

# Science and Technology Committee

## Oral evidence: The role of technology, research and innovation in the COVID-19 recovery, HC 697

Thursday 23 September 2021, Manchester

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Members present: Greg Clark (Chair); Aaron Bell; Dawn Butler; Chris Clarkson; Katherine Fletcher; Rebecca Long Bailey; Graham Stringer.

Questions 79 - 145

### Witnesses

**I:** Professor Richard Jones, Vice-President for Regional Innovation and Civic Engagement, University of Manchester; and Professor Luke Georghiou, Deputy President and Deputy Vice-Chancellor, University of Manchester.

**II:** Chris Oglesby, Executive Chair, Bruntwood SciTech, and CEO, Bruntwood; Simon Cohen, CEO, Innovate Pharmaceuticals; and Richard Jeffery, National Director, GC Business.

**III:** Dr Marianne Sensier, Research Fellow, University of Manchester; Dr Charles Knight, Associate Dean, University of Salford; and James Baker, CEO, Graphene@Manchester, University of Manchester.



## Examination of witnesses

Witnesses: Professor Richard Jones and Professor Luke Georghiou.

Q79 **Chair:** The Committee is now in session. The Science and Technology Committee is delighted to be in Manchester today, at the University of Manchester, to continue our inquiry into the role of technology, research and innovation in the Covid-19 recovery but, as part of that, to enquire about the prospects and the opportunities that we have for the nations and regions of the UK to make the fullest contribution possible.

For the first of our sessions outside Westminster there is no better place to be than a place for ever associated with technology, which is the city of Manchester. It is very good to be here. We are in the University of Manchester. Our first pair of witnesses are two professors at this university. I am very pleased to welcome but also to be the guest of Professor Luke Georghiou, who is the deputy president and deputy vice-chancellor of the University of Manchester, and Professor Richard Jones, who is vice-president for regional innovation and civic engagement and also a professor at this university. Thank you for coming and thank you for having us today.

Perhaps I can start with a question to Professor Jones. Everybody around the world associates Manchester with technology over the ages, but if we look at the figures, the level of research and development spending investment, in the north-west at least, is below the national average. Give us a feeling for why that might be and whether that is inevitable and reflects things that we cannot help or what we should be doing about it, bearing in mind that we will be going into a bit more detail later in the session.

**Professor Jones:** On the question of the concentration of research, this is something that has happened over quite a long time. The figure that I have in my mind is that 46% of all public and charitable R&D happens in London and the two regions that contain Oxford and Cambridge. There is no doubt—it is not just a question of Manchester—that the distribution of public research money across the country is very uneven.

That has been a consequence partly of deliberate decisions—there has been a time when the idea has been, particularly when funding seemed tight, that it would be better to concentrate money in a few centres—but when it is given out competitively without regard for place, there is a natural tendency for concentration. Good people go to where existing facilities are. That allows you to write stronger bids and in that case there is a self-reinforcing element. That process is played out over quite a long time. It has got us to the situation of quite extreme imbalance.

I have been talking there about public R&D. It is very important to think about private R&D as well. There is an interesting disparity between where the private sector invests its R&D money and where the public sector does. One finds places like Cambridge, which are remarkable



places, where there is a lot of public sector R&D but then the private sector piles in with a great deal of money behind that. Those are great places that the country should be proud of and encourage. Particularly in the north-west, in common with the east midlands and west midlands, too, the private sector is investing quite a lot in R&D, but the public sector is not following those market signals and, in a sense, exploiting what in many ways are innovation economies that could be made much stronger by backing that up with more public funding.

**Chair:** Thank you, that is very interesting. The public sector lags the private sector in terms of investment in the north-west.

**Professor Jones:** That is right.

Q80 **Chair:** Professor Georghiou, you are a great expert and have written extensively about science policy. This classic perennial question of the role of place versus place-blind approach to investment is something that you and your colleagues have thought about. What is your take on where we are at the moment?

**Professor Georghiou:** First, I would like to follow what my colleague was saying, that what we have in places in this country is a consequence in part of the past distribution pattern; none the less, each place does have possibilities that do not exist elsewhere. There is an ability to set local priorities that are attuned to the needs of the region. Sometimes these can be quite historically based. Older industries leave you with capabilities that can be transformed into possibilities for the future, and concentrations of research and development do that as well.

Beyond that, places combine with R&D a number of other assets. They have a skills profile; they often have a public procurement profile—to introduce one of my favourite topics—in the R&D space. Cities are major purchasers of a number of key goods and are able to drive the direction of business investment and, following on that, R&D investment as well.

**Chair:** I am going to turn to my colleagues. The Science and Technology Committee is fortunate, perhaps not surprisingly, to benefit from many members from the north-west, and I am going to turn to one of those first, a longstanding member of the Committee, Graham Stringer.

Q81 **Graham Stringer:** If I can just follow up what Professor Jones was saying about money following excellence, if one wants, as Manchester wants—both the university and the city—to have place-based policies, how do you get over the allocation of science funds being done quite sensibly on the Haldane principle?

**Professor Jones:** The Haldane principle is interpreted in a number of different ways. The way the current Government interpret it is that decisions ought to be made on the basis of expert advice.

**Chair:** Professor Jones, will you say what the Haldane principle is for our viewers who may not be as au fait with it as members of the Committee



and our witnesses?

**Professor Jones:** Yes, I will try to be brief, because I could probably talk for a long time about this. The Haldane principle is something that is believed to derive from a paper that was written by Viscount Haldane in 1917, when the Medical Research Council was set up. Basically, what it said was that, although the Government have the duty to set strategic priorities, decisions about research funding should be informed by expert opinion. At the level of individual research projects, that is a fine principle, but it does not apply to all science and technology funding. It is never applied to funding in Departments, which historically has taken up a huge amount of funding. Currently, it is interpreted in the light of discovery-based research that is funded by research councils and takes place in universities. That is an important part.

Excellence is important, but that is not the only reason why we invest money in science and technology. It is quite right that the Government should take into account strategic priorities, whether that is priorities like net zero in terms of thematic priorities or priorities about economic development where that needs to happen.

Q82 **Graham Stringer:** Is the answer to that to rebalance the science expenditure more towards place and less towards absolute excellence?

**Professor Jones:** "Excellence" is a word—

**Graham Stringer:** Excellence is a good thing.

**Professor Jones:** There are different criteria for excellence, aren't there? There is excellence in terms of how it is perceived by the international community of scientists. There is excellence as it translates into impact, and we have rightly seen a lot of emphasis in science policy in the last 10 years on this idea of impact. What difference does it make to people's lives? How does it translate into health outcomes? How does it translate into economic outcomes? Those are important. I would say that deciding priorities for science is too important to be left to academic scientists.

Q83 **Graham Stringer:** This is my final question on this section. The drift of great scientists to the golden triangle has been going on for a long time. Rutherford discovered the nucleus of the atom a quarter of a mile down the road in what is now a committee room, sadly. Rutherford left Manchester and went to the Cavendish afterwards. Do you think it is possible to stop that drift, because money also follows great scientists as well as institutions? The University of Manchester is a world-class university, but do you think it is possible to stop that drift and get University of Manchester, and some of the other great northern universities, up the pecking order to be in the same region as Imperial, Oxford and Cambridge?



**Professor Jones:** Yes, there is scope to do that. You mentioned Rutherford. I used to teach in the Cavendish myself, so I have made the reverse journey.

The point that is important, if we talk about excellence, is that people loosely say Cambridge is excellent. Cambridge is not excellent. Cambridge is a place that has lots of excellent people. The thing that defines excellence is people, and people will respond to facilities. If we create excellent facilities, we create an excellent environment, then excellent people from all over the world will want to come to those places.

It is possible to be too deterministic about this. One can create the environment that will attract excellent people from all over the world. That is what we ought to aim to do if we want to spread out scientific excellence across the country.

Q84 **Graham Stringer:** To simplify: the answer is for investment in absolutely world-class kit in universities away from the golden triangle?

**Professor Jones:** It is world-class kit, but it is also the wider intellectual climate: excellent colleagues. People like to go where there are excellent colleagues, excellent students. That is the package that you need.

**Chair:** I am going to turn to another of our colleagues from the area, Rebecca Long Bailey, who is the Member of Parliament for Salford and Eccles.

Q85 **Rebecca Long Bailey:** Thank you both for coming to the Committee today. I just wanted to return to the point that you both touched on already about levelling up. Andy Haldane—a different Haldane—from the Bank of England came to the Committee in March and stated that it was still the case that a lot of research and development investment was skewed towards London. When you look at the figures—I think Nesta did a report that showed that the north-west particularly was £171 per head less than then national average, which is quite staggering. Certainly, there is a lot of talk within Government circles about levelling up. Are you feeling that? Have you seen any indication yet that we are going to see any significant changes in terms of R&D investment here in Greater Manchester? I will start with Professor Jones.

**Professor Jones:** No. I am glad you mentioned the Nesta report because I wrote that with my colleague Tom Forth. The figures were very striking. They have made an impact. We hear more discussion of this than we have for some time. We have, for the first time, place-based funding instruments in UKRI. The Strength in Places fund is a new fund that is specifically aimed at growing capacity outside the golden triangle. That is a good fund. I shall declare an interest, I was on the panel for that so I have seen the process. It has been good to see people coming together with quite compelling propositions. The problem is that that fund



is very small. It is only a few hundred million out of a UKRI budget that is £8 billion or so. It is promising, but it is under scale.

I would also add that one of the big funding opportunities, particularly for more translational research, has come from European structural funds and, of course, we await news of the successor to that fund. It will be desirable for the Government to give a strong signal that that would have a significant innovation element.

**Rebecca Long Bailey:** Professor Georgiou, same question.

**Professor Georgiou:** I would not like you to give the impression that we are somehow looking for welfare in research funding, as some might put it. Our university was the most successful in winning competitive grant funding from UKRI in the past year. But some areas of funding are structurally not level—tilted, maybe that is the word—particularly in the health field, which is locked into London institutions in ways that under current structures we simply cannot unlock.

Q86 **Rebecca Long Bailey:** Thank you, that is very helpful. In terms of the broader research and development spend picture, the Government are aiming for 2.4% of GDP, while I am sure you both know that many of the leading OECD nations are aiming upwards of 3%. Do you think 2.4% is enough?

**Professor Georgiou:** No. I would endorse what your Committee Chair said in a recent article. It is a good step on the way because we should certainly not be below average, but it should be seen as a staging post. The leading countries are well ahead of that already and are increasing their investment in R&D. The kind of areas we are likely to be talking about later in this meeting are R&D-intensive, and if we are going to be competitive we are going to have to make those investments.

While we are on that subject, I would like to refer to some good work by the Russell Group on the profile of that increase. They have raised concerns that if we have a hockey stick increase—so we increase it slowly now and then try to catch up right at the end—we could lose, according to their model, half of the benefit. We are talking about a benefit of £5 billion of induced private sector research in three years if we follow a level progression; half of that if we have the hockey stick shape.

**Professor Jones:** I agree entirely with those comments. Our current position is between the Czech Republic and Italy in terms of R&D intensity; 2.4% would bring us up into the range of Belgium. That is a long way away from our aspirations as a science superpower, as the Prime Minister likes to say. I would like to underline the point that Professor Georgiou makes about private sector investment—2.4%; as a rule of thumb we expect the private sector to put in £2 for every £1 that the public sector puts in. This needs to involve private sector investment, but that private sector investment needs to be pump-primed by public



sector investment. As 2027 approaches, if one leaves it too late to do the public sector investment the private sector will not follow.

I would also emphasise that these are very big numbers that we are talking about here. We are talking about tens of billions of extra spending from the private sector. That amounts in some ways to quite a considerable reshaping of the UK economy. We need to reshape the UK economy anyway because to rebalance it towards the midlands and the north and to meet huge goals like net zero is a massive challenge. None of us should underestimate what a big challenge getting to 2.4% would be, even though it still does not put us at the leading rank of innovative nations.

**Q87 Rebecca Long Bailey:** That is very helpful. I have one very brief question. There are concerns that the Government might delay their commitment to increase R&D investment to £22 billion by 2024-25, perhaps shifting the date further. What kind of an impact would that have on R&D here in Greater Manchester, starting with Professor Jones?

**Professor Jones:** Yes, it is a worry. The £22 billion appeared in the March 2020 Budget with a 2024-25 date on it. That date has mysteriously evaporated from recent announcements. I can understand the fiscal situation is very difficult. The key thing we need to have is certainty that that £22 billion will arrive; it will be £22 billion of real spending. There are various ways in which one can imagine the Government might try to game the figures, so one would like to see a real increase from £14.9 billion to £22 billion. If they say that the situation is different, "We have to delay it", okay, but let us see a timetable, let us allow people to plan, let us allow the private sector to plan to meet that.

**Professor Georghiou:** Just to add to what Professor Jones has said, clearly affordability is an issue. Everyone has to be realistic about that. In terms of getting the benefits, if we were a business, exactly the right time to invest would be in a counter cycle, not waiting for the economic cycle to go up. The benefits are bigger by spending sooner.

**Q88 Chair:** To follow up on a couple of the points that Rebecca made, going back to the Strength in Places fund that Professor Jones mentioned, which is this fund of UKRI, you said it is a few hundred million out of a budget of £8 billion-plus. We will come on to the question as to whether the overall science budget is rising or is static, but were it to be static would you be saying that money should be transferred into the Strength in Places fund or comparable funds within UKRI from those allocations that are not place based?

**Professor Jones:** You put me in a difficult position in the sense that one hopes that if the Government are serious about meeting their 2.4% target they should not be imposing a flat cash settlement on UKRI. It would be very difficult to imagine that it is going to be helpful for the economic position of the UK to be taking money out of core subject-



specific research budgets. UKRI does have to address the fact that it now has more responsibility for place. Place is now a factor in research funding that has not happened. If Strength in Places is not the instrument to which that happens, UKRI could perhaps think about how else it could contribute to rebalancing R&D expenditure across the country.

**Q89 Chair:** As you say, clearly it would not be a step towards achieving the status of a science superpower if we were reducing core budget, so the opportunity to have a greater quantity of regional investment comes from an increase in the budget. Is it fair to infer logically from that that, of the increase, you would expect a higher proportion to be regionally distributed than the current snapshot of the budget?

