Sir David Cannadine:

Good morning everyone. I’m David Cannadine, President-elect of the British Academy. I assume the Presidency, if that’s the right phrase, later this month. And I’m here today not only to represent the British Academy, but also to represent the other three national academies, that’s to say the Academy of Medical Sciences, the Royal Academy of Engineering and the Royal Society, which, in our Fellows and our many activities, represent and recognise research, scholarship and innovation of the highest quality across the full spread of disciplines from the arts, through to the humanities and social sciences, from engineering, to medicine, to science and technology. And we are delighted, that’s to say the four academies, to be hosting Sir Mark Walport’s speech, setting out his vision for UK Research and Innovation, of which he has recently been named Chief Executive. But before that we are lucky and privileged to have here this morning Jo Johnson, the Minister for Universities, Science, Research and Innovation, and very shortly he is going to say a few words as well.

It cannot be said too often, and I propose, in my – the course of my Presidency, to say it frequently, that the UK’s research and innovation base is a national asset, delivering economic, social, cultural and health benefits for British society and for people across and around the world. And the UK’s research culture is one of the activities of which it can still truly and properly be said that we punch very much above our weight.

The UK, as I’m sure you all know, boasts less than 1% of the world’s population and only 3.2% of global spending on research and development, but 16% of the world’s most highly cited research papers are produced here in Britain. And another index of Britain’s significance and importance as a global player in the world of high quality research is that in 2016, the Global Innovation Index ranked the United Kingdom third out of 128 countries. And that’s third from the top going down, not from the bottom going up.

We live, of course, in an uncertain political world. We are apparently racked by national angst, uncertainty and soul-searching. But in that sort of world it’s more important than
ever that we must recognise and invest in research and innovation. And to that end this is an occasion enormously to welcome the Government’s industrial strategy, as well as its commitment to an almost £5 billion increase in R&D spending over the next four years.

Many of us in this world of higher education and research are particularly pleased that Jo Johnson has retained his position as Minister for Universities, Science, Research and Innovation. I think the words ‘strength and stability’ were perhaps bandied around a little too cavalierly in recent weeks. But we are very delighted that Jo Johnson does indeed embody for us and for our sector exactly that strength and stability, and it’s a huge pleasure to welcome him here this morning. Jo [applause].

Jo Johnson MP:

Well, thank you very much, David, and thank you to the four national academies for hosting today’s important event, important speech by Mark. We do indeed live in uncertain times and I’ve now been reappointed, or appointed to this position three times in the last 23 months. So, I think that’s a measure of how turbulent it is out there. But I’m delighted to be back in this position as Minister for Science and Universities and I’m particularly pleased because it gives me a chance to continue working with many of the people in this room and to continue to work with Sir Mark and others in implementing the Higher Education and Research Act, which I spent much of the last two years helping to develop and then actually legislating for, through the Houses of Parliament. So, this is an exciting time for science, research and innovation in the UK.

I think the creation of UK Research and Innovation represents what must be the single largest reform to our science and research system since the 1965 Act that brought into being many of the features of the current Research Council system. So, it’s the biggest reform in 50 years.

Research and innovation is clearly at the heart of this Government’s economic policy and it’s at the heart of our industrial strategy and we are, as I’ve said now many, many times, really putting resources behind this rhetoric. At the 2016 autumn statement, as David has reminded us, the Government announced a very significant increase in public R&D spending, an additional £4.7 billion over the trajectory to which we’d already committed. And this will mean, in practical terms, an additional £2 billion a year for R&D by 2020 and that is really a significant commitment at a time of continuing pressure on the public finances and it represents the single biggest increase in R&D spending, in the public component of it, since 1979. So, I hope that that financial commitment really underscores how central we see research and development being to our economic future.

Now, in her vision for the UK, the Prime Minister has described it as being one in which this country is the go to place for Scientists, innovators and tech investors the world over. And the Prime Minister has made clear that she really wants us to be a country that is successful, continuing to be successful, in attracting the best and brightest minds. UKRI, under Sir Mark and John Kingman’s leadership, is going to be absolutely central to our delivery of that
vision and how we make it a reality. And so, to that end, I’m very pleased to be able to announce today that we will be putting £100 million of that uplift I’ve just mentioned, towards the creation of a new Global Talent Research Fund.

Now, this new fund will be used to attract highly skilled Researchers to the UK. It will be named after Ernest Rutherford. Now, why Ernest Rutherford? Well, he is, of course, as many of you will all know, one of our most distinguished Scientists. He is the father of nuclear physics, a Nobel Laureate, holder of Chairs at the Universities of Manchester and Cambridge. But why him in particular, that we have many such distinguished Scientists? Well, it’s because he was an immigrant to this country. He was an immigrant who came to the UK, at the age of 24, from New Zealand. Now, Rutherford and his immense contributions to science exemplify our vision of a Britain that is open to the best minds and the best ideas around the world and stands at the forefront of global collective endeavours to understand and to improve the world in which we live.

