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WHEN MEASUREMENT GOES VIRAL

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PRECISION

JUNE 2026 ISSUE 40

THE UK NEEDS 120,000 EXTRA TECHNICIANS IN THE DIGITAL AND TECHNOLOGIES SECTOR BY 2035

The Technical Skills Landscape in the Digital and Technologies Sector report projects that up to 120,000 technical professionals may be needed by 2035 to match growth in the UK's digital and technologies sector.

New insights reveal "widespread" and "persistent" technical skills shortages in the advanced connectivity technologies (ACT), artificial intelligence (AI), cyber security, engineering biology, quantum technologies, and semiconductor industries.

These six frontier industries are part of the government's Digital and Technologies Industrial Strategy 8 (IS-8) sector and fundamental to the UK's Modern Industrial Strategy.

Published by Frontier Economics and commissioned by the UK Institute for Technical Skills & Strategy (UK ITSS), the report highlights key strengths but warns of intensifying cumulative shortfalls by 2035.

Barriers to entering and progressing in the sector and misalignment between educational pathways and industry needs are cited as the biggest challenges.

Workforce insights from the report include:

- **The AI, cyber security and semiconductor industries face the most acute shortages,** with a projected cumulative shortfall of up to 79,000 technical professionals by 2035.
- **Significant diversity and inclusion challenges persist.** On average, men hold around 78 % of roles relevant to these six industries. Where data exists, persistent underrepresentation of ethnic minorities and disabled people is reported.
- **Demographic imbalances risk compounding future shortages** – for example, 40 % of the UK semiconductor workforce is expected to retire within 15 years.

The report makes several recommendations to improve technical workforce diversity, secure the future talent pipeline through alternative career pathways, and increase university and industry collaboration.

High-impact solutions include:

- **Standardising data collection across industries** to unlock detailed workforce analysis for improving workforce diversity and enhancing skills forecasting
- **Investigating alternative technical career pathways** such as apprenticeships, T Levels and V Levels, funded through the Growth and Skills Levy
- **Aligning university curricula with industry needs** and increasing collaboration between universities, centres for doctoral training, and industry.

A new Frontier Industries Skills Coalition is now being established by the UK Institute for Technical Skills & Strategy. It will convene partners across government, industry, universities and research institutes to translate the recommendations into practical actions.

View the full report at https://itss.org.uk/wp-content/uploads/2026/03/Technical-skills-landscape-in-the-digital-and-technologies-sector.pdf.

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WHEN MEASUREMENT GOES VIRAL: INSTMC MEETS TIKTOK STAR SHANE FAN

InstMC Student Representative Gabriel Mason chats with TikTok sensation Shane Fan about the intersection of measurement precision and the digital frontier. Gabriel, who has spent two years on the InstMC Council representing industry-based students, explores how Shane is bringing measurement to the 'For You' pages of millions.

Shane Fan is a tech entrepreneur and content creator, with a massive following of more than 7 million across his social platforms (including more than 3.7 million on TikTok and 2.3 million on YouTube). A

prodigy in mental arithmetic, Shane graduated from high school at 15 and earned his degree from UC Berkeley at just 18. While at Berkeley, he founded their undergraduate cloud computing course. Shane is a founder in the blockchain and microfluidics space, using his platform to make the science of measurement a global experience.

The New Frontier of Metrology

In an age where information travels faster than verification, something unusual is happening. Measurement – once confined to laboratories and clean rooms – is surfacing in unexpected places: viral videos and algorithmic social media feeds. Part of the answer lies in visibility. When numbers reveal something we thought we understood, measurement stops being abstract. Against this backdrop, Shane Fan has built a global following by doing something deceptively simple: he measures.

An Unconventional Path to Technical Thinking

Shane's journey began in the 3rd grade, when he'd grind 20 hours a week making Lego stop-motion videos with an iPad. After his first channel was banned, he transitioned to "internet sleuthing" on subreddits, learning to repurpose data for engagement.

His mathematical foundation was laid in China through abacus training. Shane describes himself as a "human calculator" who can perform massive multiplications mentally. When he moved to the US, he found elementary school mathematics "dumbed down" and allowed his 2nd-grade knowledge to carry him until college. At Berkeley, he studied an unusual pairing: English and computer science. This interdisciplinary background now sits at the core of his work: the ability to think technically while communicating with clarity.

Seeing the World Through Measurement

Shane's viral niche centres on a specific challenge: determining a person's height from a video. The method involves counting pixel distances for objects in the background and cross-referencing them with real-world product specifications found on manufacturer websites.

The environment is rarely controlled. "It's definitely a lot easier indoors because there's a lot more references," Fan notes. He typically finds three or more points of comparison to ensure accuracy. If the reference points don't align, he redoes the research or discards the video. This quiet discipline is essential; good measurement is defined by knowing when the uncertainty is too high to proceed.

In Conversation: Process and Consistency

Gabriel: *Your workflow is highly efficient. How did you develop that?*

Shane: Finding a format is the hardest part. I've compartmentalised the process to make it easy. I spend 10 minutes on research and 15 minutes filming. I post multiple times a day – right when I wake up and before I sleep – leaving the rest of the day for my companies.

Gabriel: *What would you class as a failure?*

Shane: It's a mix of confidence and feeling. Sometimes I'm 100% accurate, but if the video is boring, I don't post it.

Gabriel: *Have you ever been proven wrong?*

Shane: Yes – when you do hundreds of measurements, it happens. But when I verify in person, I'm usually accurate down to very small margins. Error is not failure – it's part of the process of refinement.

Gabriel: *You've said measurement is creative. What do you mean by that?*

Shane: There's always a way to solve a problem if you're creative enough.

Engineering Thinking: Treasure Hunts and Sperm Racing

Shane's work reflects core engineering principles: breaking down problems and working with imperfect data. His first company creates real-life treasure hunts, hiding gold in chests and providing a live camera feed. Participants must use creative measurement – identifying specific plants, cloud shadows or weather patterns to triangulate the gold's location.

His second venture, Sperm Racing, is described as 'the world's smallest sport'. It involves racing human sperm on a microscopic racetrack using microfluidic chips. The concept has been publicly noted by OpenAI's Sam Altman, controversial content creator Logan Paul and NFL legend Tom Brady, bringing attention to performance measurement. "Sperm naturally swims upstream," Fan explains. In the chips his team manufactures in-house, they use simulated flow to push the sperm, creating high-stakes, one-on-one rivalry. The project has garnered half a billion views and raises awareness for male fertility health.

The Return of the Polymath

In an era of hyper-specialisation, Shane advocates for a return to the polymath ideal, a mindset pioneered by figures such as Leonardo da Vinci, who moved seamlessly between art, anatomy and engineering without the restriction of labels.

For Shane, this is not merely about having diverse hobbies, but about a fundamental "creative solver" mindset where curiosity dictates the career path rather than a job title.

By anchoring his work from his studies in English and computer science at UC Berkeley, Shane demonstrates that innovation is rarely found in isolation; it exists in the intersection where technical precision meets clear communication.

He views the modern polymath as the ultimate interpreter – someone capable of taking high-level technical concepts, such as the microfluidics behind his sperm-racing venture, and translating them into global cultural moments.

Shane's experiences in 'pop-up cities' alongside figures such as Vitalik Buterin, who cofounded the cryptocurrency Ethereum, reinforce this belief that the cross-pollination of ideas is the engine of the digital age.

