Alex, thank you for that very kind introduction.

As soon as the invitation arrived, I wanted to join you in celebrating and recognising University technicians.

Mind you, I had second thoughts when I learned I was speaking after Helen Sharman. It’s hard to follow someone who’s been to space. Especially when they’re also an expert in the chemistry of chocolate.

So I apologise in advance for bringing you back down to earth.

My worries grew when I saw I was speaking before the Papin Prize ceremony.

If you’ve watched the Oscars, you’ll notice they keep the introductory remarks brief.

Everyone wants to know who’s won, not what the presenter thinks about the film industry.

Finally, I know university technicians are famous for their love of long lectures by academics.

Still, you have waited a long time for recognition. I hope you can wait a little longer.

I want to begin by thanking Kelly Vere for organising this conference.

I’m glad Nottingham University is making the most of her strong advocacy.

I’ve long felt the role of technicians in higher education has been, in the words of Kelly’s own thesis, “undervalued, misused and misunderstood”.

This is a mistake.

There’s a phrase in the Gatsby foundation report on university technicians that struck a chord with me. It is “"technicians constitute the bridge between the material world and the scientists and engineers who are investigating it".
Without that bridge, higher education loses a vital connection to the world it exists to serve.

I have seen this for myself. I began my career as a graduate apprentice at Lucas industries, where I learned from technicians how to really be an engineer.

We worked as a team, trying to solve business problems. However good my theoretical knowledge was, I learned it was useless without an understanding of how to make it happen.

The bridge between the theoretical and the material was everything.

After that insight, I focussed on applying academic research to industry in my academic career.

I’d seen how manufacturing in the Far East was transforming, and knew that one foundation of that success was a focus on technical knowledge throughout the company.

Businesses like Sony and Toyota knew the importance of integrating the laboratory and the material world. That meant technicians were valued, their views listened to.

The British technicians I’d worked with had often been neglected or ignored. Worse, their managers, while often sent to do MBAs, had little understanding of the challenges technicians wrestled with daily.

The result, time and time again, was excellent design but slow, overpriced, inefficient production. That was fatal.

In 1980 I founded Warwick Manufacturing Group to address this.

Our first challenge was to create an academically rigorous programme of professional development for people working full time in commercial and technical roles.

I wanted managers to learn how to be technicians, and for technicians to have the academic foundations on which to use their knowledge to improve their business.
That was at the start of our modular and work based education approach to engineering, and though there was a lot of scepticism at first, it took off.

The programme began with managers and senior engineers, but this year, a hundred and twelve apprentices and technicians started their Bachelor of Engineering degrees with us, three times the number the year before, and many go on to do a Masters or a doctorate.

Today, I'm delighted that there's a new energy about the role of technicians in HE, from professional registration of the science and engineering councils to a renewed focus on career development and outreach.

This is a moment we must seize. To understand why, just look to the past.

The Papin awards honour the inventor of the steam digester, but he is far from alone in deserving recognition.

When the Wellcome Laboratory was set up in Herne Hill, the director decided to hire young boys from a local school as Laboratory assistants. Six were recruited in 1899.

Their role was to support the development of serums against the diseases of the day. Unusually, they were allowed to do external degrees.

Two of the six, Alexander Glenny and Arthur Ewins, became fellows of the Royal Society.

Glenny discovered the Diphtheria toxoid even before finishing his undergraduate degree. Ewins synthesised Sulphapyridine- the drug which saved Winston Churchill from pneumonia.

Diphtheria and pneumonia were global killers when I was a child. That this has changed can be traced directly to those two schoolboy technicians.

In the same vein, there is the career of the great American surgical technician, Vivien Thomas.
Thomas was the technical assistant to Alfred Blalock— one of the first heart surgeons. With Blalock at Johns Hopkins, Thomas developed the vascular surgery technique that prevents death in ‘cyanotic’ babies. What’s more, he mentored almost every heart surgeon in America.

As Denton Cooley, the surgeon who did the first ever artificial heart transplant and who learned from Thomas, says:

“It was Vivien who had worked it all out in the lab, in the canine heart, long before Dr. Blalock operated on the first Blue Baby. There were no ‘cardiac experts’ then. That was the beginning”

Today, Thomas has some of the recognition he deserves.

One of the four colleges of Medicine at Johns Hopkins is named after him.

The stories of the greats shouldn’t mean we neglect the contribution of technicians who are not so well remembered.

Often, that’s been the case, in big ways and small.

In the thirties, Sir Frank Young asked his head technician Arthur Hemmings to precipitate an extract of whale pituitary glands to support his theory the extract would replicate diabetes in animals.

