HOUSE OF LORDS

Science and Technology Committee

Corrected oral evidence: Financing and Scaling UK science and technology: innovation, investment, industry

Tuesday 25 March 2025

11.35 am

Watch the meeting

Members present: Lord Mair (The Chair); Lord Borwick; Lord Drayson; Lord Lucas; Baroness Neuberger; Baroness Neville-Jones; Baroness Northover; Viscount Stansgate; Baroness Walmsley; Baroness Young of Old Scone.

Evidence Session No. 2 Heard in Public Questions 9 - 15

Witnesses

I: Jakob Mökander, Director of Science and Technology Policy, Tony Blair Institute; Julia Willemyns, Co-Director, UK Day One.

USE OF THE TRANSCRIPT

1. This is a corrected transcript of evidence taken in public and webcast on www.parliamentlive.tv.

Examination of Witnesses

Jakob Mökander and Julia Willemyns.

Q9 **The Chair:** We are now starting our second session. I am very pleased to introduce our two witnesses: Jakob Mökander and Julia Willemyns. As you introduce yourselves, to help frame our inquiry, could you set out some of the issues you see as being really important for the UK science and technology sector?

Julia Willemyns: Chair, members of the committee, thank you so much for the opportunity to speak today. I must admit this feels quite strange. About a year ago, I started, with a friend of mine, a campaign to bring science and tech ideas into the light with the new election. I feel that it has now become something much bigger than that.

I started this campaign because I believe that science and technology are very important for living standards and human progress. Increasingly, I realise that the problem in the UK is not a technical or scientific one; it is an economic one. I would like to set the scene by being slightly blunt. Science and technology can go only so far as the economy allows them to. If it is hard to start a business, scale it or sell it to meaningful markets, even the most impressive breakthroughs are not going to move beyond the lab. The fact that something is technically brilliant does not count for much if it cannot be used, built upon or bought. At the moment, we can all feel that the UK is in a pretty tricky spot both fiscally and when it comes to our stagnating economy.

From my perspective, there are four areas of government policy that deserve close attention. That is really bringing out the thread that the economy is the thing we should be focusing on. First, we need to be making investment easier. That is not just at the frontier of deep tech but across the entire ecosystem. That means capital, yes, but it also means fixing planning and energy costs.

We need to be taking new technologies relatively seriously and thinking about adoption across the entire economy. In doing that, we should be actively incentivising adoption and diffusion in the private sector, decreasing compliance and risk costs, and setting the stage for adoption in the public sector. This Government have started doing that, which is very encouraging.

We should also be supporting regulatory innovation. We need a regulatory environment that moves at the pace of technology, with clear signals, fast pathways and space for experimentation. I will give you three quick examples. The Highway Act 1835 means we cannot have robots on pavements. That is holding back lots of

companies around the UK. With drones, the Civil Aviation Authority has the restriction that you have to have drones within sight. It kind of gets rid of the purpose of drones if they have to be within sight. We cannot do AI training in the UK because of our copyright laws.

Finally, the last thing that I would focus on is how we can grow our markets. That could be through market-shaping government procurement or strategic international partnerships, but ultimately we need to give innovators a home and a market big enough to matter so that they can get the demand for their inventions.

Jakob Mökander: I will start with a quick personal introduction and then we can get into some of the questions that you have prepared today. I am heading the science and tech policy team at the Tony Blair Institute. My own background is in both technology and social science. I started out in my first degrees as a systems engineer, and then I moved to this country from Sweden, where I am originally from, to do my PhD at the Oxford Internet Institute. The Oxford Internet Institute is a social science department studying the effects of technology on society. I try to apply that dual lens of how the technologies work and the effects they have on society.

At the Tony Blair Institute, we view science and technology policy in three buckets. First, we want to have a positive vision and foster science innovation. We want to be supportive of the science and technology ecosystem. Secondly, we want to accelerate technology adoption so that we shorten lead times from breakthroughs to time to market and products. That is what Julia mentioned about allowing the innovation ecosystem to happen. Thirdly, and equally importantly, is about how we govern emerging technologies responsibly.

We see no tensions between these three buckets. In fact, it is only by having good guardrails and governance in place that you both have the social trust to accelerate technology adoption and can protect against large-scale failures that do more harm than good. There are many powerful technologies out there in society, not least nuclear energy, that you can reap the benefit from only if you have sufficient security. Those are some of the things that we focus on.