For the next generation of engineers, Shane suggests that this polymathic approach is a distinct competitive advantage: it transforms the role from a traditional builder into a "communicator-discoverer" who can identify problems and scale solutions globally in real time. He also encourages young people to follow their interests and states "I just do whatever I find fascinating."

The future will be shaped by those who recognise that technical thinking can exist anywhere – from social media algorithms to microfluidic biological systems.

Gabriel Mason is the Student Representative Member of InstMC Council. A recent Control and Instrumentation apprentice, Gabriel is now working towards his degree, bridging the gap between hands-on industrial practice and academic theory.

Shane Fan is a tech entrepreneur and UC Berkeley graduate who teaches that "there's always a way to solve a problem if you're creative enough". Shane currently leads multiple startups focused on blockchain, gamified metrology and microfluidics.

Visit Shane's TikTok page to find out more: https://www.tiktok.com/@shanefanx?lang=en-GB

MAN CLAIMS HIS HEIGHT IS 1.70M USING A TAPE MEASURE. SHANE EXPLAINS HOW HE CALCULATES HIS REAL HEIGHT.

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BY PETER NORMAN, MINSTMC, MIET

THE GEE NAVIGATION RADAR SYSTEM INVENTED AND USED DURING WW2

In 1937, Robert J. Dippy suggested developing a practical grid mapping system using hyperbolic curves. His navigation system was not a relevant part of defence strategy and was put on ice. By 1941, however, the RAF's Bomber Command were seeking a more accurate aerial navigation system, which led to Dippy's concept being developed into what became known as Gee.

This was simply the 'G' from Grid – an electronic grid plotting system for curved position lines, typically in increments of one microsecond (μS). Its operation relied on the time delays between different pulsed radio signals for plotting physical distances by phase comparison of two low-band frequency signals between 20 and 30 MHz.

The maths behind hyperbolic navigation originated in WW1 when sound recordings of artillery fire at different locations were made to observe time differences for determining enemy cannon locations. German scientist Dr Meint Harms proposed such a system in 1931 and filed a patent, though it was never used in Germany. The technology to produce the signal oscillators was still some way off, but Dippy's electronic equipment design succeeded as the first practical implementation of position-fixing by radio signals.

Dippy and a specialist team at TRE (Telecommunications Research Establishment) developed the Gee navigation system equipment in Swanage in Dorset. The team effort produced a suitably rugged piece of military hardware equipment containing otherwise fragile thermionic valves and a cathode ray tube (CRT) for analogue display on what became known as the G-box.

The system first saw use in 1942 by the RAF, and by the Royal Navy with a maritime version.

Radio marker signals were received onto a dual-channel CRT display screen by the human navigator on his G-box indicator installed in the aircraft or ship. This unit had colour-coded control knobs for manually aligning the time domain marker pulses on the CRT display to enable analogue distance measurements in microsecond intervals between receipt of the radio signals.

Gee Airborne Equipment at RAF Air Defence Museum. Picture credit: Jmb at en.wikipedia (https://commons.wikimedia.org/wiki/File:J_M_Briscoe24_07_200713_05_14IMG2104_GEE_AIRBORNE.JPG) https://creativecommons.org/licenses/by-sa/3.0/legalcode

The Royal Navy used the Gee system to assist with navigation for the D-Day Normandy landings (Operation Neptune). Harbour defence motor launches (HDMLs) were mentioned in the navigation leaders' orders.

‘HDML 1383 and HDML 1387 are identified as the Channel Identification Group. They are to proceed from Portland independently in time to reach approach channels 3 and 4 respectively by H Hour – 13. The approaches are marked by FH 830 acoustic beacons previously laid by ML 147, ML 151 and ML 198 (Operation Enthrone). HDML 1383 and HDML 1387 are to transmit 3 or 4 as appropriate at 30-second intervals on a shielded blue signal lamp through the night. By day they are to fly a large international code numeral flag. HDML 1383 and HDML 1387 are to remain on station until 2300 on D-Day.’ [1]

HDML 1387 was restored and renamed HMS Medusa. Such HDMLs were 72ft long and smaller than MLs but proved seaworthy for voyages far from home shores. W.J. Holt designed the HDML at the Admiralty in early 1939 for wide construction by yacht builders in the UK and abroad. He also devised the ‘B’ Class MLs, which were 112ft long and more adaptable from hunting submarines to search and rescue work. Fairmile Marine Co. Ltd. were able to supply these in kit form for construction at small boat-building yards in the UK.

‘Her role was to go to a precise spot on the edge of the German minefield and stay there as a beacon for the minesweepers to cut through the minefield and then mark the entrance to the swept Channel for the invading force. Medusa carried the most advanced navigation equipment available (QM, Decca and QH Gee) to help her locate the spot. This was so secret that she was fitted with demolition charges to be detonated if capture was likely. She would know when she was in the right place, as it was marked by an ultrasonic beacon laid on the seabed by Fairmile Marine Co. ‘B’ Class MLs, numbered 147, 151 and 198 (Operation Enthrone). To establish the correct position, they started at the Nab tower and proceeded south, running out a thin wire behind them to measure distance. This took them to the position for Channel 1 (Utah beach) at 50 05N 000 58W. At this point, the first beacon was laid and then they turned east to lay the next 9. Positions were checked with QH Gee.’ [2]

‘The Decca system (referred to as “QM” by the Royal Navy) was developed prior to D-Day and tested in secrecy to reduce the chance of it being jammed on D-Day. For D-Day, 30 units were hand built. Medusa and ML 1383 were the only two HDMLs to have them fitted. It is believed that Medusa and ML 1383 went out immediately prior to D-Day to test the system.’ [3]

The Nab Tower was a Channel defence structure on the Nab rocks, east of the Isle of Wight, which then had a crew manning Bofors guns for naval defence.

The Decca Navigator System (DNS) used phase difference comparison between pairs of low-frequency signals between 70 and 129 kHz, as opposed to pulse timing systems like Gee.

RAF Bulbarrow Hill. Picture Credit: RAF Bulbarrow Hill WW2 GEE Navigation Radar Station (4) by Mike Searle (https://commons.wikimedia.org/wiki/File:RAF_Bulbarrow_Hill,_WW2_GEE_Navigation_Radar_Station_(4)_-_geograph.org.uk_-_6405345.jpg https://creativecommons.org/licenses/by-sa/2.0/legalcode

Southern Gee chain for radio navigation signals

Gee transmitters had a radiated power output around 300 kW and operated in four frequency bands between 20 and 85 MHz. At those frequencies, the range of the system was limited to approximately 150 miles at ground level and 450 miles for high-flying aircraft.

The master station was at Bulbarrow Hill, Dorset and there were two slave stations at Truleigh Hill, Shoreham-by-Sea and West Prawle, Cornwall (southeast of Plymouth). This would have operated within the 65 to 85 MHz band (XF) if HDML 1387 was using RF Unit Type 27 within its R1355 receiver. The RF27 module was continuously variable with a slow-motion control.

Decca Navigator Co. Ltd was formed in 1945 to produce and develop their equipment for peacetime. The widespread Gee navigation system found continued use for civil aviation.

The Medusa Trust is a registered charity with a focus on preserving and operating Medusa for future generations. Visit https://www.hmsmedusa.org.uk/ to find out more about their work.

“Medusa carried the most advanced navigation equipment available (QM, Decca and QH Gee) to help her locate the spot. This was so secret that she was fitted with demolition charges to be detonated if capture was likely.”

