

I want to thank Roland Aurich and the Secretary of State for coming to the Royal Society tonight. The Secretary of State has touched on some of the key issues facing research in the UK. Speaking for myself I have seen the benefits of international mobility and as research becomes ever more globalised the UK must be well positioned to capitalise on this.

Data access is another area where the UK is well placed to capitalise, if we invest in the right people and infrastructure. At present we are not fully capitalising on the scientific data gold mine, but we can.

And diversity is also crucial if we are to get the best from our most valuable resource – our people.

But tonight I want to turn my attention to how the research community can build on and go beyond the areas discussed by the Secretary of State and play its part in effectively driving sustainable economic growth.

On our panel tonight we have representatives of the three key elements needed for success in this endeavour; that is:

- Science; generating the ideas and knowledge which lay the foundations for the applications and technologies needed to drive the economy
- Innovation and commercialisation; taking that scientific knowledge and turning it into the applications and technologies required
- Politics; - even if the politician is by his own admission is actually an economist - which provides the environment and circumstances that promote this network of science, translation, innovation and commercialisation, and make it work effectively

I know the Secretary of State has been thinking about an Industrial Strategy to help our economy and the need for a long term approach to planning. This is essential. But for any strategy to work it must recognise how important this network is. It cannot just be an Industrial Strategy, it must be a joined up Science, Innovation and Industrial Strategy.

I speak tonight on behalf of science. Here in the UK our economy cannot rely on cheap labour or the exploitation of mineral resources. We have to depend on our brains, particularly the brains of our research scientists.

And as the secretary of State has emphasised, in his remarks, this puts people centre stage. I completely agree with him on the need to attract creative minds here from outside the country and also on the importance of openness, to be engaged with research across borders and with the public dialogue about science.

We need to train and attract the best scientific brains and we need to keep them here. We can do this because the UK is attractive throughout the world to scientists. That is because we are very good at science, second only to the US and, if Ralph Cicerone, President of the US National Academy of Sciences who is with us tonight will allow me, we are probably the most cost effective at scientific research in the world.

One of the reasons science works so well here is that we recognise that scientific research is a creative activity. Like other creative workers, scientists thrive on freedom. Organising them is like 'herding cats'. Freedom of thought, to pursue a line of investigation wherever it may lead and to uncover uncomfortable truths, is crucial to an effective scientific endeavour. A scientist whose thoughts are restrained, who is too strongly directed, or who is unable to freely exchange ideas will not be an effective scientist. We need to recognise this when we are determining how our investments in science are made.

Notice my use of the word investment. Support for science should not be seen as spending but as investment; investment that drives the economy, improves our health and quality of life, protects our environment, enhances our culture and civilisation.

Discovery of the Higgs Boson is not only a step for physics, it is a leap in human achievement.

We need public investment in research from Government and we need investment from industry too, with a greater sense of long term vision rather than short term thinking. The announcement yesterday by the secretary of state of £120 Million into the aerospace industry, including an investment into greener aircraft engines steered by Rolls Royce is very welcome. But we have a way to go with industrial support for R&D. In the UK business R&D is at 1.2% of GDP, in Germany it is 1.8% and the US 1.9%. I know from my own personal experience running Rockefeller University in New York how American entrepreneurs were prepared to be bold and take risks to bring science to the marketplace. We need more of that here in the UK.

We need this investment in the destination side of the so called 'valley of death', the gap between the generation of new knowledge and the application of that new knowledge for commercialisation.

A firmer bridgehead needs to be built involving a more extended and secure knowledge base in the area of interest before attempting to pass over the valley of death. As has been said "To rush into translation runs the risk of becoming lost in translation." Similarly, the bridgehead on the other side needs to be extended out, with more investment from industry in research aimed at capturing new knowledge from the other side of the valley. Without research capacity and knowledge in industry it will be difficult to build back over the valley of death. Our colleagues at the Royal Academy of Engineering know about building bridges – maybe they could offer some advice.

Just three weeks ago we celebrated the 100<sup>th</sup> anniversary of Alan Turing's birth. In the 1950's, companies like Ferranti were at the forefront of developing computers and for many the first experience of home computing was with the UK's ZX80. But where is our IBM or our Apple?

We can look for inspiration from an earlier period in our history. Increasing knowledge has led to specialisation, making interactions between different scientists, industry, the

public services and other professions more difficult. It was easier to make such contacts in the less complex society which existed at the time of the Industrial Revolution.

Take the Lunar Society for example, made up of chemists, biologists, doctors, industrialists, engineers and social reformers, meeting every month to talk and to exchange ideas. It was in this atmosphere that the industrial revolution was born and we need to reproduce it again today. This is a key message, the promotion of translation and innovation requires good permeability across all sectors.

We should not forget that we do have plenty to build on. Companies like Glaxo Smith-Kline, Astra Zeneca, Rolls Royce, BP and ARM are world leaders as innovators and businesses and we have a lot of success in fusing the creative arts with technology in computer gaming. The government's Tech City initiative could create the right atmosphere for innovative start ups. There are rich science and engineering veins that we can tap into. Low carbon energy sources offer huge potential for economic growth.

Our scientists can help innovation and economic growth in a wide range of fields. They can help open up a gold mine, if we recognise fully what they can do, if we invest in the right people and opportunities, and if we have the courage of our convictions.

I end how I began. For sustainable economic growth we need both brains and boldness. Our economy must be built on a network of science, translation, innovation and industrialisation. It will not be effective just to have an industrial strategy, we need a joined up Science, Innovation and Industrial Strategy.