To get the extract, Hemmings had to develop an entirely new procedure, installing a large continuous flow centrifuge in a cold room. Once this was done, he showed Young the system, and proceeded to pour a hundred litres of whale pituitary into the centrifuge from eight foot ladders in a freezing room for hour after hour.

Hemmings saw nothing of Young until noon the next day, when the great man popped in to ask where his extracts were.

If that wasn’t bad enough, Hemmings was not mentioned in the eventual published article.

I suspect that casual, unwitting ignorance is still prevalent today.

Clearly, the challenges identified in this conference are not new ones.
Strangely, nor are the solutions.

In 1946, the AUT, the Association of Science Workers and the British Association of Chemists held a conference to discuss ‘The problem of training Laboratory technicians.’

They concluded there needed to be “Proposals for a national scheme of training and professional certification, supplemented with further specialized advanced qualifications”

Fifty years later, the Royal Society asked Sir John Horlock, the former Vice Chancellor of the Open University, to look at the issue.

He concluded that “a more integrated approach to career prospects and training of all technical and research support staff is required.” and recommended the introduction of university training courses for technical staff.

That fifty year gap shows the lessons I learned about valuing technicians in the eighties still applied in the modern University.

For too long we maintained divides based on status, qualification or title, not expertise.

Things are improving, but we still do too little to appreciate our technical staff, too rarely recognise their contributions, or help them develop their careers.

We must change this because as technology increases in complexity, in a lab or workshop, those who truly understand how to make the best use of such precise tools are central to both research advance and student understanding.

After all, most undergraduate engineers and many academics have very little understanding of experimentation, safety or the practical barriers to their work. They need to learn those skills, and the people who teach them deserve status and acknowledgment.
That’s why I’ve encouraged WMG technicians to lead projects designing and overcoming engineering challenges, and then compete nationally - in everything from race cars to drone design.

I’ve made it a priority to encourage technicians to pursue further education, to support their career development, and for technicians to be ambassadors for engineering.

I’ll give just one small example of how we approach this.

At WMG, we’re often visited by VIPs, from the President of India to global chief executives. When they visit us, we make a point of our technicians demonstrating the work we’re doing.

After all, they’re used to explaining the incredibly complex in a way even a first year student -or a politician- can understand.

There’s been real progress across the country on recognition.

As we’ve heard, we now have the professional registers of the Science Council and the Engineering Council.

There is more emphasis in universities on the career development of technicians, and a better attitude to individual professional development.

However, there is still a long way to go.

If a technician represents the bridge between academia and the material world then they also must be a bridge between science and industry.

Just as I found as a young man when working in business, graduates need practical knowledge of how to translate theory into practice.

Technicians in Universities are uniquely able to prepare students for that. They are also often the best judges of the value of complex equipment being sold by commercial suppliers.

Technicians should also link academia to the wider community, especially schools.
When we discuss technicians, we often hear about their ‘isolation’. But it is often the sector that is isolated, while the technician is connected, whether to industry, commercial partners like equipment suppliers, or the community.

It is the responsibility of Universities ourselves to make this a productive partnership.

One challenge to overcome is the very specialist nature of many technical roles.

Today the title ‘technician’ encompasses everything from teaching to analytical services. That variety is unavoidable, but also means there is no single career path a ‘technician’ can follow.

I see this at WMG, where we have built on our traditional research in mechanical and manufacturing engineering to expand into new areas such as electrochemistry and nanocomposites.

This has led to a dramatic change for some of our staff, who have been asked to develop skills in completely new areas.

We expect Technical staff to be early adopters of -and rapid experts in- ground-breaking technologies, which means they need intensive training, and regular exposure to technology innovations beyond the university.

Technicians must be lifelong learners and we must change our approach to their working lives accordingly.

This is crucial because higher education will increasingly have to train and develop our own technicians. After the Second World War, technicians were usually recruited from industry, who had provided them with both the practical skills and connections universities needed.

In my own field, this is still the main technician route into higher education. As the Gatsby foundation said when it surveyed HE “A majority of the technical workforce in higher education has been recruited from industry”

However, this supply of connected, knowledgeable experts is drying up.
British industry has learned to value their technical workers with better pay and prospects, largely as demand for technicians exceeds the national supply.

Demand is going to intensify. There is a demand for new engineering workers of 156,000 a year – equivalent to almost one in five of UK 21-year-olds entering the engineering profession alone each year between now and 2020.

Today, Britain has an annual shortfall in domestic supply of around 40,000 new STEM skilled workers. To meet that, in engineering alone, we need to double the number of graduates and apprentices by 2020. So we won’t be seeing spare industry technicians for some time.

If we need quality technicians, we must ‘Grow our own’.

At WMG we’ve just promoted the first of a new generation of apprentices to a permanent technician role, and he is a real credit to the Group.

