

# How to unlock sustainable growth in the UK

The view of over 100 leaders from the fastest  
growing technology and innovation sectors



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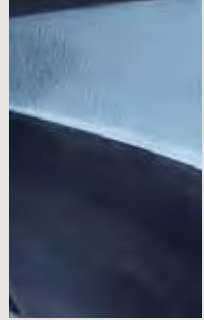
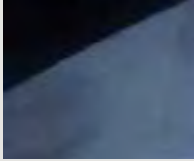


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## FOREWORD



There is a growing consensus across UK Government and business that growth in manufacturing and industry is vital for the UK's sustainable economic recovery, and that technology and innovation will be key drivers of that growth.

Yet there is no consensus on the appropriate level of intervention required from Government, nor the appropriate roles of industry, academia, banks and venture finance in promoting UK growth. In recent months, a wave of policy pamphlets, articles, and 'manifestos' has been produced by commentators. But what do the people who actually work at the coalface in these key growth sectors want to see?

Over the last six months, PA Consulting Group (PA) and George Freeman MP have held a series of 'Roundtable' meetings to draw on the insights and practical experiences of leading scientists, entrepreneurs, investors and business leaders active in these key sectors. Over 100 leaders have come together to explore the key drivers, opportunities and challenges facing their sectors and to identify where they see the greatest opportunities for growth and what they believe needs to be done in their sector to unlock it.

The participants represented five of the fastest growing sectors and one focused on SMEs as key drivers of growth:

- advanced manufacturing
- life sciences and healthcare
- consumer products
- ICT and electronics
- agri-science
- small and medium-sized enterprises (SMEs).

This report has been prepared by PA to summarise the discussions held at each roundtable. This is not a quantitative, analytical report. It attempts to capture the raw and authentic views as they were expressed at each sector meeting, and to present the range of priorities highlighted. Interestingly, and perhaps surprisingly given the range of sectors covered, a clear consensus emerged around some common themes and recommendations for action that the assembled leaders want to see to unlock growth. These are:

### PICKING WINNING TECHNOLOGIES AND SECTORS

Government should actively embrace and support a modern 'Industrial Strategy'. This is not a return to the 1970s' 'Industrial Policy' of 'picking winners' at a company level, but backing technologies and sectors with the greatest potential to unlock

sustainable UK growth in the global economy. This includes creating a supportive environment for investing in and attracting the skills, technology and leadership necessary to drive integrated supply chains so that more of the value of UK innovation is harnessed to the benefit of the UK economy and taxpayer.

### ALIGNING ORGANISATIONS ACTIVE IN TARGETED AREAS

Crucially, such an Industrial Strategy must be business led — reflecting the different and specific opportunities in each sector and technology area — but supported by Government. It should set out a long-term plan for investing limited resources in the technologies and sectors where the UK has the strongest competitive advantage, potential and track record. The work done to rebuild a highly competitive UK automotive sector from the failures of nationalisation and corporatism in the 1970s, most recently through the Automotive Council, is seen as a successful case study of what can be done.

### ENCOURAGING ENTREPRENEURIALISM

A stronger culture of promoting and celebrating entrepreneurship across the board — in schools, universities, banks, public services and Government — is vital. A successful innovation economy needs a high rate of start-up success (and failure) and an environment to support it. In particular, more needs to be done to support SMEs in growing to become the medium-sized companies



(£50 million–£100 million turnover) that are key to achieving global market competitiveness, exports and significant supply chain investment.

### INCREASING EXCITEMENT ABOUT THE MANUFACTURING INDUSTRY

A technologically-advanced and competitive innovation economy needs investment in key skills across the board. Too few of the UK's school children are studying the core STEM (Science, Technology, Engineering and Maths) subjects. Too few of our school leavers are studying STEM subjects at university. Too few of our graduates are attracted to industry, and too many of the industrial scientists we need have to be brought in from abroad. If we want to unlock growth in our highest-growth sectors we need to rebalance the higher education and further education sectors to support STEM subjects and develop proven career pathways for a high-technology economy.

In addition to these four key messages that span all six sectors, each sector report sets out a number of specific recommendations for unlocking growth in that sector.

This report carefully seeks to represent the views expressed at each Roundtable. It is not our view. It is the view of the people who we need to drive growth in the future.

We would like to put on record our sincere thanks to all the attendees for their participation and contribution.

We believe the four key messages above, and the following six sector-specific reports, set out a powerful, coherent and important contribution to the debate about how we can unlock a sustainable UK economic recovery. We hope that it will be taken seriously within Government, business and the media.



**Martin Smith**  
Member of PA's Management Group



**George Freeman MP**  
Member of Parliament for Mid Norfolk,  
Government Adviser on Life Sciences

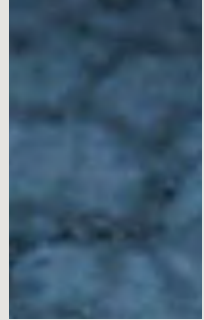


Over 100 leaders came together to explore the key drivers, opportunities and challenges facing their sectors and to identify where they see the greatest opportunities for growth and what they believe needs to be done in their sector.







EXECUTIVE  
SUMMARY

# The UK as a location for technology and innovation business

While leaders of Technology and Innovation (T&I) companies attending our roundtable discussions were optimistic about the future and committed to growing their businesses in the UK, many were concerned about the need for the UK to re-build stronger 'supply chains' in key sectors.

The UK is regarded as a good location for T&I because of its global outlook; comparatively affordable environment; support for mutually beneficial links between industry and academia; and a business culture in which the importance of design to product development is widely understood. Proximity to the continental European marketplace is also an attraction, although most attendees were more focused





on the developing economies. (Perhaps surprisingly, this is as true for small and medium-sized enterprises (SMEs) as for large, well-established companies.)

The location of a T&I capability is often the result of investment and acquisition activities over a long time, and so almost an accident of history rather than by design. However, generally, there is no appetite to relocate T&I and R&D capabilities — skilled staff are highly sought after and can easily find other jobs if they don't want to move with their employer. The degree of localisation needed to meet individual markets varies considerably by sector, and therefore so does the opportunity to develop centres

of excellence in specific locations. However, international collaboration is now so much easier thanks to communications technology that it is entirely feasible to design and deploy products from Europe, liaising with local resources for region-specific expertise and insight.

AkzoNobel, the Netherlands-based paint and chemicals company, is one of many that have chosen to locate R&D in the UK. AkzoNobel's decision was driven by several factors says Dr Stephen Davies, R&D Director Interior Wall, AkzoNobel Decorative Paints. "One of the foremost was the relatively low cost of highly creative, visionary staff here. We have found them to be tremendously optimistic

while remaining grounded in reality. This is combined with an action-orientation and global outlook.”

Companies display little or no sentiment about national boundaries when making decisions about location, and will relocate abroad to boost competitiveness. Office space is cheaper in many other countries. In Singapore, for example, high-quality premises are available for £1.50 per square foot compared with £45 in Cambridge. Even Belgium is substantially more affordable than the UK. Meanwhile, UK financial institutions and Government do not offer the financial and market support available elsewhere.

Germany, for example, provides for SMEs, the ‘Mittelstand’, where the close relationship between the different stakeholders is seen as highly valuable. When UK businesses relocate overseas the country loses out significantly because, in addition to taking jobs and investment, businesses also take their intellectual property.

Attendees at the roundtables called for more advice and support to SMEs in penetrating export markets and promoting UK technological achievements and products abroad. The UK’s relatively small home market gives the country the potential advantage of having to think internationally from the outset. This is important because the UK, like Europe as a whole, is not expected to grow as fast as developing markets. Thinking globally is a pre-requisite for a successful innovation economy.

Government could also do more in the field of international diplomacy to stimulate awareness of, increased investment in, and development for UK manufacturing skills. Roundtable attendees suggested a more proactive trade mission with the Prime Minister and business leaders around the world to promote UK R&D, scientific exchanges and trade with other countries. Every department of Government should be engaged, not just in China and India, but also in Latin America and Africa where markets are also growing fast. Britain should build on historical and cultural links, attendees felt, and not overrate the role of the EU market for hi-tech manufacturers.

However, despite optimism among attendees and a willingness to invest, there was a strong desire to see more done by both Government and industry itself to help expand the UK’s manufacturing economy effectively. This focused on four key areas, outlined overleaf.





## Four key areas for action

As part of the discussion, we asked attendees: “What should be done in the UK to help your enterprise grow?” Four areas were identified for development. The first, and most pervasive, was the need to focus on growing capability where the UK has — or can develop — competitive advantage. Beyond that, attendees also highlighted: the need to align organisations active in these areas (industry, academia, finance and Government) to build the most supportive environment possible; the importance of encouraging entrepreneurialism; and the challenge of increasing excitement about the manufacturing industry.



## PICKING WINNING TECHNOLOGIES AND SECTORS — A FOCUS ON GROWING CAPABILITY WHERE THE UK HAS, OR CAN DEVELOP, COMPETITIVE ADVANTAGE

A consistent theme across all roundtables was a desire to identify and target areas in which the UK is, or could rapidly become, world class. Other countries have used this strategy to achieve world dominance in a target technology or sector, as South Korea has in memory chips, and Germany in areas of alternative energy. The UK is already seen as excelling in fields such as automotive components, information and communications technology (ICT), biotechnology and pharmaceuticals. SMEs play a significant part in driving UK innovation. For example, electric cars being built in Britain use motors supplied by small start-up companies that are UK based. Being early into a market helps establish an integrated supply chain and 'clusters' of sector-specific skills that are powerful catalysts of competitiveness.

Although the UK is respected as a rich hub of talent and research excellence, our roundtable members expressed concern about "picking winners", particularly at a company level. However, they did believe it possible to identify priority areas where the UK is strong, is in danger of losing capability or needs to develop more quickly. Identifying the key areas will require input from industry, academia and finance. A modern industrial strategy should be led by industry and supported by Government.

A modern industrial strategy must be driven by market opportunity. The targeted areas might be sectors such as automotive or aerospace or technologies such as lightweight vehicles, intelligent highway systems or automotive computing.

The automotive sector's recovery in the 1980s and '90s, and in particular the role of the Automotive Council in addressing the long-term strategic challenges faced by the car industry, is hailed as a good model. Much of the success of component manufacturers in the automotive supply chain has been supported by the Council. If similar strategies were in place for other technologies and sectors in which the UK has, or has the potential for, international leadership, individual companies would be far better placed to succeed. This was the overwhelming consensus of the roundtable attendees.

The UK has seen a "hollowing out" of the supply chain as a result of off-shoring said Professor Richard Parry-Jones, co-chairman of the Automotive Council. "Small companies have often been unsuccessful in developing to their full potential and there is now a real shortage of successful mid-sized manufacturers. As a result, some of the benefits that a strong UK-based manufacturing industry could give us have leaked abroad and we require expensive imports where much of the value has been added overseas," Professor Parry-Jones says. "The co-ordination of activity in the UK to build

our supply chain would be in the best interests of all.”

There were also calls on Government “not to confuse investment with subsidy”, and to re-examine the unintended consequences of tax policy, such as giving companies as much tax relief for doing R&D abroad as for doing it in the UK. Brazil and India were cited as economies that have tilted the playing field in favour of home production. Roundtable attendees saw the Technology Strategy Board and Scottish Enterprise as very helpful, while recognising that the UK “can always do more”.