Q&A

Q&A Julia King, Baroness Brown of Cambridge

In the hot seat this issue is **Julia King, Baroness Brown of Cambridge DBE FREng FRS FMedSci FINAE**, winner of the InstMC 2026 Sir George Thomson Award. Julia is an engineer and crossbench member of the House of Lords, where she recently completed a three-year term as Chair of the House of Lords Science and Technology Committee. Her specialised fields include climate change, materials technology and STEM education. Here, Julia shares her thoughts on the direction of engineering in Britain and how developing leadership in big data, AI and engineering biology could be the key to cultivating high-quality jobs for the future.

What was the root of your interest in Engineering?

I have always enjoyed making things and been intrigued by how things work. I was brought up by my mother, who made a lot of our clothes, so I did a lot of dressmaking. That involved keeping our old electric Singer sewing machine going – learning how to mend it was preferable to taking it to the Singer shop, which was a 1.5-mile walk away, and it was very heavy! So, I got to know how to make basic mechanical interventions and minor electrical repairs – not the kinds of things one would encourage children to do now. Making clothes is a form of construction, turning two-dimensional materials into three-dimensional garments, and also learning about properties of fibre-reinforced materials – how strong materials are, how they have different properties along the weave and on the diagonal, how this affects the shape and performance of what you are making. Think of bias-cut dresses – we don't think of this as engineering, but it is. I also got to do various repairs around our flat because if my mother or I didn't, no one else did.

I adored science lessons at school. I would spend as much time in the labs as possible inventing experiments, and I had some very inspirational (and, in retrospect, very tolerant) science teachers – Miss Carter, Mrs Newman and Miss Jennison.

CERN was being built all through my childhood, and the papers and New Scientist seemed to be showing pictures of new particles being discovered every week (and scientists celebrating with glasses of champagne). It was also the time of Concorde and the development of nuclear power – so science seemed to offer very exciting (and perhaps rather glamorous) careers.

As a result, I went up to Cambridge to study natural sciences, thinking I might be a particle physicist, but I actually preferred the crystallography lectures and ended up studying metallurgy in my final year – becoming a materials engineer. Through my degree, I realised I found addressing, and hopefully solving, real problems rather more satisfying than discovering new things at the frontiers. I think that probably counts as my conversion to 'engineer'.

What is your vision of Engineering in Britain for the next ten years?

I would love to see Britain reinforce its position as a strong engineering nation and re-establish some of the leadership we have had in the past. It is great that we have maintained our leading role in aerospace and some areas of defence, but I would like to see our presence in new energy technologies grow rapidly – I sit on the board of Ceres Power, which develops solid oxide fuel cells and electrolysers for very high-efficiency electricity and hydrogen production. And I would like to see us developing our leadership in big data and AI and exploiting our capabilities in engineering biology. These sorts of industries offer interesting high-quality jobs, many of which are not going to be replaced by AI in the near future.

What should the UK government do to address the shortage of UK engineers?

We need a broader curriculum in our schools so children can't give up science and technology after GCSEs and have to continue with STEM subjects to 18 (and for budding scientists and engineers to continue with a broader arts curriculum). Too many young people cut themselves off at 16 from studying science and technology at university or from going into technical apprenticeships. We know from UK and international research that studying STEM subjects to a higher level increases social mobility – giving better opportunities to children from less advantaged backgrounds. This means we need more, and more motivating, science and technology teachers in our schools, so there should be compulsory continuing professional development for teachers in these rapidly changing fields (as well as more respect for teachers generally).

We should grow as many scientists and engineers as we can, but we should also be looking to recruit the best from overseas. The government needs to make it easier for universities and technology companies (especially start-ups and spin-outs) to recruit excellent staff from abroad by reforming the visa system.

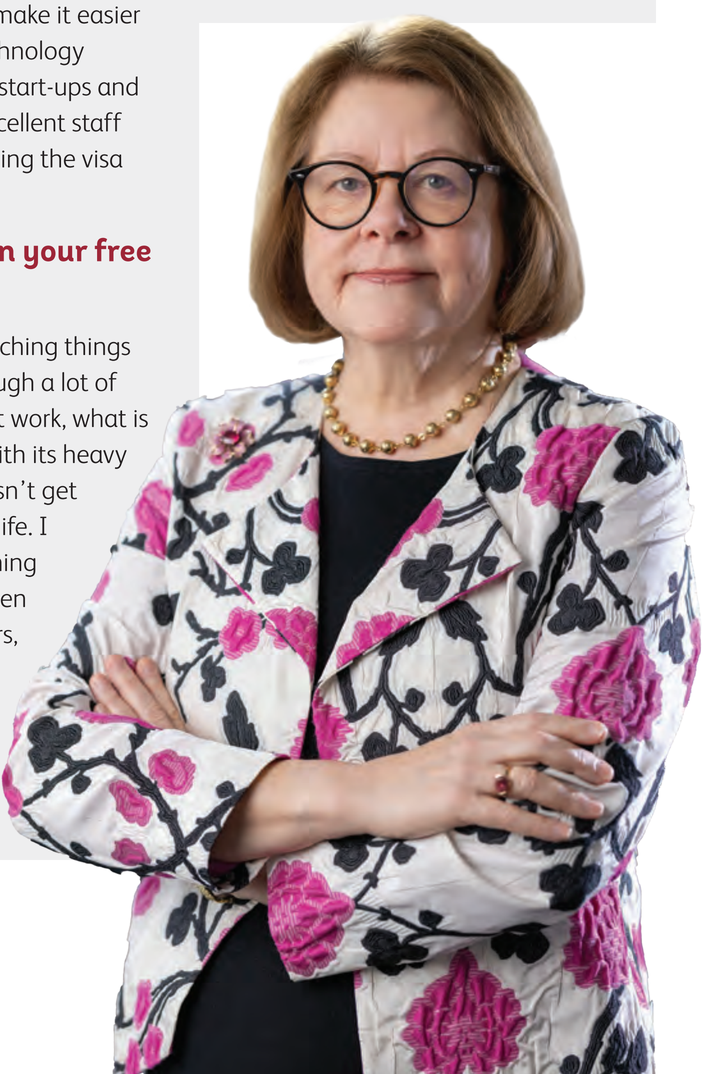
What do you do in your free time to relax?

Gardening – I love watching things grow and finding, through a lot of experiments that don't work, what is happy in our garden with its heavy clay soil and what doesn't get eaten by the local wildlife. I very much enjoy watching all the wildlife the garden attracts – birds, badgers, foxes, muntjac deer, rabbits, squirrels – but finding things that tolerate the soil and aren't too tasty is quite challenging, so I grow lots of indoor plants as well. I do a lot of embroidery and a bit of sewing when I get time, but the sewing machine I have now is much too complicated for me to attempt to repair.

Holidays centre around walking. We love the Lake District and Yorkshire, and we have walked stretches of the Camino a couple of times. We have discovered that, while walking holidays centred on very beautiful Italian hill towns are lovely, the disadvantage is that you have to walk up some very steep hills at the end of each day.

Given one wish what would that be?

That we could live in less interesting times, geopolitically, and get back to the consensus that we must act now on climate change to leave a habitable world for future generations.



InstMC

Awards Night

2026

Wednesday 1st July 2026

Join us for InstMC Awards Night, an annual event where prestige awards are presented to individuals for their outstanding contribution and services to the Institute.