**Professor Jones:** Yes, absolutely. If we take the Government at their word about saying that there are going to be genuine increases in R&D, this does give us a unique opportunity because we have had quite flat research budgets for a couple of decades. Up to now we have always been faced with that problem: do you really want to take money away from the excellence of Oxford and Cambridge to rebalance? That is a difficult issue because, as I said in my opening remarks, Cambridge is a fantastic asset to the UK's economy. But if we do have this opportunity to see rising budgets, if we are going from £14.9 billion to £22 billion—that is £7 billion of rise that has been pencilled in—it would be very disappointing if a reasonable fraction of that was not ring-fenced to start to address these imbalances, specifically with the aim of boosting the economy of those places with productivity that is too low needs to be raised.

I think that tying it very directly to the Government's goals of levelling up, increasing the productivity of economically lagging regions as well as their other very important goals of net zero, would be entirely reasonable.

**Chair:** That is literally and specifically what you are describing, is it not—levelling up, in the sense that you have said you do not want to take down the budgets of existing institutions, you want to increase the others? That is levelling up.

**Professor Jones:** Indeed.

**Q90 Katherine Fletcher:** The Government have recently been putting through the ARIA agency, which is billed at least as higher risk, higher reward, longer-term opportunities. I wondered if you could describe what the University of Manchester could bring to that space outside of the perhaps more conventional evaluation of R&D that is going on within UKRI at the moment. I will confess an interest and perhaps pride in our ability to creatively come up with something. Could that be an opportunity for growth outside of conventional areas?

**Professor Georgiou:** We have had some opportunity of that kind of funding with what is called QR funding in the past, which we have been





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able to deploy ourselves and use to make the underpinning investments that have led to the position we are in in Graphene, which you will be hearing about in more detail from my colleague later on.

The ability to invest in high-risk, high-reward research is definitely good. ARIA, as I understand it, is trying to meet two different goals. One is the high-risk, high-reward one and the other is the kind of pull through that its model DARPA in the US has achieved. It is quite difficult to meet both of those goals at the same time.

**Professor Jones:** ARIA is an interesting experiment in science funding. As scientists we experiment. We ought to experiment in the way we fund science, too, and I am supportive of that. We will see how it finally shakes out, but the idea of having strongly empowered programme managers who are able to pull a project together, keep a close eye on it but take some big risks, is a good goal.

DARPA, the US model for ARIA, is a big programme that has achieved some impressive results, but in the context of the US's overall research and development spending it is pretty small. That is going to be the same in the UK. For ARIA, we have seen figures of £800 million over a Parliament pencilled in. That is not nothing, but again in the context, as I say, of a Government R&D budget of £14.9 billion this year is not very much.

I think of it as an experiment; we do not know how it will go. How it will go will depend on the chief executive and the programme managers who are appointed. It is worth trying, and we will see what happens.

Q91 **Chair:** Just before I turn to Aaron Bell and then Dawn Butler, I will follow up Rebecca's question about the commitment to £22 billion a year of science funding by 2024-25. The Committee took evidence on ARIA from Dominic Cummings, the Prime Minister's former chief adviser, and he told the Committee that doubling the science budget was one of the conditions for him agreeing to serve the Prime Minister in Downing Street. In his writings, he cites your writings very widely as having convinced him or perhaps added to his case that this big, unprecedented increase in science funding should take place. I have a couple of questions around that; I hope you do not think it is prying into personal matters. Were you involved in those discussions or was he a fan of your written work?

**Professor Jones:** He read some of my written work, yes. I had been in a meeting with him in September 2019 to talk about ARIA, but that was a big meeting, many people. The piece of work that he was particularly influenced by was a bit of writing called "A Resurgence of the Regions", which was an attempt to spell out what I thought an innovation-based industrial strategy ought to look like, aiming at levelling up—I probably did not use that word but that is what I meant—trying to equalise productivity and raise the productivity of lagging regions. It talked a lot about the very considerable innovation that would need to go into making



net zero deliverable and affordable. I still think that those are important points. It talked about healthcare. Professor Georghiou has already mentioned the lock-in of healthcare research in the golden triangle. It talked about aligning the research agenda of biomedical research and healthcare-related research more closely to the actual health needs of our population, particularly thinking about imbalances in health outcomes that we see across the country that pretty much map economic outcomes. It was quite a long paper that went into many arguments about those things.

Dominic Cummings mentioned that in a blog. I had not had any conversations with him about it so it was entirely him picking up on my written work. I did talk to him on a few occasions after the election, after the new Government had been formed.

**Q92 Chair:** It was clearly very influential. Academic work is judged on its impact and certainly it had some. Mr Cummings, when he gave evidence to the Committee on this, and subsequently Sir John Kingman, in a lecture that he gave to mark the end of his tenure as chair of UKRI, both gave a warning that there was a high likelihood that these commitments would be gnawed away at by people in Government—official and political—who may not have the same commitment and zeal that Mr Cummings had and you from the outside have. Therefore, the curious evaporation, as he put it, of the date against the £22 billion commitment one perhaps should see as a sign of that. Do you share those concerns?

**Professor Jones:** I certainly share those concerns. I do not feel in a position to judge the depth of commitment in the Government. I can see the tensions between short-term imperatives and long-term imperatives. Levelling up is a long-term project. Net zero is a long-term project, though it needs to get going quite quickly to get there.

The only comment I would make is to stress that the Government will find it difficult to achieve their stated long-term goals without following through on that promise of increased R&D funding. I think that levelling up should mean the long-term project of raising the productivity and economic performance of our big cities outside London, of our towns, of the urban hinterlands. We want to see higher productivity that then translates into higher wages and tangible improvements in people's living standards.

If we are going to get to net zero, we have to retool the entire energy system within the UK over quite a short period. That needs innovation to get the cost down so that it is not a politically difficult imposition of costs on ordinary people.

We have a health service that is under huge strain, a social care system that is under huge strain. Again, we need innovation to solve those problems.



I am a scientist so you could caricature this as being me wanting more money for my sector, but I genuinely believe that this is about the big goals that the Government have. I appreciate that the short-term pressures are on it, but if they want to deliver levelling up, net zero, Global Britain, getting our companies producing goods that we can trade across the world, these are things that need that R&D intensity to go up to 2.4%. R&D intensity will not go up to 2.4% unless we see that pump-priming investment from the public sector.

**Professor Georghiou:** Looking at it from the scientific community, it was ever thus. For example, the Blair Government had a 10-year plan, which included a significant R&D over GDP rise and we never got to the 10 years. We improved, but we did not get there. The European Commission had something called the Lisbon target dating from the early 2000s for 3% and has hardly moved, although some of the leading countries have substantially moved, which is the problem we were talking about earlier.

**Chair:** That is a very helpful historical warning; let us see if we can break the trend.

Q93 **Aaron Bell:** Thank you both for having us and for giving evidence. I know my colleagues want to get into specifics, but I want to do a little bit more on these targets, the 2.4%, and the £22 billion.

Professor Jones, you said earlier we have a ratio of about 2:1 private to public. It seems to be a bit better in the north-west. Is 2:1 what we should be aiming for in the long term? The countries that are truly successful get a lot more private investment in. As we put public money in, whenever we get to that date—we will come to that in a moment—how can we get that ratio up from 2 to more like the 3 or 4 you see in countries like Japan and South Korea?

**Professor Jones:** That is an interesting question. I may have to defer to Professor Georghiou on that because it is proper innovation study stuff. The structure of the economies in Korea and Japan looks very different to the structure of our economy. They are much more closed. One has the conglomerates that are closely linked together. You have a very close coupling between those companies and the Government, if you read what people are saying. China, of course, is in the same category, only more so.

There is this east Asian development that involves a very close coupling between the Government and a bunch of big national champions that are very technologically intensive. Our economy is much more open. The R&D-intensive parts of our industry are very often overseas owned. It is a very big question about whether you think we ought to completely transform our economic model to something that looks more like the model in Taiwan, Korea or Japan. We ought to spend more time looking at those examples because they are very successful economies, but that is a big change. A ration of 2:1 is something that economies that roughly



look like ours—France, Germany, the USA to some extent—seem to have. The higher ratio seems to be associated with an east Asian developmental state model.

**Q94 Aaron Bell:** I will come to Professor Georghiou in a second on the same question. Before that, if we get this £22 billion by 2024-25, would you expect the private sector investment in this country to move in lockstep in that 2:1 ratio, or will there be a lag?

**Professor Jones:** I think there will be a lag. The £22 billion by 2024-25 was about right for 2.4% by 2027. The other thing about 2.4% is it is 2.4% of GDP. We do not know what GDP is going to be in 2027. I hope that the target will be more stretching because our economy will recover quicker than some people fear, but who knows.

**Aaron Bell:** Professor Georghiou, you wanted to comment on the first question.

**Professor Georghiou:** Thank you, yes. Going back to that, those Asian economies reached these ratios at a time when they were largely in catch-up mode. R&D covers a wide range of activities, and this was very heavily development funding—the last stages of bringing products to market. What we have seen is that most of those economies are now working as hard as possible, having reached the frontier, to fill in their more fundamental science bases. We have seen a rocketing increase in China, particularly in their investment in science.

**Q95 Aaron Bell:** This is to both of you before I hand over to my colleagues. Apart from the target we have already spoken about, are there any other R&D commitments you would like to see in the forthcoming spending review and the Budget?

**Professor Jones:** To say this again, net zero is something that we have to do. It is a harder task than many policymakers currently appreciate. It needs a lot of R&D to support. As low-carbon technology is implemented, that needs to be supported by R&D, as I say, to drive the costs down and to increase the scale.

**Professor Georghiou:** I would not like to leave this topic of investment with the impression that there is some sort of sausage machine; you put in public R&D money, private R&D, and innovation comes out. The countries are differential in how well they do out of this, and it does depend on getting all the surrounding conditions right and investing in a number of complementary activities, including skills, for example.

**Q96 Dawn Butler:** Thank you both for your evidence today. I just want to touch on something very quickly. Professor Jones, you mentioned energy and, as it is quite topical at the moment, I wonder what kind of innovations you think are needed in the energy market at the moment.

**Professor Jones:** There are a very wide range of innovations. If we sit back and think about what we use energy for, we use it for transport, for



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electricity—domestic electricity and industrial electricity—and for domestic heating, which is a very large part that is not always understood. Each of those we need to think about individually.

There is a big focus on transport, so we have electric cars and lots of R&D support for that. That is as it should be; that is good, though it is a very competitive world market and we need to understand what our position is in that market.

There is a lot of talk about hydrogen at the moment. Hydrogen, of course, is an energy vector rather than the source of energy, so we have to think about how we make hydrogen in a way that does not produce carbon dioxide, and then uses for that in terms of decarbonising industry. It is an astonishing story that we are seeing at the moment about carbon dioxide because people cannot make fertilisers. Making fertiliser is a fairly classic piece of heavy process engineering that needs a lot of energy. We need to think about how we can use hydrogen to decarbonise those industrial sectors.

We need to work out how we can get our housing to be much more energy efficient, how we can heat our houses. That is a very big area for innovation. A big programme of social housing and building new housing ought to be coupled with innovations and making housing more energy efficient. Yes, I know I can go on for a long time.

Energy is so important throughout our economy and the changes we have to make are so far-reaching that a huge number of innovations will be needed.

**Q97 Dawn Butler:** Going back to the question that Katherine and the Chair asked you, do you think that ARIA should play a role in that, too, as it is going to operate on a bigger level looking at all of the upcoming forward-thinking technology in R&D in energy?

**Professor Jones:** The energy problem is bigger than ARIA, as it is currently set up, can solve. There is a huge role here for the Government in driving innovation, both through regulation and through their role as a customer. As cities and regions engage in programmes of social housing, they should be using that as an opportunity to develop new technologies, new ways of retrofitting housing to make them more energy efficient. ARIA could be a part of the picture, but it cannot be all of it.

**Q98 Dawn Butler:** Thank you. Professor Georghiou, during the pandemic, lots of organisations and scientist fields have been working together. Do you think that this post-Covid situation leads to any particular opportunities for economic growth driven by research and innovation and technology?

**Professor Georghiou:** BEIS' Innovation Strategy refers to what it calls a sputnik moment; that the public has realised the benefits of scientific innovation as a result of seeing the vaccines come through, for example. There is something to be taken advantage of. The other side of that is



that we are carrying major setbacks from the pandemic period. Experience from past recessions has shown that business R&D spend, particularly on SMEs, will fall back considerably, probably, in the coming immediate years. Unless we take measures to remedy that, we will not be in a good position to take advantage as we come out.

However, as one who follows the great economist Schumpeter, often important new waves of innovation do come out of crises. This is possibly the time that we can make some significant shifts in the energy market, as my colleague was saying. Green technology is a very good example. By the way, I am very surprised, Professor Jones, that you did not mention the nuclear sector in that list.

**Q99 Dawn Butler:** Earlier today we were talking to people and they mentioned CTDA, the coronavirus test device approvals. Do you know much about that? Will that have an effect on research, development and moving forward in science fields?

**Professor Georghiou:** No specific knowledge, I am afraid, other than the point Professor Jones already made that the regulatory environment is a major area of competition between countries. If we can make it pro-innovation, that would be beneficial.

**Q100 Dawn Butler:** Does pro-innovation mean fewer hurdles and less red tape?

**Professor Georghiou:** Nobody would ever say more red tape in an answer. I think a greater opportunity to experiment under controlled conditions, a kind of sandbox approach, rather than abandoning necessary precautions.

**Professor Jones:** Allow me to place it on record that I think there is a huge research agenda. I think nuclear new build is really important. A huge amount of our current low-carbon electricity generation capacity comes from a fleet of very ageing AGR reactors that will be coming offline over the next 10 years. I find it difficult to believe that we can meet a net zero target without a substantial programme of nuclear new build, and we need to drive the costs of that down. It is clear that currently the nuclear programme is not without its difficulties. That needs innovation in things like small modular reactors and advanced modular reactors that could co-produce hydrogen. There are a whole range of technological innovations that we need to be getting our skates on a bit with, I think.

Of course, nuclear allows me to talk about regulation, too. It would be mad to have an unregulated nuclear new build programme. New technologies need to be safe; they need to be accepted widely by the public. Sensible, well thought through regulation can give people confidence in that and can give us a competitive advantage.

**Q101 Graham Stringer:** When it comes to trying to hit the Government's net zero target, isn't there a case for putting our skates in the wardrobe, rather than putting them on? There are real risks involved in being first.