### ALIGNING ORGANISATIONS ACTIVE IN TARGETED AREAS — INDUSTRY, ACADEMIA, FINANCE AND GOVERNMENT — TO BUILD THE MOST SUPPORTIVE ENVIRONMENT POSSIBLE

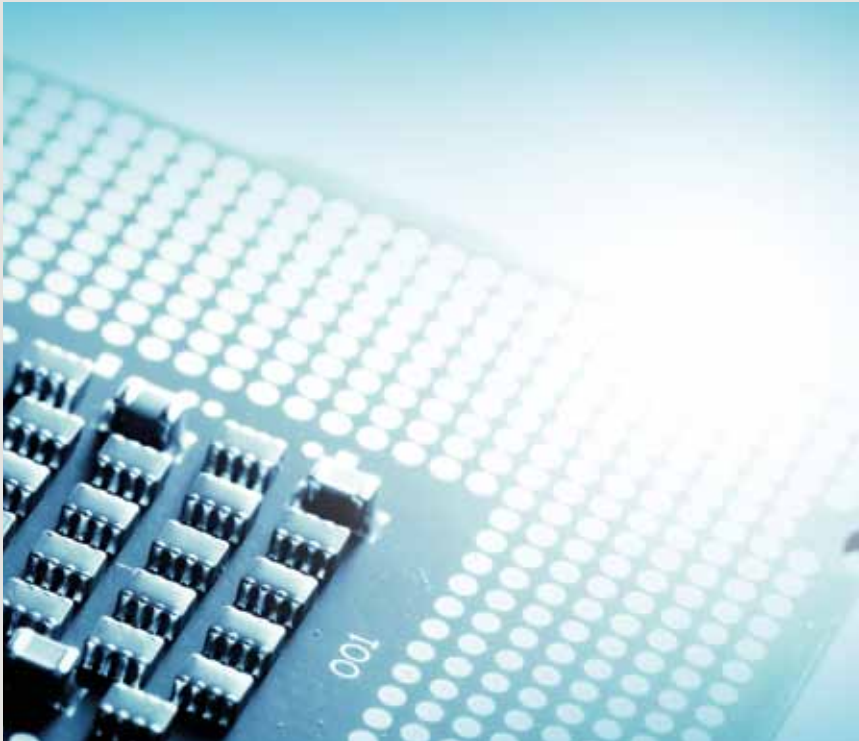
By aligning the leading organisations active in the targeted sectors and technologies, the UK can create a supportive platform for growth and help support the all-important ‘supply chain’ across academia, schools, finance and corporations. Development of the areas would be the responsibility of industry, aided and encouraged by Government, finance and academia. Alignment within key areas would be achieved by establishing co-ordinating bodies focused on the specific requirements of each area. Priorities for these bodies would be: ensuring the health of the supply chain and technology capability; encouraging

mutual co-operation; shaping Government policy to stimulate growth; and encouraging the provision of finance. These must be business-led. Leadership of these initiatives would need to come from highly credible and active business leaders in the sector.

Clarity about the strategy to develop the UK in each key area could create an environment of increased confidence and, it is hoped, investment. It should also eliminate problems such as the withdrawal of state support at critical times, while providing advice and guidance on the development of Government policies, including tax breaks to foster R&D.

The Automotive Council is among public bodies already involved in this way — it works to help develop key technologies, support the supply chain, provide a stronger voice for the industry and promote investment in related industries. In the healthcare sector the NHS gives the UK the competitive advantage of a consolidated healthcare system, but needs better connectivity to support a UK healthcare economy, encourage innovation and ensure a viable home market for drugs and devices.

One aim should be to create companies that global corporations would be keen to do business with and even acquire. Neal Matheson, Head of New Business Unit/Open Innovation, Unilever, explained: “For Unilever, start-ups can be an interesting source of ideas, but



realistically, businesses with revenues exceeding £100 million are our bread and butter. Smaller businesses compete with mega-brand projects for resources, while the bigger ones integrate well and leverage the capabilities of Unilever to grow fast. There is an opportunity for the UK to help organisations scale small, £10 million businesses to £100 million. Businesses of this size are invaluable to the UK economy. They are valuable stand-alone businesses, capable trading partners and potentially valuable when combined with other organisations.”

### ENCOURAGING ENTREPRENEURIALISM

SMEs are important contributors to innovation, and the UK has benefited from fostering close relationships between business, academia and a skilled and growing pool of entrepreneurs and venture investors, many of whom have considerable experience. The UK technology start-up investment scene is vibrant and supported by a good structure of grants and tax incentives.

The UK is considered a good place to start a technology business. But, unlike

Silicon Valley, it is seen as poor in encouraging the development of start-ups to the £50 million–£100 million companies described above because of lack of finance (a major frustration), over-regulation and shortage of skills. The UK's Alternative Investment Market (AIM) provides much less depth and continuity of investment than US markets. Many UK SMEs site R&D offshore in return for funding. Mid-term finance is a particular problem, causing companies with successful early-stage growth to stagnate or sell out before achieving their full potential. Even companies with £50 million turnover can struggle for financial support. One roundtable attendee said: "Our turnover is £50 million and getting grant aid was a painful process. We had to spend a year jumping over hurdles. That's just not acceptable in our market because things move too fast."

A general view from the attendees was that investment from private and public sources must extend far beyond the present four or five years to 10–15 years, the period of time needed to reach maturity in sectors such as biomedicine.

For example, Simon Cook, CEO of DFJ Esprit, sees the main problem as being in the £3 million–£30 million range. "The UK broadly matches Silicon Valley in the provision of start-up and early-growth funding (up to £3 million) for high-tech businesses, and there are many sources of funding for the mature-growth phase for profitable companies (£30 million plus)," he says. "However, there is a £2 billion gap

in funding for mid-stage technology businesses (£5 million–£30 million), which is having a material impact on growth. This funding should not be provided by Government — rather, funds should be developed that provide an attractive long-term framework for investors, including financial incentives. The £2 billion gap can be bridged in the UK if such a framework could be developed."

A number of attendees highlighted how much more support our free market competitors like the USA gave to their T&I economies — for example through the Small Businesses Innovation Research (SBIR) programme, Government procurement policies and agencies like the National Institutes of Health (NIH) in biomedicine.

Roundtable attendees felt that the Government could support and reward success through direct tax and legislative changes. Regulators often impose unintended barriers. In pharmaceuticals, for example, regulations have increased drug development time and cost. The NHS could provide better support for British patients and life science companies by being much more open to testing, co-developing and ultimately purchasing new diagnostics, devices and drugs, helping to generate huge value for the UK. The NHS should be seen as a 'proving ground' for innovation, rather than representing the ultimate barrier as is too often the case today. Regarding the skills shortage, several sectors lack trained talent — for example, there are too

few software or system engineers. A good number of chemists are coming through UK universities, but many are not being employed in the UK, where their contribution to industry is dangerously undervalued. The Francis Crick Institute, due to be operational for medical research in 2015, will have more than 1,000 biologists but only 30 chemists.

Roundtable attendees felt that much closer engagement between schools and entrepreneurs could provide inspiration and role models. With university access squeezed and a growing problem of youth unemployment, there was strong support for the Government's direction of travel on apprenticeships and vocational training, but a strong view that more could be done, for example in implementing Sir Richard Branson's idea of allowing young entrepreneurs to use their university loans to start businesses instead.

### INCREASING EXCITEMENT ABOUT THE MANUFACTURING INDUSTRY

The profile of manufacturing in the UK has risen over the past few years. A number of attendees made the point that too often UK policymakers talk of manufacturing as if it were shipbuilding and steel, ignoring the importance of manufacturing in sectors like food and drink (the UK's biggest manufacturing sector), healthcare and consumer electronics. However, growth depends on a constant supply of trained and imaginative minds along with start-up businesses that cultivate new

technology. There is still much to do to create an environment in which talented individuals see T&I as an exciting career path. People skilled in technologies such as virtual reality, for example, are in short supply, while demand rises. In addition, improved skills are also needed among ancillary and support staff.

Roundtable attendees saw the new 'Inside Manufacturing' programme as helpful in offering students, teachers and career professionals visits to leading facilities where they can see it is not all "oily rags and metal bashing". However, they criticised the UK education system for creating "vanilla kids" focused on learning facts, rather than thinking, tackling problems and taking risks. The national curriculum should place more emphasis on maths, sciences and cognitive skills, less on process and more on creativity and the importance of entrepreneurial thinking.

Schools should emphasise STEM subjects from the early years and ensure pupils are informed about career opportunities before choosing A levels. We can learn from the developing world about how to create a self-sustaining national talent pool. Moreover, T&I topics need to be financially rewarding to study. Roundtable attendees endorsed the idea of using fiscal incentives to encourage students — perhaps, for example, removing the extra fees incurred in four-year science and engineering courses.

In the following pages, over 100 leaders explore key drivers, opportunities and challenges facing their sectors. They identify where they see the greatest opportunities for growth and what they believe needs to be done in their sector.



“Small companies have often been unsuccessful in developing to their full potential and there is now a real shortage of successful mid-sized manufacturers. As a result, some of the benefits that a strong UK-based manufacturing industry could give us have leaked abroad and we require expensive imports where much of the value has been added overseas. The co-ordination of activity in the UK to build our supply chain, as we do in the Automotive Council, would be in the best interests of all.”

**Professor Richard Parry-Jones**  
Co-Chairman, AUTOMOTIVE COUNCIL



“In today’s difficult economic times, we know that innovation is increasingly important both to individual businesses and in adding value to the wider economy. There are many drivers of that successful innovation but PA’s work with companies around the world suggests that collaboration is a critical factor in stimulating the rapid development of new products, equipment or processes. It is clear that governments, providers of finance, industries across diverse disciplines and sectors do best when they cooperate. If all these interests come together, they can create a vibrant, financially attractive environment that attracts skilled staff and stimulates ideas. The UK already has many of these elements in place but, by strengthening the dialogue between government and industry, we can help reinforce those strengths, improve collaboration and ensure it remains a competitive force in innovation into the future.”

**Dave Smith**  
Head of Technology and Innovation, PA CONSULTING GROUP



“The UK is an excellent location for De La Rue. We value easy access to the new technologies and ideas that originate in academia and other communities with technological expertise and development capabilities. It is often the entrepreneurs and SMEs that drive innovation forward. Over the past 10 years, I have seen a material increase in the competence of entrepreneurs, their links with academia and the number of technology-based start-ups.”

**Dr Philip Cooper**

Head of Ideas Development, DE LA RUE



“For Unilever, start-ups can be an interesting source of ideas, but realistically businesses with revenues exceeding £100 million are our bread and butter. Smaller businesses compete with mega-brand projects for resources, while the bigger ones integrate well and leverage the capabilities of Unilever to grow fast. There is an opportunity for the UK to help organisations scale small £10 million businesses to £100 million where they are attractive on their own or to multinationals.”