Now, the Rutherford Fund, in practical terms, will provide fellowships for early career and Senior Researchers, both from the developed world and from emerging research powerhouses, such as India, China, Brazil and Mexico. It will be administered jointly by the national academies and by UKRI. We look forward, very much, to welcoming, in due course, these talented Rutherford Fellows to the UK. The Rutherford Fund will, I believe, send a strong signal that even as we leave the European Union, we remain open to the world, more so than ever, and it will reinforce our ambition of making the UK the global go-to nation for innovation and discovery.

Now, these investments are just the start. In our manifesto, the Conservative Party’s manifesto, we set out a bold vision of increasing the UK’s R&D levels to 2.4% of GDP within a decade. This is another significant increase on top of that which we already promised in the Autumn 2016 Statement, and it will require smart public funding and investment by businesses and also new approaches to delivering these goals. UKRI will be absolutely central to this process and it’s my aspiration and the Government’s hope that it will in time gain a reputation as the world’s best funder of science, research innovation and as an institution that other countries seek to emulate.

I’m truly delighted that Sir Mark will be taking this task forward, working with Sir John Kingman. Mark combines a track record, as a distinguished Researcher and Fellow of the Royal Society, with a reputation as a bold and creative funder of science and innovation from his time as Director of the Wellcome Trust and experience of operating at the highest levels of Government as Chief Scientific Advisor. It’s a great pleasure for me to be here today to listen to Mark outline his vision for UK Research and Innovation and I look forward very much to hearing what you have to say. Thank you [applause].

Sir David Cannadine:

That news about the Rutherford Fund was indeed, very good to hear. Rutherford, as you rightly said, was, of course, one of the great Experimental Physicists of his generation. Born in New Zealand, he worked in Canada, before coming to Manchester University and then to
Cambridge. And I remember, there’s a rather vivid essay on him by C. P. Snow in Variety of Men, which points out that Rutherford very properly had a high opinion of his own talents, which were indeed, very considerable. And somebody said to him on one occasion, “You’re always at the crest of the wave, aren’t you?” To which he replied, “Of course I am, I made the wave.” Nor should we forget that of distinguished academics from New Zealand coming to adorn and enhance British academic life and through that the global research culture more broadly, was a figure in a later generation, Sir Ronald Syme, a brilliant historian of the Ancient World, who wrote, in fact, about elite circulating from the periphery to the centre, which was exactly what he did in his own life. New Zealand does breed more people than just marvellous rugby players.

It’s a huge pleasure to welcome Sir Mark Walport, who is going to speak now about his vision for the UK Research and Innovation Organisation, of which he is now going to be the Chief Executive. It was often said of President George Bush, the first President George Bush, that his problem was that he lacked what we was called the ‘vision thing’. I do not believe, that in his remarks this morning, Sir Mark Walport is going to be suffering from panoramic deficiencies or aspirational shortcomings. And so, it’s with a great sense of both personal pleasure and high expectation that I should like to invite Sir Mark Walport to address us now [applause].

Sir Mark Walport:

Thank you very much indeed, David. No challenge, then. Thank you, Jo. Thank you all very much indeed for coming. Particular thanks to the four national academies for hosting this event and the Institute of Civil Engineers.

What I hope to present is not my vision, but the – our collective vision, because I think it’s extremely important that we all own UK Research and Innovation. And I’m going to start by giving you four reasons why UK Research and Innovation is both timely and necessary. So, first of all, I think everyone will recognise that the world we inhabit is changing and an enormous amount of that is due to us humans. So, the population of the planet is growing, with more than 7.5 billion people on it, and the demographics are changing in very extraordinary ways. So, on the left of the figure, you see the ageing population in Europe and then you see the young population in Africa and in Asia and by 2050, you see ageing of that Asian population.

With that extraordinary change in demographics goes a whole string of pressures, for which research is going to be extremely important. So, the pressures of migration and the pressures of what at least some of the geophysical community are causing – calling the era of the Anthropocene, where, whatever species is around in millions of years will be able to look back in the geological record and see the impact of our generation of humans. And so, we have the challenges of air quality; we have the challenges of infectious disease; we have the challenges of pollution of the oceans. So, there are plenty of what have been called grand challenges. And, of course, the grand challenges started in the world of mathematics at the turn of the last century with David Hilbert, but are an appropriate way of describing things.
So, the world is changing. The world of science and research is changing. We have the most extraordinary tools. I recently had the privilege of visiting CERN and seeing the ATLAS detector on which the discovery of the Higgs boson, or the identification of it, depended. We’re in a world of large data where CERN itself, where Tim Berners-Lee was responsible for the development of the web. The world of big data means that we can analyse research data from every field. In science it started with astronomy, but it now reaches the social sciences, biomedicine, almost everything. And to tackle those big questions that are posed by changes in the planet, we need increasing interdisciplinarity, looking through the lens of single disciplines will not answer all of the research questions that we face. And of course, as we’ve already heard, research is a global activity. We practice in an international landscape. We are internationally diverse, and much of the science that is done today is international in its nature, both through the instruments that are needed, which can’t be funded by any one nation alone, and also, by the desire of Researchers to work with their best counterparts wherever they are. And so, the world of science offers new solutions.