• Registration	6.30pm
• Welcome: InstMC President, Professor Andy Augousti	7.00pm
• Guest Lecture: Professor Dame Julia King, Baroness Brown of Cambridge	7.05pm
• Presentation of Awards: Professor Andy Augousti and Professor Ken Grattan	7.30pm
• Wine & Canapé Reception	8.00pm
• Evening Close	9.00pm

The Royal Institution, 21 Albemarle Street, London, W1S 4BS

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This event is free to attend. Please book your place(s) at www.instmc.org/events

REDUCING CARBON FOOTPRINT AND PREPARING FOR A SUSTAINABLE FUTURE

At its UK headquarters in Manchester, Endress+Hauser has taken a decisive step towards reducing its environmental footprint by introducing on-site solar power and a range of complementary sustainability measures. These initiatives reflect a broader commitment to energy efficiency, emissions reduction and data-driven decision-making.

Corporate commitment

The wider sustainability ambitions of the Endress+Hauser Group, based in Switzerland, include a target of net zero by 2050, a pledge backed by the Science Based Targets initiative. In the UK, the company is accelerating this journey with a more ambitious goal of achieving net zero emissions by 2030.

Project overview

As part of the sustainability commitment, solar panels have been installed in three areas of the company's grounds – on the despatch building, on the training centre and on a canopy over the main car park – at a cost of more than £625,000.

The 865-panel, 387kW system uses SolarEdge inverters to maximise the energy yield. This means that each panel operates independently, reducing energy losses should one panel become shaded or faulty. This optimised system can yield up to 25% more energy compared with traditional string inverters. In addition, built-in safety features automatically reduce high DC voltages during maintenance and, in the case of fire, protect installers and emergency services.

Measurable results

It's estimated that the total solar project will generate 336,000kWh per year – that's 75% of the site's total energy use and the equivalent of 57,000kg of CO_2. It will also allow for excess energy generated in the summer months to be fed back into the grid. A site-wide switch to LED lighting has saved an additional 22,000kWh, or 5,900kg of CO_2e. The readings from the new solar system will continue to be monitored via the site's existing energy management platform to track electricity generation and carbon savings.

Continuous improvement

Building on the success of the solar panel project, Endress+Hauser has committed to an ongoing programme of sustainability improvements. Next up is the installation of EV charging stations underneath the canopies of the solar-powered carport to complement the transition of the company's fleet of cars to electric or hybrid. It is also in the process of replacing its compressors with more energy-efficient models, relocated and optimised to take full advantage of the solar electricity generated on site. Looking ahead, the company plans to invest in heat pump technology to decarbonise heating and cooling systems, demonstrating a long-term commitment to maximising renewable energy use and reducing overall emissions while continuously improving operational efficiency.

A TALE OF TWO OBSERVATORIES: MAP-MAKING AND THE NEED FOR AN INTERNATIONAL LENGTH UNIT IN THE 1780S

BY PAUL QUINCEY, RETIRED PRINCIPAL RESEARCH SCIENTIST, NATIONAL PHYSICAL LABORATORY (NPL)

There's no point knowing your ship's latitude and longitude if you don't have a reliable chart to plot your position on. Accurate map-making can be seen as a parallel development of the skills that arose in the context of marine navigation.

Without the problems of a rolling ship, determining latitude and longitude on land is much easier than it is at sea. Latitude can be calculated from the angle between the sun or the stars and the vertical, and this can be measured with an instrument that is essentially a large protractor and a plumbline, usually a quadrant, or a very accurate zenith sector like the one used by James Bradley in 1725. Longitude can be determined by measuring the difference between local solar time and the 'clock' provided by the moons of Jupiter, visible with a basic steady telescope. Captain Cook knew where to find Tahiti in 1769 because its location had been determined by this method. The Jupiter method for longitude was available well before either Harrison's clocks or the more complicated 'lunar distance' method, but it did not work at sea.

However, these astronomical methods could be supplemented by simpler, purely terrestrial ones, finding the relative locations of landmarks by measuring the lengths and angles between them.

Triangulation

The practical difficulties of measuring lengths of many kilometres across a landscape can largely be bypassed by triangulation. If the angles between the landmarks are plotted, typically as a set of triangles that cover the area, they form an accurate map, the scale of which can be found by measuring the length of just one side of any triangle. Accurate measurements of angles could be made using instruments similar to those of astronomers such as Tycho Brahe.

Among the first triangulations was one by the Dutch astronomer Willebrord Snellius (best known for Snell's law of refraction), who, in 1615, mapped part of the Netherlands, making use of the many church spires as landmarks. He used a quadrant with a radius of about two feet to estimate angles to about one arcminute (a sixtieth of a degree). Combining his map with astronomical measurements to determine latitude, he calculated the circumference of the Earth to be 10,260,000 Rhineland rods.

The Frenchman Jean Picard carried forward the spirit of accuracy in a way that had been pioneered by Brahe, and would be continued by

Bradley and others some 50 years later. In 1670, Picard triangulated the land between Paris and Amiens using a quadrant equipped with a telescope containing crosshairs and controlled by a micrometer – innovations attributed to William Gascoigne in around 1640. His angle accuracy was about 10 arcseconds, six times better than Snellius's. He calculated the circumference of Earth to be 20,541,600 Paris toises.

In 1635, a time between the work of Snellius and Picard, Richard Norwood had measured the circumference of the Earth without triangulation, essentially copying the method used by Eratosthenes in around 250 BC with much better equipment and data analysis, and using York and London instead of Alexandria and Aswan. He found the circumference to be 132,192,000 English feet. There will be more about units later.

The theodolite

The quadrant had been adapted from astronomy, and essentially measures a single angle. We have a description of a more versatile angle-measuring instrument called a dioptra, designed by the great Greek engineer Heron, who lived in Alexandria in the first century AD. It measured both the altitude and the azimuth of objects within view, either for surveying or astronomy, using screw threads to rotate the viewing sight. Heron's instrument mainly differs from theodolites of the 18th and 19th centuries by having no magnetic compass, spirit level or telescope. Early high-quality theodolites of this kind were made by the English instrument maker Jonathan Sisson from about 1725.

A Victorian theodolite capable of measuring angles with an accuracy of a few arcminutes.

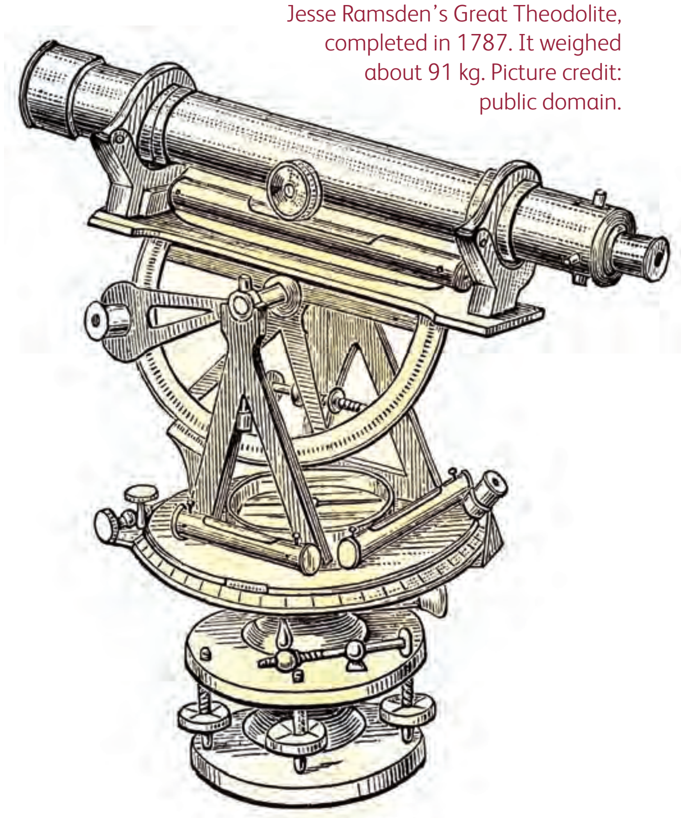
The French, in particular several generations of the Cassini family, continued where Picard left off, triangulating the whole of the nation and producing an excellent map of France in 1745. It was an age of heroic French explorer-metrologists, with Pierre Bouguer and Charles-Marie de La Condamine setting off in 1735 to measure a degree of latitude near the equator in South America, while Pierre-Louis Moreau de Maupertuis left to make the same measurement near the Arctic Circle in Lapland in 1736. This was to settle the live question of the exact shape of the Earth, which Newton had correctly predicted would be slightly flattened at the poles.