**Neal Matheson**

SVP, Head of New Business Unit/Open Innovation, UNILEVER





“The UK broadly matches Silicon Valley in the provision of start-up and early-growth funding (up to £3 million) for high-tech businesses, and there are many sources of funding for the mature growth phase for profitable companies (£30 million plus). However, there is a £2 billion gap in funding for mid-stage technology businesses (£5 million–£30 million), which is having a material impact on growth. This funding should not be provided by Government – rather, funds should be developed that provide an attractive long-term framework for investors, including financial incentives. The £2 billion gap can be bridged in the UK if such a framework could be developed.”

**Simon Cook**  
CEO, DFJ ESPRIT



“AkzoNobel’s decision to establish a new R&D team in the UK was driven by several factors but one of the foremost was the relatively low cost of highly creative, visionary staff here. We have found them to be tremendously optimistic while remaining grounded in reality. This is combined with an action-orientation and global outlook.”

**Dr Stephen Davies**  
R&D Director Interior Wall, AKZONOBEL DECORATIVE PAINTS



# Advanced manufacturing parliamentary roundtable

**Tuesday 6 September 2011**

Despite widespread assertions to the contrary, the UK's advanced manufacturing industry is in good health. At present, UK aerospace is the second largest of its kind in the world while the UK motor industry is the sixth largest industry, producing 1.7 million vehicles a year. The advanced manufacturing industry is on the receiving end of substantial investment and has exciting prospects for future growth.

Advanced manufacturing is also set to benefit from global economic trends. The requirements of an ageing population, for example, create opportunities for companies to develop the built environment and produce home healthcare products. At the same time, climate change and high fuel prices are stimulating energy-efficient technologies, while the combination of life sciences and traditional engineering is encouraging the development of new materials and biomedical devices.

There are concerns, however, that countries such as China will be able to leverage competitive advantage from their lower production costs. At this roundtable of senior figures from industry, academia and the public sector, one participant observed: "There's no point in looking at the capabilities we have lost. We've got to ask what can add value, where do we want to be, what will sustain and grow a first-class manufacturing base?"

## Big/small: minding both ends of the manufacturing spectrum

Small and medium-sized enterprises (SMEs) provide much of the innovation on which the advanced manufacturing industry depends. It was noted that many electric cars being built in the UK use motors supplied by small start-up companies that are also UK based. However, the UK supplier base often lacks the staff and time to address long-term issues such as skills training and access to foreign markets. According to one roundtable member: “We have to channel more know-how to our SMEs to help the flow from concept to market place to sales.”

Despite this need, investment for small firms is often difficult to obtain as venture capital firms consider SMEs’ long-term prospects to be vulnerable to political risk. SMEs frequently site R&D offshore in return for funding. As a result, the UK loses both the production work and the intellectual property.

As a potential redress, many large companies are bringing SMEs into collaborative manufacturing programmes. The Engineering and Physical Sciences Research Council (EPSRC) was praised by the roundtable for its allocation of grants, as was the Technology Strategy Board (TSB), which uses funding to encourage small companies and larger ones to work together. State support, however, can prove precarious and the withdrawal of funding from knowledge transfers has been damaging.

There were also concerns that the UK’s focus on developing embryonic successes leads it to overlook established strengths that the country already possesses. It was observed that Britain needs to balance long- and short-term prospects. “One day we’ll drive cars without steering wheels, but not yet. Don’t forget that people need fridges, cars and construction equipment now. We’re good at these things.”

The so-called ‘gorillas’, major companies with considerable muscle, are innovators too, and make a huge contribution to skills training and R&D throughout the industry. One example cited was the motor industry’s decision to focus on a number of key technologies where Britain can either lead development or secure significant sub-markets. These include:

- combustion engines, which will continue to be required by the industry for a long time
- energy storage and management

- electric motors and power controls
- lightweight structures, aided by the UK's leading aerospace and sports-car industries
- intelligent highway systems to reduce road congestion.

## **Government: focus, consistency, coherence**

In the context of international competition, governments work ceaselessly to build national industries. While British manufacturers distrust political interference, they welcome political engagement. Meanwhile, even the most economically liberal government still regulates and levies taxes.

One roundtable attendee observed: “Ministers have to make choices because time and money are limited and spreading them thinly doesn’t work.” Instead, a Government strategy aligned with industrial needs is required. This would mean collaboration and co-investment to promote strength in key sectors (rather than the Government picking supposed corporate ‘winners’), identifying those where the UK already leads, is close to leadership, or where leadership is up for grabs. One roundtable attendee remarked: “Our competitors have been doing this for 30 years or more.”

A successful national strategy demands consistency. Industry needs clarity and the assurance from Government that investment can be secured for at least 15 years — well beyond the traditional four- or five-year political horizon. In turn, this relies upon cross-party consensus.

The solar-power industry in Germany was singled out as an example of long-term thinking. This was described as a “world beater”, which has grown out of years of clear and consistent federal support. It was suggested that politicians should “drop their downstream crisis intervention mentality in favour of an upstream collaboration with co-investment”.

It was acknowledged that regulation can be a positive force. Clear product-performance standards, though often unpopular with business, can stimulate innovation if confined to setting benchmarks rather than prescribing methods of production. This is evidenced by the recent Code for Sustainable Homes, which requires all new houses to be

carbon neutral by 2016. To continue operating within the market, building companies must improve their own standards and thereby the standards of the industry as a whole.

Unlocking public procurement will also stimulate innovation, but only if Government makes a deliberate effort to leverage the full scale of public-sector purchasing. Ministers should review how departmental priorities connect, and look at other public bodies. It was observed that primary care trusts “fritter away innovation budgets in penny packets” instead of uniting to back three or four major research projects on individual health problems.

## **Education: tackling cultural as well as policy barriers**

The future is full of thrilling possibilities, each of which requires outstanding individuals if it is to be realised. At present, some sectors lack trained talent. There are, for example, a large number of mechanical engineers but not enough software or system engineers. In addition, there are too few students developing 21st-century skills, such as those relating to virtual reality, despite these skills being key to a balanced national portfolio.

One participant observed: “It’s apparent that we have fantastic young talent. But developing it to anywhere near full potential is often down to teachers bucking the system, pushing against the curriculum to give pupils time to grow. Kids like to solve problems and schools need to be more flexible, going with the grain of natural enthusiasm instead of snuffing it out. We’re turning out vanilla kids when we need kids with spark.” It was claimed that multinationals believe that the quality of secondary education in the UK often deters foreign employees from relocating here.

There is also a sense that the national curriculum encourages schools to teach facts at the expense of helping pupils to think clearly and coherently, which “makes universities an extension of sixth-form colleges”. “This has personal as well as national consequences: adaptability and employability are two ends of the same spectrum,” said one roundtable member.

Moreover, there are fears that the UK Government’s policy on tuition fees is damaging science and technology education in our universities. “British higher education ranks amongst the best in the world, especially

for research. It's a draw for foreign investment. But tuition fees, designed with three-year degrees in mind, are biased against students taking four-year engineering courses." This situation aggravates existing funding problems because it costs a lot more to train a student in science and technology than the humanities.

It should also be remembered that universities operate in a market economy too. Teenagers and their parents decide what courses they want to study and higher education is funded to meet this demand; it is not based on wider national need.

## **Engineering: "no more oily rags"**

Engineering is the basis of advanced manufacturing and there was marked frustration that the profession's lack of attraction for young people is diverting many into other lines of work. Schoolchildren should be encouraged to understand the importance of manufacturing and to see that it provides good careers, it was stressed. At the same time, ministers were praised for their emphasis on promoting apprenticeships, which show that it is possible to join a profession by routes other than having a degree certificate.

Insiders within the engineering industry admit that the sector could do more to promote its achievements. However, it was stressed that Government also has a vital role to play. "The country needs to learn that we're still a major player, and that our continuing prosperity depends on remaining one."

It was thought that the new 'Inside Manufacturing' programme, a joint public-private initiative, is a step in that direction. The scheme invites pupils, teachers and careers professionals to visit some of the UK's leading facilities to learn about modern manufacturing and the range of rewarding jobs available.

"We're interested in getting primary and secondary school teachers because they can pass on their understanding to their pupils. Show the modern engineering environment and you really turn people round. We're not about oily rags and metal bashing now. It would help if every pupil had to spend a day a year in a modern factory or research establishment."

Philip Cooper, Head of Ideas Development, De La Rue, commented: “The UK is an excellent location for De La Rue. We value easy access to the new technologies and ideas that originate in academia and other communities with technological expertise and development capabilities. It is often the entrepreneurs and SMEs that drive innovation forward. Over the past 10 years, I have seen a material increase in the competence of entrepreneurs, their links with academia and the number of technology-based start-ups.”

## **Roundtable recommendations for Government**

The political challenge is to achieve a radical change in perception as well as to adjust policies. The starting point must be to shed the misleading yet well-established impression that Britain’s manufacturing base has disappeared. Both opinion makers and the public must come to see that manufacturing remains a major contributor to the nation’s prosperity.

1. Be bold in promoting advanced manufacturing as an essential part of our country’s future. Industry must help, but only Government leadership can obtain the impact that is required.
2. Work for consistent pro-manufacturing policies upheld by a cross-party consensus. Set long-term policy horizons.
3. Consult on changes to the national curriculum that would place more emphasis on maths, sciences and cognitive skills.
4. Remove any unnecessary financial disincentives to taking engineering courses, which have been created by tuition fees.
5. Identify the case for setting standards to drive innovation in selected areas of manufacturing.
6. Leverage the totality of public procurement in order to incentivise innovation.
7. Explore, as a matter of urgency, new means of supporting the sector’s SMEs via investment, training, advice on penetrating overseas markets and collaboration with large corporations.







# **Life sciences and healthcare parliamentary roundtable**

**Wednesday 12 October 2011**

The UK medical life sciences (pharmaceuticals, medical devices, diagnostics and healthcare services) are major sectors of the UK economy and make substantial contributions to growth, employment and overseas earnings, as well as the NHS and the health of UK patients. Their importance is expanding as improvements in genetics, drug development, diagnostics, medical devices and therapeutics make possible new treatments for previously untreatable medical conditions. With an almost infinite demand for healthcare here and around the rapidly developing world, this is a massive growth market for UK plc.

Yet progress is slowed, even thwarted, by unintended barriers. These barriers increase the cost of drug discovery and development, inhibit access to capital and are driving the value of new discoveries away from the UK. Not only is Britain's long-standing leadership in these fields diminishing, there is also a real risk that some of the acute medical needs of the 21st-century will go unmet, and/or that NHS patients will suffer as the UK loses its pre-eminence.

This chapter focuses on four key issues identified by a roundtable of experts from life sciences, pharmaceuticals and healthcare, together with venture capitalists who help finance work in these fields. Capability

building (and re-building) is their main concern: discovery and development are inherently expensive, and reducing costs without impairing quality is essential to progress. The good news is that inexpensive improvements in the 'ecosystem' are available via data access, more sensitive regulation and changes in NHS practice.

## **Data access: the key to development**

Researchers and clinicians need to be able to predict treatment outcomes with a degree of certainty in order to avoid needless interventions and waste. However, it is currently extremely difficult to understand how patients will respond to specific approaches: a knowledge gap that leads to a high rate of drug failures. Asthma and hypertension are both conditions where lack of data prevents better treatment. Improvements in target validation and patient selection are preconditions for more effective treatments and enhanced cost control.