The third reason for the formation of UK Research and Innovation is that the world of business and industry is changing. So, we’re going through the fourth Industrial Revolution and the image there is of a Blatchford limb, which won the Royal Academy of Engineering McRobert Prize last year. And that is a wonderful example of the fusion of physical science, digital and biological, in the most extraordinary engineered product, which is beautifully designed, and I’ll come back to that later.

We’re living in a world of business that is increasingly driven by data, the availability of data, the ability to analyse it in new ways. And so, for example, the advent of precision agriculture, which will lead eventually, to better food yields, more accurate use of irrigation and fertilisers and better use of pesticides and other crop treatments, is all going to be driven by data.

Increasingly, everyone recognises the blurring of manufacturer and services. So, jet engines you essentially buy, by the hour of flight. And coming back to one of the challenges, which is our extraordinary use of resources, increasingly, we need to look to ways to reuse resources and maintain their value throughout a much longer lifecycle, so the so-called circular economy. And as, of course, as Jo, the Minister, has already indicated, we have an industrial strategy and how can you have an industrial strategy, which isn’t powered by science, engineering, technology and the application of the social sciences as well?

And the fourth reason, of course, is that society itself is changing, both in the UK and around the world. And as we’ve seen, trust, and this is a worldwide phenomenon, in the establishment and in experts, has been challenged. And it’s interesting, because if you look back to the middle of the 19th Century and the battle between Darwin and the establishment at the time, in the famous debate between Huxley and the Bishop of Oxford, the Bishop of Oxford was definitely the establishment and Huxley was definitely not. I think we’re now in a world where the world of research is seen, by many, to be part of the establishment, and I think that we have to engage with communities and demonstrate what it means to be expert.
The role of social media, of course, is changing society in many ways and that, in and of itself, is an important topic for research. It’s a truism to talk about globalisation, but someone can shout in any part of the world using social media and it will be heard virtually instantaneously in every other part of the world.

And finally, something which I think is important is that I think we sometimes have conversations at cross purposes, where issues of science and research meet issues of public values. And so, a good example of that is the debate about genetically modified organisms, where the question is not, in a research sense or a science sense, are genetically modified organisms a good or a bad thing? The question is always, what gene, what organism and for what purpose? But sometimes, the debate with people who oppose genetically modified organisms doesn’t recognise that there are some people who simply believe one shouldn’t fiddle with nature. And then you have a discussion at cross purposes, because we think we’re talking about science, we’re being opposed by people who say that science is bad, when what they really mean is, our values mean that we don’t want to do this. And that, of course, is the power of democracy, and we have very well-established systems in the UK of dealing with these contentious issues, for example, the debate around the prevention of mitochondrial disease. And so, public engagement is absolutely key.

So, faced with all of those changes, it makes sense to look at our research and innovation landscape in a much more integrated fashion, and in the next few minutes, I’ll indicate what I think it is that UK Research and Innovation should be doing and how it can make this whole greater than some of its parts. So, the first thing to say is that I think everyone here will recognise that we’re building on an extraordinarily powerful research and innovation funding landscape.

You’ve already heard from David Cannadine the bare statistics, which show how effective we are in using that public funding wisely to advance research and innovation. So, this is the simple mechanics of the organisation, what it actually comprises. So, there are the seven Research Councils here. There’s Innovate UK and then there’s this new organisation, which I’ll say a little bit about, called Research England. So, UK Research and Innovation will bring together, under a board, chaired by John Kingman, sitting in the front row these nine organisations. Research England arises from the changes in the Higher Education and Research Bill and basically, it comprises the QR support, the dual support for universities in England. But I think it’s very important to say, and I’ve visited Scotland and Wales and I’ll be going to Northern Ireland, that in the same way that HEFCE works closely with its Scottish, Welsh and Northern Ireland Executive counterparts, Research England will do so in exactly the same way. And David Sweeney, who’s sitting in the audience here, will be the first Executive Chair of Research England and works closely with his counterparts.

So, the important thing to recognise is that all of these functions are reserved functions for the whole of the United Kingdom. They will remain that way. We have enormous strengths in research and innovation across the whole of the United Kingdom, with great strengths everywhere. That will continue, as will the partnership over the dual support system, which is a devolved matter in this structure. But what UKRI Board will do is, it will bring together
these organisations and the challenge and the opportunity is to tackle those four changes in the world, in the ways that I’ll describe in the next few minutes.

So, the vision is a simple one. It is to be the best research and innovation agency in the world. Of course, that’s very easy to say, but what does it actually mean? How are you going to do it? And there are basically three pillars on which this activity will be based. So, firstly, knowledge; pushing the frontiers of human knowledge in all of its aspects. But of course, pushing and developing that knowledge is only the beginning, because if you don’t apply the knowledge then we’re missing out. And so, there’s the economic impact of the work of UK Research and Innovation and it’s about delivering economic impact and creating better jobs at a time when technology means that jobs are changing at an enormously fast rate. And then, the impact on society and culture is about creating social impact by supporting society to become stronger and healthier.

