OFFICIAL REPORT
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Economy, Energy and Fair Work Committee

Tuesday 12 March 2019

Session 5

The Scottish Parliament
Pàrlamaid na h-Alba

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ECONOMY, ENERGY AND FAIR WORK COMMITTEE
9th Meeting 2019, Session 5

CONVENER

*Gordon Lindhurst (Lothian) (Con)

DEPUTY CONVENER

*John Mason (Glasgow Shettleston) (SNP)

COMMITTEE MEMBERS

*Jackie Baillie (Dumbarton) (Lab)
*Colin Beattie (Midlothian North and Musselburgh) (SNP)
*Angela Constance (Almond Valley) (SNP)
*Jamie Halcro Johnston (Highlands and Islands) (Con)
*Dean Lockhart (Mid Scotland and Fife) (Con)
Gordon MacDonald (Edinburgh Pentlands) (SNP)
Andy Wightman (Lothian) (Green)

*attended

THE FOLLOWING ALSO PARTICIPATED:

Alan Caldwell (Robertson Group)
Willie Coffey (Kilmarnock and Irvine Valley) (SNP) (Committee Substitute)
Stephen Good (Construction Scotland Innovation Centre)
Professor Robert Hairstans (Napier University)

CLERK TO THE COMMITTEE

Alison Walker

LOCATION

The David Livingstone Room (CR6)

Scottish Parliament

Economy, Energy and Fair Work Committee

Tuesday 12 March 2019

[The Convener opened the meeting at 09:45]

Decision on Taking Business in Private

The Convener (Gordon Lindhurst): Good morning and welcome to the ninth meeting in 2019 of the Economy, Energy and Fair Work Committee. I ask everyone present to turn off electronic devices that might interfere with the sound system. I should say to our witnesses that, as the sound system is operated from the sound desk, there is no need for them to press any buttons.

We have received apologies from committee members Andy Wightman and Gordon MacDonald, and I welcome to the meeting Willie Coffey, who is appearing in Mr MacDonald's stead.

Agenda item 1 is a decision on taking business in private. Does the committee agree to take items 3 and 4 in private?

Members *indicated agreement.*

Construction and Scotland's Economy

09:47

The Convener: Item 2 is our inquiry into construction and Scotland's economy, and I welcome our witnesses for today's evidence-taking session: Stephen Good, chief executive, Construction Scotland innovation centre; Professor Robert Hairstans, head of the centre for offsite construction and innovative structures, Edinburgh Napier University; and Alan Caldwell, strategic director, Robertson Group. I should say that another witness has been delayed en route.

I will start off with a question about innovation that Mr Good and Professor Hairstans might be interested in answering. In his review, Mark Farmer highlighted that the United Kingdom construction industry faced "inexorable decline" unless long-standing problems were tackled. What are your views on that? The impression seems to be that the sector is slow to embrace innovation, modernisation or automation and, in general, to adopt new techniques that are quite common in other, similar countries.

Professor Robert Hairstans (Napier University): The Farmer review is having a lot of resonance at the moment, but it is one of a sequence of reports. We have had the Latham report, the Egan report, the Barker report and the construction strategy—there is a whole back catalogue of work and research that has consistently made it clear that the construction sector is not performing and that it must think more innovatively about the approach that it takes. Parallels are often drawn with other sectors, such as the automotive industry, that have embraced change, with a lot of emphasis on productivity, production improvements, lean manufacturing, customer-oriented products and so on.

The construction sector is fragmented, and innovation is hard to come by because of the risks that are associated with it and the culture in which it operates. Correspondingly, the uptake of new construction methods comes, in many respects, as a result of an intersection of a number of drivers, which have become more complex in the modern setting with the onset of, for example, digitisation. If we think about, say, culture, productivity, human capital, sustainability and productivity, all those challenges in the social, economic and political landscape could be resolved in the sector by innovative approaches that, ideally, would be client or customer led. However, that has not taken place, and there is a necessity for it to happen, given what needs to be done and what needs to change.

Stephen Good (Construction Scotland Innovation Centre): We were fortunate enough to have Mark Farmer join our board last year. He is a huge supporter of the industry and of driving positive change and growth in it, but as Professor Hairstans has said, we need only go back and look at all these reports. The oldest one that I have seen was the Simon report in 1944, which outlined a lot of challenges faced by the industry and suggested a lot of the ways in which it could change.

One of the key observations of the Farmer review was the relationship between the industry and its clients—something that I think is very important in everything to do with innovation—and how clients buy from the industry. As Mark Farmer and others have pointed out, the industry is perfectly well set up to deliver solutions for clients the way the clients want to buy from it. In other words, if they want the lowest cost, quick delivery or risk transfer, the industry is set up to provide that. However, the challenge is that that might not be what we want; we might want a different industry or we might want the industry to change.

The vision of the Farmer review was "modernise or die", and the Egan and Latham reports of the 1990s, which Professor Hairstans referred to, identified the important role that clients—including from the public sector, as one of the biggest procurers of goods and services from the construction industry—could play in using certain levers to drive innovation and investment in skills, technology, equipment, new facilities and so on. That would give the industry a lot of confidence, and organisations—including, I suppose, the Robertson Group—would have that line of sight and see the potential for investment if clients had a longer-term strategy for how they buy products. The "die" part of the "modernise or die" agenda was that, if industry and clients chose not to do that, the future might look quite bleak.

The Convener: Is the problem in this country that we talk a lot about this but do not do it, while other countries just get on with it?

Stephen Good: It is an interesting area with regard to policy and procurement, but there is an opportunity to look at how others are delivering that benefit. I know that some committee members have visited a Glasgow-based offsite manufacturing company that has invested quite heavily in new technology, skills and training techniques and in delivering different models. As someone who supports the wider adoption of innovation right across the industry, I look at those models and think, "Why can't more be done?" However, you have to pick right into the detail to get an understanding of how the model and structure work, how it was perhaps more advantageous for such companies to take that approach, given their relationship with their clients and how, of course, that might not be the case for others.

It makes eminent sense to look at how other countries and organisations have embraced change and are driving innovation. We at the innovation centre certainly think that there is a massive will to do things differently in the industry, but that requires the relationship between the industry and its clients to work and it requires them to have shared outcome-based objectives.

The Convener: At this point, I will bring in Alan Caldwell, who no doubt will have comments to make. As Mr Good has said, there seems to be a massive will to do these things, but they are not necessarily being put into action, while in other countries, there is a will and then something happens. Surely where there is a will, there is a way.