However, there is a large volume of diagnostic and outcome data that could be used for research, clinical practice and post-treatment care. Accessing anonymised and aggregated patient information from the NHS database would drive improvements in target validation and patient selection. Routine, generic data-release permission from patients would be transformational, as would encouraging routine consent for medical research.

There is good evidence that patients are generally willing to have their data used in this manner. Significant numbers volunteer to take drugs that are still in development, especially in cancer where Cancer Research UK runs a myriad of trials involving patients. Closer patient involvement in research can yield very real medical benefits. For example, pressure from AIDS sufferers drove the rapid development of HIV medications.

Most improved target validation and patient selection would be pre-competitive. This is already happening in some fields. The National Institute for Health Research (NIHR) collects and shares information about interventions. The challenge is to roll out this approach across the NHS. Access to anonymised, consented-ethically managed data is key to attracting big international pharmaceutical companies back to the UK to conduct drug trials. Data access must be at the heart of any global strategy for UK life sciences, pharmaceuticals and healthcare.

## **Regulation: too careful for the patient’s good?**

Regulating the discovery and development of medicines involving vulnerable patients is clearly vital. Instead of removing regulation, the call is for it to become more cost effective. Safety and efficacy criteria are seen as excessively demanding when judged against the fact that British drug trials have led to no deaths, and virtually no harm, in 50 years. As one CEO put it: “We are producing very safe drugs which are not reaching patients in time to reduce deaths and minimise suffering.”

Costs imposed by the present system (such as the requirement to conduct a battery of toxicity studies at around £1 million each) are restricting development in fields such as antibiotics capable of overcoming new viruses, depression and obesity. The two last conditions have been described by the World Health Organisation as crucial to morbidity and mortality rates over the next two decades, and all three have substantial economic impacts.

Praise for the National Institute of Clinical Excellence (NICE) was counterbalanced by concerns that it intervenes too early in the drug-development process, sometimes up to a decade before likely approval. Researchers want interventions to happen later, balanced by much earlier guidance on what the Institute is looking for in terms of cost, efficacy and safety. Similar concerns are expressed over the involvement of the Medicines and Healthcare Products Regulatory Agency (MHRA) in the development of medical devices, particularly in small-scale and very early-stage work — involvement for which researchers must pay substantial fees.

Fears were voiced that additional marginal costs, and extended lead-times for returns on investment risk driving pharmaceutical companies away from cutting-edge research in the UK into markets where easier profits may be found. These include the development of high-return, yet often medically useless consumer products in the ‘wellness’ markets.

## **The NHS: crying out for connectivity**

The UK’s major competitors lack the advantage conferred by our consolidated national healthcare system. Leveraging the benefits in terms of collaboration between clinicians, patients, academia and industry can

improve care and help grow a larger home market, ensuring that more of the benefits of innovation are captured and developed here rather than being diverted abroad.

Links between some NHS trusts and universities are strong in medicine, particularly in biomedical research. But the overall picture remains uncertain, with the majority of clinicians not linked to external networks and many hospitals having little or no culture of research support or adoption. Promoting pan-NHS connectivity should be a central goal of public policy. This links to metrics. There is relentless pressure on issues such as ‘trolley time’ but less on expediting the time spent taking a new drug to clinical trials, or data analysis. One roundtable attendee observed: “patients need to know what to expect from an intervention and where to get it. You can find out which hospitals serve the best meals but you can’t get answers to the same data on treatments.”

There are concerns that the NHS is fast becoming a poor market for new drugs and devices. Complaints are heard, even from other public bodies, of a lack of interest in new approaches such as assisted living for the elderly and disabled. Researchers report considerably more interest in countries such as the US and Japan: “It’s hard to get into hospitals; we’re forever waiting for access. There has to be a more intelligent use of innovation.”

International pharmaceutical companies are also concerned that the NHS’s increasing resistance to adopting new drugs will contribute to accelerated disinvestment from life sciences research in Britain. They argue that a fragmented system leading to variable drug uptake undermines companies’ confidence that they will be able to access the UK market.

## **Capturing value: incentivising discovery and development**

Britain has an outstanding record in drug development. Yet many of the related economic benefits are reaped by other countries. Medical devices require less cash, but here, too, there is growing concern over the effect of the NHS’s attitude to innovation adoption and investment.

Drug researchers are increasingly going to America, Japan and China to secure funding. Research firms have reported finding eager buyers overseas. Other options also result in the loss of large chunks of value: licensing production of a new drug can yield as little as 2.5 per cent of total profits.

The best discoveries and inventions mean little for the UK healthcare economy if they are not translated into marketable products tested and adopted here. Deep pockets are needed to achieve this. Investors also need patience as lead times are long, especially in biosciences, with 10–15 years needed to develop a marketable drug (and a decade or so for devices). Concerns were expressed at the roundtable about the lack of UK investors with the appetite to make such commitments given concerns over the ultimate appetite of the NHS to adopt and reimburse innovation, and the time-cost effect of bureaucracy, fragmentation and health budgeting that fails to incentivise long-term savings through innovation.

Help can be provided through better regulation, for instance by quicker decisions on licensing to get products to market. Tax incentives require fresh consideration. Past problems with gaming are recognised, but time-limited tax breaks can stimulate surges in R&D and bring long-term benefits.

There is a need for Government to facilitate consents for anonymised data release and genetic screening: “Make this available and you become interesting to big international drug companies.” New data would also drive investment, as well as medical improvements, because “money will follow innovation”.

Incentives and levers also have roles to play in universities and the NHS. Academics need encouragement to produce a greater number of papers and spinouts, while hospital-trust CEOs need encouragement to commission research from SMEs in order to develop the UK as a healthcare innovation economy.

Informed observers argue that chemistry’s contribution to industry is becoming dangerously undervalued. Chemists translate pharmaceutical discoveries into treatments. “Without them we will not hang onto the capabilities we have today,” commented one roundtable attendee. The Francis Crick Institute, a major interdisciplinary medical research institute due to be operational in 2015, will be staffed by almost 1,000 biologists but only about 30 chemists. There are burgeoning numbers of chemists coming through the universities but they need employment here, not overseas.

There is a general acceptance that Britain is unlikely to lure back much of the large-scale drug manufacturing lost over the past two decades. But improvements can be made even here, and there is great scope to secure a bigger share of global 1b and 2a work. Germany has succeeded in attaining similar goals in recent years.

Whitehall must recognise the urgent problem: that unless radical steps are taken, the flow of British development will continue to slow down, pharmaceutical firms will continue to move abroad as innovative treatments and medical devices struggle to find a strong home market. We need a new model of incentives for innovation adoption in the NHS that provides a sustainable return on investment. There was widespread recognition that the life sciences strategy launched in 2011 defined much of this problem and set out long-term strategy for tackling it, and there was a warm welcome, for instance, for the emphasis on the new models of ‘translational research partnerships’ and the role of Academic Health Science Centres (AHSCs).

## **Roundtable recommendations for Government**

1. Recognise the potential of our consolidated national healthcare system to encourage cultural convergence, collaboration and openness to innovation, so building the home market for drugs and devices.
2. Prioritise connectivity between clinicians, academia, industry and patients to make best use of the NHS’s potential. Remove barriers and develop appropriate incentives for hospitals to support innovation discovery, development and adoption, whether in drugs, devices or diagnostics.
3. Promote ethical use of aggregated and anonymised electronic records, routine consent for medical research (“a real game changer”), and better use of treatment outcome data to show what works and where to support translational research.
4. Lower regulatory hurdles in order to speed up the development of medicines, for example, by reducing the required numbers of toxicity studies and by intervening later in the development process (currently sometimes 10 years before approval).



5. Mandate the MHRA to provide earlier guidance on cost, efficacy and safety goals for drugs and devices without specifying paths to achieving them.
6. Review the tax and funding regimes: improve seed investment and allow researchers to receive grant and tax credit funding, rather than losing one when they secure the other.
7. Recognise, promote and invest in chemistry as a key skill in drug development.
8. Direct tax and regulatory changes to creating a culture in the NHS and UK universities that supports and rewards innovation and successful partnerships with the private sector.



# Consumer products parliamentary roundtable

Tuesday 13 December 2011

The UK is one of the world's leading centres of consumer-product research and development, design and production. Some of the leading firms in the field are headquartered here, their presence driving investment and growth. Essentials such as food, clothing, cleaning products and razors — as well as former luxuries such as cosmetics, chocolate, chewing gum and pet food — flow in large volumes from British factories.

Companies involved in these industries think globally, partly because of the exponential growth of emerging markets. Borders are not important: the share of these companies' turnovers generated within the UK, though far from insignificant, is a small percentage of the whole. Even the US market is no longer the giant it was as China, India, Brazil and South-East Asia scale up and grow at a far faster rate.

Yet the same companies confirm that their UK investment is disproportionate to turnover. Corporate history offers a partial, but hardly a complete, explanation. These companies find this country a good place to work in and export from. Why? They could also go elsewhere and think we could do better. How?

What follows focuses on four key issues identified by a roundtable of senior executives from multinationals operating here, plus scientists and representatives of public bodies.

## **Skills: the springboard for success**

The UK is the destination for immense investment in R&D, investment with a global function. There was general agreement that the “UK has a depth of talent”, particularly in the scientific and technological fields that makes new consumer products possible. Not only are we “very good on basic research”, there is also “something magical about technology services in this country — US firms have huge respect for this”. In addition, our SMEs are often at the leading edge. The Cambridge technology cluster and the M4 ‘food corridor’ are just two British regions with resonance well beyond Europe.

British academia is especially valued. “This is one of two places where one comes to study. The best scientists and technologists in Asia are often trained in Britain,” commented one of the roundtable attendees. At the same time, UK academics are among the most internationally connected, their papers among the most cited from any G8 nation.

The lead provider of public funding for basic research — worth £800 million a year — is the Engineering and Physical Sciences Research Council (EPSRC) which covers maths, physics, chemistry, ICT and engineering. About 40% of that funding is directed to 2,300 academic-business partnerships, all with projects likely to prove internationally competitive.

Our universities, institutes and technology companies are much admired and able to take their pick of talent from around the world. They train and ‘export’ graduates and post-graduates in large numbers, and this breeds a strong inclination to forge research partnerships with UK institutions.

These connections are, in turn, drawn on by UK-based consumer product companies. “It means you can get an organisation that is truly cosmopolitan in ideas, rather than having a purely (say) Chinese mindset. It helps us identify points of difference among national markets.”

Not that this pool of highly skilled foreign labour will remain as deep as it is today. “It’s already becoming difficult to import talent from China: people are starting to get higher pay and faster development there

rather than abroad.” Patriotism and commitment to a way of life are other factors. “Chinese staff tend to spend the minimum amount of time with multinationals before moving on; they aspire to work for a truly Chinese company.” The UK will also have to be wary of a high proportion of its talent moving to emerging economies. “Macro-economics guarantee that this will happen.”

The need for collaboration via strong, deep relationships in R&D, higher education and commerce will grow. “There’s a great desire in Asia to know how we do things (such as setting up a small business). Selling skills training plays to the UK’s strengths.” But the primary need is to forge new links with foreign research centres and to grow along with them.

