

The Foundation for Science and Technology

Talk Transcript

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Delivering the industrial strategy - how can government promote growth?

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Thank you very much indeed for the opportunity to join you this evening. I realise that the Foundation, in inviting Sir John Parker (representing business), Alan Hughes (representing academia) and me (representing Government) to speak here this evening, has physically embodied what an industrial strategy should be! Having the three of us together is, indeed, what it is all about – bringing business, academia and government all together.

I think that, in my Party, there has been a real shift in our thinking over the past few years and this is, interestingly, mirrored in a way by a shift in thinking from the Lib Dems as well. In my Party, we used to think that the only thing Government had to do was to get out of the way. There are still large numbers of businesses for whom that is their main ask, and so be it. They simply want lower taxes, easier planning rules, less red tape: those are a perfectly reasonable set of requests that we should listen to and try to comply with. But there are an increasing number of businesses and industrial sectors for whom that is not enough and they look to Government to play a far more creative role.

I tried, in a speech I gave back in January of this year, to set out what I thought that more creative role might be. I remember at the time (and we discussed it in my Party) we were waiting to see whether it was seen as controversial, whether there was a pushback from within the Party. Yet it has been broadly accepted. We have since then had Michael Heseltine's excellent report and you will find the words 'industrial strategy' coming from David Cameron, George Osborne, myself and many other colleagues. Of course I have the pleasure and the privilege of working in BIS alongside Vince Cable. Vince wrote a chapter for the Lib Dem Orange Book saying, when he was in opposition, that the DTI was so useless and the industrial policy was so useless, that the entire Department should be abolished! So Vince has been going through a similar intellectual process, culminating in his important speech in September about industrial policy.

So what has happened is that the party of John Stuart Mill, working alongside the party of Margaret Thatcher, has come to embrace industrial strategy. As to how it has happened well, I think there are several arguments that have swayed me. One that I think has probably had most impact on colleagues is that once you are in Government, you see that Government *does* stuff. You either do it randomly or you

try to have some overall strategic sense of what you are doing, but you find yourself taking decisions all the time. I guess, most recently, the trauma of the rail procurement exercise and the Bombardier case brought home to us that Government procurement was an example of Government *inevitably* doing stuff.

Looking further back I have increasingly come to the view that, even in the heyday of free market Conservatism, at a time when I was in the Treasury and then advising Margaret Thatcher in No 10, although we said we didn't have an industrial strategy we had one in reality. It was in the Financial Services Industry, in the City and included the investment to get the Jubilee line to Canary Wharf: this was a classic example of a sort of industrial strategy. If someone had ever told us "invest in a main line railway to take a line to a park where there is a large motor car automotive sector cluster which requires a rail line to shift the freight out", we would have said "we can't do that, that is industrial strategy". Yet, putting the Jubilee Line into Canary Wharf was alright! So I think, first of all, that governments do stuff and, well, if you are going to do stuff, try to do it competently, rather than randomly: that's one argument.

The second argument is that all we are looking for is what happens in America anyway. What is striking is how, behind the free-market enterprise rhetoric, so much happens in the US – indeed, you could argue more happens in the free-market US than in so-called benighted, socialist Europe! The rules about state aid in Europe are far more rigorous than anything they have in the US.

I increasingly think that we beat ourselves up in the UK and say "why do we lack the spirit of risk-taking enterprise that they have in the US?" Then we discover that they are far better in the US at *reducing* the risk that entrepreneurs and other risk-takers have to take – that is what clusters are. They have been well-defined as low-risk environments for high-risk activities or, to put it more parochially, a cluster is an area where you can, as they say in Silicon Valley, "change jobs without having to change your car parking space".

So they are very good at creating clusters, but they also do other things that essentially lower risk for entrepreneurs. Their equivalents of our Research Councils – the National Institutes of Health, the National Science Foundation – take funding much closer to market than our Research Councils. We say "why don't our venture capitalists take the risks they do in the US?" and the answer is obviously that in the US they have to take less risk because we stop the funding too early. This is where David Sainsbury's excellent creation of the Technology Strategy Board fits in, and other initiatives that we have introduced since (for example, the re-creation of SMART awards, the bioscience catalyst) all aimed at plugging those gaps. So we live within the framework of Research Council constraints, but plug the gaps between that and full commercialisation, for which people need proof of market and proof of concept, the kind of activity which is not necessarily what Research Councils are willing to fund. So the second argument is "they do it in America".

The third argument is that there is, in the modern world, a crucial form of comparative advantage in the quality of the relationship between Government, business and the research base. That itself contributes to an economy's underlying performance. There are other arguments as well: we have inherited a model, I think, of rather conventional thinking where the language is one of market failure – one is supposed to go around endlessly finding a place where markets have failed and then plug the gap. That is the conventional model and I find it pretty unsatisfactory myself because anybody worth their stuff can find a market failure. But that's the whole way the economic debate has shifted – once you have set up the criteria for perfect competition, you discover that all competition is, in reality, imperfect; hence you license Government intervention. So I personally find the market failure argument not as useful as the other three arguments I have set out.