Alan Caldwell (Robertson Group): I think so. First, I want to say that I am not our research and innovation director. Claire Reid was supposed to be here, but I had a phone call yesterday afternoon to say that she was unwell and to ask whether I could step in. I am a strategic bid director and heavily involved in the bidding side of the Robertson Group's work.

I agree with pretty much everything that Stephen Good said. It is in our interest to be at the forefront, to be looking for new ideas and to develop those, but at the same time we have to be a sustainable business that can afford to do that.

As Stephen Good said, the industry is largely set up to respond to the way in which things are procured, which is very cost and solution driven and is often already decided. To bring innovation into that context, we prefer to take a two-stage approach in which the contractor gets involved much earlier in the process and is allowed to bring ideas to the table, along with those in its supply chain. The specialist supply chain is often the source of a lot of the innovative ideas, and the earlier we get the suppliers involved in projects and bring them and their ideas to the table, the better. They also tend to more collaborative; one of the largest criticisms of our industry in the Latham and Egan reports was that it was very confrontational. To be fair, the industry has changed across the board. It has not been a sea change but, in my experience—sadly, I have been involved for long enough—although the confrontational side still exists to a degree, it is nowhere near as bad as it was, and many more things have been set up over the years.

ProCure21 in England was an early national health service drive to create a framework in which everyone was incentivised to collaborate—not just client and contractor, but clients together and

contractors together—to bring forward ideas. It worked to a degree. NHS frameworks in Scotland tried to copy that a few years ago and are still pushing that agenda. Many other frameworks have been developed with collaboration at their centre, but I agree with your comment that the will is there but the actions still need to come, and come better. The idea that we need to get over is that, by collaborating, we are not giving away our crown jewels but are getting a competitive advantage, because we are in a very competitive industry.

Colin Beattie (Midlothian North and Musselburgh) (SNP): Innovation comes at a cost. Typically, the cost is up front and you recover the benefits of that over a period of years. To what extent are profit margins a barrier to innovation?

Alan Caldwell: We are a strange industry. We take a lot of risk—depending on the structure of the contract—and in wider industrial terms, we do not take a very high margin from the work. That is just how our industry works. There is a barrier in that the margins are tight and we have to be very efficient. We tend to lean towards what has been done before, because we know that it is safe and secure, and we want to make sure that we are delivering the quality that is needed with a tried and tested solution, particularly in the light of some recent events in construction. The margins are certainly a factor in stifling innovation but if we innovate, potentially we can create better margins because we are doing things better and faster; it is about trying to get that balance.

Colin Beattie: Is that balance being achieved?

Alan Caldwell: I do not know, to be honest. That is probably not my field. There is certainly a desire to push innovation as far as we can, but it has to be within affordable limits, because we have 3,500 employees in the group and we are also trying to make sure that they will have a job next year and the following year. There is an element of risk in any innovation, but experience shows that you can manage it. There is not a reluctance to do it in the industry, but there is a caginess, which is about ensuring that we innovate in the right way and that it is not too risky or threatening for the underlying business.

10:00

Colin Beattie: Do other panel members have a view?

Stephen Good: Profit margins have an impact on a business's ability to look at any additional work that it might undertake or innovative activities that it might get involved in. Investment, skills and training are no different.

There is a paradox in that a lot of international companies that we hold up as being very innovative are the ones that appear to take a lot of big risks that pay off. In the construction industry—due to the way in which it is structured—if the profit margins are not there, companies will not see the opportunity to invest in innovation and try new techniques. In some respects, the innovation centre was established to help businesses with that—I am sure that we will have a conversation later about whether that has been successful. One of the centre's ambitions was to de-risk innovation for businesses that do not operate on huge profit margins.

Alan Caldwell talked about collaboration. There are some notable successes of collaborations between businesses that typically compete. One example is the Robertson Group—we will possibly discuss the context of off-site manufacturing later—which is one of a cluster of businesses that, although typically competitors, saw the benefit in coming together because the whole would be greater than the sum of the parts. The opportunity for the innovation centre to support those businesses collectively was much more valuable than supporting them individually. They have got a lot out of that process, which is an on-going journey. They have successfully embraced collaboration because, individually, their profit margins would not have allowed them to do as much as they have done together.

Colin Beattie: Perhaps I can broaden out the question. What are the other significant barriers to innovation?

Professor Hairstans: I will pick up on what has been said about a lowest-cost procurement strategy and low profit margin making it difficult to invest in research and innovation. Research and innovation are often about how to add value in the value proposition on a wider scale with regard to the social, economic and environmental benefits and, correspondingly, how product and process innovation can resolve to the larger-value proposition. If that is more apparent to and transparent for the client, the sector and the end user, that can help to pull research and innovation through the system. A more integrated supply chain and an enhanced level of digitisation can also help to pull research and innovation through the process. For us, engaging with academia and encouraging the development of new skills that are necessary to drive the innovation are fundamentally important.

Colin Beattie: To what extent is innovation reserved to the bigger construction companies? In other words, can the small construction companies innovate in their own way, or do they have to plug into what the big boys are doing?

Professor Hairstans: Stephen Good can probably talk to that. A lot of our engagement is with small and medium-sized enterprises, because they are often the companies that come to us with research and innovation ideas. That is not to say that larger groups are not doing research or innovating, but I suspect that they tend to keep that in-house. Although the SMEs might have the ideas, they often do not have the internal resource. SMEs are certainly our main client base—they have been historically.

Stephen Good: The majority of the industry in Scotland is SME based and the majority of the projects that the innovation centre has supported have been led by SMEs or undertaken in partnership with SMEs. They are often where innovation comes from, particularly as you go down the supply chain. Alan Caldwell might touch on that from a main contractor point of view.

Often the tier 1 main contractors are assemblers of specialist teams that deliver solutions for clients, and those specialist teams have to innovate to develop their competitive edge. That is not to say that the tier 1 contractors do not have a hugely important role in bringing together teams to drive innovation, particularly when they start to collaborate across different groups, which is where the really exciting and transformational innovation comes from.

Although the perception of SMEs is often that they are busy figuring out how to get paid tomorrow, they are a rich base for innovation within the industry because, in some respects, they have to look at a whole bunch of different ways of doing things.

Colin Beattie: I have one last quick question.

The new Construction Scotland strategy includes "productivity and innovation" as a priority. Is that vision—and the actions related to it—likely to achieve change?

Professor Hairstans: The strategy emphasises digitisation and off-site construction. Mark Farmer regards that as pre-manufacture, because it is essentially about ways of not generating waste on site, whether it is a full volumetric, fully enhanced unit or a sub-assembly being pre-manufactured to eradicate waste on site.