The trend of exporting manufacturing jobs to emerging markets is also set to peak. Companies in the developed world need fewer, more highly skilled staff for manufacturing. “We’re becoming less worried about cost per employee and more concerned to employ people with an appropriate mindset, for instance about safety. Our culture is more safety conscious. Once that happens, the developing world will start to lose some of its competitive advantage.”

Leveraging the advantages of Britain’s highly skilled talent pool is frustrated by “the uneven quality of skills among ancillary and support staff”. This is a real barrier to economic growth. “We can learn from the developing world about how to create a self-sustaining national talent pool. Reinventing apprenticeships is a good start.”

## **Melding disciplines: the key to problem-solving**

“The UK is a great place to solve a complex problem because we’re comfortable crossing disciplinary boundaries. Biologists (for instance) talk to physicists, and vice-versa. It makes us a multi-disciplinary centre of science and research excellence. That is why partnerships here are world class.” At the same time, British academics show a marked willingness to work with industry, while science in many other countries, the US included, is often seen as introspective.

One global firm has developed what it sees as a new model for product R&D in partnership with an English university. “Consumer products have to be adapted and fine-tuned for every market. That means understanding

the wider societies that mould those markets. So we're involving social scientists, historians and the fine arts, as well as the physical scientists. We give them a problem and they work at it."

It was suggested, however, that more could be done to connect the life sciences with other disciplines. The commercial potential of products addressing lifestyle factors in health and nutrition — traditional areas of mass-consumer interest that are no longer confined to the West — are vast.

The seven research councils were praised for listening to business, though there were calls for them to go a step further and discuss what research corporates would like to see from the universities. The councils work closely together to create an integrated approach. "Some people point to the fact that the US has a single council: what they don't tell you is that it has 11 subject directorates who speak to each other much less than their UK equivalents."

Concerns exist, however, that the very success of the drive to bring higher education into the commercial mainstream has "produced an unhealthy level of competition between institutions". There is a tendency to seek league table ratings in order to secure funding: this distracts from bigger needs.

## Here or there? the UK as global laboratory

The UK can be seen as a 'starship' in terms of excellence in core science, innovation and product realisation. But, like Europe as a whole, it is not expected to grow at a substantial rate in coming years. "Investment has to be in expanding markets and be cost optimised to the hilt in order to offer western-style goods at a low cost. There's huge scope to use our skills in assessing and catering for future needs in healthcare, lifestyle products and food."

The great debate, generating passionate differences of opinion, is about whether products are best developed in the UK or in their target markets. Can the UK serve as a global laboratory for multinationals, with products requiring only downstream localisation and marketing?

"You don't need to be close to consumers in the sense of physical presence. It's more about recognising and addressing their needs. We use the UK lab

and then collaborate with centres in China or wherever. Take healthcare: clinical trials can be designed in the UK and run in India. Or foodstuffs: they can be developed here with flavours customised in-country.”

Others argued that being closer to demand is more effective. It is difficult to understand a national mindset otherwise. “You need to be embedded in a culture to understand attitudes and technical issues, and so get your designs right. You’ll recruit better local talent too.”

A counter claim was that: “Collaboration deals on R&D, including access to data, allow us to do the core work here. It’s perfectly feasible to design and deploy new technologies from Europe.”

## **Design: the neglected advantage**

The emerging economies have a large and rapidly growing number of aspirational consumers. Apple’s success demonstrates that the cheapest products can be trumped by those offering greater style and functionality. “And the next Apple-style breakthrough may be in China or India. Don’t assume it will come from the West.”

Good design springs from user-centred research. It marries style to functionality and plays a massive role in consumer goods. This is one of the fields where the UK can enhance its competitive position. “Take the challenge of an ageing population. Designers can help create foods requiring minimal preparation, products that are easy for older people to use. That’s just one spin-off from an issue already emerging in the Far East as well as Europe and the US.”

The Design Council works with SMEs, scientists and public services to drive product innovation and repositioning via brand, image and reputation. Yet design is often seen as a luxury, as the icing on the cake, rather than a means of actually delivering products. “It’s hard to get grant R&D funding for design, other than in engineering.”

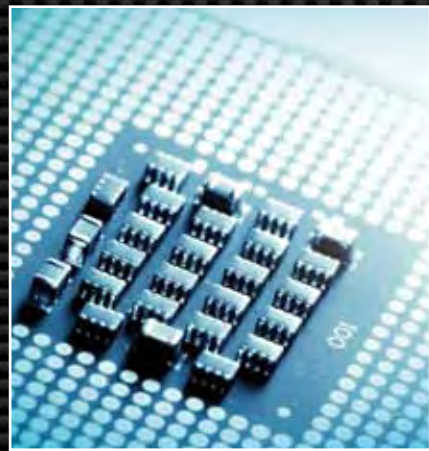
Without new impetus this country’s design advantage is likely to erode. “China has established a clutch of new design schools, trained to work with science and business, plus design zones in tech clusters. They’ve cut and pasted the model pioneered by Imperial College.”

## Roundtable recommendations for Government

1. Remember that the UK is a great manufacturing economy. “Our factories add huge value even if they don’t employ a lot of people.”
2. Strengthen policy to attract and retain investment. The UK must also stay ahead of potential giants from the emerging economies that are now looking to establish themselves in Europe.
3. Undertake a high-level review of mechanisms for building up industrial-academic collaborations, around the globe as well as at home. This is essential for UK competitiveness and should major on faster development and enhancing cross-disciplinary work.
4. Recognise the importance of diplomacy in opening and growing consumer markets. “Put the Prime Minister and some business leaders on a jumbo jet to talk about R&D, scientific exchanges and trade and you can get a lot of valuable business done in a weekend.” The Foreign Office must not over-focus on China and India: Latin America and Africa are growing fast. Britain should build on historical and cultural links, and not overrate the role of the EU for hi-tech manufacturers.
5. Rebalance research council funding. Spending on clinical and life sciences has risen by 40% since 1996. Spending on other sciences has fallen by 10%. More funding for the latter will pay dividends, not least because the other sciences supply much of the academic underpinning in maths and agriculture, for example, on which the life sciences depend.
6. Give big companies fresh encouragement to direct funds to training engineers and scientists. Industry and academia still struggle to fill essential posts from UK talent and a high proportion of skilled people are moving to emerging markets. Global companies should be urged to run joint R&D projects with scientists and engineers in UK universities.
7. Provide more support for SMEs. They have immense value in developing niche products but often lack financial strength, full-spectrum skills training and understanding of international markets. Accessing funding can also be a complicated process with no obvious gateways. Helping them is a priority for ensuring long-term economic growth.



8. Leverage the UK's advantages in design by redefining it as an essential component of product R&D. Closer integration between the seven research councils might help achieve this. Encouraging the use of collaboration technology to co-ordinate global R&D programmes that include the design function would also help maintain the UK's leadership.



# ICT and electronics parliamentary roundtable

Tuesday 31 January 2012

The success of the UK's ICT and electronics sectors demonstrates the health of its manufacturing industry. However, the industry itself is critical of policy decisions that it claims threaten its long-term future. Senior executives stress that competition is global, rapid and relentless. "New products are life and death. We've always got to differentiate, develop and take to market."

Unending innovation is the key to the industry's long-term success. This requires a large number of well-trained and imaginative minds as well as a proliferation of start-up businesses that cultivate new technology.

A roundtable of industrial leaders, joined by others from higher education and the public sector, achieved remarkable unanimity on what the UK must do to maintain its strong position.

## **Industrial strategy: "picking the winners"**

"We raised our eyebrows when the South Koreans said they would become the largest manufacturer of computer memory. They took 20 years but they got there."

In comparison, it was claimed in the roundtable that many UK politicians either shrink from such a strategic approach or are reluctant to give public expression to private agreement. This is an outcome of history as much as doctrine, informed by recollections of unsuccessful political decisions in the 1960s and 1970s. However, “We’re kidding ourselves if we think the Russians, French, Indians, Chinese, Americans don’t use their Governments to make things happen.”

Intervention does not necessarily mean repeating the political mistakes of the past. “You don’t have to go back to picking winners. Strategy should mean picking the right races for Britain to compete in. The state can encourage and nurture by joining with business to identify sectors and technologies where we’re ahead, or in with a good chance of leading.” As a result, it was felt that the Government’s job should be to facilitate success by focusing available sector and technology resources, and addressing infrastructure issues (including education) that lie beyond the reach of business.

It was stressed that the aim should not be to compete across all industries. “Don’t pick fights the UK stands no chance of winning. Don’t be afraid of buying off-the-shelf from abroad in such cases, and look at how we can insert our companies into the supply chain.”

The process of drawing up a strategy would be valuable in its own right, giving the industry political visibility and making public policy more transparent. It would also help clarify trends and viable directions. But there were warnings against the political tendency to ‘fire and forget’. Effective support requires efficient delivery systems, regular and open reviews and proper metrics. Accordingly, the Government was urged not to “repeat the experience of the Defence Industrial Strategy which was supposed to be updated after 18 months but which languished for six years”.

During the discussion, the Treasury was criticised for blocking progress by “confusing investment with subsidy”. There were also calls to re-examine the unintended consequences of tax policy. “Should companies get as much tax relief for doing R&D abroad as they would here at home?” In addition, Brazil and India were cited as economies that have tilted the playing field in favour of home production. “Adjustments need only be for a limited time frame to kick-start new business sectors. Of course, it helps that those countries are free to make their own laws.”

## Supply chain: “we need thousands of low-cost experiments”

Ongoing innovation was said to demand “thousands of start-ups, thousands of low-cost experiments”. One roundtable member commented: “Barriers have come down and you can’t rely on coming up with the best next thing in-house anymore. We have to be in at the early stage. So we place multiple bets, taking many stakes in many tiny companies.”

As a consequence, the UK has to provide additional support to small businesses. “Tax and regulation really matter when you are small.” There were also reservations about the quality of advice services provided by the Government. “They can tell you how to set up a sandwich shop but anything else is a challenge.” At the same time, engaging with academia is also difficult for SMEs. “They need a signposted, formal route into universities.”

The Technology Strategy Board and Scottish Enterprise were seen as very helpful. The latter will pay up to 45% of the cost of product R&D. There is a sense, however, that the UK will “need to gear up ten-fold to match what the Germans are doing”. While some grants will go to businesses that fail, it was argued that this in itself must not be allowed to discredit the method. “We need to speak the language of national aspirations instead of the language of subsidy.”

It was suggested that there is a category of company that is too large to qualify for major funding, but which lacks the scale to take significant investment risks. One member of the roundtable said: “Our turnover is £50 million and getting grant aid was a painful process. We had to spend a year jumping over hurdles. That’s just not acceptable in our market because things move too fast.”

Larger ICT and electronics companies are adopting a far more supportive attitude to the supply chain. They are said to be buying stakes with the aim of “creating the sort of SMEs we need”. One roundtable member commented: “They give us new ideas and further our strategies. We help develop their IP, commercialise them and let their brilliance feed through. Absorbing them is totally counterproductive – you end up killing what makes them special.”

Some micro-businesses grow to a point where significant progress will come only from purchase by a medium-sized business. Yet too many of the former are stuck with valuations of £15 million–£100 million, which is a

‘no-go zone’ for acquisitions. “Transaction costs are too high for mid-caps and rights issues won’t work.” Britain’s small ICT companies need the kind of support outlined above if their full potential is to be realised.

