Address to The Foundation for Science and Technology

By Sir John Parker, President, the Royal Academy of Engineering.

In the 16 months since I was elected President of the Royal Academy of Engineering, I have been talking about the value of creating a modern industrial strategy for growth. I use the term "industrial" in its widest sense, encompassing:

- research, design, engineering and the manufacturing of product
- the engineering and manufacturing services that support them
- the international engineering consultancy that emerges from the base.

The UK finds itself in a challenging situation. Our economy, like many others, has stalled. We have not yet established a clear path towards recovery. This, despite our enormous strengths: we are a technocratic nation with world-class engineering and science capability. That is why we must commit to a modern industrial strategy: we must harness these strengths for a new industrial future.

Personal background

My contribution to the discussion this evening comes from a half century working in executive and non-executive roles across industry: in engineering, shipbuilding, ports, energy, aerospace, defence, mining, universities – and central banking.

All of the businesses I have worked in have had engineering in their bloodstream – even the Bank of England, where I was Chairman of Court, has a state-of-the-art backup power station in the basement of Threadneedle Street!

I unashamedly believe in an engineering-driven growth agenda fuelled by the strong science and engineering base in our universities.

Tonight I shall talk about five challenges that a modern industrial strategy should address:

1. First, clear signals from the top of government

2. Second, innovation and support for new ideas

3. Third, the importance of large companies and the need to grow new ones, including emerging sectors

4. Fourth, stability and alignment of government policy

5. And fifth, our skills base.

Corporate strategy is pretty straightforward: at its simplest, it provides coherent signals from the boardroom for the alignment of the technical and commercial direction of the business. You then gear up your organisation to pull through the right leadership, skills, optimal financing, the R&D required and the other critical components of the business plan.

Creating a modern industrial strategy for the UK is about government, led by the Prime Minister and the Treasury, signalling that they mean business; that the *whole* of government will be aligned in support of industrial growth. After a period of years when industrial activity has been pretty much below the radar, to the UK's detriment, this kind of reinforcement is critically important.

Beyond sending the right signals, a strategy provides a framework within which government can create the right climate for growth. I am sure we all welcome and must be encouraged by the Prime Minister's speech at the Mansion House this week.

In the context of today's highly competitive global marketplace, a modern strategy needs to set the trajectory, both of core sectors and the critical enabling technologies that give the edge in a host of known and as yet unknown applications and including new, emerging sectors.

Policy

In any form of industrial strategy, government needs to understand the broader impacts of its own policy as a system. Each new policy potentially has an impact elsewhere. So government must understand and stress test all likely consequences of policy decisions, including unintended ones.

As an example, consider the consequences of converting polytechnics into universities. In the absence of a national industrial strategy, I doubt if the long-term implications were thought through at the time. Polytechnics provided a quality education to prepare people for work and, importantly, produce

skilled technicians; in doing so, they served our industrial base – and our young people – pretty well.

Many of the polytechnics have become fine universities, but sadly we have now lost that critical mass of professional and vocational learning. I will to return to the issue of skills later.

A more recent example is the impact of new visa restrictions on the UK as an attractive place for talented people to study, undertake research and to work. We are hearing about worrying, unintended impacts.

So – as Michael Heseltine recognises in his growth review – policy is a system. Systems thinking is the stock in trade of my 175,000 professional chartered engineering colleagues in the UK. Engineers are educated and trained to design and deliver systems that must work. I believe that government would benefit from many more people with such skills to support the design of *deliverable* policy. And, incidentally, I would like to see a Government Chief Engineering Adviser too, alongside a Chief Scientific Adviser.

Policy decisions need to be based on understanding the *real* needs of business.

In strong, well-defined sectors such as aerospace and automotive, the leading companies have formed highly effective sector bodies, with strong sector strategies and leadership. They are doing a great job of articulating their needs and those of their supply chain companies. They are developing real dialogue with government.

So I welcome the coalition government taking forward and developing the programme of leadership councils across important high tech sectors such as space and e-infrastructure.

Not surprisingly, government finds it more challenging to identify, let alone dialogue with, newer emerging sectors and those that are less well structured. This makes it challenging to anticipate opportunities, nurture potential and create leadership. In a few days' time, I am leading a Royal Academy of Engineering delegation to China, where our two national engineering academies, alongside representatives from both governments, will explore emerging industrial sectors and how to support them. We hope that initiatives such as this can help signpost the way ahead.