Digitisation is here; we are in the fourth industrial revolution and it is necessary to embrace it. There is the opportunity to create digital twins of what is being constructed, in order to interrogate them and do scenario planning. In that way, digitisation should facilitate improvements. If we can create a feedback loop from what happens through the manufacture and construction phase, the in-situ erection, the life-cycle analysis and the consumer's engagement with it, then feed that back into the digital model, we can enrich the model and understand fully what is taking place relative to what was predicted and, correspondingly, identify product and process innovation. As part of that, we can identify areas for productivity improvement.

I advocate a more industrialised and manufacture-based approach, although that does not necessarily mean full volumetric modular units being produced off site. There is definitely a place for that, but sub-assemblies can also be pre-manufactured, and those components can be brought together on site as efficiently and effectively as possible. Management and logistical arrangements are needed to do that, and corresponding new skill sets are required for that type of delivery model. There has to be a holistic answer and a holistic decision-making process. Those two components are important.

Alan Caldwell: I will chip in. As Robert Hairstans said, this goes right back to design. Not all projects and sites are suitable for off-site manufacture. Robertson Group has used such components in a variety of projects, from bathroom pods to a corridor that comes completely constructed and just—for want of a technical term—gets plonked down. They have their place, but are not suitable for all conditions. Construction can be broken down even to mechanical and electrical service runs in corridors that we pre-manufacture off site.

This is not just about waste—it is also about quality, and health and safety. There is a raft of good reasons why we want to construct as much off site as possible. We do that, but the final challenge, unfortunately, is still cost; it is not yet clear that doing that is cheaper. A lot of clients say that it is okay to wait another couple of months, or that if we can do it 5 per cent cheaper the traditional method is fine. At the end of the day, we still have to win the project. Although we can offer innovation and offer such solutions, the procurement route sometimes dictates that they are not adopted.

John Mason (Glasgow Shettleston) (SNP): I will focus on the Construction Scotland innovation centre. First—because I think there has been some confusion—what is the relationship between Construction Scotland and the Construction Scotland innovation centre?

Stephen Good: I appreciate that that is often cited. I do not want to give everybody too long a history lesson, but the Construction Scotland industry leadership group formed in 2011-12 as the follow-on from previous industry-wide leadership groups—as distinct from specific interest groups. It had a series of working groups. One of those working groups was the innovation working group, which I was asked to chair. At that time the Scottish Further and Higher Education

Funding Council set out the innovation centre programme, and the innovation working group was asked whether that call was worthy of a response from the construction industry. After a few iterations, a bid was put together and a submission was made.

At the time, it made sense for the Construction Scotland industry leadership group to submit a proposition for a Construction Scotland innovation centre. The smart vision was that there would be an industry leadership group which, despite having to do an incredibly tough job in uniting a disparate industry, would do the communicating with industry, and that, if it were funded, the innovation centre would work in partnership with the leadership group under a united brand, with a single web platform. The centre's activity would be interlinked to allow the two to work hand in glove on complementary issues around leadership and culture change in industry. That work would be driven by the leadership group and the innovation work would be plugged into the academic base.

John Mason: So, the idea for the innovation centre came from Construction Scotland?

Stephen Good: The centre was developed from a Construction Scotland working group.

John Mason: Are Construction Scotland and the innovation centre now two legally separate organisations?

Stephen Good: It was always intended that it would be that way: there is a separate governance and funding structure for the innovation centre programme. All eight innovation centres work according to guidance, and that approach was endorsed by industry leadership at the beginning. The challenge is how to ensure that there is the necessary close alignment between two organisations that have well aligned objectives on driving change and growth within the industry, but have different governance, financial and legal structures.

John Mason: Is the current relationship as it should be?

Stephen Good: The relationship has the potential to grow into something really powerful. We have responded to the strategy and have offered support across the working group areas. The six priority areas in the strategy align well with our areas of focus, which have come out of our industry-led boards and industry demand.

John Mason: I will focus on the word "potential", which is always a good word.

I understand that phase 1, which was 2013 to 2018, has been completed and we are heading towards phase 2. The Construction Scotland innovation centre's submission includes achievements between 2013 and 2018, including its having supported more than 230 innovation projects and having engaged with more than 1,350 businesses. I am not sure whether we have seen any targets relating to those. Were you hoping for more than 230 projects or were the targets not as specific as that?

Stephen Good: The targets were very specific. When the bid was put together, the industry steering group identified targets, in partnership with the other key stakeholders. I have the statistics and I am happy to share them. Do you want me to go through them?

John Mason: You need not, just now. Maybe you could write to us on the targets in relation to the list of the eight things that you have achieved in the past five years.

Stephen Good: There are actually nine key objectives. The innovation centre was launched in October 2014, with a five-year plan.

John Mason: Could you send us a comparison of how the outcomes compare with the targets? Does phase 2 run from 2019 to 2023?

Stephen Good: Phase 2 officially starts on 1 June 2019.

John Mason: Okay. There are some figures mentioned in relation to phase 2. How were those targets set and who set them? Did the CSIC set the targets or did the wider industry get involved?

Stephen Good: There are at least two parts to that. The figures are driven by feedback from an open consultation with the industry. They are shaped by our industry-led board and reflect the wider publications and industry documents on priorities and focus areas for opportunities for growth and change, including Construction Scotland's strategy, the Farmer review and the Government's "Construction 2025" industrial strategy. The transforming construction programme has specific areas that it considers present opportunities. The phase 2 programme, on driving digital transformation, culture change, building sustainably and adopting greater industrialisation, is driven by those industry-wide markers.

10:15

John Mason: In that case, is there broad agreement that the targets are correct? For instance, is the target to have 100 academic-business collaborations reasonable?

Stephen Good: Yes, I think so, given that we have 14 university partners. The figures on engagement have historically been around that number.

We are keen to increase such collaboration, and we are conscious that the model has to evolve and

develop. Phase 2 will not be entirely focused on universities, as was the case with phase 1; we will have greater engagement with colleges. We have never been funded directly to support such engagement, albeit that we have done quite a lot in relation to colleges, because industry has demanded it.

The approach is only natural, as the programme evolves into its second phase and we look at successes and how we can respond positively to opportunities that the industry is keen to exploit.

Targets were set through consultation, as I said. The industry gave us good feedback on phase 1, the industry-led board gives us good direction on where it sees opportunities, and our stakeholder partners are supportive and are in the mix, in the context of setting targets that enable us to stretch what we do while meeting wider objectives.

John Mason: When we launched our inquiry, we put out a call for evidence. It is fair to say that the evidence that we have received about the CSIC was mixed. Some of it was very positive: for example, that

"CSIC has been a source of extremely positive support",

that it has "helped us on projects", and that

"Engagement with CSIC has transformed our approach".