## Human capital: tending our own garden

Skills shortages impede growth, but outsourcing overseas is set to become less economical as Asian living standards improve. “Experienced IT staff in the subcontinent now earn around two-thirds of British wages and are moving increasingly to work in companies of their own.” More Asian countries are therefore seeking to attract talent home from the West, a trend that will make foreign graduates from UK universities less likely to remain in the country.

One answer to this problem is higher pay. However, a global market will continue to make it easy for talent to move abroad. “Let’s correct for this, skewing the education system to benefit strategic areas of the economy. We already stump up to attract graduates into teaching maths and science. Why not tilt the playing field to get more A-level students onto science, technology, engineering and mathematics (STEM) degree courses? We need literate and numerate graduates as opposed to ones who are just literate.”

Overall numbers for STEM courses (including electronic engineering) have fallen following the introduction of tuition fees. “Engineering is a tough four-year degree so you have to sway all but the most committed 18-year-olds in its favour. Tuition fees were a missed opportunity. The way forward would be to charge only £3,000 a year for engineering, but £6,000 for the humanities and £9,000 for courses in catering.”

“And stop charging students on the basis of how much their dad earns. Do it on the basis of how much, or little, their education is likely to contribute to the economy. That’s the message ICT and electronics employers need to send to ministers if we’re serious about recruitment.”

Other professions are seen by students as having more glamour than STEM industries. While these industries are becoming more attractive to the young, STEM’s constituent subjects are still too often seen as unexciting and poorly paid. “The irony is that we hear so many stories of students who might have gone into our fields had they known what they

had to offer. We have to fascinate youngsters. Business has to do more to get the message across, but government has a better reach into schools.” It was stated that the focus should be on the years before most pupils chose a career, because “they need the right A-levels too”.

## **Schools: sending the right signals?**

Concerns among industry leaders about the values transmitted by British education were widespread and deep. “Our society says it wants more initiative, more risk takers. In fact, we tend to drive these qualities out of our youth by emphasising playing safe. There’s also a tendency to bring people down to the same level. ICT in schools is more to do with process than creativity. MBAs dull the spirit and teach process, process, process...” These concerns supported complaints that companies often struggle to recruit ‘business smart’ students. “We need scientists who can work in a commercial environment.”

“Kids have been sold the lie that they’re guaranteed a better job if they go to university. But squeezing 50% of 16–18-year-olds down that route doesn’t help anyone. Too many come out with poor degrees and too few pupils are taking up apprenticeships at 16. Nor are late developers given much help. Let’s make sure they know that the likes of Richard Branson and Bill Gates didn’t have degrees.”

In addition, there was strong support for local schemes to encourage entrepreneurs into schools. “Plenty of business people will help out. These are events that really open children’s eyes. They often say they never knew this way of life existed.” It was noted that not everyone watches ‘Dragons’ Den’ or ‘The Apprentice’.

There was debate on whether it is appropriate to teach entrepreneurship in schools (a scheme that already exists in Scotland). The poles of controversy may be summarised as: “don’t leave everything to Alan Sugar” and “we’re asking for trouble if Ofsted is made the judge of how to succeed in business”. A third perspective was that: “You can’t teach entrepreneurship but you can inculcate the attitudes and values that lead someone down that path. Tell children that they’re free agents but that no one owes them a living. Teach freedom and responsibility instead of spoon-feeding information. Don’t listen to people who are uncomfortable with success.”

Complaints over too much school time being spent on the humanities are beside the point. “This isn’t about French classes versus enterprise classes, but of inculcating an attitude through the teaching of every subject.”

## **Roundtable recommendations for Government**

1. Promote a national debate on the case for an industrial strategy for the ICT and electronics industries.
2. Increase R&D funding for higher education and business, and develop more helpful criteria for grant awards to the sector’s mid-cap businesses.
3. Review the consequences of tax policy for this field in order to remove discrimination against R&D projects conducted here at home.
4. Undertake and publish a comprehensive study of the needs of the ICT sector’s SMEs, embracing tax, regulatory and advisory issues as well as the quality of their links with higher education.
5. Explore ways of incentivising students to choose STEM degrees, including by financial means (as already occurs with new maths and science teachers).
6. Raise the profile of STEM subjects in schools from the early years, ensuring that pupils are fully informed about the career opportunities on offer before choosing their A-levels.
7. Reconsider the values promoted in British education. Is there enough emphasis on entrepreneurial attitudes? Are pupils getting opportunities to hear from successful business people?







# **SME parliamentary roundtable**

**Wednesday 8 February 2012**

Biotechnology, medical devices, information and communications technology (ICT), security and defence, telecoms — the UK's small and medium-sized enterprises (SMEs) operate in every field of high technology. Yet while the UK is considered a good place to start a technology business, it is seen as a poor one in which to develop it.

“Engineering entrepreneurship is one of this country's strengths. We don't need to go elsewhere to get the talent we need. And a relatively small home market gives us an advantage — we have to think internationally. Some of us do no trading in this country at all.”

Some firms are relocating out of the UK when they cannot develop at an acceptable cost. As a result, their intellectual property is leaving the country at the same time as UK industry is losing critical mass.

These observations, and those that follow, are taken from a wide-ranging conversation between entrepreneurs and investors.

## Roadblock: “finding capital can be very difficult”

Many strong, market-led propositions backed by credible research find that they can't grow a business from Government grants alone. “The real issue is finding enough capital to escape from the start-up stage.” Lack of investment means many products are never produced and that the development of even the most successful products takes longer than it should.

Venture capitalists confirmed these reports. “There's a big gap between seed money and funding to take a company to the next level. SMEs can secure a few hundred thousand pounds, but raising anything between that and £20 million is hard going. They'll find it hard to get good interest rates, or professional help. And the banks are cagey about lending to companies making less than about £30 million.”

One roundtable member, Simon Cook, CEO, DFJ Esprit, commented: “The UK broadly matches Silicon Valley in the provision of start-up and early-growth funding (up to £3 million) for high-tech businesses, and there are many sources of funding for the mature-growth phase for profitable companies (£30 million plus). There is a £2 billion gap in funding for mid-stage technology businesses (£5 million–£30 million), however, which is having a material impact on growth. This funding should not be provided by Government — rather, funds should be developed that provide an attractive long-term framework for investors, including financial incentives. The £2 billion gap can be bridged in the UK if such a framework could be developed.”

The shortage of mid-stage funding is compounded by the failure of the Alternative Investment Market (AIM) to provide the depth and continuity of investment available in US markets. “Support from NASDAQ might ebb and flow, but significant sums are always available. In this country, the flows are smaller and the ebbs go very low indeed.”

As a result, UK investors tend to operate to short timetables, “bolting rather than waiting for high returns”. Many propositions, however — particularly in biomedical development — need time to mature. In such a market, even a 10-year deal can prove inadequate. Yet “wealth isn't created by late-stage investment”.

Many of the UK's most profitable companies are acquired by, and often transplanted to, the US, Ireland, Germany and Switzerland, countries more inclined to take the long view. The result of this is “quite incredible disparities between what UK firms are valued for here, compared to the prices which can be obtained from foreign buyers”.

Concerns were also voiced about large corporations demanding a return on supply-chain investments within a year or 18 months, when three to five years would be common in France and Germany. During the roundtable, it was stated that, “Unlike the German ‘Mittelstand’, our SME ecosystem is not nurtured by our big corporations. Entrepreneurial businesses need entrepreneurial customers. We don’t have them here.”

Inadequate investment makes moving to product realisation difficult so “companies lower overheads by manufacturing abroad”. The relative affordability of laboratory space abroad was given as an example of why companies are inclined to take such an approach. High-quality premises in Singapore are available at £1.50 per square foot on a one-year lease because the Government wants to attract technology businesses. Premises are also relatively cheap in Belgium because empty commercial property is highly taxed. This is in comparison to Cambridge, where offices are leased at £45 per square foot.

Government incentives should be aimed at developing start-ups into bigger enterprises capable of attracting their own investment. It was said that: “15-year funding won’t fly in this market without Government backing. It needs to be worth people’s while to help.” As a consequence, the Enterprise Investment Scheme (EIS) was seen by the roundtable as helpful because it guarantees investors a certain return.

Technology is “like the film industry where a handful of ventures make huge profits, Skype being a recent example”. It was suggested that Government should build a framework that allows those returns to be more evenly distributed. Ministers should also bear in mind that: “Just because a venture capitalist won’t put money into a business doesn’t mean that the business won’t contribute to the economy by employing people and paying taxes.”

## **Clusters: pros, cons and politics**

Whitehall responded to the closure of Pfizer’s facilities at Sandwich by declaring the town an enterprise zone. During the roundtable, however, it was noted that: “Cambridge could be the second biggest healthcare conurbation in the world after Boston. Why not attract enterprise there? Scarce public support is spread too widely because there’s too much politics in the process.”

Clusters are successful because they focus research in centres of excellence and accelerate the rate of recruitment by attracting large numbers of specialists, making them fertile ground for businesses to connect and develop intellectual property. “We don’t need, and shouldn’t have, a science park at every university. That wastes money on admin and co-ordination. There are about 30 laboratories doing commercial work on genetics at the moment when there should be no more than half a dozen.”

At the same time, however, some argued for caution. “Politicians and venture capitalists worry too much about geography. Businesses can work together over long distances and save on accommodation costs in the process. You can find synergies and payoffs all over the country. Look at how the pharmaceutical industry has disaggregated R&D. Too much of our talent lives between Oxford, Cambridge and London as it is.” As a result, common ground was found in an emphasis on “regional fundamentals”, investing in good transport and fast broadband.

## **Whitehall: how can it help?**

An important question is whether Whitehall should identify key areas — technologies where the UK is already successful — and concentrate on their development. Entrepreneurs suggested it is possible to identify sectors that will succeed, but not individual companies. “If you could pick winners every venture capitalist would be rich. Who would have predicted that a small English company would have done more than General Motors to make electric cars viable?” Consequently, Government should encourage successful specialisms while leaving investment decisions to businesses themselves.

Support for picking key areas was accompanied by three important caveats. The first is the difficulty of defining clear sector boundaries. “Fundamental science feeds into every area, from IT to defence and consumer products. Take life sciences: they embrace materials, compounds, engineering, nanotechnology, chemistry and physics. Breakthroughs can come from unexpected places so one can’t be too certain about future trends.”

The second caveat surrounds “lethargy of Government decision making”, when a sense of urgency is vital. For example, plans with three-year gestation periods will be out of date before their completion. R&D funding decisions need to be made quickly.

Finally, there is “too much focus on outstanding companies”. One roundtable member commented: “These companies do well regardless. Public funding tends to be skewed to bigger organisations which can afford to carry full-time grant hunters on their payrolls. Remember how Jaguar got £500 million when the Midlands was crying out for more start-ups? The real challenge is with the chronically under-capitalised second tier. You’ve got to ringfence funds, or incentivise investors as they do in the US.”

In addition, there was concern that “grant funding is a ballooning industry and one which supports people who advise, measure, monitor but don’t make anything”. One roundtable member commented: “Tax relief for R&D works. Use an old system rather than wasting effort devising new ones.”