The first question was about the big challenges or backdrops that we are facing. I would highlight three things. One is the long-term diminishing return on R&D investments. Countries and companies are continuously increasing investment in R&D, but the perceived output from that is a slower return or slower progress.

This goes hand in hand with the second point. Over the last 30 years, we have seen a decoupling between technological progress—we have amazing inventions such as the smartphone, the internet and generative AI—and the lived experience, which is one of stagnation. Why do we see this divergence?

The third point is the return of geopolitical competition. Science and technology policy can no longer, if it ever could, be viewed in isolation. Nation states really have to look at this as a matter of fitness, co-operation and competition, together with their partners. That has become increasingly evident in the last six to nine months as well. I will stop there with the background introduction.

Q10 **Baroness Walmsley:** Thank you both for coming. My question is for Julia. Julia, we have heard about what you do. My question is more about how you do it. If you are bringing together ideas from science, technology and innovation, and helping them to become industry-ready, perhaps, can you tell us where you get your ideas from? Do you go out looking for them? Do people come to you? How do you select which ones to focus on? Do you have some kind of "Dragons' Den" system? Are there particular areas on which your organisation is focusing at the moment?

Julia Willemyns: It is a mix of people sending in ideas through our website and us chatting to people who we think are working on interesting ideas and eliciting policy recommendations that could come out of those ideas. A lot of the submissions that we get are about exciting new areas of technological innovation.

One example is next-generation geothermal energy. This is a thing that is developing in the US. There is a possibility that we could tap into natural energy in the earth using new drilling technologies that we otherwise would not be able to. This is an exciting new technological innovation. What are the policy barriers to getting it to market, in particular when it comes to supporting it to be built in the UK?

Interestingly, we have had quite a few recommendations when it comes to how R&D itself is done. One thing that I wanted to highlight that might be of interest, especially when thinking through our fiscal situation and how we fund science and tech, is this concept of market shaping and pull financing for R&D. We think about a distinction between push financing—"We will give you grant funding to do a thing"—and pull financing, where there is a prize or an advanced market commitment for this innovation to occur. This mechanism of funding R&D does not really exist in the UK. It very much used to exist historically, but nowadays it is less a part of the

ecosystem. It is being trialled in the US and has been quite successful.

In the same bucket, we have a couple of recommendations relating to the REF and how we can change incentives to push the ambition of our research.

We also got some recommendations that I did not expect, to be frank, which were more about the economy itself. A couple of start-ups came to talk to us about how it is difficult to have the creative destruction in the economy that is necessary because of limitations on the labour market in the UK. In particular, they talked about the use of non-competes in the UK. They compared that to movements that are happening in the US and Australia to limit the use of non-competes, which slows down that creative destruction.

Finally, there were some recommendations that were very much to do with the fundamentals of the British economy. These are things that we have already heard quite a few times. Planning is a barrier for lab space and for housing, which is constraining Oxford and Cambridge. The cost of energy is another barrier. If we want to re-industrialise, that is not going to happen if we have the most expensive industrial energy in the world. We had a lot of recommendations when it comes to building up energy resources as well.

Baroness Walmsley: I was interested in the geothermal energy suggestion. It strikes me that these are probably going to happen out in the regions, away from the golden triangle of R&D. They will perhaps be based on the availability of local skills. Were those two things relevant to your acceptance of working with that kind of initiative?

Julia Willemyns: Yes. What I find really exciting about a lot of the energy-related proposals—both geothermal and the nuclear power recommendations—that we were getting, is that these innovations do not necessitate the same agglomeration of talent pools that other kinds of innovations might need. If you are a bioengineering company, you likely want to be in the golden triangle because that is where your talent is. If you are building out hard infrastructure—say, an SMR or a geothermal—plant, you do not need to be in those centres of talent agglomeration.

As we think about diversifying our economy and building in different regions, there are ways to do this while remaining in line with agglomeration theory. It is just about understanding where these pools of talent are and how easy it is to train up people in different regions.

Q11 **Baroness Northover:** As you know, we are starting from the assumption that the UK is very good at basic research but is not scaling this up and commercialising it. You have already been addressing this point, but, to take it further, why is that the case? What recommendations would you make? As you will know, an industrial strategy is going to be published shortly. What would you wish to see in this to address this issue?