So, how are we going to do all of this? The first Industrial Revolution was powered by the steam engine, and it’s appropriate in a way that we should be sitting in this room, surrounded by the names of Arkwright, for example, and Newcomen, who were responsible for that first Industrial Revolution. But I would suggest that the Industrial Revolution we’re going through now is also powered by steam, science, technology, engineering, arts and mathematics. And so, if you look at the objects on the right, the iPhone and the Dyson, they basically work because, not only are they well engineered, but they’re extraordinarily well designed. And what the UK brings is not only extraordinary researchers in the science, engineering, technology, the arts and humanities, it brings extraordinary designers as well. And of course, it was two British designers, Jonathan Ive, who arguably helped Apple to become the extraordinary company that it is today, and James Dyson responsible for, I was going to call them hoovers, but that’s a bad mistake. So, I really do think we’re moving in from stem – from steam to steam.

Now, I’ve already said, we’re building on existing strengths and those existing strengths, and if anyone doesn’t know, that is the famous Viscount Haldane, extraordinary philosopher, politician. And the Haldane Report was about the whole machinery of Government in about 70 pages, and if anyone wanted to know how to write a good report they should read Viscount Haldane’s report. It encompasses the whole machinery of Government for the Ministry of Reconstruction. It’s an extraordinary work. So, we’re building on the Research Councils and Innovate UK, we’re building on the dual support system and the work of Research England, we’re building on that famous Haldane Principle. Although Haldane’s most important principle, in many ways, was that he thought that Government would operate better if it took better account of evidence. That’s what Haldane really said. And he also said that It was important that experts made the decision about which particular programmatic area to fund, or within each particular problematic area, but he also said he thought it was important that the Nascent Research Councils talked to Government about some of the challenges that face society. It’s built on – UK Research and Innovation will be built on excellence and rigour, and we will have a global outlook.

So, what are the ingredients for success in this jigsaw that is UK Research and Innovation? Well, first and foremost, research is about tackling important questions, both fundamental
questions and applied questions, and research is about people. So, it’s about supporting the brightest minds, but recognising that the brightest minds come in many and diverse forms. But ultimately, our research system is only going to be as good as the people within it. But, of course, then those people require the infrastructure to be able to do their work in the most effective way. And so, going forwards, we badly need an infrastructure roadmap and that is something that UK Research and Innovation is already starting to tackle.

Everyone here knows that good research depends on collaboration. Good innovation depends on collaboration. The people that discover things are only rather rarely the people that are capable of taking through the full cycle of innovation to products that will change the world. And that requires collaboration and it comes back to, if we’re going to have the most effective research system, we recognise – we need to recognise the different types of job that are needed in order to have a rounded research and innovation infrastructure.

The ingredients of success include engagement and partnership. We have to work with each other, but we have to work with stakeholders, with our stakeholders in society, with Government, with Parliament, with industry. We need to work very widely, both in the UK and around the world, and we may be able to justify, ultimately, to the taxpayer, that the work that we fund and support and engage in is subject to rigorous evaluation. And that, I think, is a task we need to do ever better and we will need your help in working out how to do that in the best way.

So, as you’ve already heard from Jo, there are extraordinary opportunities as well and so, the announcement in the Autumn Statement in 2016 of that additional £4.7 billion of additional funding to 2021, is very welcome indeed, and that very strong commitment to science and to research generally. We have some specific opportunities around the Industrial Strategy Challenge Fund and the Newton Fund and the Global Challenges Research Fund, and I’ll say just a little bit more about those in a moment.

So, let me take each of these in turn. Fundamental questions: the needs of society, how we work with Government and with society as a whole, how we’re going to advance the UK economy, and research and innovation as a key element of the UK’s place in the world. And I think many of us here would recognise the power of science and research in diplomacy. So, when the UK’s relations with China were starting to thaw, it was the Royal Society that absolutely spearheaded that warming of relationships and today, the name the Royal Society opens extraordinarily senior doors in China. And I think the opportunities for us to engage the world through science and research diplomacy, is an enormously important one.

So, asking fundamental questions. Well, the list of fundamental questions is enormous. We wouldn’t have interfering RNA and much of the technology that’s changing our ability to manipulate genomes, without people who studied the most basic biology, understanding plant host defence mechanisms against infectious diseases, the work of people like Sir David Baulcombe. In laboratory molecular biology recently, work on the structure of the cell on how chromatin, chromosomes are packed into the nucleus, a quite extraordinary feat really, of evolution.
And we’ve already heard about crests of waves. Well, the illustration is of two different sorts of waves. On the top is an image of gravitational waves and on the bottom, of course, is the Great Wave of Hokusai, on show at the moment in the British Museum. So, that work on gravitational waves, with enormously important contributions from the UK, but a truly global collaboration with global infrastructure, the power of material science, and the extraordinary opportunities that that offers, and the need in the future to be able to integrate materials with biology, with information technology, these all depend on asking the most fundamental research questions. Questions in the arts and the humanities, in the social sciences, how can we measure poverty most effectively? And in the world of culture, where the Arts and Humanities Research Council supported some of the recent research on Hokusai that forms the background to the wonderful museum – the exhibition open at the British Museum at the moment. So, waves are important for UK Research and Innovation, though, perhaps not in the Rutherford sense.