The two observatories

In 1783, in the longstanding spirit of Anglo–French cooperation, César-François Cassini officially cast doubt on the British measurements of the latitude of the Greenwich Observatory. He wrote as the Royal Astronomer of France, and director of the Paris Observatory, with a proposal to collaborate on an accurate mapping exercise linking Greenwich to the French coast. This would generously allow England to benefit from the superior French expertise.

The British rose to the challenge, triangulating between Greenwich and the French coast. Fortunately, scientific instrument-making was an English strength, and Jesse Ramsden supplied a large theodolite accurate to 1 arcsecond, at least as good as the French instruments. At this accuracy, the angles within the triangles used for surveys can be seen to add to more than 180°, because of the curvature of the Earth.

Jesse Ramsden's Great Theodolite, completed in 1787. It weighed about 91 kg. Picture credit: public domain.



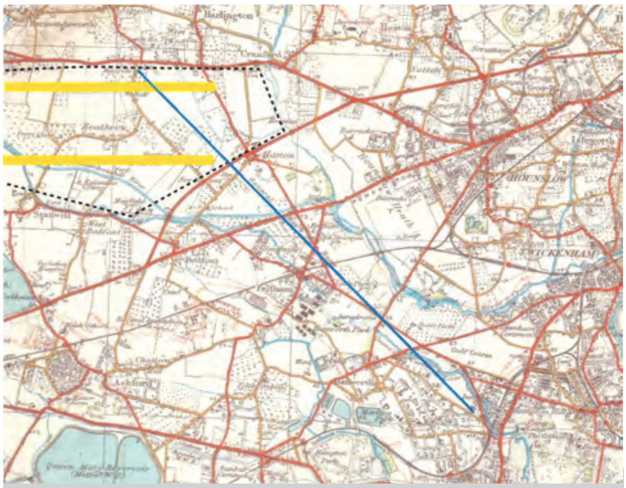
Theodolite.

The baseline measurement was a very different, highly practical problem, and this task was given to the Scottish engineer Major-General William Roy, who carried it out in 1784.

The land between Hampton and Heathrow, southwest of London, although not very near Greenwich, is remarkably level, and was then an open area known as Hounslow Heath. Roy chose a suitable stretch of land, free from houses and rivers, the only significant road to cross being Staines Road (now the A315), and set about measuring it with a group of soldiers. The baseline and the triangles connected it to Greenwich and its endpoints were labelled King's Arbour (now within Heathrow Airport), and Hampton Poor House (now in Roy Grove, Hampton).

After clearing away furze bushes and anthills, a line of wooden posts was driven into the heath to allow a set of three long glass tubes, with a 20-foot length accurately inscribed on them, to be placed consecutively along the route in as straight a line as possible, about three feet above the ground. Every 600 feet, corrections were made for the slope of the ground and for the thermal expansion of the glass tubes. King George III came to visit while the work was in progress.

The primary British unit of length was the yard (equal to 3 feet), but there was no single official standard artefact at the time, adding to the metrological difficulties. The various artefacts, such as the Exchequer yard and the Royal Society yard, could be compared within about 0.002", or about 0.006 %. The Weights and Measures Act of 1824 would eventually designate one of the existing brass yards as the one and only Imperial standard yard. This was the one that was destroyed by the fire at the Houses of Parliament in 1834.



An example of General Roy's Baseline. Credit: Ordnance Survey 1935 (https://commons.wikimedia.org/wiki/File:General_Roys_Baseline.jpg#)

Roy's published measurement of the baseline was 27,404.7 feet (about 5.2 miles). A recalculation by the Ordnance Survey in 1858, using the results of the national triangulation survey, several other baseline measurements, and the new Imperial standard yard, gave an improved length of Roy's baseline as 27,406.4 feet, a difference of only about 0.006 %.

> Among the first triangulations was one by the Dutch astronomer Willebrord Snellius (best known for Snell's law of refraction), who, in 1615, mapped part of the Netherlands, making use of the many church spires as landmarks.

Rather pleasingly (for anyone who isn't French), British Astronomer Royal Nevil Maskelyne generously checked the French calculations of latitude before the British survey was complete and found that the discrepancy pointed out by Cassini was because they had made a poor correction for atmospheric refraction.

In the bigger picture, the episode marked an important step from measurements with state-of-the-art accuracy being carried out only by astronomers and navigators, who dealt in angle and time, to surveyors, who needed length as well. Unlike angle and time, length did not have a readily available reference standard wherever you were on Earth, as can be seen from the length units used. Multinational high-accuracy work of this kind meant that the time had come for international agreements on measurement units. It was the French skill in determining the length of a degree of latitude that led to the original definition of the metre as a forty-millionth of the Earth's circumference, in 1793.

It is interesting to compare the three estimates of the Earth's circumference made in the 17th century by Snellius, Norwood and Picard. In metres, they amount to 38,650,000, 40,292,000 and 40,036,000, respectively, compared with the correct value of between 40,008,000 (the polar circumference) and 40,075,000 (equatorial). This gives us a clear example of progress in the measurement arts during this period.

Paul Quincey, previously a Principal Research Scientist at NPL, writes the blog 'Some Historical Highlights of Scientific Metrology'. To read more of his articles, visit metrologicalhindsight.wordpress.com

ADVERTISING RATES

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The Institute of Measurement and Control is committed to promoting the professional excellence and standing of engineers and technologists at all levels in the automation, instrumentation, control and related industries.

Precision is a coffee-table style quarterly magazine exploring the world of engineering, with a focus on measurement, control and automation.

Precision offers reviews and opinions from experts in the field and presents technical and feature articles in an easy-to-comprehend style. The magazine is circulated to our +2000 members and shines a spotlight on current topics, developing technology and member-related news.

A digital edition is also available on our website for anyone interested in the various uses of measurement and control. Control

We are always on the lookout for fresh exciting content, so if you would like to contribute an article, please email us with your ideas or finished article of approximately 1000 words.

For all advertising and content enquiries, please email jane.seery@instmc.org.

PRECISION MAGAZINE

40 @ 40 WEIRD AND WONDERFUL UNITS OF MEASUREMENT

To celebrate the 40th edition of Precision magazine, we delve into the darkest, dustiest corners of the metrology world to bring you 40 weird, wonderful and downright baffling units of measurement!

1. **Donkey power:** equivalent to 250 Watts or one third of a horsepower.

2. **Pony:** a shot of alcohol equivalent to 25ml.

3. **Mickey:** the smallest detectable movement of a computer mouse – somewhere around 1/10 of a millimetre.

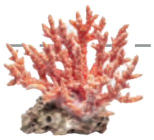
4. **Nibble:** a quantity of data. It consists of four bits (binary digits) and represents half of an 8-bit byte.