Public procurement was raised as another key issue. “Any business finds it easier to sell in overseas markets if potential customers see that their own Government is happy to buy what they make.” It was claimed, however, that public bodies are often reluctant to buy UK products, “partly because of EU rules”. Selling to the NHS and undertaking joint research projects is therefore frustrated by a complex regulatory system that “privileges big pharmaceutical companies with the time and the money to handle red tape”.

Meanwhile, political support should not be restricted to financial assistance. “Government can help by stopping things that make our lives difficult. We apply EU directives with more ferocity and rigour than any other member state.” One roundtable member commented: “The Bribery Act won’t change the way business is done in parts of Asia but still makes it effectively illegal for our smaller companies to do business there. Corporate giants may get protection from Whitehall but SMEs won’t.”

Ministers are also urged to do more to promote UK achievements to foreign markets. “The US Government talks up American goods and services and provides help with advertising and marketing. It makes for useful extra leverage. Unfortunately we’re not very American when it comes to talking about our successes.”

## **Youth: growing future entrepreneurs**

SME leaders look to the future of UK entrepreneurship and are anxious about education and training. One roundtable member commented: “22-year-olds are the best people to start companies because they typically

have no liabilities or dependants. But they must be convinced at an early stage that starting their own business is a satisfying way to live. That job has to be done in schools.”

While events like ‘Young Enterprise’ were said to attract large numbers of young people, one roundtable member commented: “The national curriculum allows little time for them to meet people from industry, and school league tables can actively discourage serious learning about the culture of work. ICT lessons should teach how to write code, but have often been being dumbed down to the level of ‘how to use Microsoft Office.’” At the same time, science classes were said to concentrate too much attention on ephemeral techniques instead of conveying basic knowledge. During the discussion it was suggested: “This helps explain why people from Poland are getting jobs which we need our kids to do. Our young people are not getting a look-in.”

The growth of apprenticeships was welcomed as a means of providing a credible alternative to university, and youth unemployment was seen as a profound waste of talent. “Smaller companies can’t solve the problem, but nor can we just tell Government to solve the problem on its own. Too many 18-year-olds have nothing on their CV and no confidence. If we can’t pay them, can’t we at least give them real work experience? Government can help by continuing to pay them benefits while this is underway. We don’t really need incentives to create below-minimum wage jobs, do we?”

## **Roundtable recommendations for Government**

1. Channel public support to technology sectors where Britain leads, or has strong prospects of leading. But leave individual investment decisions to the market.
2. Address the shortage of development capital with the aim of stimulating the growth of SMEs beyond the start-up stage, and helping them realise their potential in this country rather than abroad. Focus grants and tax credits on companies valued at less than £30 million. Facilitate longer-term (10–15-year) private investment.
3. Make grant applications less complex in order to ensure that SMEs have fair access to available funds. Explore the practicalities of ringfencing a proportion of grant aid for the exclusive benefit of SMEs.



4. Review and reduce the overall regulatory burden for SMEs.
5. Press Government departments and public bodies, particularly the NHS, to be more open to buying UK goods, and to creating research partnerships with smaller technology companies.
6. Provide SMEs with advice and support in penetrating export markets, as well as promoting UK technological achievements and products abroad.
7. Develop entrepreneurial attitudes amongst the young by awarding business-related skills a higher place in the national curriculum, promote links between schools and businesses, and continue to pay benefits to unemployed young people when they join internship schemes.



# **Agri-science parliamentary roundtable**

**Tuesday 1 May 2012**

Agri-science isn't a synonym for farming: it encompasses the application of highly advanced technologies across the agricultural supply chain: biological (plant and animal) science, breeding and genetics, agricultural machinery, crop and food storage and processing, and world-class retailing. Food production is Britain's biggest manufacturing sector.

Yet at a time of exploding global demand for both food and the technology that promises higher, better-quality yields, we are also witnessing low growth in UK agricultural productivity. We're failing to translate our impressive farming tradition and genius for innovation into products for the world market.

A roundtable of leaders from research, farming and processing discussed barriers to growth and how to dismantle them. Their conclusion, simply put, was that: "Public policy should focus on facilitating our penetration of global markets." There is both deep frustration and deep excitement within the agri-science sector at what could be achieved with some Government leadership and relatively small shifts in investment by Government towards applied agri-science. A number of people at the Roundtable said they believe the agri-science sector desperately needs a strategy akin to the life sciences strategy set out by the Prime Minister in December 2011.

## Revolutions: pressures, science, ownership

If the Government is serious about building a sustainable recovery based on an economy “rebalanced away from the City, London and the South East and a debt-fuelled consumer boom,” and much more geared around manufacturing, innovation and exporting, then our world-class but neglected agricultural science and research base has a key role to play.

There is significant growth potential in the agri-food sector — driven by a number of key factors. Firstly, world demand for food — increasingly ‘western’ foodstuffs — is rising fast, driven by the pace of development in the developing (BRIC) nations. Global prices are rising, creating a clear opportunity for the UK’s very well capitalised and efficient farming sector to generate new export markets. At the same time, urbanisation and development pressures in the developing world mean that world food production will have to double by 2050, using half as much land, water and energy. This challenge of ‘sustainable intensification’ is driving huge investment in agricultural science. Global and UK commodity price inflation is forcing ever greater efficiency savings in Britain’s existing agricultural sector, already a massive industry, and this is driving an appetite for innovation and productivity.

In this context, the UK’s world-class research base in agri-science and research — in plant and animal biology and food science and agricultural engineering — should be viewed as a major asset. For too long successive Governments since the 1980s have based policy on the memory of EU surpluses driven by the Common Agricultural Policy in the 1980s, rather than on the developing global shortages and growth opportunities for UK agri-science.

This ‘perfect storm’ of global population growth, commodity price inflation, food and fuel poverty, environmental and soil degradation and climate change is placing unprecedented pressure on global agriculture. As the recent Foresight Report by the Government Chief Scientist set out, sustainability is the real challenge and ‘sustainable intensification’ is the new watchword of global agri-science. This means growing more with less water, fertiliser, pesticides and greenhouse gas emissions, on the same amount of land, or less, and on a durable basis. Such results depend on a synthesis of ecological techniques, biology and precision farming (using high technology to match inputs to individual crops and fields, so cutting costs and improving products). “Agricultural technology can be produced on small scale but promises great returns,” said one roundtable attendee.

It offers this country an opportunity to export knowledge and skills, as well as being a major global research centre.

UK research centres are already world leaders in basic and applied agriculture science. Genetics and synthetic biology (man-made biological functions and systems) are playing a vital role in the development of high-value plant products and healthier foods. “Health-enhancing broccoli, developed in British labs, is already in our supermarkets.”

Farming has developed in parallel with these sweeping changes. “We need to forget the name ‘farmers’. They’re really all-purpose land managers, switched-on, well-qualified entrepreneurs.” The profit potential of hi-tech agriculture, and the investment required, are concentrating production in fewer hands. “Forty years ago my village had more than 50 farms. Now there are three. But they employ at least 200 per cent more people, are growing by 20–25 per cent a year, are science based and part of a global supply chain.” The arable lands of the eastern counties are at the forefront. “Eighty agricultural businesses are now farming 60 per cent of Norfolk, and 40 or 50 farm the whole of Cambridgeshire.”

A number of people felt that the Government had to decide what it wanted from its agricultural sector, pointing out that the growth of agri-environment schemes is a direct counter to productivity growth. “Two thousand acres in Kent have recently been paid to be out of production — what is that contributing to growth and innovation?”

It was unanimously agreed that: “you won’t build an export market without an innovative domestic sector”. An innovative UK agri-science sector is absolutely fundamental to driving exports. “KTNs (Knowledge Transfer Networks) can’t do it. You have to rebuild the UK’s agricultural innovation economy across the supply chain.”

## **Science: bridging ‘the valley’ and reviving applied research**

Since the privatisations of the 1980s public funding for the UK agri-science base has been cut back dramatically, and the overall strategic direction and co-ordination provided by the AFRC has been lost. Still excellent centres across the country (Rothamsted, the National Institute of Agricultural Botany (NIAB), John Innes, Aberystwyth, Reading, Liverpool

and London) maintain the UK's world class reputation in agri-science, but there is a serious problem of fragmentation, duplication, lack of concerted strategy and investment in key skills and technology platforms, poor access to industry and low capture of value from agri-science research spend.

The effect of this fragmentation of the UK research base in undermining a stronger industry/academia collaboration in agri-science has been compounded by a wider — traditional — problem in the agri-science sector: a mis-match between a relatively fragmented grower base and an increasingly globalised concentration of corporate R&D spend by the 'Big 6' agri-science R&D companies (Bayer, BASF, Syngenta, Monsanto, etc).

British academics make ground-breaking discoveries which are then commercialised elsewhere. "We get congratulated by foreigners about Britain being a leader in scientific citations; they see us as making a charitable donation to the world."

This is the infamous 'valley of death', where ideas expire for want of funding to translate them into applied research. "Actually it's best described as a chasm: you go over the edge and don't come back." Help is needed to bring ventures to the stage where private business can get involved. "The DTI used to do that and it greatly accelerated take-up."

Agri-science poses special problems for industry and venture capitalists. "A lot of work is very difficult to fund. A new or improved crop can take 15 years to travel from laboratory bench to harvest. Nor does it help that you can't always tell which value chain your basic research is going to feed into. We're also missing an enormous trick by not winning bigger slices from the research budgets of the food multinationals." Grant aid fails to address these deficiencies.

Although the UK agri-science sector has maintained a world-class brand for pure science through its research work funded by the Biotechnology and Biological Sciences Research Council (BBSRC), a number of people cited concerns over the lack of focus on the commercial applications of UK agri-science. There are reservations about the brief of the BBSRC. "The BBSRC is focused on securing intellectual property. We're winning gold medals in the science Olympics but not channelling the findings into actual food development here and overseas. More research needs to be directed in the directions which plant and animal breeders want. The problem lies partly with academics themselves: a fair few are disconnected from commercial considerations."

“We’ve faced a dearth of investment for two or three decades. Near-market research was privatised in the 1990s but funding models have not adapted accordingly.”

As a result of all of the above, the UK agri-science community has tended to retreat back into itself and a focus on pure science. There is a feeling that there is a lack of an entrepreneurial culture in the UK agri-science base — with the result that too few people in it or outside it view this as an innovative sector. And too many academics within it have become hostile to industry links. “A big problem is the gap between frontline agriculture and our research base. Too many researchers have gone back to deep basic science, far away from industry. And there is a lack of universal support for best-practice dissemination from lab to field — further undermining productivity.” Several attendees highlighted the lack of agricultural engineers who are key to unlocking the value of the UK agri-science sector.

Too much of the UK research base is in policy-related research for the Government. “We need (a) more basic science and (b) more importantly, research for global multi-nationals. The old AFRC played a key role in this before, not least in making sure the UK was doing globally orientated research.” It was pointed out that agri-science is much more vulnerable to climate change variables than other industries, which in turn creates new markets for low-carbon farming technologies, new models of ‘sustainable intensification’ and new breeding strains and traits to support agriculture in the more challenging environments.

Rebuilding our early-stage applied research structure is vital for competitiveness and for triggering industry matching funding. “When that happens you’ll see global food companies spending more of their research dollars here. But it won’t happen overnight.”