Jakob Mökander: The first thing to say is that I fully share your diagnosis. The UK does have world-leading research. I have seen at first hand the kind of people we attract to our universities. It is still absolutely top notch. Even though the conditions for UK academics are not always as attractive as they can get elsewhere, our top universities are still attractive. The premise is true.

I agree that we have a lack of spin-outs. That is especially true when we think about how that translates into economic growth. It is partly structural and partly cultural. Some of the conversations in the previous session went into that as well.

If we start with the structural elements, spinning off start-ups, companies and patents from our universities is not easy. There are significant overheads and IP challenges involved. We have put out different recommendations, as other think tanks have, to do with capping the overheads that universities take from technology spin-outs and start-ups, and facilitating different ways of sharing patents or intellectual property rights. That is one thing.

It is also a cultural thing. What do people view as success? If we take the US and UK as one contrast, it may be a more legitimate career path for someone who is studying or doing a PhD in the US to go into entrepreneurship and build a business. In the UK, there might be other things that that person puts value on, whether it is a tenure track trajectory or a civil servant trajectory. There can be other kinds of career paths that are more attractive to people in certain communities.

Being a foreigner and a guest in this country myself, I sense that, especially in academia, there is sometimes this barrier where people might not feel fully comfortable to go into the private sector. This needs to be overcome.

We often look at what needs to be done to change the current rules, but we should also be very careful not to put new barriers in place. It is definitely the case that the increasingly stringent visa and immigration rules, for example, are further constraining our ability to attract top talent, which then stays in the UK to do business and innovates on that basis. For example, we have high

talent visas that are tied to certain MSc programmes. They are very good, but they give people a two-year window. The incentive is to be locked in with a very secure employer because you need that employer to then sponsor your visa beyond that period. That is a good and legitimate policy, but it backfires if we want entrepreneurship, risk taking and dynamism.

This goes hand in hand with the perception of the UK becoming more restrictive generally. One of the most important strengths that the UK has had over the last 100 years at least has been its cosmopolitanism and its attraction of world-class talent from all corners of the world. That is something we really should not be giving up.

The final point I will make before handing over—I have already taken up a lot of oxygen—is that increasingly there will be a need to develop high-tech technologies that are also connected to state capacity and defence. To some extent, supply chains need to be localised. This presents an opportunity. If the procurement processes, the hiring processes and the public-private partnerships are done well, this can really be not a blocker but an accelerator for science and technology research and innovation in the UK.

Julia Willemyns: Jakob, I am afraid to say I disagree when it comes to the cultural point. I think the cultural point is overstated. I do not believe that British people are inherently less ambitious or were born complacent and do not respond to incentives. It is more about the structural incentives that exist in our economy and less about the ambitions of the people who exist within it.

I will give a really simple example. At university, I had a friend who did a PhD in fusion engineering. He was a really good fusion engineer. He built his first model reactor when he was 16 years old.

Baroness Northover: What did his mum think?

Julia Willemyns: I am sure she was a little bit frightened. He graduated and where did he go? He went to a quant hedge fund. Why? Because it makes sense to go to a quant hedge fund. If you are someone who is profit-driven, and that should not be a dirty thing to be, you will go where the profits are or to areas that are not blocked in terms of growth. My other friend did a PhD in aerospace engineering. Where did he go? He very much did want to be an aerospace engineer and to build. He went to Caltech in California to build there because the incentives there are to build products in aerospace engineering.

I think the cultural point is a bit of a simplification. I am happy to speak more on the cultural point, but I have some ideas on what the problems with the incentive structures are.

Previously, we have been thinking a little too much about how technologies can be pushed to market through a combination of the right conditions within R&D systems and active government support, but the reality is a little more complex. It is both push and pull. Not all ideas will make it to the market. Inevitably, innovation will fail. That is a good thing. That is true in comparator states and in the UK.

For firms to scale in the UK, our markets need to be as attractive as the markets in other places. For firms to come to the UK, they need to be even more attractive. That means that products and services need to be able to sell in the UK and to other markets from the UK. A company will scale as long as there are conditions for growth, but that means having a pool of customers. It also means being able to sell to the market. That is often missed in these policy discussions. It also means that we have to have a supply of talent. That is really important, and that goes to Jakob's point on visas.

There is a role for government when it comes to building out infrastructure, especially for innovation incentive work and incentivising the agglomeration of talents and skills. However, a lot of the problems that we see currently come from the trading barriers that exist in the UK. Those need to be light, although not overly light. Often that is where government support is really helpful—to be with companies as they are scaling. Regulatory barriers, tax barriers, and input and export barriers can all slow down scaling. To some extent, having the idea is the easy part. Having an idea that people want to buy is the harder part. Having the right market fundamentals helps people test their idea so that they can understand what people want to buy.

It is important that we have conditions that support dynamism rather than incumbency. We need a really fast clock speed on regulatory and planning approvals. We need lower fixed costs, such as cheap energy and infrastructure. Finally, we need good human capital, which comes from people who grew up in the UK—we need more support for people to access STEM degrees—and people outside the UK, who we want to attract here.

Baroness Young of Old Scone: You have been very clear about the obstacles, but you also said that your mate who went to Caltech said that the incentives were there. Perhaps you could be more specific. What are the incentives that we ought to be

developing to be as attractive as California? I should declare my interest as chair of the Royal Veterinary College and the London BioScience Innovation Centre.

Julia Willemyns: My friend who went to California went there because of SpaceX. He wants to work in SpaceX primarily because it is a company that is able to iterate very quickly and put things into space. He is a very technical person. All he cares about is being able to work on his technical project. There are various reasons why one might not want to work at SpaceX. I do not know that I would want to work at SpaceX personally, but, ultimately, if you are a technical person who wants to work on the product, having the ability to do that is really important.

Baroness Young of Old Scone: What could our Government do to create less toxic versions of SpaceX?

Julia Willemyns: There is a larger question here. There is a path in between drift and destruction. A friend of mine came up with that phrase, and I think it is really good. What you have with SpaceX or with Elon Musk-esque people is destruction. Having too much drift or friction in the system can create the kind of stagnancy that makes people such as my friend feel frustrated, opt out and then go towards people who think more in a destructive framework.

Ultimately, it comes from those questions around trading barriers. There are things that a company such as SpaceX can do in California that it cannot do in the UK. That is why a lot of aerospace companies from all around the world test and build in California.

Q12 **Lord Borwick:** We are particularly interested in these international comparisons. In which countries does it work? What does good look like?

Jakob Mökander: Maybe I can pick that up. If you want to look at which country does it well, you first have to define the particular area of science and tech policy.

I will take three examples. First, we at the Tony Blair Institute believe that one thing that will really unlock science and tech in this new age is access to data. That is about being able not just to train models with it, but to share data and to find synergies and patterns. Denmark does that really well. The Danish have managed to make good use of their government data, including healthcare data, for both science purposes and interdepartmental purposes. The Netherlands also has a population register, which is not completely unlike what the UK has in the NHS, but it has gone further in making use of that for science and technology, and in

commercialising that data. We talked about the US having good incentives, but some leading researchers at Princeton have gone to the Netherlands to do LLM research because that is the only place where they can use all-of-population data in a secure environment with that kind of centralised structure. On data, Denmark and the Netherlands are two examples.

Another thing that we believe is very important is to have more diversity in the research ecosystem. For example, university departments are very good at one kind of research, especially when we are talking about incremental research, but, when you are looking at doing more disruptive research, you also need lab structures where people can work on hard problems for longer periods. That is what has happened within DeepMind. People have left academia to work in a more enclosed long-term environment. You can be working for 10 years without the pressure of applying for a new funding grant.

There are countries that have set that up. The Max Planck Institutes in Germany is one example. It is not the perfect structure, but my recommendation would be to look at that and other labs such as Zero Parks or Bell Labs and see how the UK could have more disruptive invention, with labs that are not replacing academia but are complementary to academia. These labs basically carve out new spaces for doing research.

We talked before about the propensity of children and young adults to do STEM degrees. It is an observable fact that we have a lower number of STEM graduates in the UK than Switzerland, Germany, Sweden and others, where the STEM subjects are more widely regarded in society. This is where I do think that culture matters. You can look historically at the stamps of approval or gateways through which you can get a management job or a seat in Parliament. In some Anglo-Saxon countries, those have been law or classics; in some other countries, those have been engineering and STEM subjects. Culture can run quite deep. Those are some examples of where it works well.

Finally, to go back to the point about geopolitical competition, the question in science and tech leadership today is not, "How far is China behind the United States?" There are many areas of technology where China is ahead of the United States. We are talking about quantum computing and nuclear power. It is almost the opposite. There are only very specific areas where the United States is still ahead. Large model and compute access is one of those areas, but that is one of the last bottlenecks. That is also why there is so much focus on constraining that particular area. If

you otherwise want to see a science and tech ecosystem working at a high rate of efficiency right now, you should look at the Chinese science and tech ecosystem.

Julia Willemyns: I really agree with everything that Jakob has said, particularly when it comes to the diversity of the research ecosystem. I would also recommend looking at FutureHouse, as another example of a differently organised organisation, and the Arc Institute. I would also echo Jakob's points on the data infrastructure side of things.

I have a slightly less competitive background than Jakob does. Obviously, TBI spans many different geographies. One of the areas that I have previously done work on is high-skilled immigration, especially targeting top talent. That is an area where the US is incredibly strong. That is its competitive advantage.

Baroness Neville-Jones: It will not be after this man.

Julia Willemyns: Yes, that is one of the worst things happening with the current Administration. I very much agree.

If you look at the proportion of Americans who graduate with STEM degrees, it is not that high. It is lower than in the UK. It is 20%. In the UK, it is 26%. In countries such as China, by contrast, a large proportion of graduates come from the STEM fields. However, the UK attracts only 7% of the world's top scientific talent, compared with 24% in China and 20% in the US. In the US, immigrants constitute about 23.1% of the entire nation's STEM workforce.

There is definitely room to improve on the human capital end of things both domestically and in terms of our ability to attract top scientific and technical talent. One of the ideas that we trialled through UK Day One is the concept of an exceptional talent office. We were quite happy to see some echoing of that idea in the AI opportunities action plan.

There are some specific ideas that we are interested in. Can we fund and run domestic STEM competitions to discover and support hidden talent, especially on the younger end? If you look at the people who do the International Mathematical Olympiad and the International Physics Olympiad, they are really young, but you can already see how technically brilliant they are. There are really interesting studies looking at those people's pathways throughout their lives. They end up doing exceptional things. There are definitely many children in the UK who have those abilities but who probably are not getting the support they need to thrive, especially

if they come from underprivileged backgrounds. That is definitely a thing that we should be investing in more.

We should be headhunting top 1% talent from abroad. I agree that this is one of the areas where we can have a large edge compared with the US. It is something that America used to do with Operation Paperclip and the Soviet Scientists Immigration Act of 1992. Again, there are academic studies looking at the people who were brought across and their contributions to the scientific and technical fields across time. The outcomes of those people's contributions were incredibly outsized. That would be my input.

Q13 **Lord Drayson:** Could we turn to finance and the capital markets? Jakob, I am really interested in your perspective on the factors that the Government can actually influence. There has been lots of analysis of the exodus of investment from the UK and the decline in the public markets. We have had the discussion about pension reforms. In your analysis, what do the Government need to do to remedy this issue? The decline is just accelerating.

Jakob Mökander: Let me preface this by saying that we have an economic director at the Tony Blair Institute. For some of the questions around both this report and this dynamic, they would be better placed to answer than I can from a science and tech perspective.

It is true that finance is one factor that is currently constraining the science and tech start-up ecosystem. When we talk to science and tech start-ups, we see two things. Either the companies have to seek funding from the US or elsewhere to be bought up, or they are not managing to scale because of the lack of funding. This is happening at the same time as an outflow of money and high-net-worth individuals from the UK.

You asked what the Government could do on the upside, but there is also a question about what the Government have done recently that might have reinforced some of those dynamics. There were some interventions in the fall Budget that might have reinforced the perception of high-net-worth individuals that the UK is not a capital-friendly market. From first-hand conversations, I have learned that people who have multiple homes or places where they can choose to register are actively leaving this country, maybe even to a greater extent than happened after Brexit. We are talking about a step-up of the declining trend.

We are looking at a few different tools that the Government have. Non-dom, inheritance tax and those kinds of things are part of that toolbox. There are also things such as R&D tax credits, which hit

very differently depending on where in the ecosystem you are. For example, most companies in the UK are not R&D companies. For them, there is an incentive to invest more in R&D. If you look at the tech ecosystem specifically, where R&D is the bread and butter of the business, an R&D tax credit becomes a direct subsidy because that is a core part of the operating model. In some cases, that can prevent the weeding out of businesses that would never become sustainable tech companies in the first place.

It would make sense to look at the more general taxation of VCs and high-net-worth individuals. It would make sense to review the effect that R&D tax credits have on the market and whether those funds can be used in more effective ways.

You also have the listing of companies on the Stock Exchange.

Lord Drayson: Yes, or the not listing of them.

Jakob Mökander: For those of you who read our recent report on the capital markets and how we can help address some challenges in the science and tech ecosystem, we think it would make sense to make less of an exception for SMEs, but have them list in the normal way with the same conditions and do the interventions and subsidies through other means. That is part of the package that we are building around financing.

Lord Drayson: I just want to take the opportunity to probe your expertise in the AI space in particular. The UK has no sovereign foundational model. Where does the UK have an opportunity to scale a meaningful industry around AI in the emerging AI supply chain?

Jakob Mökander: Let us start with the very concept of sovereign AI because you asked about a sovereign AI model. When people talk about sovereign AI, it is at different levels of abstraction.

You can have a model that is developed by a UK company or even an industrial part of the UK Government, but do they control the compute that it runs on? Is that compute located in the UK? Even if it is located in the UK, is it ultimately owned or controlled by a UK entity? As of now, most compute happens through American hyperscalers, even if the data centres are in the UK. There will still be certain data access requirements from the US Government, for example.

The very term "sovereign AI" depends on what level of natural control you demand in the depth of the tech stack. It goes from very feasible to non-doable.

Lord Drayson: Perhaps I can be more specific in my question. In which part of the tech stack can the UK develop wealth from?

Jakob Mökander: I believe that will be primarily through industry and sector-specific applications. That requires two things. It requires widespread distribution of the technology and skills to understand and adopt those applications. It also requires both the data and the regulatory freedom to fine-tune models and to build applications on top of large language models.

We are talking about large language models and generative AI, but it is important to recognise that when we talk about wealth creation in the UK, this is a snapshot in time. Four years back, large language models such as ChatGPT did not exist. In four years' time, we will have way more powerful foundation models that can work with different modalities and different cognitive effects. We are seeing that right now with scaffolding, neuro-symbolic AI and others. When we are talking about whether we should or should not adapt rapidly, this is not about quickly installing chatbots in different workplaces or offices; this is really about creating a structured pathway so that as new foundation models come into the market they can quickly be innovated upon and help improve sector-specific uses.

The sectors where the UK is really strong are finance, healthcare, energy and, increasingly, defence. They do not talk much about it today, but finance and energy are probably the two biggest users of AI models in industry. In finance, it is definitely used in trading. In energy, it is used not just for optimising energy consumption, which is important in carbon capture, but in prospecting. If you look at where to find new oil, it is used for pattern recognition and so on.

You need to have the skill to understand how to fine-tune, adopt and build applications. That can be more value-creating than necessarily training large language models, but that can still be very important from a security perspective.

Lord Drayson: Julia, what are you seeing in terms of the lived experience of twenty- and thirtysomething engineers and scientists in the UK? What is their view on the ease of access to the capital that they need and the attitude to risk in the UK compared with moving what they do somewhere else, such as your friend in aerospace?

Julia Willemyns: I do think it is easier to raise money elsewhere. The reality is that, if you are a Stanford graduate with a vague idea, you go to Y Combinator and you get a bit of money. You are

then able to raise from angel investors. It is much easier. To some extent, it is easier to raise money because it is easier to have a successful company in those ecosystems. There is more proof for investors that that will occur.

The best companies do raise money. It means you have less of a chance of becoming a good company because you do not get funding earlier on to give yourself the pathway to test things out when you are not 100% sure you have a good product. If you have a good product, you are able to raise money in the UK.

Really quickly, I might have more input on the AI piece that you were asking about earlier. I was one of the co-authors of a piece on industrial strategy for AI. I want to echo lots of what Jakob said about applications and adoption. One thing that I also want to say is that if we do not adopt, we will be outcompeted. The majority of our exports and economic activities come from services. If services elsewhere become more efficient or better because they adopt AI, we will be outcompeted and will not be able to export those services elsewhere.

On the application front, there are also interesting things that one could do with AI for science. DeepMind has done this. Especially if we give firms access to the datasets that we have in the UK, which are a real strength, we could get a lot more out of that. We have the UK Biobank, which is an example of a place where we could do more in applying AI for discovery.

Why do we not have foundation models in the UK? There are many reasons, but one important reason is that training the very same foundation models that now proliferate across the market globally in the UK would be illegal. That is why the British companies that are trying to build foundational models do not train in the UK. That is because of our copyright regime. In the UK, it would be illegal to train every model that people use nowadays, even though they are being trained on UK data elsewhere.

The last area we have some strengths in is chips; inference and chip design in particular. Arm is a company that we should be very proud of. We can go much further when it comes to chip design. It is not my area technically so I cannot speak on the specifics, but clever engineers tell me that a chip that was designed to run really high-res video games is not the ideal chip to run AI. There is space for innovation there.

Q14 **Viscount Stansgate:** How should the UK science and technology strategy respond to the major changes going on in the world at the moment, both the geopolitical changes, which you know about, and

the changing political landscape? How should the science and technology sector advocate itself to government, given the very tight public finances? I will have a follow-up to that.

Jakob Mökander: I heard in your question both geopolitical and domestic elements. If we start with the geopolitical element, I am a firm believer that the UK will win if there is more international collaboration and the UK will lose out in a fragmenting geopolitical environment. This has always been true, to some extent, for an island nation, but it is even more important after Brexit.

The UK can be a force for the harmonisation of standards, for international collaboration on research funding and for closing the gap between the regulatory regimes of our big friends on either side of the waters. That could be a really important role for the UK to fill. The Government are actively trying to do that, even though it is a very difficult task.

If you take the AI Security Institute as an example, whatever your view on long-term AI safety, it is a good thing that we have the world's most well-funded security institute, which can play a role in co-ordinating other actors to set standards for evaluation and data. We can and should lean into that in more areas, in relation to not just security but innovation or research. Of course, that means rejoining different kinds of international organisations, regulatory frameworks and research funding networks, where possible.

If we look domestically, I understand and accept that the fiscal space is very constrained right now. That is why it is even more important that the science and tech ecosystem is working with and advocating for interventions that are as universal in nature as possible and that benefit the ecosystem broadly. There can sometimes be a pressure or tendency to pick a few winners or find a few showcase examples, but that is often less impactful in the long run than letting a whole ecosystem flourish.

A very clear example of that is compute capacity. DeepMind's breakthrough with AlphaFold is an amazing example of science and engineering. I would love for that to happen within university departments as well so that our researchers can have similar breakthroughs in different fields, in both the sciences and the social sciences.

When you invest in computing, the question is this: what is the allocation mechanism, if not money? Do we need to have expert committees sitting and giving that to specific research projects? Do we have built-in mechanisms in our university structures that can do that as part of UKRI funding or the general appraisal and

seniority level within university research? We need to work with the mechanisms that we already have to distribute the critical factors of innovation—data, compute and talent—across that ecosystem. That should be the focus rather than very small and narrowly targeted investments.

Julia Willemyns: This is not going to be a comprehensive answer, but one idea that would be interesting for us to look at. Currently, defence R&D is slow, risk averse and bureaucratic. It is quite obvious that we do not have a strong defence industrial base outside key primes. Our key primes are strong, but we are quite weak when it comes to new innovations in defence technology. Drones is a very scary example. You can see these videos of huge swarms of drones, which we have no access to in the UK.

There is a big opportunity to go further here and connect classified defence requirements to industrial opportunities. This can be done a lot more quickly and with a greater connection to R&D than in the past. We should be learning from the Vaccine Taskforce. I know that is a thing that people always say, but that is because we should be learning from the Vaccine Taskforce. In the US, DARPA has historically been a source of defence R&D.

The focus should be on mid-TRL development and trying to get specific technologies over the valley of death. This is something that we are writing a paper on. Once that is published, I will be happy to circulate it to the committee.

Q15 **Baroness Neville-Jones:** Perhaps I can pursue your very last thought about getting companies over the valley of death. What we have been talking about are quite well-known problems. What are your key asks of government policy, private companies, financial institutions and all the various players? What are the key issues that we ought to try to get right but have not succeeded in doing so far?

Julia Willemyns: Previously, we have been too focused on fixing the supply side of innovation by improving research funding, tweaking spin-out terms—although median equity stakes are still going up, so we have not fixed that—or offering subsidies to particular areas that we want to support.

I am not saying that those things are not helpful; often, they are helpful, but we are missing a part of the picture, which is that scaling is about demand and not just about supply. It is much easier to fix the problem at the early stage of a company's journey. We have a lot of start-ups in the UK. The early-stage VC funding

ecosystem is quite strong. It is much harder to intervene later in a company's journey when it is scaling in this way.

If I were to focus on a couple of key points, I would think a little more about the role of markets. That is not just about capital access but whether we have people to sell to. We should focus on making the UK a more attractive place to buy, sell and build. If we do not do that, firms will continue to look elsewhere.

In doing that, we have to think about the systemic frictions that we have in the economy, such as regulatory delays. If you have a bioengineering company and it is going to take you three years to go through the MHRA, when the market in the UK is much smaller than anywhere else, you are going to go elsewhere to try to scale your company.

Energy is expensive in the UK. It is really hard to build hard tech if you do not have the energy to build it. There are planning barriers. If you do not have lab space, you are not going to be doing wet lab research. There are skills shortages, to go back to the points about visas and domestic talent. There can also be a lack of clustering, going back to the agglomeration point, which is constraining some areas where we do have growth.

We are not losing companies because their tech is not good. I am sorry if we have been overly negative. I should have prefaced everything by saying that I am incredibly impressed and inspired by the people I am surrounded by. We are losing these people because the UK is a difficult place to grow.

There is also a bit of a risk of policy fragmentation, going back to the point I was making about things that tackle symptoms and not root causes.

I will leave you with three things. Can we think about unlocking growth by removing barriers to building? Can we think about improving adoption by reducing the barriers and risks to adoption faced by firms and by the public sector? Can we think about building market conditions for ambition by reducing fixed costs such as energy, improving access to talent and using government procurement intelligently?

We could also do more on trade policy. I do not want to turn this into an EU debate, but Canada seems to be struggling right now. It might want to have better trade relationships with countries that are not the US. It sounds like a bit of a silly idea, but who knows?

The Chair: Jakob, we are reaching the end. Do you have anything final to add?

Jakob Mökander: My final point is on these questions about tech start-ups. This question shifts a bit, if you look at it from the perspective of the company as opposed to the country. We are talking about UK and US companies. If you look at the start-up ecosystem in the US, you will see start-ups being acquired in the end by the same top companies, whether that is Microsoft, Apple, Google or someone else. If you look at the global tech ecosystem, for many start-up founders the whole aim, goal or impetus for starting the company is to build up a good idea, to get a minimum viable product, to showcase its value and then to exit to someone who is higher up in the supply chain.

That is combined with the fact that we have national borders. As policymakers, especially here in House of Lords, we might put a higher premium on that than start-up founders themselves do. We cannot forget the agency aspect. What is their goal and aim?

What can we do to prevent that? First of all, if we were to have less power concentrated in the market and if the ecosystem was more distributed across platforms—AI development and others—it would give room for companies to scale, grow and become dominant in their local ecosystem. That would generally be a good thing and would have other positive side-effects. Here, the Government can work with different tools that lie outside DSIT. We can look at taxation, competition law and other things. That is one thing that would help scale local, regional or national companies.

When it comes to talent and finance, this also has to be built around a narrative. We talked about culture before, but culture is not deterministic. Like you said, people in the UK are not born with a less ambitious mindset. We also have to put out the narrative that we cherish entrepreneurs, that the UK is a tech nation and that we are celebrating successes and learning from them. Such ecosystems often become self-sustaining. You want to have a couple of those champions or anchor points that other start-ups can learn from, sit on their board and get funding from.

It is a mixture of working to reduce market concentration and actively helping to shape a positive narrative around science and tech and growth in the UK.

The Chair: Thank you, Jakob. That is a very good point to end with. Thank you very much to you and to Julia. We have very much appreciated you coming to give evidence. It has been very instructive for us. Thank you so much. We are now going to conclude today’s public session.