5. **Barleycorn:** a unit of length equal to 1/3 of an inch and still used today as the basis of shoe sizes.

6. **Beard-second:** defined as the length an average physicist's beard grows in a second (about 5 nanometres).

7. **Cornish mease:** equals 505 herrings.

8. **Hogshead:** a unit of liquid capacity traditionally measuring 63 wine gallons or 238 litres.



9. **Wiffle:** equal to 3.5 inches in diameter and used by marine biologists to measure coral.

10. **Microcentury:** one-millionth of a century equal to 52 minutes and 36 seconds.

11. **Batman:** unit of mass used in the Ottoman Empire weighing 16.7lbs.

12. **Hemidemisemiquaver:** the shortest unit of musical time, it is a note lasting 1/64 of the duration of a whole note.

13. **Crab:** a unit of measurement for X-ray brightness in astronomy, defined by the intensity of the Crab Nebula.

14. **Ligne:** the French word for 'line' and used to measure buttons, ribbons and watch casings.

15. **Garn:** NASA's unit of measurement for symptoms resulting from space sickness.

16. **Slug:** a mass that is accelerated by 1 ft/s2 when a net force of one pound (lbf) is exerted on it.

17. **Savart:** a tiny measure of musical pitch representing 1/300 of an octave.

18. **Noggin:** a unit of liquid volume equivalent to a gill or a quarter of a pint.

19. **Puff:** in electronics, a slang word for a picofarad (pF), a unit of capacitance.

20. **Cornish warp:** a specific tally measurement for counting fish. A warp consists of 4 fish.

21

Smidgen, pinch and dash: cooking terms where a smidgen is considered 1/32 of a teaspoon, a pinch is around 1/8 of a teaspoon, and a dash is about 1/16 of a teaspoon.

22

Parsec (pc): considered the largest unit to measure distance, specifically to astronomical objects outside the Solar System, and is equal to 3.26 light years, or 19.2 trillion miles.

23

International bitterness unit (IBU): a measure for the bitterness of beer. One IBU is equal to a part per million of an acid in hops known as isohumulone, which gives beer its bitter taste.

24

Centipawn: a unit of measurement in chess equal to 1/100 of a pawn and quantifying how much a move deviates from the best option available.

25

BogoMips: bogus millions of instructions per second is an informal measurement of CPU speed calculated by the Linux kernel during boot up to calibrate an internal delay loop.

26

Banana equivalent dose: used to provide an everyday measure of radiation dose. A single banana produces an ionising radiation dose of around 0.1 μSv, which has been set as the value of the BED.

27

Jar: one of the oldest electrical units, a jar represents the capacitance of an early Leiden jar, with 9 x108 jars being equivalent to 1 farad.

28

Morgen: meaning ‘morning’ in German, morgen is the amount of land tillable by one man behind an ox in the morning hours of a day.

29

Bubnoff: the rates of geologic and geomorphologic erosional processes are described using the Bubnoff unit.

30

Hobbit: a unit of volume or weight derived from the Welsh word ‘hobaid’. Used for trade in grain, it is the equivalent to two and a half bushels.

31

Erlang: a unit used to measure telecommunications traffic. One erlang is equal to one hour of continuous traffic per voice path.

32

Scrupulum: an ancient Roman unit of weight meaning ‘small pebble’. It is equivalent to 1/24 of a Roman ounce, or 1.14 grams today.

33

Big Mac index: compares the purchasing power parity of countries measured in terms of the cost of a Big Mac hamburger.

34

Cow-calf unit: the amount of land needed to provide food (grass and other plants) for a beef cow with a calf at its feet.

35

Megadeath: coined in the 1950s as a unit of atom bomb destruction, one megadeath is equal to one million deaths.

36

Hoppus foot: in the timber industry, it represents the usable volume of a log, which is approximately 1.27 cubic feet.

37

Shake: derived from the phrase ‘two shakes of a lamb’s tail’, a shake represents 10 nanoseconds and is used in nuclear physics.

38

Sheppey: equal to about 7/8 of a mile, defined as the closest distance at which sheep remain picturesque.

39

New York second: the period between the traffic lights turning green and the taxi behind you honking.

40

Ohnosecond: the second after you make a terrible mistake, such as deleting the wrong file or sending a text message to the wrong person.

INSTMC 2026 AWARD WINNERS

Join us on Wednesday 1 July 2026 at The Royal Institution in London for the InstMC 2026 Awards Night, to honour our winners.

We are delighted to announce that the winner of the Sir George Thomson award, Professor Dame Julia King, Baroness Brown of Cambridge, will present the Guest Lecture. The event is free to attend, but please book your place in advance as spaces are limited. Visit https://www.instmc.org/events for details.

We are pleased to present the recipients of the InstMC 2026 Awards:

Sir George Thomson Award

Named after the founder of the Institute, Nobel Laureate Sir George Thomson, this is the Institute's highest award and given every five years. It acknowledges contributions to measurement science resulting in fundamental improvements in the understanding of the nature of the physical world.

Winner:
Professor Dame Julia King, Baroness Brown of Cambridge

Professor Dame Julia King, Baroness Brown of Cambridge is an engineer and leader with an extensive career spanning academia, industry and public service. Formerly Vice-Chancellor of Aston University and Chair of the Henry Royce Institute, she is widely recognised for her research into structural materials and her influential roles across organisations including the UK Climate Change Committee, the Carbon Trust and Innovate UK. A Fellow of both the Royal Academy of Engineering and The Royal Society, and an Honorary Fellow of The Academy of Medical Sciences, Julia has been honoured with a CBE and DBE for her services to engineering, education and technology. Elevated to the House of Lords as a crossbench peer in 2015, her work focuses strongly on climate change, innovation and technology.

Julia's career includes senior leadership roles at Rolls-Royce such as Head of Materials, Managing Director of Fan Systems and Engineering Director for the Marine business. She has authored more than 160 papers on fatigue, fracture, and propulsion technologies, and has received prestigious awards, including the Grunfeld, John Collier, Lunar Society, Constance Tipper, Bengough and Kelvin medals, as well as the Erna Hamburger Prize and the 2012 President's Prize of the Engineering Professors Council. In addition, Julia served as Chief Executive of the Institute of Physics and has been a strong advocate for diversity in engineering through initiatives such as WISE. She has held advisory and non-executive roles across industry and government and recently completed a three-year term as Chair of the House of Lords Science and Technology Committee.

Callendar Award

For outstanding contribution to the art of instruments or measurement

Winner:
Professor Simon Tait

Professor Simon Tait is Professor of Water Engineering in the School of Mechanical, Aerospace and Civil Engineering at the University of Sheffield and is the recipient of the

Callendar Award for his contribution to the field of instrumentation and measurement for industrial applications in the water industry.

His research has resulted in improved measurement and management methodologies to allow urban water infrastructure systems to cope better with pressures caused by climate change, changing patterns of use and physical deterioration.

Simon uses both laboratory experiments and surrogate or real sediments as well as numerical modelling to discover how sediments and pollutants move within networks and rivers. By understanding, through the measurements, how sediments and networks perform, better decisions can be made to ensure the safety of the urban drainage systems that serve large sections of the population. He helped form a spin-out instrumentation company with Professor Kirill Horoshenkov, which uses acoustic-based instruments to search for defects in pipes.

Simon also leads Grand Challenge for Water, an EPSRC-funded initiative comprising six UK universities and 100+ industrial partners to develop the sustainable water solutions of the future and to accelerate innovation uptake across the water sector.