The needs of society, the questions there are pretty obvious as well. I went to see these extraordinary pumps in the Somerset Levels a few years ago, shortly after I started as the Chief Scientific Advisor to the Government. But the world of hydrology and meteorology remains very important, with the full spectrum of analysis from the most fundamental modelling and computer science, which is essential to understand complex climatic systems, through to modelling and analysis at the level of the town, the city, the village, the valley, in order to understand and protect us against flood risk. No-one, I think, in the audience can be unaware of the issues of air quality from pollution from vehicles, but also, from agricultural pollution and all of the challenges that that poses for human health.

There was an American Surgeon General, in the 1950s, who famously said that “Infectious diseases were no longer a problem because of the discovery of antibiotics.” That turned out not to be a great prediction. So, infectious diseases remain a huge problem and, in many ways, an increasing problem, as population density goes up, as we move around the world, and as we live in ever closer contact with animals, from which the most dangerous zoonotic infections emerge. And so, things like Zika are an enormous challenge, the Ebola epidemic in West Africa.

The challenges of ageing societies: science, technology, engineering, design, the social sciences has an enormous amount to offer in the social services. How do we keep people healthier and at home for longer? The research question is associated with security, with understanding the mechanisms’ radicalisation, with understanding how we detect either devices or objects or people that wish us evil. And, of course, the economic needs of society. Because we can only have the best research infrastructure and people if we have an economy that functions effectively.

And so, turning to advancing the UK economy, you’ve heard already about the Industrial Strategy Challenge Fund and that is still in its relatively early days. And the first wave of challenges, which has been announced, includes can we develop and answer important questions about batteries, their longevity, how we can recharge them more effectively? Because if we’re going to deal with things like air quality then we need transport that is clean. And indeed, one of the greatest challenges in a world of renewable energy is the
storage of that energy and so, batteries are enormously important. The world of the biomedicine and pharmaceutical industry is changing and so – and other challenges around pharmaceutical advanced manufacturing technologies. And the world of robotics in hazardous environments and, of course, the opportunity to use robots in places that are dangerous for humans. We’re good at all of these things in the UK and this is an opportunity for science to come together, with industry, to answer some of these challenges. And a second wave will be announced a bit later.

What about the UK’s place in the world? Well, we are in a very fortunate position, having a significant amount of overseas development aid resources allocated to the support of research and innovation. And so, there’s the Global Challenges Research Fund, there’s also the Newton Fund, and the Fleming Fund and the Ross Fund, all of which offer us opportunities for global partnerships to tackle some of the challenges of society around the world. And the focus of the Global Challenges Research Fund is to look at the sustainable development goals that are set out on the right-hand side of this slide. And some of the focus areas there are equitable access to sustainable development, how we can have sustainable economies in societies and issues of human rights, good governance and social justice. And so, there’s an enormous amount that we can do and the UK is very strong at in tackling some of these global challenges, but there are also the global research challenges where we have to work together. So, the Square Kilometre Array, the European Southern Observatory in the Atacama Desert in Chile, these are all areas where UK Scientists are playing a prominent part and where UK industry plays a prominent part by helping to construct these extraordinary devices. By participating in these projects, which require the most advanced engineering imaginable, it actually helps companies develop their engineering for products that might be of broader and wider applicability.

Coming to an end, there’s something also important that we need to work on, in terms of the conduct of research, and I think it comes back to what it means to be an expert and how experts should behave. And I was very pleased to receive a copy from the Academy of Medical Sciences of their latest report, enhancing the use of scientific evidence to judge the potential benefits and harms of medicine. And this, of course, is an area where bad research, or improperly reported research, can actually harm human lives. And so, in general, I do think that one of the things that UK Research and Innovation will do, in partnership with all of you, is tackle issues about reproducibility of research, about what Onora O’Neill would call intelligent openness about how we communicate research and innovation in the most effective ways, and in the structures of the careers of Researchers and how we can make sure that those brightest minds get the best opportunities and have the best chances to progress in careers, both inside research and innovation, and actually, outside research and innovation.

When a very good mathematician turns to become a teacher, that is an enormous success, and so, I think we need to look at the whole diversity of careers, the diversity of people within them and make sure that there are not perverse incentives that prevent people progressing through the system. And that’s an important piece of work, and I don’t have all the answers, but I think between us, we could make a pretty good fist of it.
So, finally, how are we going to get there? Well, today is a significant start to some of that. Communication is what it’s all about, and one of the things that I and all of my colleagues who are the Executive Chairs of UK Research and Innovation and John Kingman as the Chairman of the Board, we’re all getting out and about. As I say, in the last couple of weeks I’ve been in Scotland, I’ve been in Wales and it’s very important, I think, to get out to meet the researchers, to understand the landscape, to go and visit businesses. I saw an extraordinary business making chips in South Wales, when I was there recently. Not of the potato kind, I should say. It’s about understanding the landscape, national landscape, the global landscape. It is about developing that strategic vision, but it has to be our strategic vision. It’s about drawing on expert advice, and there’s plenty of that about, and it’s about attracting and keeping the best people, and that is within UK Research and Innovation, we will only be as good as the staff that we have in UK Research and Innovation. We have extraordinary people. We need to be able to recruit extraordinary people and I think that the job of funding research and innovation well is an extraordinarily creative job and we need the brightest minds helping us inside the organisation, as well as attracting and keeping the best people in the UK for – to participate in that global research and innovation endeavour.