However, there was also some negative stuff. For example, it was said that there was

"Little useable output",

and that

"The wider industry has no insight as to what it has actually achieved."

Is there an issue there? Does the wider industry maybe not understand what is going on in the innovation centre?

Stephen Good: In some respects, in an industry of 45,000 businesses and more than 230,000 employees, it is inevitable that an organisation that has 11 outward-facing staff will have a challenge in terms of engaging with the whole industry. If that is an unreasonable position, I would welcome ideas on how we might do it, using all the digital channels and social media platforms that we use, and all our engagement events and activity across Scotland.

The reality is that the programme has to fund projects and run the centre on a budget of £1.5 million a year, so we must identify where we can make the greatest impact. We engage regularly with the more than 6,500 individuals who are on our database. Those people are kept up to date, and their number is growing at a significant rate, month on month.

The future looks positive, but there are always areas where we can engage more broadly. Perhaps the committee will not mind my taking this opportunity to make a call to the trade and professional federations in Scotland that should, if they do not already, know about us. We would welcome the opportunity to engage with those bodies, because by going to them we can reach their members much more easily.

John Mason: My colleagues might explore some of that further. I would be interested to hear from Mr Caldwell and Professor Hairstans about how the wider sector sees the innovation centre. Is there a lack of knowledge about the centre?

Alan Caldwell: I can speak only for Robertson Group. We have engaged quite heavily with the centre. The timber engineering part of our business has worked collaboratively with the CSIC and with Edinburgh Napier University. Clare Reid would probably have been able to give you a more detailed answer. I am well aware of the centre and receive communications on it, including through the normal industry media—the newsletters and so on that we get, which often have little articles about what the CSIC is doing. We are certainly aware of what is going on.

Professor Hairstans: The organisations that we work with are quite innovative, so they have a knowledge of the Construction Scotland innovation centre. There is perhaps scope for a wider reach out to professions including structural engineering, but the organisations that we work with that are driving innovation certainly have good knowledge of the centre and what it is doing, and are—to my knowledge, at least—engaging with it on research projects.

John Mason: Thank you. I will leave it at that.

Stephen Good: May I just follow up Robert Hairstans's point? It is no surprise that we engage with businesses that are looking to innovate, and it is probably no surprise that there is less awareness of the centre among businesses that do not innovate. We are keen for there to be more awareness, albeit that achieving it is a tough task. That has to be borne in mind.

Jackie Baillie (Dumbarton) (Lab): I think that we get that point, but some of the criticism has not come from the 45,000 businesses that are out there, but from Construction Scotland—which is, as was helpfully explained earlier, the industry leadership group—and is about more than awareness. I will test some of Construction Scotland's criticisms with the panel to see whether you consider them to be valid.

Construction Scotland has told us that, because of how the Construction Scotland innovation centre has been funded and governed, it has not been able to support the more strategic policy and transformational research needs of the overall industry. Is that a fair assessment?

Stephen Good: That question is probably for me. First, as I touched on earlier, the governance model was endorsed by Construction Scotland when the bid was submitted, and that model has not changed over the piece, albeit that the membership of the governance board has changed.

Jackie Baillie: Something that was put in at the beginning might now not be working. Has that issue been highlighted and will there be change?

Stephen Good: It is important to understand whether the centre is regarded as not working from just one organisation's perspective or from the industry's perspective. The evidence that we can turn to is that the governance model is consistent with the innovation centre programme's governance model. Industry leaders lead our governance board. It is important that we have a wide range of industry leaders, including of the calibre of Mark Farmer, for example, who has been involved in United Kingdom-wide and international leadership in the industry.

The question for me is about organisations' ability to collaborate, as opposed to being about changing governance models. The ambition of the innovation centre's governance board and executive team has always been to collaborate with every organisation. Ultimately, the industry will change by doing things together constructively, not by controlling things differently.

On finance and funding of projects, the innovation centre programme model was developed using world-class academic expertise in Scotland to drive change within the industry that a particular innovation centre focuses on. The model requires the industry to have skin in the game and to lead projects: we do not support projects that do not have industry leadership. Projects could be criticised for being too business focused as opposed to being focused on broader sector leadership, but I go back to the earlier point about SMEs. It could be argued that SMEs are not recognised as industry leaders in the larger sense, but that does not mean that we should not support SMEs that are trying to innovate.

The model is successful; the issue is more about willingness to engage and collaborate. Since the publication of its strategy, Construction Scotland has been aware of the innovation centre's offer to engage directly with each of the working group chairs in order to take forward whatever is within our gift. I appreciate that some people would describe the model as being imperfect, in as much as the tool that we have is funding for supporting industry to draw on academic expertise. The CSIC recognises that that is not the only support that industry needs, but the industry must take responsibility for accessing the other support that exists.

Scotland is blessed with a hugely deep innovation support landscape, but it is often not easy to navigate. One of our jobs for the construction industry is to try to declutter that landscape and highlight the support that is available for the construction industry from organisations such as Interface, Scottish Enterprise and Highlands and Islands Enterprise. There is support to deliver the strategic stuff: we can co-ordinate or facilitate that for Construction Scotland.

On the criticism that we cannot fund all the things that Construction Scotland wants to do on its own, there is no model for doing that and there should not be such a model, given the other support that exists. We have no ambition to duplicate existing support.

Professor Hairstans: The projects on which we have engaged with the innovation centre have had a value of about £300,000 over the first five years, and have largely related to a lead industry partner. Therefore, the results and findings of such work are fed to that industry partner. If there is commercial sensitivity around the work, it can be difficult for us to publish it, especially in a gold standard peer-reviewed publication.

Part of the academic endeavour is to get our work published and out there, but that is not necessarily viewed by the industry as being critical to what it wants, which is to solve a problem. From an academic standpoint, publishing our work is how we make our findings international and achieve outreach. There is certainly scope to improve on that, and for the industry to understand the value in our doing so. It raises the bar for what we can achieve here when we put the work on that international platform.

Robertson Group is involved in one of the projects that has been very successful, called Offsite Solutions Scotland Ltd. It is a collaborative framework of lead off-site providers. It was brought together at the inception of the innovation centre, although it was originally commissioned by the UK employment and skills fund, which now comes under the Department for Business, Innovation and Skills. The project moved on under the innovation centre, with dedicated research-assistant support. Offsite Solutions Scotland is now a co-operative and is its own legal and financial entity. Its aim is to increase the scale of off-site construction in partnership with the innovation centre and Scottish Enterprise, and with academic support coming primarily from Edinburgh Napier University, which is the lead academic institution.