Similarly, universities need to expand and extend their apprenticeship programmes.

This is no small task. It’s not easy to join a University as a 16 or 17 year old, when not only are the workers significantly older than you but so are the students.

Universities need to develop strong support systems to ensure that young people starting in technical roles are given career advice – on a personal as well as a professional level.

We should learn from the best. Higher Apprentices at Jaguar Land Rover are placed on a structured six year programme including a fully funded degree.

In HE, an apprenticeship tends to be rather more ad hoc, reducing its attractiveness as a career choice.

There should be a university equivalent of the apprenticeship schemes offered by major employers, setting a clear standard for the quality of a University technician apprenticeship, and this standard should be broad
enough to ensure Universities give apprentices the industrial experience they will need to succeed in later life.

Indeed, I believe that University technical apprenticeships should be offered in partnership with employers in the same field, whether in businesses like pharmaceuticals or medical technology companies, or in public services like the NHS.

We need technicians with knowledge of the world we work in, and young people want apprenticeships that expose them to industry and give them a clear career path beyond the University.

We rightly expect all industrial apprentices to receive a quality education.

Why shouldn’t we expect all university apprentices to learn the best habits of business and public services?

Seeing new university technicians as learners as well as workers reminds us Higher Education has a responsibility to address the challenge of improving STEM education well beyond providing quality degree courses.

We need to start at school.

Science has a huge image problem among the young. It is seen as the preserve of the elite.

This may be because many young people and their parents have a narrow view of where studying science can lead. They believe it gets you a job as a scientist, science teacher or doctor¹.

Why? Well, Four out of five young people think that ‘scientists are brainy’. That might sound like a good thing, but it isn’t. It means schoolchildren who don’t think they’re the ‘brainiest’ in school don’t see science as for them.

This is true even if they find science interesting and have done well in the subject.

As a result, when the Aspires project at King’s College London asked year nine schoolchildren what jobs they wanted, more said hair and beauty than science.

I believe technicians can help change that.

We need to break the perception that ‘studying science’ means ‘being a boffin’.

At WMG, we’re sponsoring University Technical Colleges, just as you are here in Nottingham. Our technical and facilities teams are playing key roles at our UTC – the WMG Academy for Young Engineers.

Our technicians have helped develop the Academy, from designing the laboratory space to advising on student projects, introducing practical skills into their engineering studies.

I believe we need to expand this approach much further and start much earlier. Quite recently, only one in three primary schools had a science subject lead.

Even today, a third of primary schools say they don’t teach the minimum of 2 hours a week on science and technology. Only five per cent of primary school teachers have a science degree.

If we don’t change this, I don’t see how British universities will ever recruit the students we need to meet the demands of our economy.

University trained technicians could play a vital role as demonstrators of the value and variety of science careers.

If we put effort into building an outstanding technician apprenticeship programme, we will also create a cohort of technical educators who would be advocates for science and higher education in schools and colleges.

Imagine if we trained a thousand more technician apprentices a year, not just for ourselves, but to increase the supply of technician educators generally. They would then take that experience with them into jobs in schools and colleges across the country, where they would improve the status of STEM in schools.
That would be the University sector investing in our own future.

FOUR STEPS FORWARD

That’s the analysis. But I wouldn’t be much of a technician if I didn’t have a plan for delivering it.

So here it is.

First, Learn from the best. Where are technicians valued? In industries where technical jobs are given clear status, exposed to a broad range of roles and continually supported to meet new challenges. That’s what we should model ourselves on.

Second, use high demand for technicians as an opportunity for Universities to offer quality technical education. Apprentices and technicians will increasingly also be students. Learning will be ever more a lifelong experience that fits in with your working life, not a three year crammer. Where better to start addressing these changes and design university courses that meet those needs than with our own workforce?

Third, build stronger, deeper partnerships with the rest of the education sector. We should think of Technician scientists and engineers as a solution to the wider challenge of transforming STEM education from primary schools to the FE sector. Primary schools can’t recruit a new generation of technician educators, while FE colleges are facing real financial pressure. Working with them, Universities could create a new British technical educator career.

Finally, focus on industry-academic collaboration. For the last fifty years, Universities recruited technicians from industry because they had the skills we needed. Today Industry needs us to help them develop their technicians. We can’t do that without outstanding technicians.

This means existing university technicians need to be constantly exposed to industry, and our new recruits need to be given the practical industrial experience that has always been valued by the smartest students and academics.
That’s my plan for the future.

Of course, the best proof of a good plan is the success of those who are delivering it already.

So now, please stop listening to me, and let us celebrate the Technicians who are making a difference in Britain’s universities today.

Thank you.