GOV.UK uses cookies to make the site simpler. Find out more about cookies or hide this message

👑 GOV.UK

Search 🔍

Departments   Worldwide   How government works   Get involved
Consultations   Statistics   News and communications

Speech

Reaching 2.4%: supporting emerging technologies

Science Minister Chris Skidmore sets out how the government is backing emerging technologies, including quantum tech, in its modern Industrial Strategy.

Delivered on: **13 June 2019 (Transcript of the speech, exactly as it was delivered)**

Thank you for the opportunity to speak to you today.

While I realise this is meant to be a speech on the importance of quantum, I hope that you will indulge me today and allow me to set out a wider vision for how I believe quantum fits into the government's approach to emerging technologies as part of its Industrial Strategy.

On Monday, building on significant investments in this area, the Prime Minister committed to £150 million for quantum.

This means total UK investment through the [National Quantum Technologies Programme](#) is set to pass a major £1 billion investment milestone.

Our Quantum Programme is admired by many around the world. And our Quantum Hubs led by the Universities of York, Glasgow, Oxford and Birmingham are showcasing this innovation excellence.

The Quantum Sensing Hub led by Birmingham, for example, is leading work on new types of magnetic sensors using quantum properties. These could dramatically enhance our ability to diagnose brain and heart conditions, such as dementia and heart disease.

And our future plans for quantum are truly exciting. The National Quantum Computing Centre will speed up development in this area and allow businesses to explore the applications of these new technologies.

We'll be encouraging business involvement early on.

Ensuring industry understands how they will be affected by these new technologies. And helping firms shape these new technologies so that when they hit the market they will meet business's needs.

Thanks to our work thus far, these technologies are on the brink of commercialisation. And we are now seeing the industry emerge, with investment piling in.

River lane, for example, a pioneering quantum software developer, has today announced that it has raised over three million pounds in seed funding. They are on a mission to use quantum computers as a platform for innovation. Creating digital twins of materials or protein-drug interactions. Allowing new materials and pharmaceuticals to be designed instead of discovered.

The UK's leading position in quantum proves the success of the approach we have taken. And it is one we are mirroring across many areas.

Because we are committed to investing in the future, something of which we know quantum, and other emerging technologies will be an integral part.

So as well as backing quantum, we are keen to back other technologies for the future. Including technologies that may not yet have commercial potential, but that we support because we know that, not to do so, may be detrimental for the UK's future economy.

We are protecting the UK's world-beating fusion capability, for example.

Announcing £86 million in 2017 to develop a globally unique set of fusion research facilities. And last year we announced £20 million to begin development of the next generation of UK fusion reactor, STEP, while working to safeguard our international collaborations.

This puts us in a prime position to develop this safe, clean and virtually inexhaustible energy for the future.

We have invested heavily in robotics too. Today, the University of Lincoln's agri-robotics centre has been announced as one of thirteen government backed projects to benefit from a share of £76 million from Research England's Expanding Excellence in England Fund, a key part of the Industrial Strategy.

This will be the world's first centre for agri-robotics. Since the government announced robotics as one of the 8 Great Technologies in 2014, an astounding £366 million of government funding has catalysed new venture capital funds and over £1 billion of industry investment, including from household names like Ocado and Dyson.

And as we invest, we need to be mindful of how the benefits of new technology can be shared between businesses of all sizes. High Performance Computing for example could transform new and existing industries and business of every size.

We want to ensure future investments in High Performance Computing deliver benefits across research and innovation, including tech start-ups and SMEs. So I am pleased to announce that both BEIS and UKRI, working with TechUK, will engage closely with industry over the coming months to help smaller, innovative businesses understand the benefits of this new technology.

And while I've just mentioned a few of the emerging technologies we are backing through our Industrial Strategy, there are so, so many more. From Agri-tech to bioinformatics. From autonomous vehicles to energy storage. From immersive tech to precision medicine. These technologies are the future and developing them will create the industries of the future.

As a Government, we have committed to investing directly in the development of new technologies. Supporting new industries and supply chains and facilitating disruption and diffusion in established sectors.

Not all new technologies of course. But those with very wide applications. Where the development costs are great but so is the potential impact. Where investments are long term. The benefits dispersed. Where the market, quite frankly, won't provide. And where, as I have said, we may suffer in the future if we do not invest today.

Such open-ended investments can take you in exciting and unexpected

directions. When we started funding space technologies, for example, we couldn't have known some would ultimately be used to diagnose cancer. But that is the case.

This is not to say that we can guarantee success. Investing in new technologies is inherently risky. If it weren't we could comfortably leave it to the market.

But so long as the UK has R&D excellence on which we can build. So long as there is an international business case and we base our decisions firmly in expert advice, we should seek to continue to invest in emerging technologies. This is a fair risk to ask the taxpayer to bear given the enormous economic opportunities on offer.

And these can be great. Of the new technologies we are backing, for instance, robotics could be worth nearly half a billion dollars by 2025.

And it is thought that, ultimately, the quantum technology market as a whole could be comparable to the consumer electronics manufacturing market today – a global market worth £240 billion.

Nevertheless, we need to spell out a clear strategy for our future investment.

This is crucial for the government's commitment to spending 2.4% of GDP, both public and private, on R&D by 2027 – the OECD average. For we need to not only raise our investment, but decide the direction of this investment and what we are aiming for.

If we do not do so, we potentially lose the opportunity to retain our world leading status in areas like Fusion. And we potentially miss the opportunity to become the future leaders in technologies like quantum.

This is the third of 4 speeches I am making on our 2.4% target. I've already spoken on investing in people and forging new international research partnerships. I further intend to speak on public vs private investment and scaling up research.

But today my focus is on the importance of emerging technologies to our vision for reaching the 2.4% target. The importance, not just of how we invest in emerging technologies such as quantum, but of how to support them as well.

The role of government must be more than acting as seed funding, or simply functioning as a state bank investing where others dare not to.

We need to be clear that it is government's role also to create the conditions by which new emerging technologies can flourish.

David Willetts once said that it isn't the job of government to pick winners, but we can pick the race.

I would go further- we now have the chance to design the race course, and the track itself.

New technologies provide us with that once in a generation opportunity, to shape not just the future, but the policy landscape in which they will flourish.

Much is made about the application of technology, defining how we can take scientific research and apply it to the problems and challenges of the modern world in order to successfully commercialise research.

The application of government should also not be forgotten.

For 2.4% to succeed, we will need to ensure that emerging technologies can grow from their scientific potential, into realisable and scalable commercial opportunities. Only by taking products to market will the benefit of the investment in research and development be proven, incentivising business to make a sustainable commitment for the longer term to R&D.

But to return to designing the track: how can we remove or reduce the barriers to emerging technologies developing successfully?

Aside from investment, I heard a concern reiterated at a Tech Nation roundtable on Monday. A concern that I know is shared amongst many of you: regulation.

For if we do not get regulation right, we will make it impossible for emerging technologies to establish themselves, even hindering their development for the future.

New technologies always create new regulatory issues. And we need to get the environment right.

Last year, for example, the Microsoft Company President called on the US Congress to take on the task of regulating the use of facial recognition systems.

And here in the UK the Law Commission has kick-started a review to identify legal obstacles to the widespread introduction of self-driving vehicles.

We understand that we need to create the right regulation to enable new technology to thrive.

That's why I'm delighted that on Tuesday, the Secretary of State announced the publication of the government's white paper on [Regulation for the Fourth Industrial Revolution](). Setting out plans to transform the UK's regulatory system, to support innovation while protecting citizens and the environment.

This builds our wider work to ensure regulators keep pace with, and support the introduction of, technology. With initiatives like the Regulatory Horizons Council and the Regulators' Pioneer Fund.

And once the right regulatory conditions are in place, we must ensure that new technologies can be tested and evaluated effectively.

We all know that this means better, faster, data.

Data lies at the heart of ensuring that new technologies are able to prove themselves.

The government has identified AI and Data as 1 of 4 Industrial Strategy Grand Challenges - seeking to maximise the potential of data and artificial intelligence to enhance our lives in powerful and positive ways.

We also want the UK to be at the forefront of global efforts to harness data and artificial intelligence as a force for good.