Honeywell International Award

For distinguished work in control by chartered measurement and control technologists

Winner: Dr Jack-James Marlow

Dr Jack-James Marlow CEng CMgr FRAeS is a UK aerospace executive and rocket propulsion specialist, with 10 years' experience building sovereign launch capability and scaling high-hazard engineering organisations from start-ups to revenue-generating SMEs. Currently COO of Skyrora, he leads multi-site operations across engineering, manufacturing, test, supply chain, QHSE, facilities and security, with accountability for 150+ staff and ~£50m annual technical budgets.

Holding a PhD in Liquid Rocket Propulsion and an Executive MBA, Jack-James combines deep technical authority with board-level commercial leadership. Under his executive leadership, Skyrora transitioned from early R&D to a revenue-generating aerospace scale-up, securing more than £50m in contracts, delivering £20m+ in grant funding, and creating more than 100 high-value UK jobs. He has overseen major national milestones, including qualification of the UK's first commercial upper-stage engine, commissioning of the UK's largest liquid rocket test site, and progression of multi-stage orbital launch systems to advanced verification.

A Chartered Engineer and Chartered Manager, Fellow of the Royal Aeronautical Society, and PRINCE2 Practitioner, Jack-James is recognised for building robust operating systems that translate complex R&D into repeatable, compliant delivery. His leadership spans crisis response, rapid organisational scaling, lean production transformation, and aerospace programme execution.

Featured across national media and a frequent recipient of engineering and leadership awards, Jack-James represents a new generation of UK space leadership – technically grounded, commercially astute and mission-driven to restore sovereign launch capability and industrial strength.

Cornish Award (sponsored by WCSIM)

Given to an individual, group or company who has excelled in some dimension of scientific instrument making within industry, academia, or national or international laboratories

Winners: Dr Tongyu Liu and Dr Ya Nong Ning

This award is made to Dr Tongyu Liu and Dr Ya Nong Ning of Intelligent Sensor Systems Ltd. This recognises the success of their alliance over 25+ years, which has resulted in significant advancements in intelligent sensor systems, through better simulation and measurement, and its application in creating new technology to solve problems within the mining industry.

Dr Liu is a PhD graduate of Brunel University and Dr Ning a PhD graduate of City, University London. They began working together as post-doctoral research fellows at the University of Kent. They went on to establish Shandong Microphotonics Electronics, a company based in Shandong Province in China which focuses on the research and development of mine safety laser methane and other gas sensors, addressing the major mining industry in that province. The company specialises in fibre optic distributed temperature, fibre Bragg grating-based vibration, displacement, pressure, microseismic, wind, humidity, and other similar sensors for industry. Dr Ning invented a miniature laser methane sensor to meet a critical safety need in coal mining by providing precise and reliable methane detection. This has now been deployed in more than 2,000 coal mines across China. These sensors became a vital part of the broader automation and safety IoT ecosystem, contributing to an 80-fold improvement in coal mine safety over the past 20 years. The same laser methane technology has also been adapted for lithium battery power storage facilities, providing early warnings of thermal runaway and preventing potential disasters. This work demonstrates how foundational measurement technologies can be applied to meet emerging critical safety challenges across industries.

Dr Liu is a regular conference speaker and has authored and co-authored more than 150 journal and conference papers and has more than 20 patents to his name. He worked closely with the Institute of Measurement & Control to create a successful – and profitable – conference on 'Sensors and their Applications' hosted by the

InstMC at the University of Limerick in 2024. Dr Ning is also the author of more than 100 high-quality publications in the best international media in the field.

L B Lambert Award

For meritorious service to the Institute through involvement with Local Sections, Special Interest Groups and InstMC committees

Winner:
Mr Duncan Hutton

Mr Duncan Hutton has given significant time and effort to the Institute, particularly over the last three years, and navigated challenging times for the Professional Registration Committee at the beginning of 2025.

Duncan remained present, level-headed, focused and supportive throughout those challenges and worked tirelessly to ensure the best result for the Institute. Where resources were lacking, he took on extra work to keep things progressing. He played a significant part in getting the procedures in place and making the committee more productive to ensure a good result at the five-year Engineering Council Licensing Review.

L B Lambert Award

For meritorious service to the Institute through involvement with Local Sections, Special Interest Groups and InstMC committees

Winner:
Mr Christopher Smeeth

Since joining the Institute in 2014, Mr Christopher Smeeth has consistently delivered practical, member-centred improvements and proactive outreach in support of InstMC aims. Notably, since 2018, there has been a 418.75% increase in InstMC membership at AWE, rising from just 13 members at the lowest point in 2022 to 83 at the end of 2025 – a testament to sustained advocacy, visible recognition initiatives and structured engagement with apprentices and colleagues.

Christopher created AWE's first Control & Instrumentation (C&I) apprentice training programme and secured InstMC approval for the scheme, strengthening the pipeline of early-career members. He went on to become AWE's first Head of Profession for C&I in 2021 and joined the InstMC Council in 2023, where he has actively contributed to Institute governance and improvement initiatives.

Christopher has already completed Professional Registration Assessor training and has plans to serve on the Professional Registration Committee, with an ambition to contribute further on the Board of Trustees. He is progressing InstMC accreditation for his organisation's graduate scheme. These plans underscore sustained, committee-based service aligned with the L B Lambert Award's spirit and intent.

Honorary Fellowship

Recognising distinguished, and normally long, service to the Institute and/or measurement and control

Winner:
Professor Sheila Smith

Professor Sheila Smith receives an Honorary Fellowship for her work over more than three decades and for her three-year service as President of the Institute – only the third woman to hold the post. She had been involved in the work of the Institute for many years before becoming President, also chairing the InstMC Accreditation Committee for five years.

Sheila obtained her BSc (Hons) in Applied Physics from the University of Strathclyde. She then stayed at Strathclyde to pursue a PhD in the Photophysics Group in the Department of Physics and Applied Physics. Her PhD was in collaboration with industry, where she worked on modelling microheterogeneous systems using fluorescence lifetime spectroscopy.

In 1995, Sheila joined the Department of Physical Sciences at Glasgow Caledonian University (GCU) as a lecturer. This multidisciplinary department spans chemistry, instrumentation and control. She has just retired as professor, after completing a significant term as Head of the Department of Applied Science.

Sheila is now emeritus professor at Glasgow Caledonian University and remains active in Women in Science and the work of the Institute, having been involved in many STEM events over the years.

> Professor Sheila Smith receives an Honorary Fellowship for her work over more than three decades and for her three-year service as President of the Institute – only the third woman to hold the post. She had been involved in the work of the Institute for many years before becoming President, also chairing the InstMC Accreditation Committee for five years.

LOCAL SECTION NEWS

NORTH EAST

2026 Annual Dinner & Reunion

The 2026 North East Local Section Annual Dinner and Reunion was held on 12th March at Leonardo's in Middlesbrough. Attended by 144 members and guests, representing 17 international, national and local companies, the evening included addresses by Mr John Noon (Past Chair), Mr Mark Cassady (Teesside Hospice) and Danny Posthill (raconteur).

Following the formalities of the evening, members and guests, old and new, enjoyed the opportunity to mingle, converse and make new contacts in a relaxed atmosphere.

The generosity of the attendees raised money from raffle proceeds for the chosen charity, Teesside Hospice, a leading "end of life" care organisation which supports local families and individuals affected by terminal illness.