In our drive to innovate for our industrial future, the UK's excellent science base is a huge advantage. A strategy for growth must recognise the critical importance of sustained support for science – and, Minister, we could not have a better advocate than you on this

front. In better times, we would match our main competitors' increased investment – again a point reinforced in Lord Heseltine's growth review.

But, however strong our academic research, translating knowledge into innovation does not happen by itself. It needs coherent, sustained, applied engineering effort. Now, I applaud the work of the TSB and its excellent initiatives for accelerating innovation. But I ask myself, are we as a nation adequately supporting this critical part of the pathway to growth? In Europe, the UK's innovation performance is only average; we lag behind Germany, Denmark, Finland and Sweden.

There is a pressing need to address this. As part of a much bigger drive, it seems to me that the new Catapult Centres are a positive step.

The Catapult Centre for High Value Manufacturing is the most established of them. Advanced manufacturing is critical – and already a vital enabler for some of our leading *existing* sectors. EADS Airbus, a company I am associated with, has a wing factory in Wales that is one of the world's most advanced production facilities. And Nissan's factory in Sunderland is the most efficient car plant in Europe.

I recently visited the Manufacturing Technology Centres in Rotherham and Coventry and was deeply impressed by the work to create significant advanced manufacturing processes that could enable us to compete with the lowest-cost countries. These are the foundations for a renaissance in manufacturing.

Last week, in this very building, I had the privilege of hearing the Chancellor deliver a landmark speech about his vision for a future economy based on cutting edge science and engineering. Innovation, he said, comes from creative interactions between science and business.

I recently visited the excellent Northern Ireland Science Park in Belfast, a great centre for such creative interaction, where we talked about three critical issues for innovation:

- **communications** – between universities, businesses and government to understand what each can bring to innovation;
- **access to finance –** when it may not be possible to attract private sector investment in early-stage ventures, there is a need to find better ways for the public sector to fill this crucial gap, as in a number of other countries; and

- **scale –** the scale of the growth challenge and global competition to be leaders in innovation; and the scale and critical mass of companies we need to compete.

To compete globally, we need to invest at the right scale or perhaps invest jointly across borders to share the upfront risk. At the risk of upsetting my friends in HM Treasury, I doubt if we have ever in this country adequately distinguished between (i) the cash allocated to investment on which we should earn a long-term return and (ii) the cash cost of the overheads to run the country and its institutions.

We also need to identify new ways to support technology entrepreneurs in building their *own* capabilities, and to help potential investors identify opportunities. At the Royal Academy of Engineering, we are establishing an enterprise hub. This aims to provide our most promising entrepreneurs with practical support from our 1,500 Fellows from across industry and engineering academia. That includes mentoring and coaching in practical aspects of business, including access to finance, and helping build the confidence and ambition they need to commercialise their ventures.

Growing more world leading *companies* at scale really does matter: our industrial future cannot be built on SMEs alone. We already have great companies, with terrific global brands.

- Rolls-Royce, based in Derby, puts nearly half of the engines into the world's modern widebody aircraft;
- Arup designs iconic building across the globe;
- Laing O'Rourke is at the forefront of innovation in construction;
- Vodaphone is the second largest mobile communications company in the world; and
- JCB engineers equipment for the world's construction companies.

We need big, heavyweight businesses like these, acting as traction engines to pull through long supply chains, skills and R&D. A modern industrial strategy needs to recognise the importance of the major players that we already have and create a climate to grow new companies, and supply chain companies can, in turn, operate at scale.

Which brings me to my next point about policy. The business of building new sectors, industries, and big companies is a very long game. More than anything else, investors and innovators need *stability*, with policy, tax regimes and investment incentives that

they know will be there for the long term. In a sense, it matters less where the goalposts are as long as they stay fixed for the duration of the game. The CEO of a major manufacturing company in Germany recently said to me that government policy in Germany isn't the paragon it is sometimes painted to be but, it is above all else, *stable.*

Many policy decisions affecting industry and infrastructure extend well beyond the five-year political lifecycle. Look at the huge challenge of modernising our energy system and getting our national infrastructure up to scratch. Of late, the signals have been anything but clear. How do we plan to cope with the phasing out of coal fired power stations? How green do we plan to go? Why does it take so long to start building new nuclear? Is another dash for gas the answer?