We have established a new Centre for Data Ethics and Innovation, which will look at how to improve the way data and AI are used and regulated.

We are setting up Digital Innovation Hubs - the NHS, academia and industry working together to improve access to, and the quality of, NHS data. We have published draft guiding principles for the use of NHS data for research and innovation. And we are working with the NHS, academia, health charities and industry to refine these and allow the full benefits of data sharing to be realised.

Providing effective, meaningful support for emerging technologies, requires understanding the challenges faced by creators, inventors, researchers. So we can design that racecourse that I spoke about, but for the particular race that they are running.

Since becoming Science Minister, I have had the opportunity to visit over 30 universities, and many other research infrastructures, science parks and companies conducting research.

And a topic that has come up again and again is Intellectual Property. For once scientific proof of concept has been established, I find unresolved issues remain. How best to move to a commercial proof, for example? And who should own the IP rights to emerging technologies and their application?

Many universities have established incubators or spin outs, with some really inspiring success stories. I've been impressed, for example, visiting RCA Innovation, the University Enterprise Zone at UWE, Launchpad in Falmouth, the Hive at Nottingham, and many others over the past 6 months.

The government is keen to encourage more enterprises such as these.

That is why I launched the University Enterprise Zone competition in March, to help fund up to another 10 zones across the country.

However, while there are many examples of great work going on across the country – inspiring innovation through university and SME collaboration – there are no agreed principles around which the rights to innovation have been firmly established. Some universities retain a share of the IP, to varying degrees, and others do not.

I believe that we will need to do more to establish a better, strategic focus, for IP when it comes to helping to harness emerging technologies in our Industrial Strategy.

I could not be more convinced that IP is central to fostering a vision that puts innovators and creators at the heart of our mission to grow and retain talent.

For a strong and healthy, not to mention clear, IP system is central to a value system that rewards success, hard work with the benefits of ownership.

Just as they disrupt existing ways of thinking and present industries, emerging technologies are also challenging how we ensure effective IP protections for the future.

I'm delighted that next week, the World Intellectual Property Office have chosen London to host a key conference on AI and IP, looking at just these challenges.

And I am looking forward to meeting Dr Francis Gurry – the President of WIPO – to discuss how we can ensure IP protections are prepared for the fourth industrial revolution.

And today, we must consider how our Industrial Strategy will help us lead the fourth industrial revolution, as we did the first.

Last month I attended the launch of the landmark report of the UCL Commission for Mission-Orientated Innovation and Industrial Strategy, chaired by Mariana Mazzucato and David Willetts.

It sets out eloquently the fact that industrial strategies have traditionally involved horizontal policies to improve the conditions across the economy, such as skills and infrastructure. As well as vertical policies targeted at specific sectors such as automotive or aerospace.

But, it argues, mission-based approaches to innovation have the opportunity to redefine that vertical approach, realigning it to focus on problems that affect many different sectors.

And helping to ensure that a range of emerging technologies can be deployed to achieve a specific goal. Meeting a defined challenge for the

future.

It is in pursuit of these ends that we have placed 4 Grand Challenges at the very heart of our Industrial Strategy.

These reflect the major forces shaping the world today, to which the UK – with its academic and industrial strengths – is in a prime position to respond.

Alongside AI and Data, which I mentioned earlier, they are:

- harnessing innovation for an ageing society
- setting the UK at the forefront of the future of mobility
- maximising the opportunities from clean growth

We want the UK to be at the fore of meeting these challenges so that, as the world moves towards a low-carbon economy, and as societies age, we have the technologies it needs to adapt. Opening up enormous global markets.

We need our finest minds on the job if we are to solve these challenges. This includes some of the youngest.

So I am pleased to announce the Government will be investing almost £1 million in the expansion of the Longitude Explorer Prize, working with NESTA Challenges. Targeted at 11 to 16 year-olds, this will encourage young people to use their entrepreneurial skills to address our Industrial Strategy's Grand Challenges.

As we face these defining challenges of the next 10, 20 and 30 years, we will need to harness every ounce of talent, from every person, of every age, in every part of the UK.

And the enormous benefit of the challenge approach at the heart of our Industrial Strategy, is that it encourages partnerships.