There are calls for an agri-science technology and innovation ‘catapult’ centre “to bring together the fragmented excellence of the research base into one really focused translational hub”. Many participants see the industry itself as highly fragmented. “No one takes a holistic view of the whole value chain and there are a lot of indirect negative effects when people think in boxes. For instance, we turn out very few graduates in agricultural engineering; only one institution awards degrees in the subject. We need a joined-up supply chain, working in partnership with Government, with all members working together for transparency, sustainability and profitability.”

## **Culture: “people don’t see agriculture as a business”**

“People want the car industry to succeed. Do they feel the same about our agricultural industry or our agri-science sector?” There are major cultural obstacles to agriculture being seen in a commercial light. “Farmers are seen as stewards of the countryside who produce food as a by-product. Big farms are seen as bad. Grants bribe farmers to let land go wild. And the Common Agricultural Policy spends 40% of the EU budget supporting stagnation in the form of small farms.” Britain’s smaller farmers are notably more effective than many of their continental counterparts, but still lack the capital for sustainable intensification.

The need to grow food is neglected in comparison with concern over the environment. “That’s why we produce a smaller and smaller proportion of our own requirements. We import from other countries with lower standards and so end up exploiting their environment! Sustainability is about more than green issues. Competitiveness counts and it is big farming which will win matching funds, embrace new technologies and deliver secure food supplies.”

The industry feels unappreciated. “Governments tend to shy away from supporting and celebrating agricultural productivity, and show little awareness that added value is created outside farms as well as on them. In their enthusiasm to back manufacturing, politicians hurry to be photographed in factories but forget that our biggest manufacturing sector is food and beverages.” There is a supportive All-Party Parliamentary Group but as one roundtable attendee commented: “Most MPs show little understanding of agriculture and their reactions are driven by the tabloids. We need a big political gesture which shouts ‘food and ag-research is fundamental’ — like David Cameron’s ‘husky’ trip to the Arctic to dramatise global warming.”

“Show the public what the sector can do and you will create excitement and generate support. Get schools to teach where food comes from, and where it is going to come from. Show people that science can mean less use of pesticides and less demand for precious water. We should be encouraging young people to enter the industry, not to start their own farm (how many people start their own car company?) but rather to join progressive larger businesses.”



## Technology: being bold with the public

“We are only in the early stages of the biological revolution. It’s been said that it’s just like the industrial revolution, except that it happens faster, and has a far greater impact on all our lives.” The success of this revolution demands a willingness on behalf of the consumer to embrace contentious technologies, not just genetically modified (GM) crops, but nanotechnology and large-scale agricultural production systems. “The truth is that the consumer doesn’t trust us. They have to be persuaded.”

The industry accepts the need for regulation, though it argues for “science-based, predictable” rules to encourage investment. The problem here lies in Brussels and Strasbourg, not in London. “Our government gives fantastic support to agri-food innovation. EU officials are very sceptical of the application of new technology, including non-GM breeding techniques.”

GM is seen as a front-line issue. “Europe is a backwater, while South America and Africa, as well as Asia, are pressing ahead with both the science and commercialisation. But no one, politicians or business, wants to take risks here at home. Yes, GM soya is on sale in supermarkets (with very high level of penetration) but not much else. No retailer feels it can go further off its own bat. Government needs to say that GM is safe and public agencies must stop hedging.”

Some argue that public attitudes are changing. “Price rises are moving the agenda; many consumers would be glad of cheaper food. Succeed with one product — eggs from chickens fed with GM soya — and the rest will follow. You have to get labelling right — do you mark up everything that’s been fed with a GM product? — and harness the power of marketing: be bold with the public.”

There are calls for Government to invest more in genetics and understanding gene function and application. “That transcends so much — local environments, borders, economic systems and species.”

Government also needs to encourage the development of new metrics to measure output, resource use and the environmental impact of food production. “Only then can we give clear direction to R&D, funding and regulation.”

There is strong support for setting a national agri-science strategy via a Government-industry body. This would address the problem of

fragmentation; it would also include environmentalists. “You can't leave it to the NFU to worry about sustainability. Climate change is happening and natural capital is decreasing. These facts must temper the productionist agenda. Many of the disputes between green and commercial interests have been settled but the public needs to see they have been settled. But it's two way: people must see that competitiveness is as important as the environment.”

## Roundtable recommendations for Government

1. Recognise that agri-science is a crucial UK industry with remarkable economic potential. Publicly acclaim its contribution to the economy and security of food supply, and affirm its needs.
2. Launch a major strategy for UK agri-science similar to that launched for life sciences in 2011, which should be industry-led, ambitious about the growth potential of the sector, target specific sectors and technologies with the most potential for attracting inward investment and exports, and set out a new contract between Government and industry to drive investment and growth in the agri-science field.
3. Establish a national agri-science council, including ministers, public bodies, the industry, academics, consumers and environmentalists, to develop a national strategy and facilitate a more cohesive value chain. Support a national agri-science research ‘council’ and an institute along the lines of the ‘Fraunhofer’ centres advocated by Hermann Hauser in Cambridge and reflected in the Government’s Catapult centres. The council and institute’s remit would be to:
  - attract inward investment to the UK research base
  - maximise technology transfer and IP value capture for UK plc
  - develop UK excellence and leadership in key technologies in which the UK can play a genuinely world-class role.
4. Re-focus research priorities on those areas where the UK has a genuine global lead, attracting the inward research investment from the major global agri-science ‘majors’, and creating a more joined-up supply chain where UK innovation is brought to the stage where private

- investment becomes viable. Place more emphasis on applied science, aligning grants with commercial objectives, and stimulating match funding from industry.
5. Campaign for reform of EU agri-science regulation, and for a more positive attitude to innovation among European Commission officials.
  6. Address public perceptions about large farms, new agricultural technologies (including GM) and the balance between conservation and competitiveness. Increase awareness of food sources and of security issues.
  7. Encourage the development of new metrics that define sustainable intensification, allocate costs to consumption of natural resources and so provide a more reliable framework for public policy.

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<b>Martin Collison</b> COLLISON AND ASSOCIATES LIMITED	<b>Dr John Hart</b> ENDOCRINE PHARMACEUTICALS
<b>Professor Sir Gordon Conway</b> IMPERIAL COLLEGE	<b>David Hatcher</b> MOD
<b>Simon Cook</b> DFJ ESPRIT	

Dr David Hawksworth QUEST DIAGNOSTICS	Professor Richard Parry-Jones AUTOMOTIVE COUNCIL
Professor Barrie Hayes-Gill MONICA HEALTHCARE LIMITED AND THE UNIVERSITY OF NOTTINGHAM	James Peach CANCER RESEARCH UK
Scott Heath IMPERIAL COLLEGE UNION	Daniel Pearsall APPG SCIENCE & TECHNOLOGY IN AGRICULTURE
Stuart Hendry SPHERE MEDICAL	Ewan Phillips DELTEX MEDICAL
Professor Peter R Hobson BRUNEL UNIVERSITY	Dr Nigel Pitchford IMPERIAL INNOVATIONS
Dr Chris Hollowood APPOSITE CAPITAL	Dr Charles Potter GLIDE PHARMA
Dr Peter Hotten PLOUGHSHARE INNOVATIONS	Dr Neville Reed ROYAL SOCIETY OF CHEMISTRY
Derek Jones BABRAHAM BIOSCIENCE TECHNOLOGIES LTD	Professor James Ritchie HERIOT-WATT UNIVERSITY
Dr Tony Jones HUNTSMAN PIGMENTS	Peter Robbie EADS UK
Peter Kendall NFU	Rob Rolley GENERAL DYNAMICS UNITED KINGDOM LIMITED
Dr Nigel Kerby MYLNEFIELD RESEARCH SERVICES LIMITED	Ellie Runcie DESIGN COUNCIL
Professor David Leaver RASE PRACTICE WITH SCIENCE GROUP	Professor Dale Sanders JOHN INNES CENTRE
Professor Simon Lovestone KING'S COLLEGE LONDON	Professor Nigel Scollan ABERYSTWYTH UNIVERSITY
Professor Christopher Lowe UNIVERSITY OF CAMBRIDGE	Professor Savvas Tassou BRUNEL UNIVERSITY
Professor Paul Matts PROCTER & GAMBLE	Colin Taylor TELEDYNE OIL AND GAS
Ian McNeil BOEING DEFENCE UK LTD	David Thomas MARS INCORPORATED
Tim Mead GB INNOMECH	Mark Tinsley PC TINSLEY LIMITED
Dr Steve Mockford METRICELL	Dr Eric Ward THE SAINSBURY LABORATORY
Nigel Moore KWS UK LTD	Chris Warkup BIOSCIENCES KNOWLEDGE TRANSFER NETWORK
Calum Murray TECHNOLOGY STRATEGY BOARD	Tony Wiener DEUTSCHE TELEKOM (UK) LIMITED
Linda Naylor ISIS INNOVATIONS	Clarke Willis ANGLIA FARMERS LIMITED
Dr Chris Newton BIOFOCUS	Dr Louise Wood RESEARCH AND DEVELOPMENT DIRECTORATE DEPARTMENT OF HEALTH
Professor David Oxenham MOD, DSTL	

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**Kevin Deane**  
kevin.deane@paconsulting.com

LIFE SCIENCES AND HEALTHCARE

**Ian Rhodes**  
ian.rhodes@paconsulting.com

CONSUMER PRODUCTS

**Wil Schoenmakers**  
wil.schoenmakers@paconsulting.com

ICT AND ELECTRONICS

**Frazer Bennett**  
frazer.bennett@paconsulting.com

SMALL AND MEDIUM-SIZED ENTERPRISES (SMEs)

**Claire Ruskin**  
claire.ruskin@paconsulting.com

AGRI-SCIENCE

**Mark Humphries**  
mark.humphries@paconsulting.com

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In today's uncertain climate, businesses face many questions and paradoxes. How do they lower their costs while growing their market share? How can they plan for the long term while the economy remains so volatile? While most companies struggle in a downturn, how is it that some make record profit?

PA develops and commercialises products to help its clients achieve long-term growth through consumer-led innovation, cost optimisation and new business models.

For more information about technology and innovation at PA visit: [www.paconsulting.com/technology](http://www.paconsulting.com/technology) or email: [technology@paconsulting.com](mailto:technology@paconsulting.com)

We are a firm of over 2,000 people specialising in management and IT consulting, technology and innovation.

We operate globally from offices across Europe, the Nordics, the United States, the Gulf and Asia Pacific.

We are experts in: energy, financial services, life sciences and healthcare, government and public services, defence and security, telecommunications, consumer goods, automotive, transport and logistics.

We create visible and sustained value for our clients because we are:

- dedicated to sharing our expertise
- committed to working together
- focused on long-lasting results.

we are focused on your success

## PA Consulting Group

### Corporate headquarters

123 Buckingham Palace Road  
London SW1W 9SR  
United Kingdom  
Tel: +44 20 7730 9000  
Contact: [martin.smith@paconsulting.com](mailto:martin.smith@paconsulting.com)

### Cambridge Technology Centre

Melbourn  
Herts SG8 6DP  
Tel: +44 1763 261222  
Contact: [dave.smith@paconsulting.com](mailto:dave.smith@paconsulting.com)

[www.paconsulting.com](http://www.paconsulting.com)

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