The key will be to have more such frameworks and collaborations with well-connected organisations that could be viewed as competitors. Coming together in collaboration makes a lot of

sense: that collaboration can permeate up and down the supply chain.

Jackie Baillie: My colleagues will explore that point further. I want to go back to your original comment and the criticism made by Construction Scotland that the commercial nature of some of the projects means that the learning from them cannot be shared initially. The innovation centre tells us that the majority of learning is shared and that there is a culture of open intellectual property. Is it fair to say that those two things do not sit entirely comfortably together?

Professor Hairstans: There is always a sense of that, and it is not just an issue for innovation centres. We are involved in knowledge transfer partnerships as a result of projects such as Innovate UK and other funding mechanisms, through Scottish Enterprise and so on. When we do research innovation work for an industry partner, there will inevitably be commercial sensitivity and a need for them to trust us. We are skilled in knowing how to publish work while avoiding the commercial sensitivities and without eroding that trust. We have a track record of doing that.

Industry needs to see the value in journal publications and creating academic outputs from work, which is not always fully apparent to it. Publication means that work is peer reviewed, the methodology is demonstrated to be robust and, correspondingly, the findings have resonance and impact. Creating impact, our research having a legacy and building a body of work that can inform future innovation are key things for us as an academic institution.

Jackie Baillie: Is the Robertson Group a member of Construction Scotland?

Alan Caldwell: I believe so.

Jackie Baillie: There is a dissonance between what Construction Scotland—the construction industry group—tells us and what we are being told by the innovation centre. I understand that the potential for collaboration is excellent, but it is not happening and I am wondering why. Can you shed any light on what is going on?

Alan Caldwell: I am sorry, but I probably cannot, although I can make a couple of observations. Construction Scotland has a wide-ranging membership, from companies like us down to small contractors. That is the idea behind it, but I suspect that it makes it difficult for Construction Scotland to represent everyone and to the same extent. I am not sure about the author of that submission.

Jackie Baillie: Construction Scotland had the foresight to want the development to be an innovation centre—

Alan Caldwell: Absolutely.

Jackie Baillie: —and governance models were agreed at the beginning. However, something has happened along the way, and I am just trying to understand what that is.

Alan Caldwell: I can certainly take that back and look into it.

Jackie Baillie: It would be helpful to get that view. Perhaps Stephen Good himself has a view.

10:30

Stephen Good: The leadership of the industry leadership group is different now, and its views on what the priorities are might be different from the views back in 2014 when the innovation centre was conceived. I appreciate that the website is only one dimension of our engagement with industry, but I think that there was sound sense in creating a united website with common branding and a common message, because it allows the industry leadership group and the industry's innovation centre to work hand in glove. The vision behind that is not bad, although some might feel it to be less of a priority operationally.

As I have said, we have a common website with Construction Scotland. Members here or members of Construction Scotland might want to revisit it and explore the case studies of projects that have been undertaken and completed and the dissemination events that we hold. Indeed, only two weeks ago, our building better homes event was attended by 60 industry members, who heard about four projects that have been completed. That was about dissemination from academic and industry partners, and I think that that answers your question. You do not have to take my word for it—all those people were there, and if the general data protection regulations allow, I am happy to provide the committee with the names of those who attended.

In a wider sense, our web portal allows anyone who accesses it, whether they be Construction Scotland members or others, to connect into—as far as we are aware—every other national funded programme in Scotland and across the UK that supports innovation in the construction industry. It also ties into the catapult centres across the UK and into Konfer, a web portal that uses artificial intelligence to scan academic research papers on all subjects. To be fair, it is not the richest database for construction-related research, but that might lead us to ask whether there is the breadth of rich research into construction available and whether the industry could, if it wanted to, commission that. Plenty of vehicles and mechanisms can be accessed through the website shared between Construction Scotland and the innovation centre, and it provides answers to

many things that the writers of the comments in question might want to refresh their memory about.

Jackie Baillie: I am sure that they are listening in rapt attention.

Willie Coffey (Kilmarnock and Irvine Valley) (SNP): Going back briefly to the digital agenda, I noted two lovely comments in our papers. The first is from Stephen Good himself, who said that the

"construction industry is on the verge of a digital and manufacturing revolution."

However, someone else said:

"the construction industry has remained in the stone age."

I suspect that the truth is somewhere in between, but I want to explore what side of the line you think we are on and where we might be going with regard to digital skills in the industry.

Stephen Good: I have been hogging the mic a bit. Perhaps someone else might want to go first.

Willie Coffey: Well, you made the comment.

Stephen Good: I do not think that the two comments are incompatible: the industry is on the verge of a digital and manufacturing revolution, but it also has a lot to do to catch up. Perhaps I can give you some statistics that sit behind that comment. In its most recent evidence on the level of digitalisation in 20-odd industries across the world, McKinsey Global, which provides a lot of statistics on a lot of industries, placed construction second from bottom, just above hunting and fishing. That shows where we are at the moment, but in some respects that creates huge opportunities, because—this goes back to Robert Hairstans's point about industry 4.0—with 19 or 20 industries sitting above us in embracing digital transformation, we perhaps do not have to reinvent the wheel. It brings us back to the point about collaboration: this is not just about industry talking to construction industry folk about how to drive change, but about reaching out to other industries and finding out how they have embraced change and adopted digital technologies. That presents huge opportunities for the construction industry.

It is important to note that the construction sector, both in the UK and globally, is already adopting a huge amount of digital technology, whether that be moving from paper-based drawings on-site to iPads, building information modelling at level 2 or beyond or advanced off-site semi-automated solutions. Augmented reality and virtual reality also offer huge potential.

The future looks incredibly positive for those businesses that want to embrace that change. For those that do not, the harsh reality is that organisations such as Facebook, Amazon, Google and Airbnb are investing in pre-fabricated manufacturing companies, because they see opportunities in the industry. It sounds like a daft expression, but our job is to help the industry to disrupt itself before it gets disrupted by others.

We are hugely positive about the opportunities that technology presents for the industry. Industry has to embrace those opportunities, but the other comments suggest that some parts might not.

Willie Coffey: Are digital skills coming in at the right level—the graduate entry level? Is industry aware of its growing reliance on the digital transformation agenda? I do not think that it is at the moment. Does more work need to be done from the bottom up at that graduate entry level in order to get the software development and awareness skills into the industry?

