research Initiative)**
  This initiative provides public sector procurement contracts to business for R&D to develop new products and services. The business gets finance to develop its ideas in conjunction with a potential purchaser and the public sector gets more innovative solutions to deliver better services.

- **Missions**
  Support for trade missions, in which the pick of innovative UK companies in areas such as web, healthcare or clean technology travel to the US to make new connections and meet potential investors, suppliers and customers.

- **Bringing people together**
  We organise networking and partnering opportunities which bring businesses, researchers, innovators, funders and others together to make innovation happen. Our annual flagship event *Innovate* sees 2,000 delegates get together.

Case study

Connecting innovators with supply chain partners

Networking through the Modern Built Environment KTN enabled innovator Mark Singleton to meet supply chain partners, Costain, secure R&D funding, and provide a route to market for his innovative Startlink construction solution for energy-efficient, low cost housing. The project is targeting an increase in Costain's turnover of £3.5m and the creation of nine jobs.

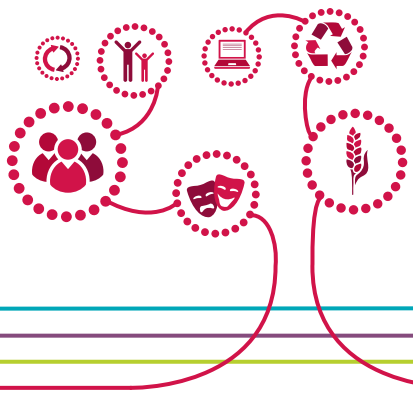
We also facilitate *Collaboration nation* events for companies that have received our funding, to showcase the results of their projects to their peers and others with a view to finding new partners to collaborate with and new sources of funding.

- **Knowledge Transfer Networks**
  A dynamic resource for individuals to enable business innovation by sharing knowledge, ideas and opportunities within and between specific sectors. There are also special interest groups set up to work across KTNs on specific tasks. The **_connect** site extends the reach of the KTNs and creates virtual communities to share knowledge and ideas.

- **Knowledge Transfer Partnerships**
  A well-established programme which stimulates business innovation by drawing on the expertise in UK universities and colleges; companies work with recently qualified individuals on challenging projects which transfer knowledge into the business.

All of these activities represent a range of effective ways in which businesses can accelerate innovation.

Our intention is to create a coherent package of support activity with clear routes, enabling businesses to move more rapidly towards marketable products and services. We will continue to be innovative in developing and integrating our programmes in response to business needs.



Case study

KTP partnership sparks remote renewables revolution

Supporting a micro company through a Knowledge Transfer Partnership (KTP) has helped develop world-leading hydrogen expertise and offered affordable energy for a remote Shetland community. In 2003, Aberdeen-based siGEN Ltd embarked on the PURE project with Robert Gordon University, supported by the Engineering and Physical Sciences Research Council, to develop a hydrogen demonstrator unit for the people of Unst. This developed into the Pure Energy Centre (PEC),with the original KTP Associate Ross Gazey as a founding director. Unst's PEC is now a global trailblazer in renewable and hydrogen technologies and it recently designed and supplied two wind hydrogen projects for NATO.

Governing Board

Members of the Governing Board as at May 2011

Dr Graham Spittle CBE (Chairman)

Iain Gray (Chief Executive)

Dr John Brown

Eur Ing Nick Buckland OBE

Dr Stewart Davies

Dr Joseph Feczko

Anne Glover CBE

Dr David Grant CBE

Lord Kestenbaum

Andrew Milligan

Sara Murray

Prof Christopher Snowden

The Technology Strategy Board was established as a separate organisation in 2007 and is a non-departmental public body sponsored by the Department for Business, Innovation and Skills.

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