So, I’ll end pretty much where I began: the vision is to be the best research and innovation agency in the world. We’re going to tackle the four sets of issues that I raised right at the beginning, which I think provide a very powerful basis for why we were created, and it really is about knowledge, the economy and society. Thank you for your attention [applause].

Sir David Cannadine:

Mark, thank you so much for that wonderfully panoramic survey. There was certainly no lack of vision there and that’s a very exhilarating thought. Mark and Jo have both kindly agreed to take questions. So, if any of you would like to ask them anything, or maybe make comments, this is the time to do so. I believe we have a roving microphone somewhere and so, perhaps you could wait until the microphone reaches you. Let us start with this gentleman here.

Delegate:

Venki Ramakrishnan.

Sir David Cannadine:

Okay.

Sir Venki Ramakrishnan:

So, towards the end of your talk you mentioned the problems of reproducibility and so, the way in which experts are regarded. And as you may know, there was a long article in The Guardian about the publishing industry and there have been a couple of articles in The Times recently about the, sort of, perverse incentives and one view is that the incentives are
very hard to change. I mean, even a relatively senior scientist like me, and I’m under pressure to have papers from my lab go to the high prestige journals, because the post-docs or students who work on it see that as their ticket to the next step. And the next step usually, is the academic track, because everything else is considered, sort of, falling off the track and so, there are several problems here. One is that we’re, sort of, incentivising people for this very narrow academic goal and another problem is, you know, we’re going after these high prestige journals.

Now, in the past, when there’s been – when there have been problems, for example, Geneticists would refuse to deposit their sequence, because it gave them an advantage, and I know, in my own field, in structural biology, people would not want to deposit co-ordinates, it’s the funding agencies that have actually changed the incentives by, you know, enforcing conduct. So, I’m wondering if you have any thoughts on that.

**Sir Mark Walport:**

Well, thank you, Venki. I mean, I agree with your diagnosis completely and of course, there is no single magic bullet. It’s a, sort of, systems engineering problem really, which is why I think we do have to work collectively to think how to tackle this. We are addicted to these, so-called, high impact, high profile journals, and yet, we know that a lot of the papers that are published in them are never actually cited. And so, I think we’re also at a time, of course, where the revolution in publishing means that research can be published in ways that were never done before. And I think we’re only starting to use our imagination, in terms of how to get the research out there, alongside the data that underpins it, because if you’re going to tackle issues of reproducibility then you need to have complete scrutiny, and I think that’s an area where the academies have a role. I’ve got no doubt about that. You are significant publishers. Universities have a role because, ultimately, they do make the promotion decisions and they have to decide on what basis to make those decisions. But surely, the argument is they should read the research, rather than read the title of the paper in the journal in which it’s published. And certainly, that’s the way in which Howard Hughes operates, in terms of actually looking at the quality of the paper.

I think we have to wean our addiction to a particular mode of publishing in Journal X as being the arbiter, when all you’re really doing is then measuring how referees for a particular journal behave. So, there is – and your diagnosis is completely correct and unarguable and I think that we’re going to have to work collectively. But I think the important thing is that we need to judge a piece of research by its content, rather than by its title and the place in which it’s published and that involves reading it. And it involves, I think, many of the people in this room participating much more actively in that process to make sure that it’s done as fairly and as wisely as we can.

**Sir David Cannadine:**

Over here next, I think.

**Sir Robert Lechler:**
Robert Lechler, President of the Academy of Medical Sciences. Mark, the first thing to say is I think you set out a fantastic vision. And the second thing to say is that, if I can speak for my other Academy colleagues, that we’re committed to working with UKRI to make it a terrific success and I’m sure it will be. But one question for you about the balance between research and innovation, which many would argue are intellectually somewhat different pursuits, how do you see managing the balance of funding between research, on the one hand, and innovation and Innovate UK on the other?

Sir Mark Walport:

Yes, I mean, the first thing to say is that it takes slightly different people to do the different stages, but, of course, there is an intimate link ultimately, between research and innovation. And, of course, the most innovative companies – one of the other products of UK Research and Innovation, in fact, when I say one of the others, probably the most important output is the people that are trained. And so, if you look at the companies around Cambridge, and I think Herman has his hand up, you’ll see that many of them are populated – they’re not actually spin-out companies from the university, but they are people who have brought their skills from the university to work on problems in innovation. So, they’re related pursuits, they’re certainly not identical, and scientists basically, researchers basically, are remembered by what they discovered, but also, who they trained, and I think we need to think very carefully about that. It goes back to the – my comments about conduct, how do we look after those very bright people that we train, including after they leave the worlds of academia, how do they do in industry, how do we make it more permeable?

Your second question I think is a more difficult one, because it’s a how long is a piece of string question? And it turns on a question that UK Research and Innovation is going to have to think about with Government, with Ministers, very carefully indeed, which is the balance of allocations between the different elements of that. And I think the first thing to say is that there’s not going to be any reflex movement and nothing’s going to happen suddenly and dramatically.

I think that if you look at the balance, I think one has to say well, how much opportunity is there for taxpayer money to support innovation to grow? And I think most of us would agree that the opportunities for growing innovation, funding and support are very substantial indeed. Now, obviously, I would be as keen as possible not to do it at the expense of reducing the amount of research. That would not be a good outcome, and so, I think we need to work very closely. But we are in the very fortunate position of working against an increased funding envelope. So, that £4.7 billion of additional funding, an additional two billion a year, gives room for scope for increasing our innovation spending.

David do you want to...?

Sir David Cannadine:
I don’t know if Jo wants to add anything on that?

Jo Johnson MP:

No, I would just add and don’t forget the R&D tax credits element too, which is also growing very rapidly, now worth, sort of, almost £2½ billion a year, and that’s something we want to continue.

Sir David Cannadine:

Hmmm, Ann?

Dame Ann Dowling:

And thank you, Mark. You outlined a very compelling vision there. And actually, my question is a bit similar to Robert’s, but across the other elements that you’re integrating. I should say I’m Ann Dowling, President of the Royal Academy of Engineering. I very much welcome the fact that, under UKRI, you’re able to join up the spectrum of research right from fundamentals through to its application, through to innovation.

One of the other elements highlighted at the formation of UKRI was the ability to give advice to a Minister about the allocations across disciplines, across the research councils, which have maintained historic percentages. Could you say how you are going to approach that? You’ve talked about the innovation cut of the funding and, of course, the money available for industrial strategy helps that side, and one can see how UKRI will help the interdisciplinary work, but how will you address whether the allocations are appropriate within the subject disciplines of the individual research councils?

Sir Mark Walport:

Well, I mean, as I just said, Ann, and we’re not going to, as it were, make any immediate jumps in that because it’s going to require a lot of analysis. But, I mean, essentially, what we do need to analyse is the research landscape as a whole, how the money is spent in different disciplines and we need to, you know, ask questions about where the opportunities for further spending are and then ultimately, and of course, we haven’t got our full board yet, but I hope we will have soon, it’ll be a discussion at the level of the UK Research and Innovation Board, we will consult very, very widely. But it’s clearly, it’s not an easy decision, you know, how much a priori do you spend on biomedical research as opposed to engineering research, as opposed to fundamental physics? There isn’t a, sort of, simple formula for that.

One thing we do have to be sure of is that there is a balance of excellence across our funding. So, an easy decision would be if there was one area where the success rate was 70% and another area where the success rate was 5%, so one would need to look very
carefully about the quality of research in different areas. But I think the fundamental principle has got to be a principle of excellence that we only fund research that is of the highest quality, be it in the humanities, the economics, engineering. And then I think that we’ll have to take all the evidence and working with the board, try and make those Judgments of Solomon and advise Government on that basis. But I don’t think it’s something that we can duck. I think it’s something that has been ducked for many, many, many, many years. We, as Paul Nurse pointed out, we have essentially, a largely fossilised system, in terms of the balance between the disciplines at the moment.

Sir David Cannadine:

I’m very conscious of the clock. So, perhaps two more questions, that one, yeah?

Dame Ottoline Leyser:

Yes, so I’d like to ask a question about diversity, which was great to see emphasised. And we’ve already covered some of it, in that I think key is diversity and assessment mechanisms, so if we use these very narrow range of assessment mechanisms, we’ll get a very narrow range of people. There are two other aspects I think would be interesting to get your views on. One is diversity of routes into the research base, and you already touched on out of the research base. And I think, again, making sure we have, in the research system, this really wide range of people means we have to get them from a wide range of places and support them in leaving to a wide range of different places. And the other is diversity in funding mechanisms and we – there’s a tendency to – for the funding system, to swing towards either a very large programme, interdisciplinary, or to much smaller and we need that diversity across the system and how you’re going to ensure that multiple different mechanisms for funding research is – are in place to support diverse researchers in the system?

Sir Mark Walport:

Okay, well, let me tackle those questions in reverse, if I may, Ottoline. I think that there is a great deal that we can do catalytically, with small grants as well as the large ones. And so, you can achieve an awful lot of value for relatively small amounts of money with small grants. And so, I think what we probably need is that balance between the pump-priming grants, the grants that can be used to develop an idea, to develop a collaboration, to deliver links between disciplines. There’s all sorts of ways in which we can do it and so, I think those pump-priming grants, and they need to be covered – coupled with a low administrative cost as well, both in terms of preparing them and also assessing them. I think that we can do a lot through convening as well.

It seems, to me, that one of the things that a funding agency can do is convene and bring together people who might not know each other very well. So, I think there’s lots of things that we can do at a catalytic level. And then I think it’s that balance also, between personal support and making sure that there isn’t – there aren’t, sort of, holes in the repertoire, if I
can put it that way. So, we need fellowship support for people pretty much at every stage of their career, including probably, rather earlier than fellowship support is available at the moment. One of the advantages of the UK funding system is actually, we do get people as PIs much earlier than on the other side of the Atlantic, for example.

On your other question, which is routes into the research base, that, I think, and I’ll turn to Jo, because I think that’s also a question about higher education, which is that we do actually have a rather monolithic system where you go in at 18, typically, you come out at 21 or 24, typically. But in a world of lifelong learning, where people will change throughout their lives, then we need to have much more flexible routes in and out of higher education, in and out of research. And I think how we achieve that permeability between research and industry is an issue we’ve still to resolve, I think. And again, it comes back to the questions I was asked by Venki about incentives in the system. It can’t make sense that appointing – you can’t appoint someone from industry because they’re not going to contribute to research papers. So, we need to, sort of, think about that quite carefully, I think.

**Sir David Cannadine:**

I think one final quick question and then, since Jo has been taking lots of notes, I thought I might ask him to give us the benefit of his collective wisdom. I think someone at the back, yes, the…?

**Delegate:**

The – my question is about the assessment of the innovation there. You mentioned that’s about the evaluation research, because the citation over the good paper or regarding the publication is the assessment for research. But the how and the when in that timescale, the innovation is going to be assessed, or evaluated, or indexed, or…?

**Sir Mark Walport:**

Well, I mean, the evaluation of innovation and I think you ask a, sort of, question which is important, which is that evaluation has to be bespoke and you can’t, I think, reduce all the outputs of research and innovation to single numbers. So, the question with innovation is, has innovation occurred? Has a product been developed? Has a company grown? Has a social benefit been achieved? And I think one has to look at each innovation, in a bespoke fashion and say, has it achieved what was intended, or in fact, if it hasn’t achieved what is – was intended, has it achieved something else which is beneficial? We all know perfectly well that the research people do is not necessarily the same as they put on the application form, because actually, you can’t predict the future, in terms of exactly what experiments you’re going to do. So, we’ve got to be intelligent in our assessment and actually ask the question well, what were you aiming to do in the first place and have you achieved it?

**Sir David Cannadine:**

Jo, a few words from you?
Jo Johnson MP:

Well, thanks, David. I mean, just to pick up on a couple of the points, and Robert’s and Ann’s, first of all on, sort of, allocations and how UKRI is going to be helping Ministers make these, sort of decisions across the mix between innovation and research on the one hand and then between the Research Council and discipline areas on the other. I mean, the more we look at how we’re going to use the uplift, the 4.7 billion that’s been given to R&D by 2020/21, the clearer it is that this would be a very, very difficult task in the absence of a body such as UKRI, capable of sitting on top of the system and having some form of strategic oversight. I mean, really, it is baffling to me how we got to this stage, without this capability in our system. So, I think UKRI really is going to be an absolutely indispensable part of having a strategic overview of how these kinds of decisions are going to be made. UKRI is working on this question, these questions, right now, as we approach decisions in relation to 18/19 funding and thereafter. And Ministers will, you know, be looking with, you know, great, great interest at the advice which we receive from Sir John and Mark, because it will be hugely influential in our own decision-making.

On diversity, in response to Ottoline’s question, I’m obviously embarrassed that his mini panel is of one gender, and, you know, we – you know because you sit on the BEIS Diversity Steering Group, how important an issue this is and how seriously the department takes it. I think it would be great for UKRI, as one of its earliest policy initiatives, to approach this question holistically, as we try to do in the BEIS Steering Group, looking at all the different facets of what makes for a diverse and resilient research system that optimises all the talents available in the country, looking at questions such as advancement, mentoring, grant application and success rates and recruitment, so that we do better as a country and rise to the challenge, which you’ve rightly set us.

Sir David Cannadine:

Well, this has been, I think, a hugely interesting and exciting morning. It’s been a great privilege to have chaired this session. And I certainly want to say on behalf of the British Academy and also on behalf of the other three academies, whose Presidents are all here today, how much we are looking forward to working with UKRI as itself, it settles down and goes forward. I think we must also, as we ponder these issues, never forget the exciting, but challenging, paradox that research may be seen as part of the establishment and after all, the Government is putting up more money to fund it, but the wonderful thing about research is that it’s also unpredictable and often exceptionally subversive. And as we struggle with those paradoxes, going forward, I’m sure we’re all going to have an enormously interesting and, on occasions, worrying, time.

That being said, I do want to thank Jo Johnson for having been here this morning and for having, as it were, done so much to bring about the creation of UKRI. I want to thank Mark for having, as I said, been absolutely not deficient in vision. I thought that the vision he unfolded this morning was indeed, hugely exciting. And I want to thank all of you for having come. There are drinks outside, but the hour being what it is, they are caffeine, rather than
alcohol, but they await you outside. So, thank you all very much for coming this morning [applause].

[End of Audio – 62:38]