Stephen Good: A lot of what we have spoken about today—and will continue to talk about—comes back to culture and leadership. If the industry develops the right leadership skills and embraces the right culture, it can co-ordinate the activity that it wants to see and embrace digital technologies—which by their nature have impacted all of us—as and when those enabling technologies offer benefits for those businesses. A business is not just going to adopt ARVR technology because an innovation centre told it that it should. Ultimately, it will do so if it can recognise some benefit.

For us, innovation is about change. It delivers some degree of value and capturing that value is key. The training and skills around that will sit at all different levels, from leadership to apprenticeship levels. There will even be engagement at primary school level to make construction an industry of choice, as opposed to one of last resort, as it is perhaps sometimes perceived. The change is coming; the issue is how industry organises itself culturally through leadership to take advantage of that.

I will maybe touch on what some individual businesses are doing on that. There is always a challenge in that some businesses will lead that charge. The obvious observation is that, as an innovation centre, we will work with innovative businesses that will embrace changes and new technologies. However, at a wider mainstream level, given that it is so big and fragmented, the industry will have some catching up to do—as will those who deliver the skills support that sits around that. It is not a linear process; there are a lot of moving parts.

Willie Coffey: Most of the businesses that we are talking about are SMEs, of course. Is it the case that a lot of them do not understand the technology and cannot afford it anyway? Are they

just not going to make that step change? What might enable them to do that? Is it organisations such as your own?

Stephen Good: There is always a risk in doing something different, and there is a nervousness around technology. We probably all experienced it when we started using smart phones in different ways. Human nature is broadly risk averse, so when change comes, there will be those who adopt early because they see the opportunity and think that they have the skills to take that forward, and there will be those who prefer to wait and be second, third or fourth in the line.

We have worked with some micro-SMEs that are right in the middle of the technology space and see themselves not as construction businesses, but as technology businesses that work in the construction industry. That is an interesting twist regarding where some SMEs see their model in the future. They kind of wake up a bit more global. Often, construction can be criticised for being a bit parochial, but some of the businesses that are embracing technology, innovation and change do not see Scotland as their only market. That is hugely interesting for an industry that does not export an awful lot.

Willie Coffey: Professor Hairstans, do we have the right digital skills in the industry? Are we doing it correctly, or do we need to do more?

Professor Hairstans: That is a good question. I want to touch on the fact that as we move forward, the nature of the industry will become more interdisciplinary and multidisciplinary.

Historically, construction and the professions have been quite siloed. However, the purpose of building an information model is to create a more collaborative approach and workflow, and transparency around the products and systems. The sector is fragmented and the supply chain can be difficult to synthesise. Correspondingly, trying to build that into digital models can be difficult. However, as we move to a more industrialised, factory-based approach, that process should become easier. Manufacturing organisations have enterprise resource planning systems and, ideally, internal digital frameworks that cut across the relevant departments, which should mean a more digitised approach as we move to a way of creating the built environment that is based more on manufacturing.

With regard to a lot of the SMEs that we have worked with, I refer to Stephen Good's point about their having strong leadership and a particularly innovative culture. They are often at the forefront for a particular reason, such as digitisation, capturing information to demonstrate the environmental credentials of their product, creating virtual reality or augmented reality for the augmented worker, or demonstrating from a marketing perspective the value of their product or the consumer's understanding of their product so that they can get an early design freeze, which is key for a manufactured approach. Some of those organisations have been at the forefront of driving the digital agenda, and we are seeing more of it in the sector.

Productivity is key, though. Scotland is not alone with many of those challenges, because productivity internationally in construction is poor and stagnating at best. However, in the United States, for example, Katerra had a chief executive officer from a tech background, and the organisation's aspiration was to defragment the construction sector to create a better performing product environmentally and to have productivity-driven agenda. That tech start-up now has a $3 billion valuation after four years.

As Stephen Good said, organisations such as Google and Airbnb are looking at the situation from a different perspective and those that are not doing that will get left behind and have to cope with the disruption in the sector. It is about thinking of the product as both a physical and a digital asset. Information can be collated from that digital asset through the user's engagement with it that then involves data management. The issue is how to capture that data, utilise it and, in effect, monetise it. There are therefore changes afoot and the organisations that are not looking at them will get left behind. We have to think laterally about the skills and knowledge of the individuals who move into that sector and how we will deliver that future workforce, because it will be different.

The Convener: Before we bring in Dean Lockhart, Jamie Halcro Johnston has a supplementary question.

Jamie Halcro Johnston (Highlands and Islands) (Con): Thank you, convener, and good morning to the panel.

One of the issues that the committee has been talking about is the role of universities and colleges, but I wonder whether schools could also play a greater role. Last week was national apprenticeship week, during which colleagues visited apprentices around the country. One of the groups whom I met talked about the potential for a dedicated construction foundation apprenticeship. Is earlier involvement by schools in such apprenticeships of interest to the panel? Such involvement could be an opportunity to integrate some of the digital skills that the panel has been talking about.

Professor Hairstans: Yes, that would be of interest. We all want to encourage science, technology, engineering and mathematics

education and I support having schoolkids involved in projects about the built environment.

I am sure that the committee is aware of Class Of Your Own Ltd and its programme that is branded "Design Engineer Construct!". The programme goes into schools and encourages schoolkids to design digitally a class of their own. The class does not have to be restricted to their school: they can use local vacant and derelict sites, which are a challenge for us in Scotland. I am a member of a task force that is working on that. We can encourage kids to think about and engage with how we deliver the built environment in the future. What is really neat is that they pick up STEM-orientated skills through the programme.

10:45

As we know, the younger generation is digitally aware, so they find it quite easy to engage with the process. There are tools and technology available, particularly if we have industry engagement. We have even encouraged students from the university to mentor and facilitate learning in schools. Schoolteachers often do not have the knowledge or background to deliver the programme, but we can create a mentorship model to encourage them. It is fundamental and could be a tool for learning. Regardless of whether individuals then go into careers in construction and deliver the built environment, the understanding and problem-solving skills that the programme can provide create a much wider educational base.

Stephen Good: Although we do not have capacity in our existing model to reach an awful lot of schools, we have hosted several thousand schoolchildren at the innovation centre to expose them to the art of the possible—what the industry could look like, the technologies that the industry could use and how those technologies relate to the children.

My kids are 10 and 12, and they are significantly more digitally savvy than I am. They are the future of the industry, so the industry has to be appealing to them, and it has a responsibility to engage with schoolchildren and young people of all ages to paint an appropriate picture of itself. If their perception is that the industry is about pushing a wheelbarrow around a muddy building site, that will disengage many children who see their future as working in a digital industry.

The chief executive of the Data Lab—which is one of the other innovation centres—and I often talk about the talent war, and how we can make sure that children who want to be data scientists recognise that, in the future, that will be a valuable role in the construction industry, as will robot operator or co-ordinating building information models, which is Minecraft for grown-ups. There are huge opportunities.