Partnerships across industry and academia, and across different sectors, disciplines, and technologies. Which will be critical to meeting the complex Grand Challenges we face.

For complex challenges require complex solutions and the greatest gains often come from enabling new and emerging technologies to converge.

It is quantum combined with AI, and robotics, for instance, that can revolutionise autonomous vehicles. Rather than just one technology alone.

Setting challenges in this way is a tried and tested approach. Proven to drive collaborations, boost markets and provide excellent returns.

Look at the Human Genome Project. Where a challenge by government, backed by public funds, saw engineering, informatics and biology come together to unravel one of the great human mysteries.

With huge returns: for every dollar the US government spent on the Project, they saw a return of over $140 for the US economy.

It's no wonder this is an approach we want to replicate today. And we are already seeing the results play out – with technologies applied to novel problems and collaborations flourishing.

Take, for example, initiatives like the quantum Gravity Pioneer Project. A consortium of industry and academic partners, backed by £6 million of government funding.

Developing a prototype cold-atom sensor with the potential to be used in infrastructure projects such as roadworks and rail, significantly improving the ability to detect hazards under the ground.

We are seeing this challenge-led approach succeeding across different technology areas.

But we want to go further and faster.

That's why we have set 'Missions' within each of our Grand Challenges: defined goals to be met in a set time.

Driving faster solutions.

So, for example, by 2030 our AI and Data mission will have transformed the prevention, early diagnosis and treatment of chronic diseases. Generating a whole new industry of diagnostic tech companies.

Again, this is a tried and tested approach to accelerating innovation, collaboration and private investment. Driving new markets and new – sometimes surprising – technologies.

When NASA set its mission to put man on the moon few people's first thought would have been that nutrition and textile innovations would abound.

It is these 'moonshots', as Professor Mazzucato, calls them, which we now need to seek to help establish the successes, failures and the unexpected potential of emerging technologies for the future.

As we celebrate the 50th anniversary of the moon landing next month, it is worth reflecting upon that vision that Kennedy set, back in the Rice Stadium in September 1962. A grand vision, yet with a mission so specific, even his words shine with its precision:

" If I were to say, my fellow citizens, that we shall send to the moon,

240,000 miles away from the control station in Houston, a giant rocket more than 300 feet tall, the length of this football field, made of new metal alloys, some of which have not yet been invented, capable of standing heat and stresses several times more than have ever been experienced, fitted together with a precision better than the finest watch, carrying all the equipment needed for propulsion, guidance, control, communications, food and survival, on an untried mission, to an unknown celestial body, and then return it safely to earth… and do all this, and do it right, and do it first before this decade is out–then we must be bold."

We too must be bold if we are to meet our own Grand Challenges for the 21st century. That is why the Prime Minister has now set our nation the challenge - that I announced yesterday – for the UK to become the first major economy to reach net zero carbon emissions by 2050. This we must achieve to save our own planet.

It's a mission which we simply can't afford to fail. And yet our success, along with the future success of our Grand Challenges, together with meeting our 2.4% target, will depend on us embracing the emerging technologies for the future.

And we will do that through listening to you, the innovators, so that the racecourse is expertly designed – with the regulation, the data and the IP system you need to thrive. We will do it by being brave enough to invest in new technologies, accepting that some may not succeed. And we will do it by setting challenges and missions for industry and academia, driving the collaborations we need to see.

That is how we will support emerging technologies, and ensure our future. Thank you.

Published 13 June 2019

Explore the topic

Research and development

Prepare for EU Exit

Prepare your business or organisation for the UK leaving the EU

Living in Europe after the UK leaves the EU

Prepare for EU Exit if you live in the UK

Continue to live in the UK after it leaves the EU

Services and information

Benefits

Births, deaths, marriages and care

Business and self-employed

Childcare and parenting

Citizenship and living in the UK

Crime, justice and the law

Disabled people

Driving and transport

Education and learning

Employing people

Environment and countryside

Housing and local services

Money and tax

Passports, travel and living abroad

Visas and immigration

Working, jobs and pensions

Departments and policy

How government works

Departments

Worldwide

Services

Guidance and regulation

News and communications

Policy papers and consultations

Transparency and freedom of information releases