L-R: Cec Logan, Hassan Hameed, Gordon Mogg, John Noon, John Hemy, Malcom Parker, Ian Tyzack, Richard Leng, Colin Mather, David Otterson, Chris Cowperthwaite, Colin Howard, Clary Whittingham, Norman Harison, Bob Fish, Danny Posthill, Mark Cassady

The SAFE Assessment

Assess your organisation safety

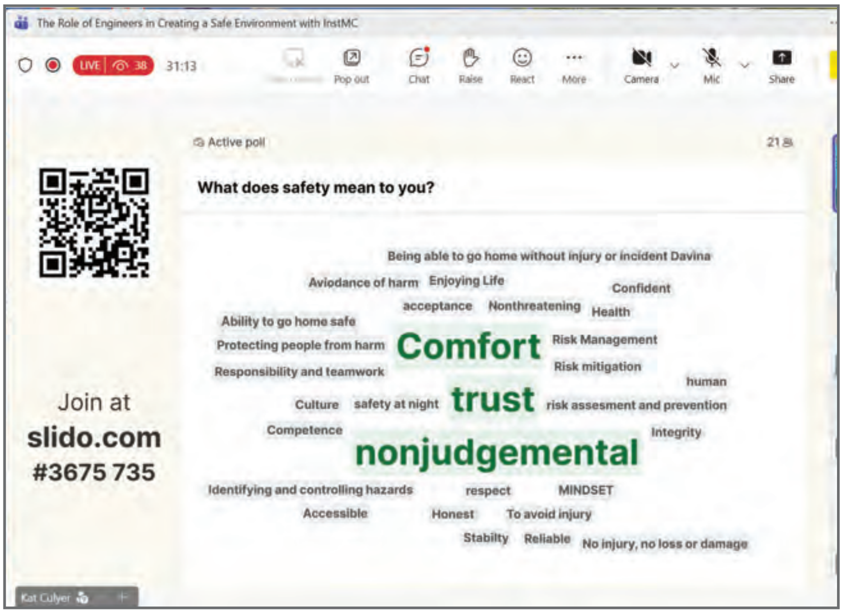
- It takes just 5 minutes
- It is completely free
- You receive instant results

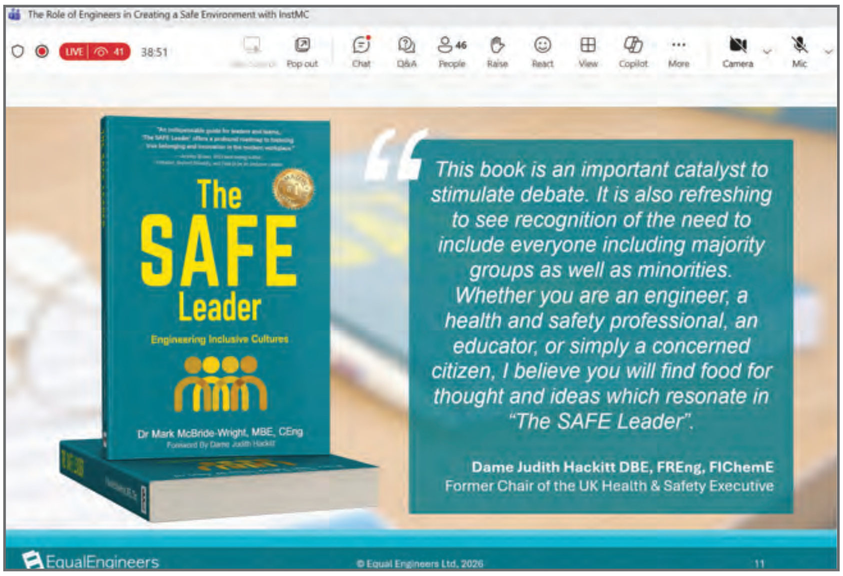
IS YOUR ORGANISATION SAFE?

We recently hosted our first joint event with EqualEngineers – 'The Role of Engineers in Creating a Safe Environment'. Presented by Dr Mark McBride-Wright, this online event looked at how safety is shaped, not just by systems and processes, but by the everyday behaviours, leadership choices and team cultures that engineers help create.

Drawing on Mark's SAFE Leader approach, the webinar also included interactive elements, helping attendees reflect on what "safe" really means in modern engineering environments and what individuals and organisations can do to strengthen it.

One of the activities attendees took part in was 'The SAFE Assessment'. This is a series of questions with answers, producing a scorecard which reveals how well your organisation fosters trust, openness and empowerment.





It's free, quick and easy to complete! To take part, use the QR code at the top of the page or visit https://equalengineers.scoreapp.com/ and get your results immediately.

Dr McBride-Wright is the author of The SAFE Leader, which explores how the principles and practices of diversity, equity and inclusion (DEI) can close the engineering skills gap and create a physically and psychologically safe workplace where innovation and design can flourish.

If you missed this event, you can view the video recording on YouTube at https://youtu.be/iMSCcekr_S8?si=aFw1Taca22OXVaZ8 and get practical insights to apply in your own workplace.

FOCUS ON A SIG
ARTIFICIAL INTELLIGENCE (AI)

InstMC has long provided a vital bridge between academic innovation and industrial practice, supporting engineers working across measurement, automation and control.

As artificial intelligence (AI) rapidly becomes embedded within these domains, the newly established AI Special Interest Group (AI SIG) arrives at a pivotal moment – one where the profession must both embrace opportunity and address emerging responsibility.

Special Interest Groups (SIGs) within InstMC have traditionally served as collaborative forums, enabling members to share knowledge, develop guidance and shape the future of engineering practice. InstMC SIGs are driven by practitioners and thrive on cross-sector engagement, producing thought leadership, hosting events, and fostering professional development. The AI SIG builds on this strong foundation, but with a focus on one of the most transformative technologies of our time.

At its core, the AI SIG supports engineers and technical professionals in the practical and responsible adoption of AI. Its mission is not simply to promote AI, but to ensure it is applied in ways that are robust, ethical, and aligned with established engineering principles. This includes building confidence in AI-enabled systems, exploring real-world applications, and addressing the complex interplay between people, processes and technology.

What makes the AI SIG distinctive is its grounding in measurement and control thinking. In traditional engineering, measurement provides the evidence base for decision-making. In AI systems, however, measurement becomes more nuanced – encompassing model performance, uncertainty, data quality, and system behaviour over time. Without rigorous measurement, AI risks becoming opaque and untrustworthy. The AI SIG therefore places strong emphasis on evaluation, validation and assurance so AI systems can be understood, trusted, and governed effectively.

The scope of the group reflects the breadth of AI's impact. Topics include AI-enabled measurement systems, intelligent control, digital twins and data-driven automation, alongside critical considerations such as safety, ethics and governance. This combination of technical depth and systems-level thinking positions the AI SIG as a forum not just for innovation but for responsible engineering leadership.

A key priority for the group is continuing professional development (CPD). As AI reshapes engineering roles, there is a growing need to equip professionals with new skills – ranging from data literacy to an understanding of AI limitations and risks. Through seminars, workshops and collaborative discussions, the AI SIG aims to build a shared knowledge base that supports both early adopters and those beginning their AI journeys.

Equally important is the SIG's role in fostering open dialogue across disciplines. AI does not sit neatly within traditional engineering boundaries; it intersects with software, human factors, regulation and ethics. By connecting practitioners from diverse backgrounds, the AI SIG creates space for informed debate and collective problem-solving – ensuring AI adoption is both technically sound and socially responsible.

Because the group is just getting started, there is a significant opportunity for members to shape its direction. