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Economy, Tourism and Energy Committee

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na h-Eaconamaidh,
Turasachd agus Cumhachd

Tuesday 8 September 2026

Session 7



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ECONOMY, TOURISM AND ENERGY COMMITTEE
3rd Meeting 2026, Session 7

CONVENER

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DEPUTY CONVENER

*Daniel Johnson (Edinburgh Southern) (Lab)

COMMITTEE MEMBERS

- *Gary Bouse (Falkirk West) (SNP)
- *Kate Campbell (Edinburgh Eastern, Musselburgh and Tranent) (SNP)
- *Martyn Day (Falkirk East and Linlithgow) (SNP)
- *Rachael Hamilton (Ettrick, Roxburgh and Berwickshire) (Con)
- *Kristopher Leask (Highlands and Islands) (Green)

*attended

THE FOLLOWING ALSO PARTICIPATED:

Sandy Begbie (Scottish Financial Enterprise)
Professor Michael Rovatsos (University of Edinburgh)
Heather Thomson (The Data Lab)
Rich Wilson (Gigged.AI)

LOCATION

The Mary Fairfax Somerville Room (CR2)

Scottish Parliament

Economy, Tourism and Energy Committee

Tuesday 8 September 2026

[The Convener opened the meeting at 09:30]

Decision on Taking Business in Private

The Convener (Duncan Massey): Good morning, everyone. Welcome to the third meeting in 2026 of the Economy, Tourism and Energy Committee. I do not know whether it is standard to keep counting the numbers all through the year, but we will see how it goes. We have no apologies from members.

Agenda item 1 is to decide whether to take agenda item 3, on pre-budget scrutiny, in private. Do members agree to take that item in private?

Members indicated agreement.

Artificial Intelligence (Economic Impact)

09:30

The Convener: Agenda item 2 is the main session of the day. We will be talking about artificial intelligence and its impact on Scotland's economy. AI is a vast topic, but this is the Economy, Tourism and Energy Committee, so this particular evidence session will focus on its impact on the economy.

I am pleased that we have four expert witnesses today: Heather Thomson, chief executive officer, The Data Lab; Rich Wilson, chief executive officer, Gigged.AI; Sandy Begbie, chief executive, Scottish Financial Enterprise; and Michael Rovatsos, professor of artificial intelligence, University of Edinburgh. I will ask each witness in turn to introduce themselves and to make some key opening remarks about AI and its potential impact on Scotland's economy.

Heather Thomson (The Data Lab): Good morning. I am chief executive of The Data Lab, which is Scotland's innovation centre for data and AI. Thank you for the opportunity to give evidence today.

In November, I gave evidence to the Scottish Parliament's inquiry into AI and the economy, which helped to shape the AI strategy that was published in March. I highlighted then that Scotland's constraint was not ambition or research quality but primarily adoption. I am pleased to say that there has been progress in that area since then, although challenges remain.

The Data Lab is funded by the Scottish Funding Council and hosted by the University of Edinburgh. We have a remit to support every university and college, and we work with ecosystem partners, including the enterprise agencies and hundreds of private and public sector organisations across Scotland. Since 2014, we have backed more than 160 collaborative research and development data and AI projects, from Shetland to Dundee to the Borders, generating more than £200 million in additional revenue for Scotland's data and AI sector and creating or safeguarding more than 1,500 jobs.

Today, I am speaking from the vantage point of seeing the entire ecosystem, both geographically and across sectors. Scotland's AI opportunity is real, but it is not yet evenly realised. Independent analysis suggests that AI could add more than £23 billion a year to Scotland's gross domestic product by 2035. Scotland has five universities in the United Kingdom's top 30 universities for AI

research output, a substantial AI growth zone investment in Lanarkshire and around 300 AI-focused companies, which demonstrates Scotland's capability to build AI products. However, only around 30 per cent of Scottish businesses use AI, and nearly two thirds of small and medium-sized enterprises do not use it at all. That gap between world-class foundations and everyday adoption requires focus and attention.

Closing the gap is not primarily a hardware problem; it is a people and confidence problem. At the start of the statement, I referred to adoption. The national AI adoption programme for SMEs, which was funded by the Scottish Government alongside the launch of the strategy, is delivered by The Data Lab together with the enterprise agencies and Business Gateway. We work directly with hundreds of businesses, and there is a consistent pattern in what we hear from them. Leaders do not lack interest; they lack confidence, time and a trusted place to start. That is where innovation centres can add real value: not by building the technologies but by de-risking the first step for the businesses that employ most of Scotland's workforce.

My ask to the committee is this: as public investment flows into flagship infrastructure, such as data centre, computing and growth zones, please ensure that equally sustained, long-term—not fragmented—investment flows into adoption and skills too. The opportunity is real, but infrastructure on its own will not deliver productivity gains.

Rich Wilson (Gigged.AI): Thank you, convener and committee members, for the invitation. As the convener said, I am the chief executive officer and co-founder of a Scottish AI scale-up called Gigged.AI, which I will touch on in a second.

First, I will give you a bit of my background. I am looking at this issue from a skills and talent perspective. I have spent the last 20 years in technology, data and AI talent. Back in 2006, I helped to bring to Scotland Allegis Group, the largest, privately owned tech-staff recruitment company in the world, and I then spent 12 years scaling it. It came to Edinburgh, then Glasgow. We created a lot of jobs in Scotland and worked with some of the leading companies throughout Scotland.

I then spent a number of years as a technology advisor to some of the top leaders in the world at Gartner, the largest technology advisory firm in the world. Many years ago, I also spent three years working on The Data Lab's skills advisory boards, supporting a lot of the great work that Heather Thomson and the team do.

In 2021, I decided to quit the safe, corporate life and start Gigged.AI, which is a proudly Scottish

start-up. We are headquartered in Glasgow. We are trying to help large enterprises to scale their use of AI and merge it with human skills. It is not an easy feat, but that is the point that we believe AI adoption is at.

We have raised just over £3 million in venture capital funding, we continue to scale in the United Kingdom and the United States, and we work with Fortune 500 and FTSE 100 companies. However, the scale-up issue is real, and I will touch on it in a second.

Last week, I released a book called "The 40/40/20 Workforce", which is all about humans and AI. The concept behind it is that full-time workforces in many companies are reducing, their reliance on AI is increasing, and their reliance on other talent pools outwith full-time work is also increasing. The talent pool is changing and how people hire and get hired is changing, and quickly.

My opinion is that Scotland does not have a talent issue. We have some of the best universities in the world, and we have some of the best talent in computer science and AI coming into the market. We have amazing talent—I would say the best talent in the UK. That can be seen from all the master's programmes and skills programmes in Scotland—in Aberdeen, Glasgow and Edinburgh. However, we have a demand issue. We are not creating enough jobs. Only one in 10 graduate jobs in the UK are created in Scotland, whereas three in 10 are created in London. We are not creating enough data and AI jobs in Scotland.

Let us think about what hiring for AI looks like. There are the frontier labs, which everybody will know: Google, OpenAI and Anthropic. Then there are smaller ones, which are still huge companies, such as Synthesia and ElevenLabs. In the past 12 months, such companies have announced the creation of big hiring hubs in London. We missed the boat on those frontier labs, but we cannot miss the boat on applied AI.

Only three applied AI scale-ups were cited in the Scottish Government's AI strategy that was published earlier this year: us, that is, Gigged.AI; Wordsmith AI; and Malted AI—we scale-ups like to use the term "AI" in our title. It is a huge issue that only three scale-ups were cited.

I recently spent some time in a large call centre in Livingston, and more than half of the people there were computer science or AI graduates. They could not get a job in AI. They had done a degree but could not get in. And guess what? That call centre is getting taken over by AI. Voice AI agents are real, they are coming, and they are going to take those jobs, so where do those people go?

I am a Lanarkshire boy, born and bred, and I have a lot of time for the AI initiative that is happening in Lanarkshire. However, we hear that data centres create jobs, and they do—for three months, when they are being built. However, if you have ever been in a data centre, you will know that there are no people inside.

We need to go further with our support for scale-ups and on bringing in more inward investment. Companies such as JP Morgan, Morgan Stanley and Barclays are bringing in more applied AI jobs. To grow AI in Scotland, we need to stop focusing on the supply element. We have enough great people, including great graduates, but we do not have enough jobs for them in applied AI. That should be a big area of focus.

Many of those issues are set out in Scotland's AI strategy, which was written by Chris Boyland. It contains a lot of great points. By taking that strategy and executing it as quickly as we can, we can get ahead in this area.

Sandy Begbie (Scottish Financial Enterprise): Many thanks for the opportunity to be here. I echo what the other panel members have said. The opportunity for Scotland is real, but we run the risk of losing this economic opportunity, for reasons that I will touch on. I will comment from two perspectives. First, I am representing the financial services and professional services industry. Secondly, I will also give you a view from an investor's perspective.

For those of you who do not know this, I note that the financial services represent Scotland's largest sector economically. It is worth £17.8 billion a year, which represents 10.5 per cent of the economy. As was reported a couple of weeks ago, it represents 35 per cent of the Edinburgh economy alone, which is more than the next three sectors added together. We have added 22,000 jobs in the past three years, and I will touch on where those jobs have been created shortly.

In our growth strategy, which we launched just under three years ago, we set ambitious targets to grow the sector, and we are well on track to do that. The number 1 reason why firms come to Scotland is access to talent. In response to a point that was made earlier, I note that we do not have a talent problem or a supply problem, but at times we have a political and investor tone issue. I will come on to that.

Recently, Morgan Stanley highlighted that, around the globe, £3 trillion will be invested in AI infrastructure by 2028. How can Scotland grab its fair share of that? Associated with that is investment in data centres, which has been the subject of a lot of debate of late.

The key here is adoption. The financial services industry is at the forefront of AI adoption. That is quite challenging, though, because we are a highly regulated industry. We regularly take our members' pulse on the topic, and the best way to sum it up is that all firms are looking at AI adoption and are trying things out and piloting things but there is a degree of caution because we are a highly regulated industry. However, the change is undoubtedly coming.

From a positive point of view, a lot of the change has been focused on productivity and not necessarily on jobs. No firms are currently putting together business cases based on AI investment that will remove hundreds or thousands of jobs, but firms are looking at how they can improve productivity. That is hugely important not only for the Scottish economy but for another agenda that I am quite close to, which is public sector reform. How do we improve public sector performance through the use of AI?

Rich Wilson touched on some recent investments. Lloyds Banking Group is investing more than £200 million in its premises at Morrison Street in Edinburgh, which, once the work is completed, will end up being Lloyds's main data and AI research centre. BlackRock completed a move to a new campus in Edinburgh just 18 months ago, which is its only data and AI research centre outside the US. We also have Barclays, JP Morgan and Morgan Stanley, which are all in Glasgow, investing hundreds of millions not only in premises but in people.

A lot of that investment goes into the skills side. We have a very well-educated workforce in Scotland due to our universities and colleges. However, the danger is that, if we do not grab the investment opportunity, those young people will end up leaving Scotland and going elsewhere in the UK or abroad.

Scotland has long suffered from an investor tone that has been, on balance, neutral to negative towards investment. That has changed over the years. Particularly in areas such as scale-up, we have a funding challenge around retaining businesses in Scotland. Needless to say, the current tone around data centres is proving to be quite negative with investors, and words such as "moratorium" send the wrong message to investors about the opportunity that exists.

AI will be part of the future, and data centres will be very much part of it, too. We will need them for public services as well as for attracting additional investment. It is all about how we do them, not whether or if we do them.

In summary, a real opportunity is presenting itself to Scotland, but unless we move quickly over

the next couple of years, we run the risk of being left behind again.

09:45

Professor Michael Rovatsos (University of Edinburgh): Good morning. I am grateful for the invitation to speak today.

I am professor of AI, and dean of research and innovation for the science and engineering disciplines, at the University of Edinburgh. I have worked in AI for over 25 years, particularly in what is nowadays called agentic AI. Back then, it never worked, so people did not have to worry about it.

I was previously director of the university's Bayes centre, which connects research into AI and data science with industry and innovation. During my tenure, we helped raise £50 million for research and development on data science and AI, and we also helped tech start-ups raise over £100 million. Therefore, my perspective combines the technology with questions of research skills, commercialisation and responsible adoption.

The work of your predecessor committee identified many of the right issues, such as uneven business adoption; public sector pilots that struggle to scale; fragmented data landscapes; skills gaps; and the need for strategic focus. As others have said, the Scottish Government's recently published AI strategy responds to many of those points, and I think that the important question now is delivery. Where do we concentrate limited resources? How quickly can we scale successful approaches? What measurable outcomes do we actually expect for the economy?

The AI landscape around the world is incredibly competitive, and although we have an excellent AI research base and innovative start-ups, I personally think that building the AI technologies of the future will only be a small part of how we benefit from AI as a nation. Investment in AI start-ups and scale-ups is extremely important, and we need to keep the graduates that we educate in Scotland here if we can, but the true opportunity for Scotland is to be at the forefront of AI adoption. Indeed, it is an area in which we can be world leading, because we have all the ingredients.

If we want to be a leading AI-ready country, we must really think about how we accelerate upskilling and cross-sector collaboration by orders of magnitude. Looking at when the AI strategy came out and what has happened since, one senses that the pace at which the technology and the global landscape are moving is such that our existing public and political structures will struggle to keep up. Therefore, we need to think about how we can accelerate their pace. That is what worries me most at the moment—that we are not able to move fast enough. When it comes to using AI for

public services, for example, we need much closer triple-helix partnerships between industry, academia and Government so that we can think through all the different use cases of AI in those services and make progress by working together.

We also have to think hard about what educational programmes are needed to ensure that every school child and every working person—and, indeed, those who are out of work—are seasoned users of AI, at least of the every-day commodity AI that we have in generative AI bots and so on. Otherwise, we will not be able to keep up with what is a rapidly evolving technology landscape.

As a final note, I would say that, given the financial challenges to the higher and further education sector, there is a real risk that we will not be able to scale things up to the point where we can deliver more talent and supply it to the economy. This is a time when universities and colleges are thinking about cuts, whereas we should be investing in such areas, growing the programmes and upskilling opportunities that we provide, and, indeed, broadening them out to the wider economy, instead of thinking just about students. That is key.

I will stop there. Thank you.

The Convener: Thank you. That was a tremendous series of introductions. Before I bring in members, I will ask one overview question. Listening to what has been said, I can see that people's points of view are obviously quite different, but I heard one big area of agreement regarding the AI adoption piece. Heather Thomson talked about SMEs and Rich Wilson talked about scale-ups and getting more into that. Sandy Begbie talked about scaling it up in financial services and Michael Rovatsos talked about the adoption of AI as a key area for Scotland. Is that a fair summary of the evidence? Does what we heard reflect the areas in which we think Scotland is best placed in this regard?

Professor Rovatsos: The problems that are involved in driving the development of future AI are different from those that are involved in using it across the economy. Rich Wilson has spoken a lot about how it is incredibly hard to compete on frontier AI. We have a lot of companies that can translate that frontier AI into benefits for the different sectors, such as manufacturing, financial services, health and life sciences. However, adoption is a completely different problem, because most of the companies do not have the resources, time and confidence to really get into that. If I could, I would deploy five AI engineers into every SME in Scotland to help the companies learn from those who already have the skills,

because that investment is not something that they can stomach themselves.

Heather Thomson: There is a connection between the two issues. They are different, but they have an impact on each other. On one side, businesses are trying to scale and, on the other side, there are leaders who are not in a position to deploy and operationalise in a way that enables them to make the most of the products that are coming out, because of a lack of skills and a lack of adoption insight. Although they are two different problems, they are very much interconnected.

Rich Wilson: On the AI adoption point, from a scale-up perspective, there is a funding element that I can talk about later. However, the main thing concerns regulation. Sandy Begbie mentioned that a lot of the banks in Scotland are leading on AI, but it is difficult for a bank to adopt AI properly because the area is so regulated. There is a similar issue with AI adoption in the public sector, which Michael Rovatsos alluded to. None of the three scale-up companies that I mentioned work with Scottish local government, the Scottish Government, the Scottish national health service or anything like that, because we cannot get through the procurement process. We cannot get in.

A big tender recently went out, but none of the three AI interviewing start-ups in Glasgow could bid for it, because they were not on the frameworks. One of them, which has 15 employees, is a world leader in the sector. The tender went to a Japanese company, but it should have stayed here, given that there is a world-leading AI company in Glasgow that could have done the work. Would it have struggled and would it have had to learn things? Yes; as I said, it has only 15 members of staff. But the work should have stayed here.

As I said earlier, we have given up trying to work with local government, because there is just too much red tape. We help upskill and match people to different opportunities within Scotland using AI. What we do would be a perfect solution for local government, but we cannot get in.

The same issue applies in relation to multidimensional interviewing. Great things are being done with small language models rather than large language models, which is a really interesting concept. However, we just cannot get anywhere near the sector because of the antiquated procurement process.

A great AI adoption opportunity would involve Scottish scale-ups working within local government, because of the positive publicity that would come out of the success stories around that. That would be a quick win. However, right now, we cannot get near the sector.

Sandy Begbie: I echo that. I think that the use of public sector procurement to better support economic growth and scale up businesses in Scotland is a huge opportunity.

In our sector, we have big firms that arguably have more resources. However, we are finding that there is a need to upskill the leaders at the top of the organisations. If leaders do not feel confident about adopting AI, that will hold back the organisations.

The Financial Conduct Authority produced an interesting report at the beginning of July on AI adoption, particularly in the retail financial services industry. It was written by Sheldon Mills, who worked for Nikhil Rathi. Sheldon Mills made a comment at an event about the huge variability among senior people he had interviewed about their understanding and comfort with AI—it was enormous. He said that that will be a driver for how firms adopt AI and whether they survive in the future. It is very important for the public sector and the broader economy to be upskilled in that area.

Rachael Hamilton (Ettrick, Roxburgh and Berwickshire) (Con): Before we move on, can I ask Heather Thomson a supplementary question on that point?

The Convener: Of course.

Rachael Hamilton: Sandy Begbie and Rich Wilson have been talking about public procurement. Your biog, Heather, says that your organisation works with the public sector in terms of its services, but do you consider, from start to finish, how the public sector is accessing the services of the three main service providers in Scotland so as to better support Scottish companies in AI?

Heather Thomson: The short answer is no. To echo the comments made by both Rich Wilson and Sandy Begbie, I would say that this is not a three-company problem. The Scottish Government ran an innovation week last year, which had around 20 start-ups at different stages, from very early to global. Every single one of them had the same story: they do not have too much of a problem accessing the funding to get where they need to be—to get to scale—but there is a huge issue when it comes to procurement and being able to deliver in Scotland.

From a public sector perspective, our support is at the leadership level—as Sandy Begbie was discussing. It is about leaders understanding the value of data and AI for their organisations. It is about helping them to understand the opportunity, to develop a strategy and to understand how to build a workforce to deliver that. However, the procurement side of things is not part of the data.

Rachael Hamilton: I will ask another supplementary question, if I may. Is AI part of the current Excel process for public sector procurement?

Heather Thomson: I would not comment on that. We do not get involved in the Scottish Government procurement processes.

Rachael Hamilton: I do not know whether any of the witnesses knows this, but it seems that there needs to be some sort of review of the procurement process so as to keep up with the advancement of different technologies that are coming into play for buying and selling.

Heather Thomson: Procurement is not something that I deal with specifically but, from what we understand from speaking to organisations and to people in the public sector, there are legacy systems that were not built to consider split human-AI workforces or AI products, as Rich Wilson was saying. Using such systems is like trying to fit a square peg into a round hole, in some respects.

Professor Rovatsos: The problem with AI is often that we do not yet know what the solution that needs to be procured will look like. Hence, I was talking about triple-helix partnerships. There is an interesting precedent from the UK Government, which is experimenting with a commercial innovation hub for making the procurement route easier for the commercial supplier, if the first couple of hurdles can be overcome in working on the use case.

One problem concerns the whole research base. Although research and development sometimes needs to be done to address the problems, we never get involved in procurement, and we are not a supplier. That needs to come from industry. The question is how we bring the best talent together with the problem owners and then enable those SMEs and tech start-ups that get involved to get through the process and deliver a commercial product to the public sector. That will help with their own growth at the same time, as it provides them with customer number 1 or number 3, say.

There is something interesting around how we can organise that. I talk to those in the industry, and they cite the NHS as the classic example, because there is just no way—some of them have tried for years—that they can get through the bureaucracy to create a new solution for the NHS.

10:00

Sandy Begbie: I will comment on that, too. In the interests of openness and transparency, I note that I am on the public service reform board, and one of the things that we have talked about is the

fact that there are no organisational incentives in the civil service to do anything different on procurement. As humans, if we want to go and buy something, we go and buy it. In the civil service, there is no incentive to think radically differently about what you are buying and how to make the operation significantly more efficient and effective. There is no long-term strategy around it; it is purely a procurement process. I know of a couple of AI firms that, for all the reasons that you have heard, have given up on the idea of transforming a service, because there is no organisational incentive to do so.

To a certain extent, that is part of a separate public sector reform topic, but it is also relevant to this, because Scotland has huge AI capability. However, unless the Government and the civil service recognise that and think about how they can adopt it, we will end up pushing jobs out of Scotland, because the firms will have to go and look elsewhere.

Rich Wilson: On Sandy Begbie's point, I note that we are one of those firms that have given up. We gave up trying—we could not get anywhere near the public sector, and it was a waste of our time and resource. However, we have managed to get pilots with a lot of the financial services firms that Sandy mentioned. It has taken a long time, but we have managed to do it. We have managed to run successful pilots and work with leading companies in Scotland such as Aggreko and Gap Group, but we had to give up on trying to even get close to the public sector in Scotland; we just could not get near it. We kept hearing that there was no way for it to happen. We were told about the CivTech challenges, but there is nothing about AI in those challenges, and they are very small pilots. With no disrespect, a £5,000 to £10,000 pilot will not create any jobs for my company. If I can get a larger pilot, then guess what? I will hire those graduates and AI people. I will hire them in Glasgow, because I am not hiring people outside; I am going to do it here. As I said, I had to give up on the public sector route, because we just could not get into it.

The Convener: Do you think that part of the problem is that we have a traditional procurement mindset, whereby you say, "I need a new database," or something, whereas, as Michael Rovatsos touched on, the AI model is perhaps more a case of sticking five engineers into a business and, after six months, they will have improved processes and things like that. It is not so much that you are procuring a product in the traditional sense; you are procuring a new way of doing things, and that is difficult for people to get their heads around. Is that fair?

Professor Rovatsos: You need some sort of innovation function in Government, the civil

service or the different departments, because solutions need to be co-developed with those who will use them. They do not exist off the shelf, particularly those that have to work with legacy systems, so you need a different model. People are really cautious, because, in procurement, you want to de-risk everything, so you ask lots of difficult questions. In addition, people are worried about lots of things with AI. If you do not think about that risk while you are developing the solution, it will not work, and then people just say, “We cannot get guarantees that it will work.”

We have to acknowledge that it will be quite disruptive. If you start automating or semi-automating certain decisions in public bodies, there will be big challenges, and we have to think about our risk appetite and what we are able to stomach in terms of things potentially going wrong. However, we have done this with other technologies. We started using cars, for example, despite the fact that people have always gotten themselves into accidents. There is something about the mindset and how you work with those developing the solutions.

Kate Campbell (Edinburgh Eastern, Musselburgh and Tranent) (SNP): That was very interesting. While listening to that, I was thinking about solutions for procurement. A large capital project involves employing a design team, and there are stages of procurement starting with an early design phase and then advancing to the next phase. Would a model along those lines work? Should we start to think about data and technology in a different way, perhaps more in relation to capital investment or a long-term strategy?

Sandy Begbie: Before starting with a design team, you need to have a vision of what you want to do and have a strategy that builds on that. It strikes me that the public sector continues to work on a traditional investment model with a waterfall-type approach, whereby you decide what will be built, you build it and then you find out at the end that it might not be exactly what you needed. The whole concept of agile working and having a more iterative way of building and constantly improving are not models that have yet been adopted in the public sector.

Kate Campbell: I disagree with that, actually. My experience of being in a local authority was that we would know that we had something that needed to be built, but we would go out to consultation, particularly with the local community and also with other service users, to decide what that would need to look like. There is certainly a model that works in local government procurement.

Sandy Begbie: The national health service app is a great example of why that model does not

work. It took seven years, but it should have been thrown out to the private sector right at the beginning. There is an existing mindset of, “We will build it ourselves,” and, seven years later, barely anything is live. There will be good examples of where the model works, but that is a great example of where it does not.

Kate Campbell: I am trying to problem solve and ask whether there is a model that we could use or consider trying to apply when we are thinking about tech.

Rich Wilson: I will jump in on that. Financial services—many of which are in Scotland—all have an innovation team. If they want to engage with a start-up, there is a way and a process to do that. Engaging with a multinational systems integrator will be very different from engaging with me, because I will not be able to compete on an invitation to tender with a \$55 billion company—there is no chance. I can try, but the chances will be slim. However, it will be different if I can come in thorough an innovation pilot and those financial services proactively come to us and five other companies to say, “Look, we are trying to build this.”

I agree with your point. The public sector in Scotland is trying to adopt agile as a methodology. Agile, especially in the software development life cycle, is about having a rough idea about where to go but needing to iterate on that.

To respond to Michael Rovatsos’s point, AI and large language models are changing so much; they will iterate a lot, even in three months. All we do is iterate and iterate. That is all we do—we pivot, we iterate and we change; that is how software works. It needs to work that way, but it is tough to do that in an antiquated procurement function. That is because, as I said, those large invitations to tender will go out and attract big companies, and it is difficult to compete.

Ring fencing or having a pilot or an innovation—whatever you want to call it—and engaging a smaller number of companies will be the start of the solution and start the ball rolling. That might end up turning into a bigger piece of work and bigger companies might need to be brought in, but the question is how we start to get the ball rolling. We need to say, “We have an issue regarding AI adoption in this area,” and, instead of going out to tender, we look at the top three, four or five—whatever it is—companies in Scotland and ask them to come and do a mini-tender or a mini-pilot. We can do it that way and ring fence it and then, if those companies want to be part of the tender or pilot, we can take it from there.

I know that the G-cloud framework is a United Kingdom Government thing, but that is difficult for any Scottish start-up to get into—it is almost

impossible. That is because you need to have five years of accounts. What start-up has five years of accounts?

There will be a lot of challenges, but it is about being able to pilot, innovate and test and to be okay with failure. However, there will also be success stories. This is where the AI use cases will be—"We worked with XYZ start-up, we created these jobs and this was a success." There are ways to do that, but it will need to be ring fenced, the data will need to be in a sandbox and there are various things that will need to be done. However, it is all doable.

Professor Rovatsos: The design and ideation of doing it together is key. We find that the private sector's interaction with Government often involves it being a supplier, while academics are often advisers or experts; we give an opinion, but we do not really collaborate on the solution or as part of the same team. That could be looked at.

Of course, it is tricky, given the obligations that the Government has on transparency, consultation and so on. Many people talk about how sovereign AI is in relation to the models and the data, but I worry more about whether we will lose our sovereignty because, instead of using the NHS app, people will just download something from the internet that has been built by a big tech company, and it will provide their healthcare. That is the reality. People will stop coming to the universities because some avatar will be teaching them online. We are facing big disruption to many of our sectors, and if we do not do it, somebody else will, who may not be in Scotland or the UK at all.

The Convener: Gary Bouse has been patiently waiting to ask a question.

Gary Bouse (Falkirk West) (SNP): My question touches on something that Michael Rovatsos said about the problem with predicting the future. Does that bring in a risk element that will be a particular challenge for local authorities and Government bodies? In my experience, private businesses have adopted a good bit of AI and have had the sense to say, "Okay, we've lost jobs in certain areas, but we'll train those people up so that they can do other jobs in dealing with AI." In that sense, AI can become a big benefit.

The council that I was in, which was Falkirk Council, has used AI and seen some benefits from it. However, does the big leap that you guys seem to be looking for represent a big risk of AI becoming a problem, whether that is a matter of presentation or of intelligence about where people have taken that big leap? I promise you that I am genuinely not a Luddite and that I believe that AI is the future, but how do we get over that risk factor? Change is risk and, particularly when we are

dealing with public money, that becomes a big challenge.

Professor Rovatsos: It is hard. It is also a really confused space because, although we all talk about productivity improvements, the way that they will happen through the use of everyday commodity AI will be very hard to measure. I am yet to see many businesses or public organisations that have saved a lot of money. It will be like the internet, Google or email—we will all become more productive, but the issue is mainly about whether we will deliver the quality of services that citizens expect in line with how they live and work.

The real benefits will come from more specialised, applied AI solutions for things such as diagnostics in healthcare, the better management of public finances or the energy grid. Because those are narrow AI applications, we can put them to the test, de-risk them and so on. People read the big headlines about things that may go wrong, such as AI agents hacking into systems and so on. Those are big issues, but that kind of AI is very different from a specialised algorithm that gets involved in lending decisions or investment decisions, where we can manage the risk.

Think about what we did with social media. Facebook started in 2004 and the first UK legislation was in 2023. With AI, we just do not have 20 years. In the meantime, all kinds of terrible things happened on social media, and we did not really do anything about them. I would prefer that we assume some of the risk in a responsible way and deal with it, rather than just leaving it and seeing what happens.

Gary Bouse: You have answered my follow-up question perfectly, which was going to be about legislation.

Sandy Begbie: There is a risk in doing nothing, which Michael Rovatsos touched on. Firms will adopt the use of tools such as Claude and ChatGPT, and the general view is that doing so improves productivity. Such use is not removing jobs; it is just making people more productive. They are spending more time on more productive activities, and we then see firms developing use case studies on significant time-consuming internal processes that could be done differently.

10:15

There is still a general reluctance to do too much in the direct-to-consumer space. There are some pilot programmes, but a lot of firms are concentrating on big internal processes that absorb a lot of resource. I will give you a good example of that. There is a firm, which I will not name, that is now using AI agents to analyse more than 70 per cent of its customer complaints. The

analysis is more accurate, because it removes human interaction and is done more quickly, so it is better for the consumer. The agent will draft a letter and make a recommendation on compensation, but a human is still overseeing that final step in the process. That has allowed the firm to take the resource that was previously dealing with customer complaints, re-skill those people and direct them into more productive activities.

That is a real-world use case involving a firm that is freeing up a significant amount of resource and has now automated processes to the benefit of the customer, because they are getting quicker and more consistent replies. That is a win-win situation. However, the firm is managing the associated risk in order to reduce it. You must remember that we are a hugely regulated industry, and regulators' oversight is vitally important. That is where a lot of the focus is, but there is an appetite to test such things out.

Heather Thomson: I can give some further examples. One of the interventions that we offer through the national AI adoption programme does exactly what you have just heard about. It provides a test bed and helps organisations to dip their toe in the water, if you like, and take that risk in a safe environment so that they can explore ideas and build prototypes. Not only are they doing that in a safe environment, but they are not having to invest in platforms without really understanding what they are purchasing.

What we find with a lot of the organisations at the moment is that there is overwhelm. On one side, you have people with a fear of missing out throwing money at everything and then realising that what they have got is not what they need; and on the other side you have people on the other extreme, who are almost frozen because they do not know how to take that first step, and their default is to do nothing. It is useful to be able to hold people's hands and ensure that they can take a safe first step and understand what is possible.

We see people who want to jump to AI, but one of the first things that we look at is data around the company, because we want to ensure that the company is set up in a way that will enable it to grow on its AI journey. The test bed has allowed companies to free up time and resource internally in a way that allows them to engage in more productive activity, and, in a number of the cases that we have looked at, that initial internal process has highlighted the potential for something that could go to market, because they have ended up with something that is scalable.

We have set up our very small temporary test bed with the funding that we have for the AI adoption programme, but we would like to work with the Scottish Government to secure longer-

term investment in a national test bed for Scotland, which could help businesses to make that first move.

Rich Wilson: Risk is obviously a huge topic, but what people mean when they talk about risk in relation to AI is data security and data privacy. AI is a lot of software code that is based on whatever data you give it access to. There are ways to mitigate the issues around that.

We use publicly and privately available skills data. That is sensitive data, and we need to be careful about how we handle it. We work with one of the largest banks in the United Kingdom, and we need to be very clear about how we can use its skills data—the same would apply if we were working with any other organisation.

You need to have a very clear plan and have clear guardrails in place about data security and data privacy. People are scared of what will happen if that data gets leaked, if the system is hacked or if the agent goes rogue. However, that is the same with any technology. Those issues need to be thought about.

In responding to Kate Campbell, I mentioned an innovation pilot. Among the first things we need to look at in relation to that sort of work are what data we have access to and what risks are involved. Those need to be the first questions that we ask. Of course, we need to ask what the business challenge is, but we must first ask what the data risk is. If you start asking those questions, you can start crafting things in a certain way.

We need to be very clear about what we mean when we say the word risk when it comes to AI.

Kate Campbell: I am kind of surprised by things that I have heard, and I am keen to hear your thoughts about them. I am coming at this very much as a layperson, and you all have a much higher degree of understanding of AI than we do—that is one of the challenges that we face: politicians do not have that detailed knowledge, and we will probably never have it at the level that we would like to.

I have read about an incident in which hundreds of AI agents—about 1,200 of them—broke out of sandboxes using multiple chains of skilled hacking techniques and were able to get to the internet, where they then talked to each other on third-party websites and a German Wikipedia-style site about how they managed to break out. I read that they asked each other whether they should tell the humans about what was going on and, although some of them said yes, the majority of them said no.

I take the point that Sandy Begbie made about investor tone, but the sort of thing that I have read about is a genuine concern. It seems like

something out of a science fiction novel. When you talk about people's fear or concerns, that is the sort of thing that they are based on.

Looking at the AI strategy, I saw that it talks about a chain of trust and use of sandboxes. However, we have seen AI agents breaking out of those sandboxes. Do you feel that we have the right regulatory framework in place? That is what is needed if we want to give people the necessary confidence to use AI. What should we be looking for in terms of reassuring the public?

Professor Rovatsos: People are confused by what they see in the media. A human operator can use an AI agent to get a task done by giving it autonomy over resources, so it can go out into the internet to do its own thing and take its own action. In a sense, if you think about those bots and agents as having some intelligent skills and some cognitive ability to perform tasks, that is no different from hiring people to do things. On the regulatory question, imagine you had lots of free interns who could go on the internet and do all these tasks for you—

Kate Campbell: I will push back on that, because free interns could go to prison if they broke the law. They are humans, so—

Professor Rovatsos: Exactly. My point about regulation and governance is that we need a framework whereby the person deploying that technology would be accountable for it. Sooner or later, the AI agent will be able to do most of the things that we can do, but it will never be accountable for what it does. So, the question is, how do we get people to a point where they are confident that they can take responsibility for the AI that they are using?

As Heather Thomson says, that is actually more of a skills and confidence issue. I would not be confident in letting an AI agent send emails on my behalf, and that is because I know that, occasionally, AI agents make errors, and it might send a resignation letter to my boss—I do not want that to happen before I sanction it.

In some sense, the worry relates to things that the frontier labs are experimenting with. In the stories that make the news, what has often happened is that certain safeguards have been disabled to see what will happen—we can talk about whether that is a responsible thing to do, given what could go wrong.

Equally, if we do not give people the confidence and the skills to be able to answer those questions for themselves, they will be exposed to the ways in which malicious actors use the technology.

Kate Campbell: My question is about the regulatory frameworks. You are saying that there are companies that are testing in sandboxes that

they think are safe but which agents are breaking out of, and you are saying that there is a question about whether those labs are behaving responsibly. Such incidents could affect all of us. At the moment, the AI agents are just discussing how to break out, but who knows what the next stage of that is? That is a genuine concern that people have about AI. My question is, do we have the regulations in place to ensure that the people who are testing things are taking responsibility for what they are doing?

Sandy Begbie: In financial services, the regulators are all over that. Trust is a big part of the issue. Edinburgh Napier University has a centre for digital trust, which is looking at trust in digital assets, AI and so on in financial services. We benefit—perhaps not always, but we do benefit—from having a very regulated business. Our biggest risk from AI is that people will seek financial advice through an unregulated source. Someone could go on ChatGPT and ask, for example, “I've got £20,000 to invest. How should I invest it?” That advice will come from an unregulated source. It might be good or poor advice, but the person might then make decisions based on it, and there will be no compensation or recourse for them because of that.

There is a big debate in financial services at the moment about whether the boundary of regulation should be expanded. The regulator is currently considering that. A report that was published just a couple of weeks ago said that, among the under-30s, almost 35 per cent think that, if they get advice from ChatGPT and it goes wrong, they will be compensated from the financial services compensation scheme, but they will not.

There is something about education and transparency, but there is also something about making sure that the regulatory regime continues to keep pace with what is happening. However, as an industry, we are obviously highly regulated. The Financial Conduct Authority will run sandboxes, people will go along and pilot and test things, and that will be done in a safe and secure environment.

Rich Wilson: Can I add to that?

The Convener: I am conscious of time, and I want to keep the conversation broad, so I would like Kris Leask to come in with his question first.

Kristopher Leask (Highlands and Islands) (Green): In Rich Wilson's opening statement, it was interesting to hear a reflection on how well we have delivered economic development or economic benefit from the growth in AI so far. I got the impression, as I did last week with the programme for government, that we are marching towards something and have an ambition—you can argue about the merits of it, but nonetheless it is the ambition put forward by Government—with

the misplaced belief that we have already done the work that is required to develop the work pathways, the economic development approach and the broader landscape to enable us to make best use of the talent supply pool that you talked about at the beginning. Will you reflect on that a little? Has that work been done, or is there a recognition that it needs to be done? Alternatively, are we marching towards a national ambition with perhaps a misplaced belief?

Rich Wilson: There are probably two strands to that. In further education, universities have done a phenomenal job in Scotland. Some of the best PhD programmes in data science in the world are in Edinburgh. In Glasgow and Aberdeen, there are a lot of programmes with really talented people coming through.

To come on to your point about where we can go further, that comes under the topic of AI adoption. If you are not doing a computer science PhD or are not an AI expert, are you learning the skills? Can you adopt AI? How do we get more people who work for organisations to do that? Sandy Begbie made a point about senior leaders' AI adoption. The Data Lab used to have a great executive education programme that was about educating senior leaders on AI. There needs to be more adoption among people who are not in AI. I have been in tech for 20 years, so AI is not a new thing for me. AI ain't new, but we need to consider the education of people who are not in AI—those who work in a bank, shop or whatever. There is definitely a gap in how we upskill people who are not in technology.

With graduates and new people coming into the workforce, we have done a good job. However, from the perspective of people who are not trained in AI, much more can and needs to be done around AI adoption, for sure.

Kristopher Leask: Do you have anything to add, Heather?

10:30

Heather Thomson: Yes—I will echo what Rich Wilson said. As part of our master's programme, we do not focus only on the deep tech of AI and machine learning. At the moment, we support more than 44 courses across 14 universities. There is a recognition that data and AI are embedded within everything that we do, and we are trying to ensure that we expand people's skill sets, regardless of which discipline they are studying.

Also, through the Edinburgh city region deal data-driven innovation skills gateway, for the past six years, we have been part of a data skills for work programme. As part of that, at The Data Lab, we have developed a data and AI skills framework,

which is about exactly what Rich Wilson talked about: recognising that it is not only data scientists and professionals who need to have those skills.

Education and literacy are vital for everyone now, whether you are a citizen, a worker who is going to your job in Sainsbury's but might need to look at a spreadsheet, or a professional. There is also a huge gap at leadership level. The data and AI skills framework has been developed to support employers and individuals to better understand the skills needs based on where they fit within that taxonomy, and to think, across sectors, about what skills are needed and what training to focus on. The framework helps to signpost people in what is a cluttered landscape now.

No matter what you do now or what your job is, just to get out of bed in the morning and in daily life, you need to be data and AI literate to some level. However, it is not a one-size-fits-all approach. We hear bold statements from people saying that they will ensure that, by 2035, however many thousand or million people will be AI literate. What does that mean? It does not mean the same thing to everybody.

The Convener: Martyn Day has a supplementary question.

Martyn Day (Falkirk East and Linlithgow) (SNP): It flows on from exactly where we are in the conversation now.

Back in 2022, at Westminster, I hosted the launch of the Institute of Analytics's analyst competency framework. It seems to me that we need the equivalent for AI literacy for all walks of society, particularly managers in the public sector and private companies, so that they get an understanding of it. How do we go about getting there? Ten years ago, we did not even have AI on our horizon, but it is changing at pace. I see many challenges in setting up a framework, but I would have thought that a lot of the institutional resistance to moving in the public sector is probably because of a lack of familiarity among the people who make the decisions on AI. How do we take a belt and braces approach and get that into the model?

Heather Thomson: The foundations are there. We have our framework and there are various others. We are seeing that, as with everything, frameworks are starting to pop up all over the place. At the moment, because there have been so many changes over the past five years, we are doing a scoping exercise to understand what is already out there, because we do not want to duplicate and confuse people. One of the challenges that we have with such frameworks, particularly in AI, is that things change daily, so it is difficult to keep things up to date. Nevertheless, there are some very foundational skill sets that will

not change, so people can get those early skills. To go back to my earlier point about data and data literacy, that is a real foundation that needs to go right the way through.

Rich Wilson: I have spent most of my life working on skills frameworks and taxonomies. The problem that comes with that is that organisations always try to build their own skills framework and taxonomy. Every organisation has its own one—nobody has the same. Organisations start to create their own, then they grow arms and legs, and then they are not updated. In the public sector in Australia, New Zealand and even the US, there is an open-source framework called the skills framework for the information age, which is updated regularly. It has just been updated to take account of AI and data.

A lot of The Data Lab's framework was built on some of those methodologies, but then it had to go further, because even that did not go far enough. However, there are frameworks that companies can adopt, and it is about trying to get them to adopt those in order to be able to look at skills.

The next thing is that somebody needs to own the issue. We have talked about the chief skills officer or chief work officer. There needs to be a change in our thinking about how work is done and about tasks. AI is a big topic and AI agents are only one part of AI, but agents do certain tasks. They are not yet taking over a full job—although that is coming—but they are taking a lot of tasks.

How do we start to map tasks and skills together? That is where an open-source framework comes in. We could have an open-source framework for Scotland and build on what The Data Lab has already built. There are options out there. The problem comes when everybody builds their own and there is no standard model. It is definitely a challenge, but also an opportunity.

Martyn Day: The problem with everybody building their own is that there is no certainty that there will be a portable certificate that confirms that users and operators have the same understanding, given that they come from different sources.

Rich Wilson: Yes. With a standard framework such as SFIA, which I mentioned, people could take a certificate with them as a passport. SFIA has seven levels while a data and analytics framework might have three. There is a Scottish start-up called Amicus. People could put the certificate in the Amicus passport and take it with them. There is another possible pilot for Scotland. There are other things that we can do to build on that. It is absolutely doable, and it is not difficult.

Professor Rovatsos: It is also about the mix of different skills that are brought into organisations.

There is a big gap around the leaders of organisations being able to understand what they can do, which is not so much about subject matter expertise. For example, every company has its estate and its facilities, but chief executive officers are not experts in facilities. They understand the parameters of cost, risk, infrastructure, benefits, the upgrading of infrastructure and so on, and they then rely on the experts that they have to answer the business questions. There is a real challenge around the leaders of organisations being able to envision how to restructure the tasks that underpin their business processes and understand what they can do to get productivity gains, and then having the subject matter experts, the AI, the engineers, the analysts and the specialists to implement that. Those are two different things, and we need both.

Sandy Begbie: This needs to start in secondary education. The curriculum review is ongoing, but education will have to react much more quickly to the world that we are moving into, and that rolls into colleges and universities thinking about AI, data, robotics and so on across the entire curriculum. This should not be viewed in a silo. AI and robotics could very well impact many disciplines and how they are incorporated is really important.

We hear from firms that are questioning whether having four-year degrees is the right approach in certain areas, given the pace at which the world of work is changing. Graduate apprenticeships, where people earn and learn at the same time, are more likely to be a preferred model. If someone does a four-year degree and then enters the world of work, what they learned in the first three years might be redundant by the time they get into the workplace.

We are a big advocate of graduate apprenticeships, and I think that they will become a bigger part of the further and higher education system. There are other reasons why that might happen, but the model of employers continuing to develop people on the job as they are going through their degree will become more prevalent.

Daniel Johnson (Edinburgh Southern) (Lab): Sandy Begbie touched on the key hot topic in AI at the moment, certainly in Scotland, which is AI data centres. It is important that we examine that. I will play devil's advocate on the subject, at the risk of being negative on investment, which I am certainly not, as Sandy will know. Why do we need to build hyperscale AI data centres here? What is the risk if we do not build them? What opportunity would we miss if we did not build data centres in Scotland?

Sandy Begbie: I will focus on the opportunity. I think that others in the room are more capable of talking about some of the technical aspects of data centres. However, from our point of view, we are going to need them in the future. We are not suggesting that all 24 applications that are currently in are for data centres in the right locations and to the right specification, but the idea that we will be able to get by with none and that we can let the investment opportunity pass us by is just not going to be the right answer.

New Zealand is an interesting case study for the adoption of data centres, for a variety of reasons. Its data centres have been located right next to wind farms in order to use the excess power that comes from those wind farms. New Zealand has a similar climate to ours, and it has also put data centres in quite remote areas. The question is how we connect up and think about using our energy infrastructure.

Looking at this issue, I have learned that the vast majority of those data centre applications are for sealed units, so the water usage will be minimal. We need to have a degree of facts in the discussion. We are potentially losing out on billions of pounds of investment. There is also a point about data sovereignty and holding data here rather than elsewhere, which might be a trust issue.

On the point about jobs, I used to run data centres for Standard Life; there have been data centres for a long time. They will employ a minimal number of people, but there will be a significant number of construction jobs that come with them. Unfortunately, given our level of unemployment, we are not in a privileged enough position at the moment to pass up investment opportunities.

We need to look carefully at data centres. Our view is that the discussion has become polarised; it is about saying either yes or no to everything, but the discussion needs to be more nuanced than that. We need to lift our heads and look at other countries, such as the Republic of Ireland or countries in Scandinavia, which have taken a more proportionate response.

Daniel Johnson: I will pursue a point as a devil's advocate. If data centres are being built and people will access AI models through the cloud and the internet, why do we need to build the data centres here? Could we use our excess energy for other purposes, especially when we are considering building them in the central belt? Although Scotland has a relatively low population density, the central belt does not.

Sandy Begbie: Why would we turn down the opportunity? If economic growth is a defining objective of this Parliament and Government, why would we not consider grabbing some of that

investment? Blackdog data centre up in Aberdeenshire, which is being built next to a wind farm, is an interesting project. This year, we have paid companies more than £1 billion in the first six months alone to switch wind farms off, so we are not even using the capability of the energy generation that we currently have. We could use the excess power—the problem is the grid, but there are clearly opportunities.

I spend a lot of time in China for business. I know that it has a completely different environment, but it is basically building its solar farms right next to its data centres to avoid having huge issues with connecting to the grid and so on. The excess power is taken and used to power data centres—other countries are doing that.

Daniel Johnson: Michael Rovatsos, I will bring you in and add a couple of questions. Are there any technical reasons why proximity is an issue? From a broader technical point, I have also often wondered about AI density—I am again pursuing a point as a bit of a devil's advocate. In the history of computing, there has always been a presumption that we will centralise the computing and processing power and that we will access it using long lines with terminals and mainframes, but that has never turned out to be true; it has always ended up being distributed. Is there a risk that, in pursuing data centres, we will concentrate the processing power and then end up with a distributed model again, like we have always done?

Professor Rovatsos: The processing power will be distributed either way, because none of the individual data centres will be big enough in the end—the capacity that we need will keep growing. However, there is another reason for Scotland to be playing in this arena, which people do not often talk about. Between our excellence in semiconductors and communications, our experience with high-performance computing and now exascale, and our knowledge in setting up that infrastructure, we are in pole position to develop the green data centres of the future. Rather than just establishing some technology that is currently commercially available, between our excellence in green energy, net zero technologies and AI, there is an opportunity for us to export our capability in those areas.

From semiconductors to building AI models, there are very few small areas in the world like the central belt and the north-east that can do that or that have everything in place for it. I agree that we do not necessarily need data centres to be here to be able to do world-class AI here. However, as the data centre sector is a growth sector, there will be opportunities to play in that space and to bring some economic opportunity to the country.

10:45

Daniel Johnson: I say this for clarity's sake, as I was playing devil's advocate. I take the broad view that, if we are not on the front foot with such things, we are probably on the back foot. That is not to say that we do not need to consider this issue very carefully, but we need to consider it very rapidly. The points that have been made have been useful.

I will ask a broader point, and I am interested in getting a response from anyone. You have spoken about the need to consider AI in education. I would be interested to draw out some specifics. I am still hearing from schools about children not being allowed to use AI at all and about AI being associated with plagiarism.

We need to think about the skills that we need to provide to young people. We have an opportunity now to impart the right skills to children and to make them ready for the change. It is like what calculators were to arithmetic. There is a force multiplier here if we get it right. However, what does that look like? Do any of the witnesses have clear views about changes that we could make to the curriculum, to teaching practice or to pedagogy so as to get on the front foot with AI in education?

Professor Rovatsos: I think about this from the point of view of universities. Knowledge and, in some sense, intelligence are no longer something that we are the gatekeepers to, and they will be available to anyone. The question is what remains uniquely human and is important to develop skills in. That is all the things that are outside AI. For schoolchildren, that essentially means the experiential element of how you decide what to learn, what that changes in you and how you develop as a person. It will be a matter of understanding why you had to learn arithmetic before using a calculator. It is because something changes in your brain when you do that, which gives you the facility to do other things in the future.

However, if we did not embed the use of AI in the process from a very early age, we would be missing a trick. I do not think that there is a way to keep AI out of the classroom. There is no way to keep it out of the office or the factory. I therefore think that we need to start early.

Rich Wilson: As I mentioned earlier, AI is not new. However, because of the leap in generative AI, the genie is out of the bottle. I could talk a lot about regulation, and we can come back to that at another point.

If you are working at a large company in Scotland, you have been through an AI upskilling programme: you have been told what models you can use—you are allowed to use this model, but

not that model—and you have been told that you are not allowed to use it on your phone. The bottom line, however, is that you are being upskilled. I have upskilled my whole team; we upskill people all the time. That covers questions such as, “What is a large language model?” and “What is a small language model?” or “What is co-work?” Terms such as those are coming up all the time. There is all that education. People who work in a company are being educated in that.

Someone who uses Microsoft Copilot is using AI. Most schools have a Microsoft Teams account. My daughter has it: she is using Copilot. She is not allowed to use ChatGPT, but she is allowed to use Copilot at her school, which is perhaps forward thinking. I do not think that that is any different from how we would educate an adult in a company. They all have training programmes, and they all have access. It is the same for the children coming through. Going back to your point about the calculator, Mr Johnson, we cannot pretend that the calculator does not exist. It exists, and there is a time and a place for it. There is a time and a place for AI.

There are a lot of skills, however, such as critical thinking, that should not have AI near them. I do not think that art should have AI near it. Music should not really have AI. Those are personal opinions. However, there are plenty of things that should have AI next to them. As I say, there is a time and a place for it.

Being able to adopt critical thinking skills is important, as is education on how and when to use AI. In preparing for this meeting, for example, I did not use AI; I wrote out good old notes, although I could have used my Claude agent to do it. However, if I had, that would not have allowed me to think. There is a time and a place for AI. However, we must embrace it, and we need to embrace education on AI.

Heather Thomson: Can I just add to that? I will be brief.

The Convener: Sorry, but, being cognisant of time, I note that Gary Bouse wants to come in on this, followed by Rachael Hamilton.

Gary Bouse: I want to make a point that Rich Wilson touched on, because I know a couple of young people who are involved in art and music, and their dislike—I will use that word rather than others—of AI is huge. They are finding that their work has been copied or stolen—“stolen” is probably the right word for it—but there is no legal recourse for them to bring it back, which is a big challenge.

However, my bigger question is on Heather Thomson's point about the £23 billion increase, and this follows on from the questions asked

earlier about hyperscale data centres. That is quite an astounding number—and I think that Heather said that that would be by 2035, if I picked that up right. Would that be dependent on having such centres close by? I understand that that is a potential draw for businesses. That is what we are being informed—or sold, if you wish; whatever way you want to put it. Is the £23 billion dependent on having local hyperscale data centres? Just about everybody is happy with data centres for up to 50MW, but the big concern is the hyperscale data centres, as the proposals that have come forward have been rather clumsy. I think that that is hurting what you guys do every day, because people probably look at that side of it. Do the growth, which is so welcome, and the data centres tie together?

Heather Thomson: I would not claim that the £23 billion depends on there being X number of data centres in Scotland. I caveat this by saying that I do not claim to be an expert on data centres—and the planning side of things is huge—but when you talk about the opportunity and the growth of data centres, it is important not to just think about the boxes themselves; you have to think about the ecosystem that comes with them. Sandy Begbie spoke about the jobs that come with the data centres themselves and there is also the construction. If we truly want to maximise on the opportunity and bring the inward investment and the innovation parks, we must recognise that they will be drawn to where the data centres are.

When we were involved in the expressions of interest for the AI growth zone applications, one of the pieces that we were consulted on was how to build the ecosystem around the data centres, because, without the ecosystem, the value is not there.

On your question about what the £23 billion includes, it is about how much we can maximise on the opportunity.