The scale of what we need to achieve in energy and infrastructure alone is staggering. That is why I endorse the call by our colleagues in the CBI for strong political consensus on core areas of policy to allow momentum well beyond the five-year life of a Parliament. There is a balance to be struck of course. In a democracy, the electorate has the right to vote for change. But a modern industrial strategy would, I hope, create buy-in across the political parties for a 20-year vision of what is needed.

Another practical benefit of an industrial strategy is the alignment of policy and greater cohesion between government departments. We will not succeed unless every government department is playing its part in delivering the growth strategy.

Throughout my career in business, I have seen how many other nations organise themselves so that policy is *tilted* in favour of their industrial base. Many nations cherish and nurture their flagship sectors. For a host of reasons, that produces a real competitive advantage and, in a global marketplace, we cannot ignore the consequences of putting ourselves at a disadvantage. It is hardly a coincidence that the German government is planning to buy 15 per cent of EADS Airbus shares that Daimler is planning to sell following them blocking the merger with BAe Systems.

And it's absolutely not about fending off all comers. Foreign direct investment is increasingly critical to the UK and our relationship with foreign investors must be part of the industrial growth strategy.

To take one example, look at what the strong investment in engineering from Ford and then the Tata Group has done for Jaguar Land Rover.

Take, for example, the stellar performance of the company's Range Rover Evoque:

- nearly 90,000 Evoques have been sold worldwide
- 30,000 supply chain jobs are supported, many in the northwest of England
- £3bn of contracts have been awarded to 40 UK based suppliers
- AND, it has won the Royal Academy of Engineering's MacRobert Award, which celebrates innovation and commercial success.

That's a great example of the kind of major company acting like a traction engine, pulling along a strong supply chain, driving growth and jobs. And there are many other great examples in this and other sectors.

My final point is probably the most important of all. It is about people, their skills, livelihoods and prospects. A modern industrial strategy for growth, backed from the top of government, sends a message to society, to families that: *industrial activity in all its forms, is important and provides a rewarding career choice for our young people.*

We have a lot of ground to cover to get this message across. But there is progress and interest to build on. I remember that terrific opening ceremony of the London 2012 Olympic Games, with its emphasis on engineering, technology and industrial activity, inside that breathtakingly engineered stadium. It is a matter of national pride that the Olympic engineering project was delivered ahead of time and below target cost.

We at the Royal Academy of Engineering are equally delighted by the cross-party support for our Queen Elizabeth Prize for Engineering. This biennial £1million international prize aims to raise the whole profile and image of professional engineering, especially to young people.

Given that I am an engineer and industrialist, you would expect me to be a passionate advocate of engineering industry as a career choice. Of course I want to see the UK creating a home-grown workforce with the skills that employers need. But there's another reason – in the Academy we have research showing that a career in engineering can provide value not only to the *economy* but to the *individual*. So a modern industrial strategy that supports the skills for industry provides a real *opportunity* for young people, whatever their social backgrounds, to enhance their life chances.

Our research also shows that we need more graduate engineers for both engineering and non-engineering jobs. Already, one in three engineering employers is finding difficulty in recruiting graduates. Nearly one third of high tech manufacturers are recruiting outside the UK because they can't get home-grown skills. I can back this up from my own experience. At Airbus, we have a shortage, in just one company, of 2,500 professional engineers in the UK and Europe.

Over the next year, 39% of UK engineering employers are planning to expand and recruit. Where will they get their graduate engineers? One solution is for industry to address the enduring under-representation of women in the professional engineering workforce, which is the lowest in Europe.

As well as graduate engineering skills, our strategy must put the right emphasis on vocational training. I would expect a modern industrial strategy to include an even bigger push for apprenticeships and university technical colleges. We welcome another recent announcement by the Chancellor that the 14-19 Engineering Diploma is to be reworked to create four rigorous qualifications, each equivalent to one GCSE. It's excellent news for growth and we are looking forward to getting down to work on it. Now that's what I call alignment!

So, the UK's strategy needs to see more engineers – especially young women –emerge from education and be ready to fill Britain's skills gap.

Prospects, fulfillment, excitement, making a difference – what more could a young person aspire to?

Conclusion

Ladies and gentlemen, universities, government and companies are in this together, backing a high tech, modern industrial strategy, capable of creating long-term wealth for our country and rebuilding our exports.

Minister, it is a big task, but it can be done. Be assured, we are here to support you and your colleagues in any way we can.

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