In his review of the labour model, one of Mark Farmer's key observations was that if we want to engage future talent in the industry and create the skills that we will need in the future, we have to engage with children who are now in primary school, whose parents, teachers and guidance teachers do not know what the industry will be.

The CSIC will do what we can on that, but we have to be mindful that every bus of school kids that comes through the innovation factory might slow down the project activity that we do with businesses. Perhaps there is an opportunity to widen our remit. It is incumbent on us to ensure that the pipeline of talent for the future is engaged and wants to work in this amazing industry, which has so many diverse opportunities, and to ensure that it does not just attract talent on the basis of whether someone's mum or dad was a joiner.

Jamie Halcro Johnston: Could changing that perception also increase the number of women who take on apprenticeships, which is currently low?

Stephen Good: Absolutely. About 11 per cent of the industry's workforce is female, so the industry has work to do to improve that. There is evidence from many areas that tells us that better balance delivers better businesses and educational institutions. As an industry, we have to make sure that we do not disengage 50 per cent of the population, because we need that talent to work in this industry.

Robert Hairstans touched on Class Of Your Own Ltd and its DEC programme. Alison Watson, who runs that initiative, joined our board because she saw huge value in the opportunities that businesses such as Robertson Group, which engages with the programme, see in developing the pipeline of talent by using the digital skills that the industry uses today.

We were involved with colleges on the pilot for the future equipped programme recently, and a big part of that was about training the trainers. If the people who teach schoolchildren or college students do not know what the industry will look like in the future, it will be difficult for them to inspire children about it.

Part of our role is to educate the educators. For that, we bring in expertise from universities and engage them in the technologies that businesses are already using to show them what the future looks like. There is a lot to do on that. We do outreach using things such as the Construction Industry Training Board's "Go Construct" website as a hub or linchpin. That is in contrast to what often happens, which is understandable in an industry that is so broad and fragmented.

If the key role of Construction Scotland is to unite the industry, one of the greatest opportunities will be for it to have co-ordinated programmes that all start from a common approach on where the industry is going, what the opportunities are and the routes into it.

The Convener: Dean Lockhart might take up that theme.

Dean Lockhart (Mid Scotland and Fife) (Con): Yes—I will continue to explore the future of the sector. What are the panel's views on where the future growth of the sector might come from and the key areas of opportunity in the next five to 10 years?

Professor Hairstans: As you can probably tell, my focus is on off-site industrialised construction, which embraces digitisation. Scotland is exceptionally well positioned to capitalise on that and to think about it all the way through the supply chain, to the forest floor. We have worked extensively with the organisations that have been involved in Offsite Solutions Scotland, which are largely timber-based off-site manufacturers. We also work closely with the Forestry Commission and the industry leadership group. Correspondingly, we work with the supply chain, from the forest floor all the way through to the end product.

Timber is, in essence, a clean tech solution for the built environment. There is an opportunity to evolve products and processes, engineered timber products and systems and enhanced panelised systems that can be manufactured in timber off-site facilities, such as those at Robertson Group, CCG Scotland Ltd in Glasgow, Makar Ltd, Carbon Dynamic and all the way up to Norscot Joinery Ltd in Caithness. They are taking a fabric-first approach and are delivering affordable housing that is sustainable and sequestrates carbon, and therefore helps with the climate change agenda.

There are also social and economic impacts, even from a start-up position, through creation of new products and systems and development of the new skills for delivery of the built environment.

Ultimately, if renewable energy sources power those houses, it is a win-win scenario, because we are conserving energy through the fabric performance, sequestrating carbon within it and, ultimately, using renewable energy to power the infrastructure. We can be a trailblazer on that front, if the correct levers are pulled and if we synthesize the supply chain as much as possible and create a digital thread throughout it that takes us right back to the forest floor.

Alan Caldwell: I wish that I had a crystal ball, because then we would be in a great place to look ahead. Certainly, the digital side will be huge. Robertson Group embraced it properly about five years ago and we have set up a team and rolled out training across the business.

The earlier question about going into schools is a great one. We engage with thousands of schoolchildren every year—not just through school projects, but through projects to promote the industry. To add the digital side to that would be great for the industry's future.

The benefits of getting involved with building information modelling are now obvious to us; we are already realising some of those benefits. We build the building twice. We do it once on the computer, where we sort out as many problems as we can, although we can never sort out all of them. Then, once we are on-site, deliverability is more credible and more consistent and we meet budgets and timescales consistently on all jobs.

We have seen the benefits of using augmented reality in client engagement because they can really see what the new building will look like and can walk through it while the previous building is still on site. The more we develop that and the earlier we can get a design locked in, the more consistent and better the building will be.

I do not see the need to develop new sectors: we need to improve what we do in the sectors that we already have. Renewables need to become just part of what we do, rather than something that we try to fit into a building. That is the approach that we should already be taking as an industry, because it makes sense all round, given the cost of energy and the fact that we want our energy sources to be reliable.

We must continue to emphasise sustainable delivery: greater emphasis is placed on it every year. We need to be aware of it and we need to find new and better ways to develop a sustainable industry. It is important that we do that from a green perspective, but also from a business perspective—we need to be here in 10 years to ensure that we can deliver on those things.

On facilities management, if we develop the digital side of things properly, running buildings becomes so much easier—everything is there. Stephen Good mentioned iPads, which we already use on site, and which might not be the norm, yet. Our project managers all have iPads and go around checking what is being built against the drawings, and anything that is not done is recorded at the touch of a screen. We are involved in continuous improvement all the time; digitisation of the industry is a significant help in that.

Stephen Good: I want to go back to the question about our phase 2 priorities. Those priorities are grouped around culture change, which is very broad. The other three areas are digital transformation, accelerating industrialisation—manufacturing, as Robert

Hairstans touched on—and building sustainably, in particular against the backdrop of young people's awareness of digital technology and the environment, and the challenges that we face.

The construction industry is a huge contributor to some environmental problems, including waste and CO_2 production. There is a big opportunity for Scotland as a nation to find, as Robert Hairstans suggested, trailblazing solutions that pull things together in a holistic offering—for example, by using the best digital enabling technologies to deliver the best and most efficiently manufactured products, whether that is done on site or in a factory environment elsewhere, in order to meet demanding energy targets. It is our responsibility, as an industry, to ensure that we are not contributing to the problem.