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If some other country or somebody else makes a big innovation in improving the efficiency of batteries or small nuclear reactors, one can go through a whole series and if we have gone down one road that is not as good, it may be that we are saddled with very high costs when there is better technology there. Sometimes it is better to be second or third to benefit from innovation elsewhere, is it not?

**Professor Jones:** Yes. We see an example of that in solar. The costs of solar have plummeted. The costs of solar have largely plummeted because the Chinese Government have given their factories free capital. It is a difficult issue. We account for a few per cent of the world's GDP, so we will not lead in every technology. That is why we need to be quite discriminating about which technologies we think we can make a contribution to and benefit from. I am not calling for indiscriminate R&D across the entire picture. We will buy lots of things; we are part of global supply chains.

Q102 **Graham Stringer:** It just means there are potentially very expensive risks involved. We have not mentioned the reports from California, France and Oxford that there have been breakthroughs in fusion recently. Do you think that Manchester, the north-west and the country as a whole should be looking more closely at fusion? If there really is a breakthrough in fusion, that does alter the whole structure of the energy market over the next 30 or 40 years.

**Professor Jones:** The UK has a genuinely significant position in fusion. Having hosted JET for some years, Culham is a very impressive laboratory, and, as you know, it is attracting private sector funding. However, I think it would be very unwise to believe that we should do fusion in case it works. I don't think that it would be at all wise to rely on fusion to get us to a 2050 target.

Q103 **Graham Stringer:** That was not quite the question I was asking, relying on it; whether we should be putting more eggs, not all of our eggs, in that particular basket.

**Professor Jones:** I think we are putting quite a few eggs in it. If I think back to when I was on the council of EPSRC, the fusion grant was pretty much the biggest single grant that we gave out. We have focused a lot on fusion. I am not necessarily saying that is a bad thing.

The other thing that we should think about is whether we are maximising the spillovers from our fusion investment? Do we get the benefit from it, even if it does not pan out the way we hope? Will we be able to use the capability that that has given us in other sectors? You can see where those areas are. Very advanced robotics are happening in Culham, very advanced material science. Some of the similar advanced material science that we will need to do, for example, is a high-temperature advanced modular reactor.

Since we are in Manchester, I have to mention that those are things that are being studied right now in the Henry Royce Institute about the



behaviour of materials in extreme environments. Those are going to be the limiting factors for fusion. If we can crack those problems, we can use those in other areas, too.

**Professor Georghiou:** Just to pick up on the north-west dimension as well, this region would be very well placed to host the present test facility that is being talked about, either in Cumbria or in Cheshire, with support from all of the rest of the region in the necessary skills. That is not an open competition.

**Graham Stringer:** It is not an open competition?

**Professor Georghiou:** Well, it is a competition, and I hope we will be in that competition.

**Graham Stringer:** The university is lobbying hard.

**Professor Georghiou:** We do not think it could possibly be in Manchester, so we are neutral in that sense, but we have said we will support anyone who puts a credible bid in from the north-west with our technological capabilities.

Q104 **Graham Stringer:** A final question comes back to another way of asking the first series of questions. If you were to say what the benefits were simply of devolving R&D spending to the regions, how would you summarise that, if I were to put that in a report?

**Professor Jones:** The benefits really come about from having local knowledge. What we want to do is to build an innovation ecosystem to support existing innovators. If we are talking about a city like Greater Manchester—and we have a structure for doing this in Innovation GM, which is a collaboration between the private sector, the universities and the combined authority—what we can do at a city level is understand at the moment who is doing that innovating and find out what the barriers are that are stopping them doing more of it. Those barriers could be access to facilities or they could be about skills. They very often will be about skills. Those are things that we can find out, that we can have knowledge about locally. It is very much more difficult to imagine being in Victoria Street or in Victoria Embankment or even Swindon and saying, “We understand the needs and the technical textiles sector in north-east Manchester. This is what needs to happen to support them”. We just need to be closer to the action to be able to make those decisions.

The argument for devolution or co-creation—because we should work with central Government agencies on doing this—is the extra knowledge that we can bring to bear on it. We can then combine that with the other capabilities that local government can have, so if we are creating new facilities, we can integrate that with what we are doing about transport. We can integrate that with what we are doing about skills. We can get the universities and FE colleges to work together to make sure that the skills are in place for the more innovative economy that we hope would





emerge from our R&D efforts. That is how I would summarise it: local knowledge and ability to integrate it with the other functions of local government.

Q105 **Chair:** Just on that, when we talk about devolution of funds, what we usually mean is taking funds that are currently held centrally or nationally and putting them in the hands of local people. Going back to our earlier conversation in which you said it was the increase in science funding that gave the opportunity to have new money being more local, that is a bit different from devolution, which is about existing funds. You have been a member of the council of the Engineering and Physical Sciences Research Council. Are you saying that some of the research council budgets ought to be devolved and, for the reasons you very eloquently said, might be better allocated locally?

**Professor Jones:** I would focus on devolution of additional funds. If there are additional funds that were being ring-fenced for the purpose of levelling up, if you like, I think those are funds that should be devolved. I come back to this "co-creation" word, though. I think it would be very helpful. Absolutely, competent bodies in cities and regions should be working in partnership with research councils. In the same way as EPSRC will work in partnership with a large company and it will inform its strategy, I see no reason why EPSRC should not consider Greater Manchester to be a partner in the same way that Rolls-Royce or JLR might be. Likewise with Innovate UK. This is going to happen in a number of different ways. There is a case for new money being devolved.

There is a burden on cities. Cities need to be able to demonstrate that they have the capacity to make good decisions, that they have the networks in place, and that they are connected in the way that they say to their local business communities. It is a two-way business. It is a deal that has two sides, if you like. That new money can be handled in that way, but then there is scope for wider partnership working across other agencies of government. We talk about the research councils, and we must not forget that Government Departments spend significant amounts of money on R&D. The R&D budget at the Department of Health and Social Care is very large, and arguably perhaps ought to be more in touch with other regions than London and the south-east. The Ministry of Defence, of course, has a large budget. With the slightly more uncertain world we are living in, the way that money is spent could involve regional involvement, too.

Q106 **Chair:** Finally on this point, in some ways if the policy is devolution and Government Departments can be directed to follow that, as Mr Stringer referred to in his earlier question, the Haldane principle provides a bit of distance between the research councils and the Government. From your experience as an academic and having served on the council of a research council, do you think research councils would be up for that kind of regional collaboration, as can happen, as you rightly say, with some private companies?



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**Professor Jones:** It would be wrong for me to comment. I am not involved in the research councils at the moment. I think quite highly of the research councils. I think they are creative and innovative bodies and, to go back to the Haldane principle, nothing in the Haldane principle says that the Government should not set strategic priorities as they do with net zero. If a strategic priority of the Government is levelling up, I think it is fine for them to challenge the research councils with ways in which they could contribute to that agenda and I think they will come up with creative and experimental ways of doing that. I would put it in those terms.

Again, the Haldane principle applies to the research councils. Government spending on R&D is much bigger than the research councils. Historically, it has been very much bigger. Now the research councils are quite a large bit of it, but getting to £22 billion, that is not going to all be going through the research councils, so we would need to think about all those other ways in which the Government are spending R&D money, rightly, in pursuit of their energy goals.

Q107 **Chris Clarkson:** I would like to pick up on a local theme. As you have probably guessed, I am also a Greater Manchester MP. There are plenty of us on the panel. I would like to turn specifically to the pandemic and I would like to understand from your perspective how research in the region has been affected by the pandemic, whether certain settings were more effective than others and how long lasting you think some of those effects have been. I would like to start with Professor Jones and then go to Professor Georghiou.

**Professor Jones:** We can answer this question at a number of levels. At a very practical level, it has been as disruptive to the day-to-day business of researchers as it has been to everyone else. It has slowed down research. It has made it difficult to collaborate. It has made it difficult practically to get into the lab and do things. I think companies have found it difficult and, as Professor Georghiou said, any recession of any kind tends to lead to a reduction in the R&D capacity of companies, and the company fighting for survival has to prioritise getting through the crisis over the long term. Those are the immediate effects.

On the other hand, there has been a slight Schumpeterian aspect to this, in the sense that I think we have seen it particularly in healthcare and in health research. That has produced big changes in the way the health service operates. It has been a bigger impetus to digitalisation of healthcare than anything we have seen for some time. We have seen very impressive, fast progress in vaccines, therapeutics and so on. It has affected it in both ways. It has been an enormously disruptive, difficult period as it has been for everyone. It has shaken things up.

Q108 **Chris Clarkson:** Do you think that shift in focus is going to be long lasting or do you think things will naturally default back to a wider mix of research areas?



**Professor Jones:** I think it should be long lasting. In a sense, it is a little bit early to tell. When the dust settles, we should be looking at what our life sciences sector did well and where there were gaps. We have learnt things like the importance of diagnostics that perhaps we did not take seriously enough. Even vaccines—we did not have a very big vaccine manufacturing capacity two years ago. That has been something that has developed very fast, so that has been a positive thing. We need to make sure that we learn those lessons and things might perhaps be a little bit different.

Coming back to public health, looking at the inequalities of the impact of the pandemic across our communities and the way that maps on to economic inequality, that reminds us to go back. We have had very unequal health outcomes, both across the whole country and within the country. Health outcomes in your bit of Greater Manchester are much worse than health outcomes in the south-west of Greater Manchester. That to me seems something that we have probably tolerated too long and maybe the pandemic has shone a light on that and will make us do something about it.

**Professor Georghiou:** If I may add to that on the effects here, in practical terms during the first lockdown we had to stop all onsite research, other than that which was Covid-related, so we had quite a strict filter on that. Of course, quite a large amount of work on Covid-related activity was going on, with good results. After that, distancing meant that labs had to operate at substantially reduced capacity. Talking to companies, their capacities were about the same, perhaps 20% to 25%. There are effects and they will be felt for some time in terms of outputs and timing of outputs.

The point I want to add was possibly true in other things as well: the effects are differential on people who are early in their careers. They have missed out key development stages, key opportunities to establish themselves, make contacts and so forth. If we want to take any remedial measures we should concentrate on these people, otherwise we will have a harmed generation coming through the crisis.

Q109 **Chris Clarkson:** I am glad you picked up on that, Professor. What is being done at the moment to try to support those people and research in general? Let's pretend that I am the Government for a second. If you had key asks what would they be?

**Professor Georghiou:** I am sure their representatives will make requests for themselves. An early issue was to ensure that their financial support was extended so that they could finish, for example, doctorates if they were at that level, or that projects could be extended. UKRI did make substantial efforts. Not all funders did. Wellcome was very good in this respect and was a leader.

We probably need to assess where we are now as we come out of the pandemic, but it could be interesting, for example, to have a programme



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of starter grants for people who have been affected by this. It would not be as expensive as some other things in the world of research, but it would give these people some space to re-establish their careers.

**Chris Clarkson:** Is there anything you would like to add, Professor Jones?

**Professor Jones:** As a scientist who runs a research group, the toll it has taken on researchers is apparent and things that we can do practically to support them as they start out on their careers I think are very valuable.

Q110 **Katherine Fletcher:** I want to turn to one of the topics we were talking about earlier. I will perhaps start with Professor Georghiou. As proud north-westerners—not quite all, colleague to my left excepted—we know our region has lots of strengths. We have already highlighted health and innovation. We have already highlighted nuclear. What strengths would you highlight that could be targets for improved focus on R&D pounds from the public purse?

**Professor Georghiou:** In a sense, at least for our immediate region of Greater Manchester, we have put in a lot of groundwork to identify where those strengths are, beginning with a science and innovation audit and following on with a number of other detailed studies. We have identified health innovation, as you have already mentioned, partly building on the devolved health system in this city. But in particular, and very important for our university, advanced materials is a clear comparative advantage and how that plays into the business sector is very important for us.

There is a very strong digital and creative sector, MediaCity being one focus of that, but there is more than that. We are also trying to align as much as possible with the city's more ambitious targets on clean growth and net zero and the 2038 target. That is a short list. There are others.

Q111 **Katherine Fletcher:** Yes, there are capabilities all over the place. What I am interested in is the translation of that into commercial research, because ultimately we level up by paying our way, by creating the next meeting of Rolls and Royce in the Midland Hotel, if you want to go classic about it. The Government produced this innovation strategy in July, which is about paving the path to that. Do you think there is enough support for the commercialisation? I know we are a step ahead of the pure R&D that we have been talking about, and we will focus it on the next panel, but I would love to make sure that we link the two.

**Professor Georghiou:** Let's begin with commercialisation. Coming out of universities there was a clear deficit—well, not just in this region, in the north of England—in terms of available and targeted investment for spin-out companies, some of them emerging from the building we are sitting in now. Essentially, the Golden Triangle spin-outs were getting probably 50 times as much investment, even though we produce as many as they do.



We addressed these ourselves, with good catalytic support from Research England and UKRI. We went to them with a proposal to found the Northern Gritstone investment company, as it is now called. It was called the Northern Triangle originally. This is a spin-out fund targeted to the outputs of three universities: the University of Manchester, the University of Leeds and the University of Sheffield. If you add us up, it gives us a substantially bigger collective research income than any other university in the country—11,000 academics, 33,000 doctoral researchers—so there is a big potential of innovative activity to invest in. We account for about 10% of patents coming out of universities now.

This company has been formed. We will only have very small shares in it, but we have signed agreements that we will pass our intellectual property activities through it with a guarantee of investment. It is aiming to raise £200 million round about the end of this year and a cap of about £500 million. That will absolutely transform that landscape.

**Q112 Katherine Fletcher:** If I may add, fabulous room to expand quality people and a lovely view.

I want to return to the Government's innovation strategy and how that ties in with wonderful locally led initiatives like Northern Gritstone. Is there anything more that the Government need to do? Is it to put more flesh on the bones? I don't want to put words in your mouth, but I am interested in it as it is so recently released.

**Professor Georghiou:** I do think we have quite a good set of innovation policy instruments in this country. Things like Knowledge Transfer Partnerships are imitated in many countries. So, it is not lack of good people and good ideas. The question would be the scale of these things. Do they exist to match the challenge? Knowledge Transfer Partnerships, for example, will put somebody under academic supervision into a company, often an SME, and allow them to develop a very practical innovation. The problem is the total number of them. There are actually more here than anywhere else, but the total number does not match the number of innovative companies that this country needs. It is a population issue. It is not that companies don't do enough innovation but that we don't have enough companies to do innovation, if you can see that distinction.