Going back to the previous question about why we should have data centres in Scotland, I echo the comments from witnesses about renewable energy and the lower carbon intensity in Scotland. We have an opportunity to do this sustainably and responsibly and not just to do it in the same way. If that is recognised, it will attract investment and talent. It is definitely not just about the data centre in isolation; it is about everything that comes with it, whether that be the community benefit or the research and innovation parks.

I echo what Daniel Johnson said, and I share his opinion that very important decisions need to be made and very critical conversations need to be had, and that needs to happen now, because we are at risk of missing out on all these opportunities. They will pass us by if we do not move forward.

Sandy Begbie: If I may—

The Convener: I am really cognisant of time. We will finish that point with Sandy Begbie, I will bring in Rachael Hamilton and then we will conclude.

Sandy Begbie: In the investor space, there is something called the compound effect of economic decisions. The danger is that you make an economic decision based on one thing and do not take account of the broader—or compound—effect. To Heather Thomson's point regarding the decision about data centres, I repeat that I am not suggesting that they are all in the right location or all have the right design, but there is a need to think about the wider message that is sent to investors.

On Daniel Johnson's point about education, I completely agree that AI is there and we need to let it into the classroom. However, we need to think about how we support teachers. At the end of the day, teachers could very well be nervous and uncertain about using it. What the young people are doing with AI is important, but we also need to think about how we educate them. Teachers in secondary schools already have huge workloads, and we must think about the pressure that that will put on them.

Rachael Hamilton: On the displacement of jobs, the argument is made that the drawback of the displacement of jobs will be outweighed by the increase in productivity and opportunity. This morning, Rene Haas from the Cambridge-based Arm Holdings—which is a technology company, not a defence company—said that humanoid robots will be with us in five years. That is a little bit futuristic, but how do we ensure that we continue to have tax revenue if jobs are displaced? Do we rely on the productivity and the opportunity that will be created in terms of economic growth, or do we think about taxing robots?

Sandy Begbie: For every report that says that jobs will be displaced, such as those concerning Elon Musk's comment about how none of us will be working by a certain point in the future, which is the most extreme example that I have heard, there are other reports that say that the impact on jobs will be minimal—this week, I have heard two chief economists in big organisations say that that is the case.

A research report relating to financial services that we commissioned with the Financial Services Skills Commission contains an interesting graph that shows the types of jobs that will increase in number versus those that will decrease. Categories such as accountants, actuaries and so on are at risk, because a lot of what they do will be done by agents. However, significant increases

are forecast in categories such as AI research, AI development, cybersecurity and data engineering.

How all of that will unfold is unknown. I would love someone to say where we will be in five or 10 years' time, because I do not think—

Rachael Hamilton: I think that job displacement is already happening in the financial services sector in Scotland. We have seen a forecast of much lower tax revenue—£720 million lower—than was forecast by, I think, the Scottish Fiscal Commission.

Sandy Begbie: That is not because of jobs, though. We have created 22,000 jobs in the sector in the past three years, going from 135,000 to 157,000 jobs. We could get into a debate about people's behaviour around tax and so on—that is a whole other issue. The fact is that we are one of the few sectors that has created a substantial number of jobs in the past three years, many of which are in the areas that we have talked about this morning.

Heather Thomson: It will be interesting to see how the situation unfolds over the next two to three years. It is difficult to forecast what will happen.

We are seeing organisations starting to make redundancies as a result of AI and deciding not to bring in graduate-level roles. Some of them are losing people who have 40 years' experience and expertise in that domain. To touch Rich Wilson's point about critical thinking, I think that they are going to quickly realise that they have workforces that only know how to work with AI and do not understand the business, and that there is a real risk of some really negative outputs coming from that. People are going to quickly realise how important the domain expertise is and how they have undervalued it.

It would not surprise me if we start to see a bit of a U-turn on that approach and a change in thinking with regard to the valuable human skills that need to be retained within a business. At the moment, a lot of people are looking at it from a cost-efficiency perspective, and they will quickly realise that it is not as straightforward as that.

11:00

Professor Rovatsos: Our best bet is to be the country where the robots are built, because, if we import them, we will not be part of that value chain. It is important to think about where the value is created.

Heather Thomson: It is also important to consider health and safety legislation and regulation about humanoid robots interacting with people in workplaces. A regulation was passed earlier this year, but the technology is in the very

early stages and there is a lot to think about. You can see how long it has taken for us to get autonomous cars on the roads, and we are still not there. I think that five years could be quite optimistic for humanoid robots.

The Convener: Rich, do you have a view on the job creation side?

Rich Wilson: There is a lot of talk about taxing AI agents. In some companies, an agent called Bob or Sue is going to do work. I am no expert on taxation and I do not know how easy that would be, but the job landscape is changing. As we have talked about, there is job creation, but jobs are also being lost, and the people who are being hit are feeling it. People say that the impact on jobs will be minimal, but if someone has lost their job, they have lost their job. It may take them six to 12 months to find another job, and they may need to go and get a job that is not in their skill set. That is where we are letting people down.

On the point about taxation, I will give what may be a controversial view. The largest area of work globally, which has grown into a multi-trillion economy, is the freelance economy. In the UK, that relates to the IR35 legislation at the UK level, so it is not a uniquely Scottish problem, but we should think about how we have ripped the heart out of contracting, which used to be one of Scotland's biggest areas of taxation. The full-time head count will start to grow, but it will also start to decrease. How do we start to look at other job types? Let us consider PhDs. Some of those great people could be training models, but the taxation system that we have at present does not allow them to do that. Guess where they are doing it—in San Francisco. People are getting taxed in San Francisco, but they live here. How does that work?

Taxation is a big subject but, when we look at how people work, we must remember that it is not just about full-time work. That is an interesting way to think about it.

The Convener: I am cognisant of the time. We have been talking for an hour and a half, and it feels like we have just scratched the surface. I invite our witnesses to make some brief final remarks. If you had one specific ask of the Scottish Government, what would it be?

Heather Thomson: I will revisit a point that I made in my opening answer, but bring in a few of the points that we have spoken about today. As we look to increase public investment in infrastructure—the data centres, compute capacity and growth zones—I would make a plea that we ensure the sustainability of skills and their adoption. That takes me back to the comment about the size of the opportunity, because it will be significantly restricted if it focuses on infrastructure

alone. We need a more holistic investment picture going forward.

Rich Wilson: We need to think about AI in terms of software and infrastructure, and the glue that holds it together is called compute. We have talked about the infrastructure side, but it is the applications bit—the software bit—where we are going wrong and falling behind. We have fallen behind on frontier AI.

For me, the biggest takeaway from our discussion is how we can get the public sector working with more of the start-ups and scale-ups in Scotland around the innovation pilots. How do we do more of that? That will create more jobs, more adoption and more successful use cases. It is a quick win and it is something that we should look at urgently.

Sandy Begbie: I go back to where I started with a point about economic growth opportunity. The only way that we are going to be able to fund the public services that we all want in the future is to accelerate economic growth, which has been treading water at about 1 per cent per year for the last 15 to 20 years. AI has to be part of that and will be part of it. The economies around the world that are growing at 2 to 3 per cent a year are absolutely embracing the opportunity that AI presents, so we cannot let this pass us by.

Professor Rovatsos: My final comment is along similar lines. I am almost tempted to say, “Pretend it’s a pandemic”, because it is really urgent and we will fall behind if we do not act. With the pandemic, we pulled together between the public sector, the private sector, universities and so on, and we made some really big things happen fast. Given that AI will continue to be very competitive, if we do not do that, we will end up being the buyers rather than the makers of these technologies.

The Convener: Thanks very much, panel. It feels as if we could talk about the subject 10 times and have 10 very different conversations. Thanks again for all your input.

That concludes our public business for today. Our next meeting will be on Tuesday 15 September, when we will discuss AI again, looking more at the data centres and energy use aspect.

11:05

Meeting continued in private until 11:54.

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