Anyway, for whatever reason (Vince might give a slightly different approach) I think all of us have gone through a similar thought process in the two Parties in the Coalition and reached a shared Coalition conclusion that we do, indeed, need an industrial policy.

Then, we need a framework for it. Now you are going to have to be patient with me here because a framework for industrial policy does require a rather sophisticated 'wiring diagram' to convey its full subtlety; but it has five elements:

- First, we identify particular sectors where we think the comparative advantage argument particularly applies, where relations with Government particularly matter and where Government can contribute;
- Second, we focus particularly on access to finance as a real challenge for British business today;
- Third, (and John touched on this) there is the skills agenda. A legitimate and crucial role of government is investing in skills;
- Fourth there is procurement – the £270bn a year that Government spends. You might think we would try and use that to help create markets. Yet another lesson we can learn from the US is that one of the best ways you can finance an SME or a start-up is not to lend it money or have a venture capital investment, it is just to provide it with a contract – a contract early on. I think of a meeting I had at the Bio-Conference in Boston earlier this year with a guy who was trying to develop an organ on a chip. It is a classic story but true. I said "how's the funding on this?" and this wasn't some esoteric health research project, it was a Defense Advanced Research Projects Agency (DARPA) investment because they saw this as potentially of use on the battlefield. He was clear that DARPA were not just paying for the research, they were paying for the prototyping. He also expected that his first contract, very early on, would be for the first 10,000 units and that this would be a DARPA contract. So the procurement function is critical;
- The fifth part of the analysis concerns the technologies – the general purpose technologies of the future.

So those are the five dimensions for industrial strategy as we see them.

I would like, briefly, to touch on the first and the last of these. I think even if you don't claim these are the final word (none of this is claimed to be perfect) you have to accept there are going to be mistakes. One of the things that has crippled governments is the recognition that we don't have perfect foresight and in five or ten years' time someone is going to be able to come along and say "ministers said they were backing this sector and it's gone belly up" or "ministers expressed some interest in this general purpose technology and it has failed to deliver". That is, indeed, the case – I am still waiting to commute to work using a personal jet pack as used by James Bond in *Thunderball* – it hasn't happened and it is very frustrating! We are operating in an imperfect world with imperfect information, but that shouldn't stop us having a go. So the sectors that we have identified are the following:

There is, first of all a structure of three main types of sector and further sub-sectors within these. The first main area is Advanced Manufacturing. Here, we have identified aerospace, automotive, and life sciences (which in turn actually comprises medical and agri-tech).

Then there are the knowledge-intensive industries of the future, including Education. I'm very pleased we have education being recognised as a business sector and I should say to people that I respect, like the Stephen Killeens of this world, that people enter the world of Higher Education not necessarily because they think they are joining a business. We fully understand there are inherently worthwhile academic reasons for entering the world of universities, and that must be protected. Nevertheless, Education, at school, FE and HE levels, is also an important business sector nowadays. Then there are professional business services.

There are, in addition, what we call the 'enabling' sectors that stand behind the economy: there is, first, construction and, second, energy (which in turn can be thought of as civil nuclear, oil & gas and renewables).

If you add them all up you have 10 groups – aerospace, automotive, medical life sciences, agri-tech, education, professional business services, construction, civil nuclear, oil and gas, renewables, and in the course of the next six or nine months you can expect to see the responsibilities being divided up within BIS. Vince will do some, I will do some, Michael Fallon will do some, but between us we are each taking responsibility for a work programme in one of these sectors, with the aim of working with business and others to produce a report. This will include a set of proposals which will not be the last word, but will often reflect on excellent work which is already underway in some of these sectors. So that is the 'sectoral' bit.

The other part that is of particular interest to me is the technologies. Alan was absolutely right, I think the technological way of thinking is very important and this is where you start thinking about how to connect the science base to innovation technology and industrial policy. With general purpose technologies, one of the crucial criteria is wider application. I have summarised eight leading technologies which I have included in a report to the Prime Minister and the Chancellor. They draw on an excellent speech the Chancellor gave here in this building only last week.

