

The Foundation of Science and Technology

Speech presented at the Foundation meeting on 10th July, 2007 on the changes to the machinery of government: the creation of the Department for Innovation, Universities and Skills and the Department of Business, Enterprise and Regulatory Reform.

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I want to start by discussing where we are in the worlds of science, technology and business, in order to explore whether the responsibilities of these new departments will give them the best means of supporting the UK's industrial base; in other words to enable them to help Britain be a leader in the generation of new products and services.

Throughout the last century as modern technologies were applied in more and more spheres there was a relentless increase in complexity and fewer and fewer advances were made by individuals working alone. Ideas, of course, always originate with individuals but today the vast majority of new technologies are created by bringing together and developing capabilities which have been developed all over the world by thousands of creative people. Their success lies in the way the ideas of the individuals are brought together and improved. The list of examples is endless - the hybrid car, the mobile phone, the clean diesel engine, the jet airliner, electronic navigation, modern medical and dental surgeries, digital TVs and radios, medical scanners, the equipment used to decode DNA, high speed trains, satellites, electronic stock-markets and systems for financial exchange, the iPod, drug discovery and production techniques, and it is important to note that all of these advances came about through a process in which established capabilities were evolved and combined in new ways. They were the result of engineers seeking solutions to practical problems and human need. They depended upon scientific discoveries but none of the technologies I have mentioned emerged directly from basic science or from individuals working alone. They were the result of the efforts of large resources, hundreds of individuals working in harmony and building upon earlier generations of technology until they developed new capabilities that were wanted in the market.

How are we going to stay in this race? The art is first to have a team of creative engineers and applied scientists - and I do not place much importance upon what we call them - who can stay at the head of the pack in terms of innovation and speed to product and who are kept in informed of the market and the business environment. In most of the countries that will be our major competitors, the brightest of the bright choose these careers over all other careers. The competition is severe so we had better do our best to see that the same is true here.

Let me look back minute. Thanks to Tony Blair's strong and enthusiastic backing of science together with many years of knowledgeable guidance by Lord Sainsbury and Sir Keith O'Nions and high quality advice from Sir David King, Britain remains second only to the USA in terms of the accepted metrics of pure science; that is in the number of British authored scientific publications, the quality of the journals in which these publications appear, and the number of

times others refer to our results. However, our record for using this science to build or sustain industrial leadership in science based, high employment, industries has not been strong. We are also behind our international competitors in the percentage of our most talented young who opt for careers in applied science and engineering that I have been talking about. The first challenge for the Brown government, and he has wrestled with this issue for a long time, is how to bring the same emphasis to applied science and engineering as has been brought to bear on pure science so that the full potential of our science can be released. We have to find the means to persuade industry to bring their R&D funding and strategic commitment up to world standards, and to reverse the decline in student uptake. Progress in either of these will support the other. Industrial R&D needs the bright young minds and the clever young people will be attracted to the fascinating world of R&D if they see it flourishing.

Satisfying our need for applied science and engineering graduates is not just a matter of numbers. As I have said, it's a matter of attracting our top minds to these careers. It frequently takes more intellectual power to harness new scientific ideas to improve our lives and sustain our environment than it does to have the ideas in the first place. In China and India the competition for university places in engineering and applied science is so fierce that it makes our university entrance competition look tame. However, there is no doubt that we could be competitive if we could just persuade our brightest to participate. For positive proof of what can be achieved one only has to look at the financial sector, which for the past several decades has attracted the brightest of our numerate youth to what is a mathematically complex world. London now competes with New York and in many aspects has become the centre of the non-US financial world. If such a flood of talented graduates had been attracted to our manufacturing industries more of these industries would be in world leading positions. Admittedly there is also the issue of regulation, or lack of it, that has been important in the City but stimuli might also be found to boost our manufacturing enterprises - another challenge for the Brown Government. There are of course some bright spots, the universities are contributing well as are the aerospace and perhaps the pharmaceutical sectors, and the environment for entrepreneurs and small companies has improved significantly because of changes initiated by the Treasury but the need to sustain our large companies and to grow our small companies into large companies remains and the Government needs to persist with this issue until it is resolved.

It is not important that we work in all industrial fields. In fact it is important that we do not - we simply do not have the resource to do so. But in the fields in which we choose to compete I see no option but to do everything from the basic science to the modern sophisticated engineering that is required to develop and manufacture the resultant products and services. We needn't do it all in the UK but we must have access to it and a good deal of control over the resources and how they are deployed. The same is true whether we are sustaining an existing speciality or building a new competence. Past governments have eschewed this policy and made mistakes at both ends of the spectrum. On the one hand it has been thought that we can sustain an industry by merely manufacturing other peoples' products. Recent happenings in the automobile industry have shown us, once again, that this is rarely the case as two of our much loved brands are once again up for sale by their overseas owners. And besides, how are we going to attract the very brightest of our young to engineering if they are not themselves going to have the chance and the

dignity to design the world's best?

At the other end of the spectrum it has been thought that it is possible to carry out the intellectual research remotely from the development and manufacturing, ignoring the fact that most progress is evolutionary and that if you do not practice the present process it is unlikely that you will be first to think of ways to improve it. Asian countries that began with the manufacturing have rapidly built their engineering and development capabilities and are now establishing research and understanding the importance of pure science. They have yet to reach our level of capability in science but their efforts are built upon a broadly based pyramid of application which in the future will support and nourish an apex of pure science and not leave the science isolated from its application as is the case in many fields in this country. What needs to be done here is to build the pyramid underneath the science so that its potential is assured. This pyramid can only be built by industry because the resources are far too large to do it in the universities and small companies struggle. However, it is essential that there are no breaks in communication between the innovators that create the new products and those who understand the market and have to manufacture them. The links between product development and innovation and efficient manufacturing should be as strong as possible. Ideally they should be within a single organisation.

There is never a single point at which it is best to place a weak link in an organization but in an industrial company to do so between the product innovators and those who understand the market, the business environment and who have to manufacture the product, would be nonsense. The situation in government is different and perhaps we are about to enter a nirvana of joined-up government so that it won't matter where breaks occur, but, while it may not matter so much in the financial sector, I find it difficult to understand the logic of the new division of responsibilities when it comes to industry. There were many shortcomings with the old departments but I felt that these were more a matter of poor execution than a function of the wrong allocation of responsibilities.