**Katherine Fletcher:** Yes. Professor Jones, anything to add?

**Professor Jones:** I think the question of translational research is very important. I mentioned the Strength in Places fund before. One of the successes of the Strength in Places fund was the Advanced Machinery and Productivity Institute that is being built in Rochdale. What are the characteristics of that? That is very much driven by local businesses that have then brought in the support of the National Physical Laboratory as a major government research institution, and local universities including the University of Manchester. That is an example.



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The Catapult centres have been successful. In my previous life I was in Sheffield, and the Advanced Manufacturing Research Centre was very effective at driving up productivity in the regional company base. We do not have a Catapult centre in Greater Manchester, and I think we ought to have one. We need to follow where the industry is. A characteristic of Greater Manchester's economy—and Lancashire's too—is that it is very heavily driven by SMEs, and we need to think about how we support SMEs in their innovation activities. We have the Made Smarter scheme, which I think has been a great success. That is one good thing. I think we can expand that.

I would like to see a Catapult centre focused on advanced materials because that is a really important sector, both for our regional economy and in terms of the academic support we can give. I would like to see a Catapult centre for materials for sustainable manufacturing and I would like it to see it not on Oxford Road but somewhere more in Chris's end. That is where the centre of mass of the industry is. We need to look at where the industry is. Where is the need? That is where we need to put those translational research centres.

**Katherine Fletcher:** Forgive me for interrupting, but I would point out that Springfields nuclear is a wonderful site, up on the other side of Preston, looking over that centre of expertise, but that is me being cheeky, sorry, Chair.

**Chris Clarkson:** There is a very nice space in Stakehill in Middleton.

**Katherine Fletcher:** Northern pride overcomes us. Thank you very much, gentlemen.

**Professor Georghiou:** There is one gap in our policies, as I know we both think, because we have been talking about research and innovation. There is also the diffusion of technology—the acquisition of technology by existing companies—and it has tended to be a gap in this country for as long as I can remember. It has never been the primary mission of any agency. In decades past, the old Department of Trade and Industry used to run consulting support schemes and things, but—

**Katherine Fletcher:** I am very conscious that the Chair wants us to stop. Would it be possible for you to write to the Committee with a brief outline of that diffusion view so that we can take it into account with our evidence?

**Professor Georghiou:** Absolutely.

**Katherine Fletcher:** Thank you.

**Professor Jones:** Made Smarter is a good example of something that does address that, but it needs expanding and scaling up.

**Chair:** I can just see the Science and Technology Committee becoming an estate agency with people giving attractive descriptions of the



properties in their constituencies, all very justified.

I am very grateful to our two witnesses, who are professors of this university. We are very grateful to be here. If I may say so, the excellence of the research in this university and others across the north, and the writings of our witnesses today, have driven the fact that we are talking about increases in investment in what is a profoundly successful sector, and we are talking about the importance of regions and how they can contribute further to that. For the heritage of your work and for bringing us up to date in our inquiry, thank you very much indeed.

## Examination of witnesses

Witnesses: Chris Oglesby, Simon Cohen and Richard Jeffery.

Q113 **Chair:** We are now going to turn seamlessly to our next panel of witnesses, which will require me to introduce them as they take their seats. I am very pleased to welcome three witnesses who can talk to some of the commercial and industrial opportunities that there are both for recovering from Covid and, in general, prospering over the years ahead. I am very pleased to welcome Chris Oglesby, the executive chair of Bruntwood SciTech and the chief executive of Bruntwood, which is a company that has developed and made available investments across the country, with a particular expertise in science parks and estates in which spin-offs from university research can take root and prosper. I am very pleased to welcome Simon Cohen, who is the chief executive of Innovate Pharmaceuticals, and Richard Jeffery, who is the national director of economic development business GC Business. Thank you very much for coming to join us here today.

Perhaps I can start with a question to Chris Oglesby. Thinking of the development and the future development of economic opportunities here in the north-west and Greater Manchester in particular, would you say a little about the role of the Greater Manchester combination of authorities and the working arrangements that have come together over the years? Perhaps you might make mention of the local industrial strategy that has recently been put forward by the Greater Manchester partners.

**Chris Oglesby:** Thanks very much. I think it is important that you highlight, Greg, that where we are today in Greater Manchester has a long thread of history through an evolving strategy. The local industrial strategy that you mention highlighted four areas that the previous two witnesses talked about, those of health innovation, advanced manufacturing and materials, clean growth, and digital—four sectors that we see as not only driving the growth of the economy of Greater Manchester through the strengths in those sectors, but also the adoption of those sectors by companies. Going back to the final point where you left the last discussion in terms of diffusion, we are seeing that it is those



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companies that are adopting digital, clean growth and so on that are disrupting their sectors and driving the economy as well.

The local industrial strategy span out of the Manchester Independent Economic Review, and you can go backwards over a period of time as to how this has built up. The local industrial strategy, which was developed by the Local Enterprise Partnership, has now pulled together a proposal called Innovation Greater Manchester, which looks forward in terms of how we develop the well-advanced innovation ecosystem in Greater Manchester to enable the businesses and people of Greater Manchester to properly thrive through the adoption of innovation and research and development.

We would ideally like to agree a place-based innovation deal with Government—whether it is pure devolution or a partnership remains to be seen—that allows Government to have the maximum impact on the people and businesses in Greater Manchester and the wider north-west, bridging the gap and levelling up both north/south nationally but also levelling up across the north, using the assets at the centre of Manchester and Salford, where we have these developed innovation assets, and spreading the benefits of those assets more widely across Greater Manchester.

We have a great history of working in collaboration within Greater Manchester, bringing together academia, local government and industry, and I think we have a strong track record as well of collaboration with Government in terms of helping them to deliver their national priorities through Greater Manchester, which comes back to that culture of collaboration that is at the heart of the city.

Q114 **Chris Clarkson:** Thank you very much for coming to see us today, gentlemen. Chris, you have started asking the question I wanted to ask, which is: what local opportunities are there for research and innovation to drive the recovery in our region? Chris, if you want to start because you have already begun the thread, and then if either of the other two witnesses want to come in.

**Chris Oglesby:** It is absolutely massive. The crisis has accelerated what we were seeing before in terms of the upcoming fourth industrial revolution. In many ways, in this part of the world we are still trying to deal with the fallout of de-industrialisation, and there are lots of lessons that we have learnt from that in terms of how we are then going to prepare for this fourth industrial revolution. What we have seen coming out of the downturn is this K-shaped recovery where, as I said before, those sectors or those businesses that are adopting those disruptive strengths are thriving, and those that are not are in decline. What we need to do is to create the environment around those businesses that are thriving to allow them to do so.

The starkest fact at the moment that we are seeing in Manchester—and I think it has played out nationally—is the scale of current vacancies that





we have at a time when we also have challenges around unemployment. The secret there, clearly, is to get the people who are out of work at the moment skilled for these new jobs that we are creating. The reality is that in this part of the world, having spent 30 years trying to create jobs post-deindustrialisation, our challenge now is that we are creating more jobs than we can fill. It is about then upskilling people for those jobs that we are creating.

**Chris Clarkson:** I completely agree. That is basically the problem in my patch at the moment.

**Richard Jeffery:** In terms of those opportunities, what we have seen, working with thousands of businesses over the last 10 years and particularly in the last year, is just how much innovation has accelerated. I take quite a broad view of what “innovation” means, in terms of innovation in systems, processes, people, leadership and throughout the whole business. They have had to adapt and they have realised that they can adapt. We have a real opportunity right now to capture that; to build on it and then celebrate those businesses that are doing it and show it can be done. Right now, up the road, we have over 3,000 people gathering at Progress 21, where we are bringing together a whole raft of people to celebrate those successes and celebrate where that sits.

We have discussed at length the sectors, and I agree with all of that. That is what we see coming through. Our challenge is to make sure that more business from that long tail of businesses are part of that innovation ecosystem, and to open it up so that people from a broad variety of backgrounds and a range of areas feel they have access. That is where Innovate GM and the proposals really come to the fore, because it is not just focused on the centre of the city; it is about creating those opportunities and those nodes, those innovation centres, across the whole of Greater Manchester. It is critical that we get that in place and build that ecosystem now to make sure we capture the innovation that has been taking place over the last year.

**Simon Cohen:** I was looking at the medical and health side of things, and we have amazing facilities around Manchester and around the north-west. It is about bringing them all together, so that the universities, the NHS and small companies such as ours are working together to feed that innovation, from early innovation all the way through to medicines that can be used by the public and by the NHS. It is joining that system together locally that is going to show real innovation and a real move forward in the future.

Q115 **Chris Clarkson:** Picking up on those innovations—and this is to all three members—what innovations have you come up with during this crisis? I am interested to see what you have been up to.

**Simon Cohen:** We talk about disrupting and about changing paradigms, and that is what we have tried to do. We have looked at an area, which is repurposed medicine. During this Covid-19 pandemic repurposed



medicines started to come to the fore, whereas before they were the poor man of medicine. What do we do with some actives that we know work, in the future?

What we have done is look at a way to bring repurposed medicines to the fore, to look at how we can make them more effective in different disease areas and, importantly, look at the end point, which we have not tended to be very good at in this country, which is the commercialisation of those, and look at what incentives we need to bring these new medicines to market. The problem in the past has been, of course, that because they were already patented and the patents had run out, there was very little commercial push to spend £10 million or £20 million to bring them to market when everyone could copy them. It is looking at how we can change that. By enhancing and reformulating them, we have managed to re-patent them and, therefore, made them a commercial prospect.

**Chris Oglesby:** Our business is about enabling our customer base, the science and technology businesses, to innovate. You met a few of those this morning and, I think, have seen how nimble they have been.

In our organisation we developed out one of the Lighthouse laboratories within three weeks to respond to the requirement at the early stages of the pandemic; we turned a conference centre into a mass testing facility. The ability to move quickly and develop these kinds of facilities with a client in the public sector on the other side that, for once, was able to move very quickly as well is something that we would love to be able to replicate as we respond to some of the big challenges going forward.

The biggest area of innovation has just been in the customer proposition and the flexibility that we are able to offer. Primarily, what our customers need from us at the moment, they are telling us, is access to finance, access to skills and access to the network, and working in collaboration with partners around Greater Manchester, being able to provide those facilities for those customers.

Q116 **Chris Clarkson:** Is it fair to say that your support to these businesses has been the innovation?

**Chris Oglesby:** That is the innovation, particularly. This is, again, going back to one of the big challenges that we have at the moment. We talked about skills, but it is also innovation, driven by these innovation districts that we are developing, generally regarded as being driven by proximity density and this culture of collaboration; it is these clusters. Work from home is always an easy give when we are looking at the priorities in terms of lockdown for the Government. Work from home is always the first one that we can put in place because nobody is particularly going to vote down work from home, yet the cost of that in terms of the impact on innovation is very significant. We have created clusters where people are colliding together. We need to get people out again and working collaboratively together. I would make the case very strongly that when we are thinking about how we limit the spread of the virus, we are



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thinking truly about the economic cost of work from home because a lot of the things that have been done around here, that have powered the economy forward, are as a result of people working physically close together.

**Chris Clarkson:** I completely agree. Richard?

**Richard Jeffery:** Our business is all about engaging with other businesses, that face-to-face contact, encouraging people to change their behaviours, adopt innovation and so on. When we have said, "Right, you cannot actually physically go and see any of these businesses", we had a bit of a challenge there, but we very quickly pivoted all our services and we did a number of key things.

For the city, we created a mechanism to capture live data from businesses. Every business we spoke to, we asked the same set of questions. That was live and that became the situation report, which was hugely helpful to all partners across the city. We brought all our partners together on a virtual but weekly basis to make sure that all the business organisations and everybody else was coming together and sharing intelligence, and we continued to innovate by bringing forward new services, albeit virtual and in a slightly different way.

A really good example is perhaps the work we did around global scale-up. We have programmes in place to help companies grow, scale and get into global markets. Obviously, prior to the pandemic, a lot of that global activity was done face to face, getting out there, but what we did is we joined a partnership, as Greater Manchester always does. We brought together key partners such as KPMG, DWF, Santander and others, and we said, "Right, how can we solve this problem so that we can continue to create those opportunities?" That programme was hugely successful. It was actually more market-centred during the pandemic than it was before the pandemic because we found new routes to market and new ways to open those up. One particular company that has been well publicised, The Insights Family, deals with data and intelligence around young people. That company has expanded rapidly and entered multiple markets, having not necessarily been to those markets. They have found a way to do it because of the connections and connectivity.

We have constantly been innovating ourselves, but have been amazed and inspired by how much the businesses we work with have adapted and been able to innovate. I absolutely agree with Chris, it is important to sustain and to build on that now that we have more actual contact, and that is why we have things like Progress 21 taking place right now up the road.

Q117 **Chris Clarkson:** Fantastic. I have one last question. This one is to Simon. I just wanted to ask how Innovate Pharmaceuticals' experience would have differed without help from the Business Growth Hub.



**Simon Cohen:** It made a big difference to us, both that and the other funds that we were able to access. They were one of the few funds that we could access.

The difference it made for us was being able to work with other universities. The innovation voucher, in particular, gave us the ability to put funds in and have some more funds available to do the work for us at specific universities on specific formulations. It did make a big difference. The MATMED money allowed us to look at a very specific area of one of our drugs that is going to be used in Covid-19. The trial starts on 4 October in Louisiana, and without that money it is doubtful whether we would have been able to do that trial at all. It was very useful indeed.

Q118 **Graham Stringer:** That is all very positive, and I am not surprised it is positive, but there must have been some challenges that it was impossible to overcome, particularly in relating research to economic growth. I do not want to be negative, but perhaps you could tell us the most difficult problems that have not been overcome and how the areas you work in now are different from two years ago. Is that likely to remain? We will start with you, Chris.

**Chris Oglesby:** When we talk about that K-shaped recovery, it is thinking about those businesses and those parts of the economy that are in decline and whether it is the right thing to do to look at interventions or not. I go back to the point I was making earlier, which is that for a large amount of those sectors the winners are the ones who are effectively diffusing innovation and adopting new practices and policies that are allowing them to thrive. For me, I still keep going back to the fact that the biggest single challenge is skills and, ultimately, the leftover consequences of the challenges of the last 30 years in terms of the polarisation of outcomes for our population. The only way that we are going to unlock the potential of the country is to unlock the potential of the whole population.

The silver lining there for me is that when I started work in the early 1990s, everything was about the corporate function. It was all about your education and where you went to school as to how you were to succeed. Now, technology has completely democratised the workplace. We are seeing businesses come and expand in Manchester because of the diversity of our population, as opposed to necessarily purely its educational achievements to date. Therefore, for me, we really must be focused on now taking those people who to date have underachieved and finding ways to link them with these jobs, because the reality is that the jobs that we are creating they are capable of doing, whereas in the past, when you were landing new lawyers, accountants, bankers or whatever in these cities, there was only a finite proportion of the population that, realistically, you were going to be able to get into those jobs.

When I look at the challenges, they are those wider social challenges, which is why Innovation GM sits as part of the broader recovery strategy in GM, alongside the transport strategy and the skills and education



strategy. It is thinking about the investment in people and place that sits alongside the investment in innovation that is so important, which is why I believe it needs to be a collaborative approach between place and central Government. If central Government try to do this on their own, landing this money in a real sniper fashion in a particular micro-location, then they are probably going to fail because it does not necessarily have the rest of the infrastructure and ecosystem around it, if that makes sense, Graham.

**Q119 Graham Stringer:** It does, it makes a lot of sense, but is there anything that is particularly more difficult or worse after the last two years, or slightly less than two years, of the pandemic? That is what I am trying to get at. You have given a very positive, problem-solving scenario. I just wonder what has gotten worse.

**Chris Oglesby:** The biggest single thing for me has been the impact on the population. We sort of bandy “mental health” around, but if we go back to the work that we are doing in our communities and the impact on those communities—and it goes back to the impact of isolation—that has had such an impact in terms of making people capable of doing the jobs. There is a skills piece, per se, but also there is the resilience and everything else that has been hit as a result of this, which I feel we need to work at. As one of the previous witnesses said, it has exposed those health inequalities that we have. Those underlying social challenges, for me, are the biggest things that are going to hold us back.

In the economy itself, yes, we would like to see the investment in R&D and excellence in our region that we feel we are able to multiply. You were talking about the multipliers earlier of two to one. If you are putting investment behind business-led R&D—and again, the whole point of Innovation GM is that it is a business-led initiative—then I think the businesses working with academia will give you a much better return on your investment than the way that it has been distributed in the past.

**Graham Stringer:** I do not know if Simon or Richard want to add an answer.

**Richard Jeffery:** I will come in on that. I think the question was, “What was more difficult during and what is more difficult now?” During, it was a lot harder to sometimes get some of the collaborations going and motoring forward. There are some amazing firms out there, such as Simon’s, and amazing academics such as Richard and colleagues, but trying to align that is challenging at the best of times. It can be done, and the growth hub and others do that job. During the pandemic that was a bit harder, just because of all the priorities that everybody had. That has been touched on earlier.

Yes, there is a challenge around the workforce and people getting access to these opportunities, but it is also worth just dwelling for a moment on some of the challenges of leading businesses and SMEs at the moment. We have had the huge challenge of guiding new business through Covid,



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we have come out of that and now we are going to business saying, “Right, you have to sort out your low-carbon strategy as a business. Right, you have to deal with the challenges of some of the cash flow changes. You have to deal with your supply chain challenges”. You have so many more demands on the leaders of those businesses, and at the same time we are saying, “You need to innovate more and you need to adopt digital”. I think it is worth acknowledging the challenges in leadership.

That is why Made Smarter—and we were really pleased to deliver the pilot of Made Smarter in the north-west of England—has been such a useful programme, because it has given people a roadmap. When you go to a business and say, “Right, you have to innovate and you have to adopt digital”, that is a big topic and there are lots of issues to deal with in that. Starting to work out what digital technology is right for you, who you can trust in that market and what you are wanting to get out of it, getting that roadmap in place plus a bit of support to bring on those suppliers, is really helpful. It takes a pressure away from leadership and gives a pathway. We have certainly seen a whole raft of companies beginning to adopt that. It has been a very successful programme, and I really hope it continues.

**Simon Cohen:** If I may give a specific example for our company, we were very involved in a cancer trial that was going to start here in Manchester. In fact, we met just over there with professors, doctors and so on. What happened in that case was that as Covid hit, all of those centres switched their attention to Covid and that trial has been severely delayed.

To answer the second part of your question, do we hope that will change, we certainly do, and we expect it to and to be able to get back to that cancer trial. That is very important. The knock-on effect, of course, is to patients and the delay in getting those medicines to market and into patients. That has caused major problems, especially in the cancer market.

Q120 **Graham Stringer:** Thank you. I have one last question. One of the things that will change because of the pandemic is that there is a Health and Care Bill wending its way through Parliament at the moment. All the evidence we have heard is that the devolution deal to Greater Manchester has been very helpful in encouraging what was already a collaborative situation. It is not clear to me that when the CCGs go, that devolution deal will be completely safe. What would you say to Government if that devolution deal was at risk?

**Chris Oglesby:** From our point of view it would be a huge missed opportunity in terms of R&D. One of the big benefits of the devolution deal is exactly that, in terms of innovation in health and the ability to be able to invest money in preventing people from getting ill in the first place. Again, it goes back to the idea of place-based innovation deals—the idea that in place we are able to have a bigger impact working in



collaboration with Government. As I say, we have seen huge innovations since the adoption of devolved health. I think that would be a huge step backwards if it was taken.

**Richard Jeffery:** If I can come in on that, trying to design an intervention in Whitehall that lands with a business in Bury or Bolton and solves all of their needs is really hard to do. By devolving responsibility, you are able to take that place-based approach and get all elements of the ecosystem to work together. We are a long way down that journey in Greater Manchester already and any setback on that would be a really big setback. I think it is just about continuing that journey. We have proved as a location that it can work here and it can work really well here because it is building on solid foundations, and that is key. That would be a really big setback for Greater Manchester, and indeed for other areas that look to this city as a place where they can pick things up from and learn from, to get that broader adoption. It would be a big setback, not just for Greater Manchester but for the key cities across the north and beyond.

Q121 **Rebecca Long Bailey:** First, to Simon, I understand that Innovate UK has been developing something known as liquid aspirin. Could you give us a little bit more information about how that would have been in development before the pandemic and what sort of situations it would apply to, and how your thinking and research then changed?

**Simon Cohen:** Absolutely. Obviously, we look at repurposing and we look at taking well-known compounds so that we can get them to market much faster, but also to keep them affordable. One of the big problems we have worldwide is the cost of getting a new molecule to market, which is about £2 billion at the moment, and the cost knock-on to the NHS, where the budget needs to increase by 10% a year just to keep track of the new innovations and the new medicines out there. We were looking to find something that sat in the affordable range.

With enhanced liquid aspirin, we looked at the most widely used product in the world and looked initially to develop it in repurposed areas such as cancer. The aim was that, as it is a significant improvement on aspirin as far as anti-inflammatory markers are concerned, this would reduce inflammation and, therefore, improve cancers etc. This is the way we drove the product and we self-funded that all the way through until we had these trials, as we were talking about before. Unfortunately, what has happened is that there has been a significant slowdown in much of the research out there except for Covid.

It just so happened that enhanced liquid aspirin had three aspects to it that were specifically important for pandemics and for Covid-19, which are that it reduces viral load, which is pretty good in Covid; it reduces inflammation, considering that the cytokine storm is something that leads to hospitalisation; and it reduces blood clots, small blood clots that tend to be the main reason why people die in hospitals. It affected all three. We had to change our vision or the way we were going—not away from



cancer and cardiovascular disease because they are still massively important—because of the lack of any facilities to use outside of Covid. We have changed the direction for now and, as I say, we have looked to have a Covid trial. It would have been lovely to have it in this country, but it is going to be in the United States starting on 4 October.

**Q122 Rebecca Long Bailey:** That is fantastic. That sounds absolutely ground-breaking. I note that earlier on you sang the praises of the growth hub in Greater Manchester, which is fantastic—I think a lot of the north-west MPs will have positive stories about the growth hub and there not being anywhere else like it in the UK—but you also said that it was one of the few funds that you could access. Can you tell us the challenges that you faced trying to get this ground-breaking treatment off the ground?

**Simon Cohen:** Absolutely. The difficulty is that tag, “repurposed medicine”. As I said before, repurposed medicine has very few incentives for anyone. I will pick one, simvastatin, which is a drug that is now shown to be very useful in cancer. The problem is spending £10 million to £20 million getting that to market, when anyone can copy it from anywhere in the world. There is no incentive and no protection on it. Therefore, when you are looking for funds to back you, the minute you say it is repurposed, they say, “There is no commercial value to it. We cannot commercialise it. Yes, it has great benefit to patients, yes, it has great benefit in the NHS and further use, but can we make anything from it for the company? How are we going to get our £10 million or £20 million back?”

What we looked at was changing that paradigm, just changing it so that we could re-patent the drug and at least give it some protection. The problem is that it is still seen as repurposed. There are no incentives from central Government. There are no incentives from anyone, really, even though during the Covid pandemic it was something that was mentioned all the time—“Repurposed drugs, repurposed drugs”. In order to develop them, the companies that are going to spend that money need to have some incentive. The R&D tax benefits are phenomenally good, and I must commend whoever within Government put them together because they really have made a difference to us and without them we would not have survived, but more incentives for repurposing and that type of innovation would be very useful.

**Q123 Rebecca Long Bailey:** Did you engage with the Government’s Antivirals Taskforce at all, and what was the response?

**Simon Cohen:** We tried. You spoke about SMEs and some of the difficulties we have as an SME. In order to make our product affordable and keep it affordable, we made a business decision, which was that we would remain a micro-company and that we would engage with universities not just in Manchester but across the world to act as third parties for us, to help us out, to keep the costs low and to have world-class R&D. The problem with that is that as a micro-company we remain somewhat under the radar. Therefore, when you try to communicate with





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taskforces such as that, because they do not know you and because they do not know anyone on your board, it becomes very difficult. Yes, we did try to engage, but we did not have any response back, unfortunately.

Q124 **Rebecca Long Bailey:** That is disappointing, but thank you very much, that is very helpful. In terms of wider questions, I know, Chris, you mentioned the skills gap earlier. How closely aligned would you say our skills strategy in Greater Manchester is with our industrial strategy?

**Chris Oglesby:** We are working very hard, as best we can, with the levers that we have locally. There are working groups, FE/HE, and the various providers get together on a regular basis to talk, and what we are now looking to do through Innovation Manchester is effectively to create a funnel where we are able to aggregate industries' requirements and be able then to link those to the providers. We would love to be working more collaboratively with central Government on some of those skills levers in order that we are able to be more agile for industry.

Some fabulous private sector providers are coming forward now and answering that. We have people who are taking call centre workers on £25,000 a year and doubling their salary in 12 weeks through coding boot camps, and companies are paying for the cost of that because effectively a £50,000 a year coder would cost them £10,000 in recruitment fees. There is lots of local innovation here that is helping with the problem, but to a certain extent we are still hamstrung with a lot of skills being centrally controlled. I would support any opportunity to get that closer to industry, which, again, is so granular. Richard or Luke said that it is very easy for Government to work with Rolls-Royce or Jaguar Land Rover and organisations of that scale. What we are able to do in Greater Manchester is to aggregate the needs of the smaller businesses, particularly look at where there are common needs and develop programmes that then will satisfy those.

**Richard Jeffery:** One of the things that we have at the moment in the growth hub is the programme Skills for Growth, which is helping companies to understand their skills requirements and put skills plans in place. That helps to, as you say, bring together a group of requirements that we can then take to providers and others, and they can help innovate as part of that solution. There is a lot of great work taking place, but it is within the limits of the levers that the city has at its disposal. The more things can be devolved, the more Greater Manchester can pull those things together, and indeed other cities and other locations, and the more you can get the system to work well together. You are not having to try to line up lots of different things and spending your time hiding the wiring, so Simon and the others do not have to spend all their time understanding all the various bits of funding. We do spend a lot of time. I think Greater Manchester is in a good place, but it could do more.

Q125 **Rebecca Long Bailey:** Great. I have one final question, a very brief one. I am sure all of us on this Committee would love to see a company like Simon's go through all of the research stages and eventually manufacture



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its product here in the north-west. How capable are we of doing that here in the north-west and would a company like Simon's need to go overseas to secure that capability? Chris, is it okay to start with you?

**Chris Oglesby:** I think we have all the capability. It is interesting that one of the worst pieces of news that we have had in the north-west in terms of life sciences in the last 10 years was AstraZeneca's decision to pull out and for its R&D facility to go to Cambridge, but that created an opportunity and we have already brought drugs to market at Alderley Park since AstraZeneca vacated. I think we have all of the things here in place in the region; we just need to recognise that.

It is great, but we only have one southern member of the Committee—sorry, two, as the Chair is here, and thank you both for coming. It would have been challenging to have it without the Chair. The geography does make a big difference. So much of what happens up here—again, because it is led by the private sector—goes under the radar and a lot of the excellence in the private sector is in these smaller companies. Then somebody like The Hut Group suddenly floats and is worth £8 billion or whatever, and everybody wakes up and thinks, "Oh, there are some reasonable-sized companies up there". We have more unicorns per capita in Greater Manchester than anywhere else in Europe. We had another one last week, Matillion, an Altrincham-based business that recently raised money. The capability is here, the companies are here; we just need the recognition of that and for the region to be viewed as a place of excellence, and then to close that disparity in the region as well. Simon, what is getting in your way?

**Simon Cohen:** We are manufacturing the UK. We are. Unfortunately, it is not in the north-west. What got in our way was simply capacity, particularly because so many parts of the vaccines are being made here. The capacity was not there to make something fairly small for a smaller trial like ours. We did fight to keep it in the UK and have kept it in the UK. It would have been nice, as I said before, to have the trial here as well, and hopefully the next part of the trial will go on here. The block really is capacity and having more capacity in the north-west.

**Chris Oglesby:** Manufacturing is a key part of innovation in Greater Manchester and the proposals up in the Northern Gateway or, for that matter, around Wythenshawe Hospital for medicines. We have great excellence along the M56 corridor as well. We are seeing a huge amount of demand at the moment for manufacturing in life sciences and materials and so on, and it is going to be a real priority for us in this region to ensure that we develop those facilities for those manufacturers because for the first time since the 1980s, I think, we are seeing a significant increase in manufacturing in the region.

**Richard Jeffery:** It is across a whole range of sectors. Over recent years, we have been running a major programme for textiles and technical textiles. One of the key things that has been really successful with that programme was that we were able to understand and get a lot



of intelligence on where the key businesses were in their supply chains. If they went, there would be a real knock-on effect. That intelligence that we were able to pull together in understanding where some of the supply chains were enabled that fund to be well targeted. That funding is coming to an end now, but that was a really successful model, I think, which combined the deep intelligence together with supporting companies to come up with the propositions, but then targeted it around those bits of the supply chain where the investment was needed the most.

There are some incredible stories up here and with people like Chris and others, it is the fact that you then have the property folk and the other folk who can all come together to make that happen. There is always that can-do attitude to make that thing, and it is possible because of people like Chris and Simon and the support infrastructure that sits around it.

**Chair:** I should point out for the record that I am Middlesbrough born and bred, so I have a foot in both camps.

Q126 **Katherine Fletcher:** We are succeeding if he has come out with that fact on the public record, gentlemen.

I am listening to you, fascinated, and thinking about the practical “What next?” because there is a really interesting story of recovery post pandemic to tell. I wanted to return to one of the themes that we have heard evidence on earlier, which is Government-led R&D spending, which the north-west does not necessarily get in proportion to its effort. It sounds like we have a wonderful story to tell, driven by the private sector. Nobody is going to say, “No, don’t give me more Government money”, but could you explain why we are achieving such good success with relatively less funding than the north-east, Scotland or even London, and what, if we got more, we could do with the multiplier effect? I will start with Richard and then come across.

**Richard Jeffery:** A number of very large companies are making some of those investments because we have that infrastructure and because we have the collaboration, thinking about some of the reasons we are doing well. Even though there is less going into the system, the system is pretty efficient and works well. We have spent a lot of time trying to plug some of those gaps. For example, we know one of the early stage gaps was access to angel funding to really get the R&D flowing. That is why we created GC Angels, which was about plugging that early-stage gap and creating a co-investment fund. That has been really successful in helping to develop a pipeline. We have heard about some of the other funds that have been developed as well. I think that is why we are doing well, because we have spotted the problems and we have been able to tap into that.

**Katherine Fletcher:** It is a systems-based approach. Sorry, I do not mean to interrupt.



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**Richard Jeffery:** No, absolutely. We have all stood back and made sure that system is there, and spent a lot of time understanding where those gaps are. It is also a place where, when those strategies have been developed, they have not just sat on the shelf. These are active strategies where people have really grabbed them and got behind them, public/private, to make it happen. Look at the ambitions that were set out for the tech sector 10 years ago, to make Greater Manchester a centre of the tech industry. At the time it was a long way from that, but the vision was set, everybody got behind it and we are now one of the fastest-growing tech centres in Europe. It is an incredible story with unicorns coming out of that from e-commerce and so on.

What more could be done? I think you would put it on super-drive if you got the extra investment in, but the key to it is making sure that if that investment in some of those calls is there, it can be really well aligned to some of the local sector specialisms. For me, that co-creation and co-design is key, so that when calls are going out it is drilling down to some of those niche sectors in fintech, healthcare and so on that we have here.

**Katherine Fletcher:** And nuclear. Sorry, Chris and Simon, if you would like to add anything to that, what could we achieve with a greater share of the public R&D?

**Chris Oglesby:** You asked as well, "What is the difference in this part of the world?" I think the big difference in this part of the world is that we have a global top 20 university here in Manchester with the University of Manchester, plus some really fantastic vocationally focused universities as well at Salford, Bolton, Manchester Met and UA92 now as well, which is Lancaster working in collaboration in Trafford. There are a number of different universities and we have this entrepreneurial economy, and when you put those two things together that is where we are really thriving and seeing, again, that diffusion of R&D and the application of it to disrupt industries, as well as having those businesses that are research-based industries. We are able to harness the two together. Again, that is what we are looking to do through Innovation Greater Manchester, to unlock those businesses that are driving the R&D forward and those that are diffusing it.

Under the umbrella of innovation, we would also like to put money in the infrastructure that supports that. That might be the physical infrastructure, and I would say this as a property man, but we have some big developments that are going to cluster industry, whether that be the likes of ID Manchester up the road here, which will make us one of the biggest innovation districts in Europe; whether that be the Salford Research Triangle, building on the expertise at Media City and linking that in with the university and the hospital; or whether that be up in Rochdale, where the Advanced Machinery and Productivity Institute is going to be the anchor of a big new manufacturing centre.



What we are looking to do is develop a network of innovation districts across Greater Manchester where businesses can thrive, and we then link those together and link the businesses together with the skills, the funding and all of the other parts as well. We have a thought through plan as to how we link all of these different things together, whether that be the investment in the R&D itself or whether that be investment in the infrastructure that supports it. We are not just looking within our own city region; we have Cheshire on the doorstep, we have Staffordshire just to the south, we have Lancashire and some great industry, and Cumbria with nuclear, etc, as well as linking to the north-east in terms of things like hydrogen and other areas. Again, the Northern Powerhouse has a big part to play in linking this across the north.

**Katherine Fletcher:** Very true. Simon, can you follow either of those two opus magna?

**Simon Cohen:** From my sector, the health sector, I would like to mirror that we have the universities and the excellence in the universities, and we bring in the hospitals as well. Certainly, we have some of the best hospitals anywhere. Look at The Christie and the amazing work that it does. How have we made the most of very little funding? Because of collaborating and good old-fashioned northern grit. We do not take no for an answer, we keep going and we push through. I would say to the Committee: look how much more we could do if we had that funding in place. What the north-west could do with that would be amazing.

**Katherine Fletcher:** Hear, hear. Thank you, gentlemen.

**Chair:** I think we are going to need to speed up a bit because we are asking more questions than we have time for. I am going to turn, for a model of brevity, to Aaron Bell and then Dawn Butler.

Q127 **Aaron Bell:** Thank you, Chair, I will try to be quick. I am just looking a little bit more specifically at the pandemic. Richard, how has the support you have provided to local businesses changed since the onset of the pandemic? How many of those changes do you think will become permanent, or at least hybrid?

**Richard Jeffery:** One of the big changes was obviously switching everything to virtual. There was a much greater focus on making sure that businesses had access to the cash that was available, and the Government did step in and create a lot of facilities. One of the challenges was making sure that businesses could access all of that. We worked really closely with local authorities, local partners and the banking sector to make sure that there was a clear call to action and a simple process to get access to that finance. That was the initial one, and then making sure that they could, wherever possible, get access to some of the innovation calls and so on that came out that were pandemic-specific.

In many ways, a lot of the things we were doing were there beforehand in terms of those structures. It is just about continuing to build on that



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and take those forward. We have learnt that we can do an awful lot remotely. We will be keeping some of that going, but we will absolutely be doing a lot more face-to-face activity.

The big challenge in keeping things going, though, is going to be making sure that we have clarity about some of the big things that back this ecosystem. No doubt about it, ERDF and the structural funds have played a big role in enabling us to do what we do. Yes, we have been fortunate to get backing from the combined authority and others, but the removal of that ERDF funding and the lack of clarity about what comes next is a really big challenge for us and for many others in the system. The sooner we can get clarity on that, the better.

The one lesson I have learnt, not just in the last year and a half but before that, is that building up that collaboration and faith in what we are doing is really important. There is a lot of chopping and changing that takes place when it comes to business support and economic development. We have been really fortunate here in Greater Manchester to have that consistency and we have reaped the benefits of that. We need to keep that going. That applies here and in other places as well.

**Q128 Aaron Bell:** Previous recessions, which have been driven by the economic cycle or indeed by the financial crisis, have led to declines in innovation and R&D. Do you think it will be different this time because the nature of the recession that we had was pandemic-driven? Some of what we heard in the first session was that you get this innovation in response to a crisis. Again, what additional support would be welcome, specifically through the tax system as well? Simon mentioned the R&D tax benefits earlier. We also have super deduction coming in. Is that going to help? Can we just go across, and then I will pass back to the Chair because we are running short of time?

**Richard Jeffery:** There were quite a few questions in there.

**Aaron Bell:** Yes, there were.

**Richard Jeffery:** I will try to address some of them. Let us deal with the R&D. R&D tax credits were incredible, really useful and very popular, but there is still a lack of knowledge about it amongst businesses and the private sector, especially some of the smaller professional service firms that advise those businesses. There is awareness-raising still to be done on that activity.

In answer to the question, "Are we going to see a real explosion of innovation?", I believe we are. I tend to be quite a positive person anyway, but I am seeing it because we saw it during the pandemic. They kept quite quiet, actually. Firms who were innovating and doing really well were a bit embarrassed at the time because they did not want to celebrate and say, "Hey, we are doing really well". We should be telling those stories and celebrating the stories of Simon and others. That is



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what we have to shout about. There is a real energy to adapt and change.

What would help? The plans are set out really clearly in Innovation GM for how to do that. It is not just about the R&D spend at that top level; it is about the ecosystem, the build, making those connections and putting all parts of the system together.

**Chris Oglesby:** Certainly, with the increased tax rates, then those tax credits are even more impactful. Customers are telling us that they are a big thing. In comparison with other recessions, we are in the recovery phase now so absolutely it is what is going to power us out of that. The interesting thing is that through the recessionary bit, as we have pointed out, we had to innovate because it was such a sudden change. No, unquestionably in my mind the winners that we are seeing are those companies that are investing in innovation and R&D.

We keep talking about private-sector led innovation in this region. If you go to a company and say, "You're thinking about innovation. We'll give you 25% so you're getting a three times multiplier; at 20% you're getting a four times multiplier", that gives them the bravery to be able to go and do it. It can be so catalytic. Therefore, I believe that at a local level we are going to be able to identify those businesses that are absorbative of that kind of investment and that will give you that kind of return on your R&D investment. It is about creating an environment where companies understand what is available and they can see the pathways to that kind of money. If we are able to do that, I think we will get a much better return than historically has been benchmark.

Q129 **Aaron Bell:** Simon, we had the discussion about the specific drug, but have you felt supported otherwise by the Government through the pandemic? What additional support would you welcome going forward?

**Simon Cohen:** Have we felt supported through the pandemic by the Government? Not particularly, to be honest. One thing that did support us was the R&D tax benefit. As I said before, it is fantastic. It is a fantastic way to get extra money and to allow you to innovate with that money.

The change I would make is to look at the ease for small companies, in particular, of getting that R&D tax benefit. Currently, we are having to go through third-party companies, usually accountancy companies, which take up to 30% of your R&D tax benefit as their fee. It would be nice if that was regulated a little more so there was a cap or they were giving you that benefit. I would like to spend all of my R&D tax benefit on research and development. If I was going to look at something, it is an area I certainly would like to have a look at.

As for your other question on innovation and whether we are going to increase innovation, in my sector absolutely. We were caught somewhat with our trousers down with Covid-19. We need to prepare now for the



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next pandemic because it is coming and it will come, whether it is another Covid or whether it is something else. We have a cycle and we need to be ready for that cycle. Therefore, we need to look at how we can incentivise companies to look at future pandemic protection so that we are fully prepared for next time as well as able to help out the NHS to cope.

**Aaron Bell:** Thank you. I would love to ask more, but I think I had better hand back.

Q130 **Dawn Butler:** It is true, I am the only southerner around the table. That is probably the reason why I am the one feeling cold.

I hear you on being able to get all of the R&D expenditure so you can spend it on R&D rather than paying accountancy firms and stuff. I did not realise they took as much as 30%. I want to talk also about repurposed medicine. What I had not realised was that because of the patent it is not commercially viable. People do not invest because there is no money in it, basically. Is it more fundamental then? How do we ensure that we prioritise healthcare as opposed to the profit that can be made from healthcare?

**Simon Cohen:** Profit from healthcare is something that drives R&D; for sure, there has to be some ability to drive that R&D. However, it is important we make drugs affordable. Therefore, we have to find a way to find that middle road that changes the paradigm where very large companies are able to spend very large amounts of money on R&D on new molecules.

If there was an ability to take an older drug that has come off patent and either re-patent it or find an incentive for that company to invest in bringing that to market, then the actual profit that comes out at the end of it is much smaller for that company because, in fact, what it is doing is selling that product at a much lower price than if it had invested in a new molecule. For example, for a treatment that might be with an enhanced older molecule, such as aspirin, the cost to the NHS is in hundreds per treatment, whereas newer treatments might be in thousands or even millions. The famous one is the one for a rare disease, which costs £1.7 million per treatment. It is about finding that mixture of newer drugs and older drugs, and encouraging invention and innovation around how we use those older drugs, how we enhance them, how we make them better and how we reduce the side effects, allowing the companies that are doing that to at least recoup the money they have had to spend to get to market.

Q131 **Dawn Butler:** What role can the Government play in that?

**Simon Cohen:** To look at incentivising those companies, taking a company that has an older molecule and saying to it, "Look, we will help you to develop that molecule and allow you to maybe have an interim patent in this country". They can patent it for five years or 10 years to allow them to sell that drug on an exclusive basis. The problem is not





profit based, it is the fact that every single country and every single other manufacturer will jump on their R&D and sell their product on the back of it, so it is about protecting their research.

**Dawn Butler:** Interesting. I know we are out of time. I would love to ask more questions. Thank you all very much.

**Chair:** I thank our three witnesses. We had a bit of a taste of Greater Manchester in the last hour. We are trying to distil it and make it available to the rest of the country, whether it is through the growth hub, through property development, or an example of a successful and innovative business in life sciences. You have done that very well. You have given evidence that we will draw on to make recommendations in our report. Thank you very much indeed for your time with us today.

## Examination of Witnesses

Witnesses: Dr Marianne Sensier, Dr Charles Knight and James Baker.

Q132 **Chair:** We are now going to move to our third and final panel of witnesses, who I will introduce as they are taking their seats to save interrupting the broadcast of the Committee.

I am very pleased to welcome Dr Marianne Sensier, who is a research fellow here at the University of Manchester, Dr Charles Knight, who is the associate dean of the University of Salford, another very important university as was referred to in the last panel, and James Baker, who is the chief executive of Graphene@Manchester, which includes the National Graphene Institute and the new Graphene Engineering Innovation Centre. Welcome, we are very grateful for your attendance here.

Picking up on some of the themes of the last session—given we are meeting after Covid and looking to the future—what do you see as the opportunities from your perspective, perhaps particularly drawing on the north-west and Greater Manchester, which point to the use of science and technology in driving that?

**James Baker:** Thank you for inviting me today. Graphene, for those who are not aware, was first isolated here in Manchester. What is it? It is a single atomic layer of carbon. If you take sticky tape and some graphite, you can peel it. The real difference is that it has unique and different properties for advanced materials.

For me, the opportunity is really advanced materials manufacturing that fits very strongly into a lot of the conversation we have had today. Sustainability is probably one of the key ones—new energy sources and more sustainable construction—listening to the news this morning.

If you take cement, I think 10% of the global CO<sub>2</sub> emissions are down to cement. If we can reduce the amount of cement, not only would that reduce the amount of CO<sub>2</sub>, it could also make our buildings more sustainable. Graphene is an example. You can add a very small amount



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of graphene to cement and you can actually do the same equivalent performance for 30% less cement, so less CO<sub>2</sub>. You can get rid of the steel so you can actually make it cheaper. You can make it more affordable with less CO<sub>2</sub>.

Therefore, advanced materials help with that economic recovery. It could be on light-weighting of vehicles, it could be on new energy sources. I think there is opportunity through advanced materials, if we can find a way of accelerating them from the universities into products and applications. For me, the agenda from earlier—talking about ARIA and other institutes—is how we take these new materials and take them into our products and applications at a pace that traditionally has taken many tens of years. How do we do that in single years or a few years to accelerate things like net zero?

Looking quite positively from the pandemic, we heard earlier that our labs being closed and people not being able to work slowed things down. However, I have actually seen an increase in innovation through the use of Teams and the use of Zoom, where you get people to actually come up with ideas and challenges and then bring people together to innovate. I think there is real opportunity. Earlier you heard Chris and others speak about Innovation Greater Manchester. If we can create this ecosystem here between industry, academia and the creation of supply chain, by doing things differently there is real opportunity to create growth and meet targets like net zero.

Graphene is just one example; we could go on to many stories around graphene. Advanced materials is a great strength here in the north-west. The Henry Royce Institute has graphene as well, and at Sheffield Richard talked earlier about the Catapults. If we can bring those together in a unique way we can create real value in a different and quicker way than we have traditionally.

**Chair:** Thank you very much. We will come on to graphene in particular in a bit more detail, I am sure.

**Dr Sensier:** The question is what will help in recovery for the north?

**Chair:** What can we draw on here, especially in Greater Manchester, but obviously you can look at the science and technology space more generally.

**Dr Sensier:** There are lots of strengths, obviously, to draw on in Greater Manchester that were already highlighted in the local industrial strategy.

I see the crisis and recovery from the crisis as essentially a window of opportunity that is open to make people think differently and transition to new ways of working. If you look back to the financial crisis, the evidence has shown that firms had difficulty accessing finance—obviously, as that was a banking crisis—but more access to finance and more Government incentives were offered, and they particularly talked about the Growth



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Company Innovation Vouchers scheme. You could use something like that to confront the societal challenges. Things like net zero, health and social care problems and energy security could essentially be offered to companies to get them to transition and think about innovating in these areas.

Strength in the north-west is in nuclear. I live in West Cumbria. I understand what is going on in the nuclear industry because my husband works in the nuclear industry. Energy security, as we have seen recently, is incredibly important going forward. Therefore, investing in things like small and advanced modular reactors, which at the moment the private sector—Rolls-Royce—has put seed funding towards, needs to be scaled up in places like Cumbria, Preston and Cheshire, where they have essentially lived with nuclear facilities and are very accepting of this. A number of social science projects have been done at the University of Cumbria, talking to the local community on what they think about new nuclear. This was before and with the advanced modular reactors.

A lot of this is high risk, so the Government need to incentivise and underwrite this space. The private sector is not going to step in without that kind of safety net and without that security of a long period of funding.

**Chair:** Thank you very much, Dr Sensier. Dr Knight, give us the perspective from the University of Salford.

**Dr Knight:** I am not from a scientific background. I work in the business school at the university. We work as a facilitator across the institution for the wide range of STEM activities we engage with. We have a new robotics lab and we have a facility called Energy House 2.0, which is looking at the future of energy.

Not to duplicate some of the points that have been made previously and if I can make a slightly different point about the skills agenda, in the previous panels people mentioned creative destruction. We have seen a period of creative destruction. There has been a little bit of—I do not want to use the phrase “the new normal”—people trying to return to the past. You can never return to the past. We are never going back to the past. One of the challenges for R&D, but also one of the opportunities for R&D, is that there is an eroded link between place and role.

If I can give an example from a slightly strange place, I was at a dinner last night with the Salford Red Devils and I was talking to someone from a recruitment agency. They said they were currently recruiting people for technical skills from the Greater Manchester area for roles in London, but those people will never go to London. Therefore, there are opportunities across the economy for levelling up that does not involve the kind of brain drain we have seen previously.

What we need to underpin that is—we talk about the technical infrastructure—the skills infrastructure. If I can give you a University of



Salford example, within the business school we have recognised that business leaders of the future will need more technical skills than previously. Therefore, by 2023-24 all of our business school graduates will have a management degree or an economics degree but will also have some discrete technical qualifications alongside that to do with data. That is because we recognise that the use of data is going to be absolutely core to the UK economy.

If I can give a final example, fintech was mentioned earlier. Just this week Chase has announced it is going to move into the UK economy. Chase is a US economy and has massive reserves to draw upon. Maybe “attack” is not the right word, but when it enters into the UK market it can draw on those reserves and our home-grown fintechs may struggle against it. That is where the use of the R&D tax credit to support home-grown industry that can grow jobs, and grow jobs here in Greater Manchester, will be absolutely vital in the near future. However, we are never going to return to the past.

**Chair:** Thank you very much indeed. I am going to turn to Rebecca Long Bailey, who I assume is your local MP.

Q133 **Rebecca Long Bailey:** In terms of the way universities have been impacted—certainly with Salford being an example, and I know the University of Manchester is very similar—there is a lot of collaboration between business and the research element of the university, to the extent sometimes that I think universities become reliant on an income stream from businesses coming to carry out their own research. In Salford’s case I point to the Energy House, where you have different businesses coming in to test different types of insulation and there is a whole range of different departments that do the same thing. How have you been impacted financially as a result of that reduction in collaboration with the private sector during the pandemic?

**Dr Knight:** Obviously, there has been some impact, which is undeniable. However, many of our facilities that we are undertaking—we are building a new science, engineering and environment building, and I mentioned we have a robotics innovation centre—were already in plan so they have continued.

You are absolutely right, in Greater Manchester—one of the previous panellists mentioned this—one of the challenges has been that many of the businesses in this region are small to medium enterprises, especially in the Salford area. I am an alumnus of the university, by the way. Those small to medium enterprises are the ones that cannot take the shock of the pandemic in the same way larger businesses have. One of the challenges has been that, you are absolutely right, those businesses do not come forward. To tie it to a previous panellist’s point, we need to make clearer to the small to medium enterprises the benefits of the research tax credit. It is a complicated scheme and some businesses I have worked with—I used to run a productivity and innovation centre—



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are not aware that they can apply for the research tax credits. The multiplier effects we talked about before can be obvious.

There has obviously been an effect, and we need to think carefully in the region. As I know you are aware, we have the Salford Innovation Triangle, which is a collaboration between the University of Salford, MediaCityUK and other local industry and local government. We have to think carefully about whether we are putting infrastructure in place to allow those businesses to return to growth and also to create the kind of jobs we need to see in the near future. If we do not create that, we do not create the tax base of the future.

**Rebecca Long Bailey:** That is great.

**Dr Sensier:** I do not have any direct evidence of this from the University of Manchester; maybe James will have some more evidence. In a way, it has given people more chance to cross-collaborate because people have been at home and at the end of a Zoom call. There have probably been collaborations taking place that would not have normally. However, I am sorry I do not have any evidence of that, apart from talking to Middleton Cooperating, which has been very interesting, in helping to get that off the ground.

**James Baker:** As Luke already said, if I use Graphene, research has been affected because we have not had people in the building. Our second graphene building, the GEIC, the Graphene Engineering Innovation Centre, is much more tactical around nearer term. So I have seen an increase in pace of innovation, partly because of the ability to collaborate. Traditionally, we may have waited for an industrial partner to come visit, whereas now, through Teams, we can do that initial engagement and have the conversation. For me a real positive lesson learnt is this combination of Teams, mute—we are all used to this now—and doing the engagement and doing videos online. So, “What is Graphene?”, I can talk to five people or I can do a video now and post it on social media and get to a lot more people. Concrete is an example, it is one of our hot areas. We put that on social media and had 650,000 hits in two days because it fits sustainability, it fits the shortage of cement and it fits the shortage of lorry drivers. We have been able to use social media and other means to get some of our messages across much more quickly.

Building on the theme of today, you have to have some of those schemes to enable you to engage with industry. We have been fortunate to have an ERDF-funded company, which we call Bridging the Gap, aimed at SMEs to get them engaged in what Graphene is, how we work with you and how we take it forward. For me, there is a question of what happens after ERDF and how we use that.

A strong component—this is something for Government—is the risk element, which was commented on earlier. We need to look at different innovation models. It is good to fail, but if you are going to fail, fail fast,



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learn and move on rather than take two, three, four or five years before you find out you have backed the wrong horse or the wrong area. This whole area of rapid innovation is something that we have learnt, and I think we are doing a lot better.

Again, I do not want to talk all about concrete today, but three months ago we laid the floor of a gymnasium near Stonehenge. It was risky. It was over 100 cubic metres of concrete. If it had failed, we would have had to dig it up and start again. However, it was 30% less concrete, no metal reinforcement, cheaper cost and cured more quickly so it did not require as much labour. It is stronger. It does not crack. Already we have a number of other pours that are taking place, building on the back of that. However, we need Government intervention to support, for example, certification and regulation of that if we are going to take it forward.

We have learnt some lessons. I think there are some positives from it, but how do we retain that pace? Some sectors—*aerospace* is an example—are really struggling. Although they are charging net zero, from my background of *aerospace*, unless we start doing things differently—we should have really started 20 years ago—how are we going to meet the targets on net zero in the *aerospace* sector by 2035? We need to look differently in terms of innovation. However, if I put a positive on it, and it is a cautious positive, I think Covid has made us think differently and work differently. We need to build on that and move forward, if we possibly can.

**Q134 Rebecca Long Bailey:** As a completely random side issue, I got quite excited by the comments you made about decarbonising the cement industry. Very quickly, two points: first, how far away are you from commercialising that so we can roll it out across the cement industry? Secondly, what support do you need from Government to push that forward? That would be a game changer.

**James Baker:** For me, it is a game changer and it is moving very quickly. There are two things happening. One is that it is new. The challenge of a new material is less about the technology and more about the engineering, the certification, the testing and the qualification.

At the moment we are laying floors. We have done a road. We have done a gym. We have done a housing estate. For anyone who goes skating, there will be another announcement in Manchester in the coming weeks that I am sure you will hear about. It is a step forward, but it is not a high-rise building. It is not a roof. It is not a structure. Why is it not? Because we do not know all the answers today. We do not know what is going to happen after five years, 10 years or 20 years so it is not fully structural.

If we want to keep the lead we have to do a lot of testing, a lot of validation and a lot of verification. Some of that comes down to making cement and testing it. I think earlier there was a conversation about



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modelling, maybe using computer models and artificial intelligence to understand that. What can Government do? It is really acceleration of the verification, the testing and the validation of a new material.

I think there was a question earlier about some of the vaccine testing. It was not about taking shortcuts in terms of validating a vaccine. It was about doing things in a much more systematic way that reduced the time it took to validate a new material into the market. It is not about shortcuts. It is about doing things in a smarter and more systems way to accelerate a new material into the market. Policy in terms of sustainability is one point and then it is supporting testing and validation.

We talked about the National Physical Laboratory. An NPL in the north is something we should be pushing for. It is how we get some of that testing, that characterisation and measurement to validate new materials if we are going to accelerate them into the market.

**Rebecca Long Bailey:** That is great, thank you.

Q135 **Dawn Butler:** I cannot believe I am getting excited about concrete as well, but it is very exciting for the future. Are we the country that is leading on this in terms of graphene and concrete?

**James Baker:** Graphene is open innovation; lots of people are doing it. I believe we are leading in that we have developed what I call an engineered graphene concrete solution. People are adding graphene to concrete and getting improvement. For me, the work we are doing that I believe is leading—nowhere else in the world is doing the same—is having a structure like a floor. The novel bit is to have that with less concrete, with the drive of sustainability. However, the area where we are absolutely leading is also reducing the need for metal reinforcement and rebar. Not only is that reducing further the environmental impact of steel, it also reduces labour, so it is lower cost. It is Rebecca's point, why isn't everybody doing it? It is because there is still a risk in terms of measurement certification before you would do that in everyday life.

We are leading, but there is a great opportunity—again, I do not want to make a pitch—and we have interest from Brazil and Abu Dhabi. I know two weeks ago a £10 million investment was announced. At the expense of Man United fans in here, I think there is some Man City support, Etihad, so the GEIC is part funded through inward investment through Masdar out of the UAE. There is great interest in terms of potential investment around the UK and UAE.

I think it is an area where we could try to make sure we are leading if we can get the investment to accelerate that certification and the patents. It is not medical, but it is the same story. How do you patent the know-how of mixing cement? We have to find a way of protecting that so we can exploit it and have a leading position in the UK and the world.

Q136 **Dawn Butler:** What other university-led innovations have come out



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during the pandemic? You say you are all working now more closely together.

**Dr Knight:** An interesting one, which we do not really think about, is that UK universities are world leaders themselves in terms of education. If I broadly use the word “edtech”, educational technology, and if you look at how the UK universities shifted from largely traditional teaching in person to online very quickly, we saw all sorts of innovations there that have changed the nature of education and will continue to change the nature of education.

To give you a very simple example, within the University of Salford in the business school, our students this year will use far more simulations with real-world data. During the pandemic we had to think about ways to educate them online in ways we had never really considered. What we have seen is a number of companies step into that space to provide products and services. Many of those are UK-based products and services that we can expand as a nation overseas, because traditionally the edtech market, as I will call it, has been dominated by North American companies. Even in the process and act of how we transmit and create knowledge and pass it to the next generation and get them involved, there has been an awful lot of activity.

The other thing I will say, which sounds really trite but I think is exciting, is the knowledge exchange that was happening during the pandemic between institutions online. For example, previously if you were trying to get someone—I might try to get James to come and do something on concrete for me—it was always about the schedule, “I will have to travel up” and so on. The amount of cross-fertilisation of knowledge to our student body, who are the next generation of innovators, was much greater because, suddenly, it was OK and easy to get people involved. I could get leading London academics involved and collaborate, so there is that.

The other thing I will mention, talking about the post-pandemic period, is that in Salford there is a digital strategy across the region. With Salford at least there are lots of new businesses bubbling up that we have collaborated with online. I am quite optimistic, as some of the previous panellists were, that we will see a lot of new innovative businesses. What we need to make sure of is that they can find the right infrastructure in the area and they can find the right people with the right skills; if not, they will have to think about that.

Q137 **Dawn Butler:** Does that mean you now see an acceleration of innovation because everyone is now so interconnected and that should accelerate people’s thought processes because they have more information?

**Dr Knight:** From a management perspective, the other important thing that the Government did in the pandemic period—you talked about risk and the speed and the Government reaction to Covid and R&D funding for





vaccinations—is they sped up the R&D funding process to allow that to happen quickly. That was really important.

The core cultural thing that I think has changed, which we have not really seen in the UK before, is that there is more of an appetite for risk and there is more of an appetite for saying, “Let’s do it quickly. Let’s see if it works. If it doesn’t, we move on.” During the Covid period, for many of us, we had no choice. I was involved in writing a university strategy for delivering online, which we did successfully, but I had to do that in a few days, basically. Previously, we would have had committees and six months later we would still be discussing it. I think the speed and the risk—and risk is good in this context—for innovation is really exciting.

**Q138 Dawn Butler:** Are you saying it does not just benefit the universities but it benefits the region because of the new business?

**Dr Knight:** I think there is a massive amount of overlap. The University of Salford and all the institutions in the region are civic institutions. We are here as anchor institutions to help in the wider region. There is always that cross-fertilisation and there is always that collaboration anyway, but I think it has sped up. It has become easier for small businesses to access institutions. If you are running an SME, even the act of saying, “Okay, I am going to travel an hour to the University of Salford, meet someone for an hour and then travel back”, takes a lot of time. Now someone can have a meeting with me, I can give them some advice and then they can get on with their day-to-day business. Therefore, I think there is that speed and a good appetite for risk.

**Dawn Butler:** Dr Sensier, university-led innovations?

**Dr Sensier:** From my subject area, economics, there was an immediate pivot from UKRI, the funding body, to give short-term grants to look at issues around the pandemic. A website was set up, the Economics Observatory, which answered lots of relatively basic economic questions people had around the economy: what does this terrible hit to GDP mean and what are the regions’ unemployment profiles like? All these things sprung up quite quickly, within a few months, and were very useful. Suddenly, academia became quite interesting to people because everybody was looking for stuff online so there were also small videos and things like this that went along with the Economics Observatory.

It has brought a lot more people together and there is more collaboration. You can collaborate with more people across the world. This morning I was on a Zoom call with people in Norway. I did not have to actually go to Norway, I only had to spend a couple of hours rather than take half a week to go to Norway. This kind of collaboration has intensified and got greater. Hopefully, academia has become more useful to society over this period by providing this information. I hope the public realise they can look up these things. Many people watched webinars on YouTube and podcasts to try to understand what was going on initially.



**Dawn Butler:** Great, thank you.

**Chair:** Thank you very much indeed, Dawn. We are now going to go to Aaron Bell and then to Chris Clarkson.

Q139 **Aaron Bell:** Thank you to all three of you. I will focus my questions specifically on the north-west region. First, we have heard already that in this area private R&D investment is proportionately much higher than we see in other areas. As Katherine said earlier, you are not going to turn down more public sector investment. What are your thoughts about the fact that here it does seem to be quite private sector led? Is that a good model or would the region benefit from a more even distribution of public and private?

**Dr Knight:** It is an interesting question. I have to be careful, coming from a business school, not to give my philosophical bent that I am always interested in the private sector leading these things.

It is always a question of, yes, more public support for R&D and more public support for upskilling the region and levelling up. Obviously, people are not going to say no. The question is about targeting. If the private sector here is, "We have more R&D funding" is it then a question of wanting to support those areas to become national champions and then international world leaders, or is it a question of needing to think about whether we are, therefore, weaker in other areas in this region? We do very well here on digital. We have all sorts of exciting research clusters here. Yes, to the idea of more public support, but I suggest, first, we would need to think about the targeting and, secondly, going back to this point of speed, whether we can make sure the process of people accessing it quicker and help people understand it better.

Interestingly, in doing a bit of refresh reading for coming to this panel, I discovered that the amount of advisers out there taking a cut to advise people on how to get R&D money is massively large; it is a growth industry in itself. As a taxpayer, do I want that R&D money going to a door-opener, to help people to get R&D money, or do I want it all to go to the businesses? I think it is about targeting and also thinking carefully about how people can access it quickly.

Q140 **Aaron Bell:** Thank you. We heard about that in the previous panel as well.

Dr Sensier, I think you have just written a new policy paper about levelling up and regional resilience<sup>1</sup>. Is public R&D the way to level up or should it be more private sector led?

<sup>1</sup> Sensier, M. and Devine, F. (2020). "Levelling up regional resilience: policy responses to the COVID-19 crisis", An Industrial Strategy for Tomorrow Policy Series, no. 5, Bennett Institute for Public Policy, University of Cambridge. <https://www.bennettinstitute.cam.ac.uk/media/uploads/files/Indust. Strat. 5 Levelling up.pdf>



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**Dr Sensier:** My belief and what I have read of the evidence is that private sector money follows public sector money. Private sector money is crowded in by public sector investment. What has happened in the north-west, being private sector led, is pretty amazing. There are so many people here who want the north-west economy to succeed for future generations, and obviously for many other reasons.

There is the example of the Advanced Machinery and Productivity Institute being set up in Rochdale, which is essentially answering the demand for help for that industry to diversify ready for this century. That is being led by the National Physical Laboratory, Strength in Places funding, Rochdale Development Agency and some support from the Greater Manchester Combined Authority. All these groups have come together because they know this training and the skills needed in this pipeline are lacking in this area.

I do not know if you have visited the Advanced Manufacturing Research Centre just outside of Sheffield, in Rotherham. It is an amazing place to go to. It is using those skills that have been developed over generations, training the next generation. It is taking people who may not necessarily go immediately to university and training them for the industries the private sector has set up around that region. In fact, Professor Jones was part of the reason that centre was established. You need other routes for people to go into, not just university. If people are capable enough once they have done a couple of years of further education at the Advanced Manufacturing Research Centre, they then go on to maybe a four-year funded degree with the companies so they can continue training.

We need the skills pipeline in these regions. We need nuclear investment. Particularly where I am, in West Cumbria, there are about four institutions training in nuclear investment. You need that kind of Government seed funding to start off these industries of the future. If we are going to be global Britain, how are we going to compete if we do not have that same kind of underwriting from the Government that all these other countries have? We had that under the EU. It was silly to say that it was not, because now we have had Brexit. We need to put in that public money to really turbocharge the economy.

If you look at the east of England, public money has made the east of England a lot more profitable and now there is four times as much private sector money going in. However, if you look in London it is half as much. You have to remember that back in the 1980s Mrs Thatcher invested in Canary Wharf, she invested in the infrastructure and the Docklands Light Railway to go out there. The East End was a building site. It was a wasteland until it was invested in. The financial services sector essentially was built on that. That was a public investment that turbocharged the City. People should not be worried about paying their taxes back to this area; we need that public money to turbocharge the heritage in these regions, the industry.



Q141 **Aaron Bell:** Thank you. Can I ask you both as well what lessons there are from previous crises? How did this region's science and technology sector fare during previous crises and are there any lessons or, as we discussed in the previous panel, is this crisis different?

**Dr Sensier:** This crisis is obviously different because it is not a banking crisis. This region suffered with the financial crisis. Greater Manchester, for example, did not really recover until about 2012. However, with the economic development policies laid down in Greater Manchester, the number of years they worked with central Government, the encouragement of funding streams and the property development that went on in central Manchester—the “build it and they will come”—there was essentially a boom in jobs from about 2012. The BBC moving to Salford certainly increased the digital and media sector there. It is not just the people on the payroll you need to look at when you are looking at that data. I have seen studies that say, “It hasn't had such a multiplier effect”. There are loads of self-employed people who work for the BBC who are not necessarily showing up on the books of the BBC and there is the multiplier effect there on the economy.

I have forgotten the question.

Q142 **Aaron Bell:** What you are saying is that the sector fared poorly in previous crises. The lessons this time are, presumably, more of the same in terms of that investment you have talked about.

**Dr Sensier:** The support did not come in the last crisis really for the rest of the north-west. Greater Manchester had its act together already. AGMA has been working collaboratively for a number of years. It had funding from the airport as well, which helped.

This crisis possibly has not hit sectors like the university as badly—apart from we do not really know exactly what is happening with student recruitment for probably a few months.

We need support in the heritage sectors where the strengths already lie. As Richard was saying, a number of places have put a number of great bids in for the Strength in Places fund. There was one at the university that I worked on that was working with the health economy. Pitting places against each other is a waste of resources because you have a lot of competition. There were some great ideas and lots of people coming together, and then they are only funding about 25% of those ideas. Those kinds of funds I think need to be boosted, particularly in recovery.

Q143 **Aaron Bell:** Thank you. Dr Knight, any historical perspective?

**Dr Knight:** It is very difficult to follow an economist on the economy. If I take a slightly different tack, I am originally from North Shropshire. Owen Paterson is my MP. If we go slightly forward looking—you have covered the past in quite a lot of detail—one of the things we are seeing here now is that the pandemic has accelerated interest in things like productivity in robotics, automation and so on. I mentioned earlier that we have a new



facility institution for robotics, artificial intelligence, infrastructure and so on. I am very, very positive about the north-west and the ability of the north-west and Greater Manchester to continue to attract both private and public money.

However, when I visit my family in North Shropshire, I am very concerned about the potential cascading ramifications for them. Lots of my friends work in the low-skilled side of the economy, and I predict for many of them that their jobs will be automated within the next 10 to 15 years. Therefore, I do wonder what will happen to my hometown. I see the north-west region, Greater Manchester, creating new jobs and new innovations and doing very well out of this area, but if we are not careful there will be all sorts of ramifications. Economic theory—I do have an economist on my left—would teach us that new jobs will be created, but will they be created in the kind of town that I am from in North Shropshire? I am very optimistic about the picture here, but I am worried whether we can see that across the UK economy as a whole.

**James Baker:** Again, my main observation is this drive towards sustainability coming out of the pandemic. On funding, if I look at our second building it is 100% industry funded. As an example, where Government can play a bigger role—I will not talk about concrete—is roads. Next week we are doing three kilometres of the A1, driven by National Highways as part of the infrastructure-wide graphene in roads. We want a road that has no potholes, with less maintenance, more productivity and that is also sustainable. Stop planting trees when we build a bypass and use more recycled sustainable materials. I think there could be more intervention from Government around driving sustainability.

If I look at what is here in the north-west—and I will go broader than the north-west to the north—in terms of manufacturing and if we look at construction, it is about the local supply chain. Again, concrete and building is all about the local supply chain and we need to build that. That can have a “tail”, if you like, not just in the high end but also in terms of the materials, the manufacturing and then the labour associated with that as well.

Q144 **Graham Stringer:** I have a quick question to James. You have mentioned graphene. When the discoverers of graphene came before the Science and Technology Committee they said that George Osborne had helped the Government to put quite a lot of money into the graphene centre but it had gone into bricks and mortar and not into graphene. Do you think the Government could have done more in terms of the development of graphene itself as opposed to just providing buildings?

**James Baker:** Yes, the famous Andre comment. First, in the context of moving new material—whether it is graphene or any new material, and my background is aerospace—it takes 25 years from first discovery through to products in the marketplace. The first thing they needed was a building to bring together the research, to bring together the physicists



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with the material scientists and the chemists, and the first graphene building did that. It was very much around the science, using the technology readiness level. It is the new discovery, the new science.

I use the term “graphenes” now. We are not just talking about graphene, there are many different types of graphene. There are over 100 2D materials. If you look at the future, a bit like Lego bricks we will be creating stacks of multifunctional material. For me, the building was essential towards that first bit. However, it also needed more emphasis on the translation, which came up earlier. That is where the second facility came in, the GEIC. That is aligned with the Catapult, which is more about the translation of that science into products and applications.

For me, a simple analogy is a three-legged stool. We still need that fundamental science, that research, that curiosity-driven science. ARIA came up earlier in reference to driving that curiosity and new science. However, we also need the infrastructure, the equipment and the facility to do that translation. In very simple language, I look at innovation as a process. We design something. We then need to make it and we need to validate it. It is whether we can do that in a much more concurrent systems way.

I like the design at the moment and we have all talked about it. We can now do that virtually, we can have Zoom. I have met your Salford colleagues virtually over the last 18 months, but I probably never would have met them in a normal world.

It is how we do that design more quickly, but then we need the infrastructure and facility. Government have helped there to build things like the NGI, the GEIC, the Royce and the kit and facilities to do that experimentation. Then we need to do that very rapid engineering and validation, which is probably where at the moment we are not doing as well as we might do and that is why some of that technology goes overseas.

**Q145 Graham Stringer:** I know nobody ever says no to more money. Do you think we could have been much further down the track with graphenes had the Government been quicker on the draw and put more cash in earlier?

**James Baker:** Andre would have done more science and we would probably now have 500 2D materials rather than 100. I think we could have put more money into science. There has been a lot of progress around the different 2D materials. The fact is that it takes time to do the different sectors. We have talked about concrete; if you had £20 million tomorrow we would put more people testing and validating concrete and we would do it more quickly. If you wanted aircraft or hydrogen, on each of those verticals I am sure we could put more focus and emphasis. I do not think it is money for academia; building that supply chain is the bit we have to do better. Government have a role in that. It is how we build that supply chain in a smarter way that is a key challenge going forward.



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**Chair:** Thank you to our witnesses for giving us the opportunity to reflect on and draw on your thoughts on how we learn some of the lessons from the pandemic and apply them to our future development.

On behalf of my colleagues, I thank the University of Manchester for hosting us today, our Clerks team for the efforts they have put in to putting today together, and our broadcast colleagues for making sure the rest of the country, and indeed the world, can have an insight.