Those areas align particularly well with the transforming construction programme strategic approach to digital manufacturing and energy, which is about how we design, manufacture and operate buildings better. As Robert Hairstans suggested, Scotland already has world-leading expertise on the manufacturing and digital sides. The market opportunity for Scotland in the rest of the UK alone is huge, given that everyone else is looking for smarter, better, faster and cheaper solutions.

I agree with Alan Caldwell that such opportunity is not confined to a single sector. However, there is a huge opportunity in the retrofitting market. Much of what we talk about is to do with how to build new things better, but the elephant in the room is the existing stock, of which there is a lot, and the technical challenges around that, which are often much tougher. How do we go on the same journey with existing buildings to ensure that we make the same contribution there? There are major opportunities for the industry in that respect.

Angela Constance (Almond Valley) (SNP): Looking to the future, are people concerned about Brexit? Can you summarise the main challenges for the sector—perhaps your top two or three—beyond innovation and the issues that we have discussed thus far? Given that innovation is one of the Scottish Government's economic strategy priorities, alongside investment, inclusive growth and internationalisation, what more can the Government at all levels and across the public sector do to support the construction sector better?

11:00

Stephen Good: In some respects, I view Brexit as an additional spur to make the industry reform. Before Brexit was a potential scenario, the Farmer review and others said that the industry needed to change. The challenges that Brexit will bring, whether we are talking about confidence to invest, supply of materials, goods and services, or the availability of skilled labour, will not be faced only by the construction industry. The industry has a reform agenda despite Brexit.

The wider question about the levers for Government takes me back to the feedback in our written evidence and our earlier discussions today. Government and Government agencies that buy from the construction industry have huge levers. I appreciate that there are procurement challenges in terms of using those levers effectively.

However, the policy is that public sector clients and others should buy things from the construction industry in a way that drives investment in skills, innovation and technology. Sometimes, the public sector chooses not to do that. That is my observation. If Government can do anything, it is to encourage agencies and organisations that have control over the policy levers to use those levers as effectively as they can to help the industry. As you have heard today, the industry is willing to invest in technology, skills and change, but there is a degree of risk in that. The National Infrastructure Commission has set visionary long-term objectives and investment plans.

Let me quickly give you an example that sums all this up for me. We engage with a particular business, which is hugely engaged in the innovation journey, and it always makes three observations to us. It says, "As an industry, we do not really want grants; we do not really want loans; we want contracts, and we want those contracts to be long enough and certain enough into the future that we can make our own investment decisions about what is best for our business in relation to skills, technology and innovation."

The levers that Government can pull can help to create that longer-term certainty, whether we are talking about contracts to build 50,000 homes or wider, non-domestic infrastructure. There are huge opportunities; the levers probably just need to be pulled in the right way. I suppose that I am asking the agencies that have those opportunities at their disposal to use them as effectively as they see fit, to help the industry to move on to the footing on to which we all want it to be. None of that should be impossible.

Professor Hairstans: Brexit will obviously have an impact on the supply chain and cost—certainty in relation to materials.

I can speak from the standpoint of the education sector, too. We have a lot of students from Europe, who represent a large talent pool in the education sector and as they move on into the industry. In the research centre that I operate, we have an Italian, a Bulgarian and a Polish person as well as a Scottish person—and there is 50 per

cent female participation, which is great. We have a really good culture in the team, with different skill sets and a blend of knowledge, which is inspiring. We do not want to lose that—for the sake of the students whom we bring in, the research that we do and the talent that then bleeds into the construction sector. There are challenges ahead in that respect, because we do not want to come off the trajectory that we are on.

From the construction sector's point of view, there is a lot to do, as we heard. There are a lot of opportunities in the mix for us to embrace change. I talked about the opportunity to look at the different drivers within the socioeconomic and political context, and to consider how, ultimately, they resolve into a more industrialised approach.

There is an opportunity for us to look at the synthesis of the supply chain and use our own resources to deliver that in a blended approach, because we will never have all the resources here but will always have to import. There is a huge opportunity in that regard.

We interface very closely with the industry as it stands, but with the new skills and knowledge that are required going forward, there is an opportunity to do more of that and to interface directly with industry on live research and industrial challenges by harnessing student talent and utilising it on almost-live projects or, at least, on hypotheses of what is to be live. I know that real learning is taking place that is starting to drive future product-process innovation in the sector, but the interface could be closer.

We have tried to do that through the creation of the built environment exchange in Edinburgh Napier University, for example, in which student talent interfaces directly with organisations and we provide mentorship. I believe that we can start to address challenges and be more dynamic and agile on that front. Ultimately, those challenges can be client led and the procurement process and business model of construction can change so that more agile and quicker innovation can take place.

Angela Constance: Thank you. Mr Caldwell?

Alan Caldwell: I pretty much agree with everything that the guys beside me have said, so rather than repeat a lot of that, I will pick out one or two other things.

On Brexit challenges, we undertook a survey of our supply chain and found, slightly surprisingly, that there are no major worries about Brexit. The challenge from our perspective is a bedding-in period for the supply chain. We are concerned about a general industry and economy slowdown, however, as everybody tries to take in what is happening. Such slowdowns always have a negative effect on construction.

There is also the challenge of increasing costs of materials because of tariffs or lack of availability. With regard to labour, we have talked previously about people leaving the industry, which applies to experienced construction workers from the eastern bloc, in the main. A lot of our labour in the past 10 to 15 years has come from that source. There is also the challenge of increased labour costs as a result of lower numbers.

An occasional issue at the moment is clients trying to transfer Brexit risk to contractors. Whatever the outcome of Brexit might be, additional costs should be borne by us, so I do not think that that transfer risk is fair in all cases. We do not have a crystal ball in that respect, but nobody seems to have one.

Another challenge is resources in the short term. I hope that we can deal with resource challenges in the long term by attracting the right people in the right numbers into the industry through measures such as have been discussed in the meeting. However, we must get through to young people and make them realise that construction is an exciting industry in which a lot is going on, and that they can be very tech savvy and use that in their daily working life in construction.

We have to learn how to maximise the benefits of digital construction through building things better or through new construction techniques. Modern methods of construction are sometimes erroneously considered to be always volumetric or to be leaning in that direction, but they are not. Modern methods just mean that we can do things better by being smarter. Components might still be brought to a site and constructed there, but it is done better and smarter. We need to keep our minds open to new ideas.

On what the Government can do, the guys beside me have touched on continuity of workload, which is hugely beneficial to us in planning resources, development and innovation, and for considering whether an investment is worth making. If we can see a pipeline, that allows us to make more secure investments and to de-risk the process.

Angela Constance: Thank you.

The Convener: I thank all three of our panel members for coming to give evidence.

11:09

Meeting continued in private until 11:55.

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