These are distillations of the advice we have received from the Research Councils and the TSB. I am going to run through these very rapidly because, as I say, we don't claim they represent the final word and it will be interesting to know whether people agree or disagree. The eight are as follows:

1. *E-infrastructure*. This includes everything from data-driven discovery in science through to the way in which business is increasingly replacing physical prototyping by virtual modelling. This in turn shortens time-to-market for innovators and you can see a clear parallel between the skills of our leading scientists in the Large Hadron Collider or, in the future, the Square Kilometre Array, and the needs of our advanced businesses – the Rolls Royces and the Jaguar Land Rovers of the world – to be able to handle very large datasets and use them for modelling. Underlying e-infrastructure was something that concerned me two years ago when I thought Britain was not necessarily investing sufficiently in the IT and e-infrastructure requirements of our academic research base. I was able to persuade the Chancellor, who completely 'gets' this, of the £150m investment needed to at least keep us up with cutting-edge e-infrastructure for the academic community.
2. Second, *synthetic biology*. Applying, increasingly, engineering techniques to the life sciences. In many ways you could see that as standing for a wider, crucial training: the increasing combination of dry and wet, the increasing convergence of IT and engineering skills with the life sciences.
3. Third, *regenerative medicine*.
4. Fourth, *agricultural science and agri-tech*. You know, John Beddington's excellent work tells us that there are crucial challenges here. I think of exciting projects like the BBSRC's 2020 Project to get us up to 20 tonnes of wheat from a hectare of land within 20 years (on average you get about 10 tonnes of wheat from a hectare now, or 1 tonne in the case of organic farming).
5. Then there is *energy storage*. This is a challenge at several levels – be it for the batteries that drive our iPhones through to the need for batteries for new automotive. Our investment in this is one of the reasons for the European version of the LEAF electric vehicle being manufactured in Sunderland. There is also the wider need for energy storage for our energy infrastructure.
6. Sixth on my list is *advanced materials and nanotech*, where the decision on graphene is part of a wider framework of recognition that advanced materials matter for aerospace, for motor cars and other functions.
7. Seventh – *robotics and autonomous systems*, where I think there has been a very significant recent development with the legislation in California providing a legal framework for driverless cars by 2015, as well as changes in the American regulatory regime for drones and un-manned planes. I like the joke where they say "in future a plane will be flown by a man and a dog – the man's job is to feed the dog and the dog's job is to bite the man if he touches the controls!" This is, I'm told, the future and the fact that you can see the regulatory regime changing in America, both for aircraft and for motorcars, again tells me this could be a technology that is coming to a tipping-point.

8. Finally, *space* – not so much the upstream bit, though there are, of course, continuing advances in satellite technologies. We can be very proud that in Britain we are probably the world leaders in low-cost, small satellites, because the correct strategic decision was taken not to stick with launch technologies. So instead we have been driven to look at how you can get small, nimble, lightweight loads that can cadge a lift on someone else's great big rocket when they are putting a great big, thundering satellite into space. Increasingly, too, data collected via satellites will be applied to a whole range of purposes, from disaster-monitoring to parking your car.

So those are eight areas of technology and we – George Osborne and I – have put them up for debate. However, these are not the personal whims of one or two ministers, these reflect assessments by scientists in the Technology and Innovation Futures exercise. They are areas where there is significant scientific advance, where we are reaching the stage when you can see which technology going to be used to apply these advances, where we have in Britain the capabilities, perhaps comparative advantage for some reason, and the business opportunities to apply them. So, then, how do we apply them?

Let me end by saying how I see this work being done. It is pretty straightforward and of course Alan is right when he warns us that there are horses for courses – these things can't be completely standardised. In my experience, my starting model, my initial template would be as follows:

First, you use the convening power of Government to get around a single table the people researching it, the technologists developing it and the businesses that might use it or help pay for some of the R&D.

Second, if you discover that, as a result, a useful conversation is emerging, you may come to the point when you convene a leadership council which represents scientists, technologists and businesses. Crucially, (and this is one of the traps which we have to avoid) it mustn't be dominated by big incumbents – you have to spot the SMEs, you have to allow new entrants – that's crucial.

Then what you do with a leadership council is to find a trusted individual – it was Keith O'Nions with space, it was Dominic Tildesley with e-infrastructure – whose job is to describe a 'technology roadmap', again drawing on the advice of all the players around the table, in order to set out how the technology is advancing and the things that Government is doing and the things that business is doing. You will find areas of overlap, you will find areas where one is acting and the other isn't, but a technology roadmap is then commissioned.

If you have a technology roadmap which commands the consent of the sector, at that point you can go to the Treasury and say "we've got this model and we are pretty confident that if we in Government do a, b and c, the business sector will do x, y and z". The Treasury is very aware of the fact that the business sector in Britain is sitting on £750bn of unspent, horded cash and if you have a good enough case

and have built sufficient trust in the arena of the leadership council, you can say “I think if we do this, they are likely to do that. If we invest and put a bit of research funding or technology funding into this, I’m pretty clear from the assurances we’ve had that businesses will step up to the plate and do their part.”

That is how one can make it work.

Now, I don’t claim all of this is original. In fact it is rather important it shouldn’t be original and some of this was being developed in the final years of the previous Government. But I think it provides a framework within which we can make real progress. I think it commands goodwill and support from all the key players. If you look at all the decisions we have taken in the past two years in areas in which we are investing science capital, you can see we are serious about making this model work.

Thank you very much.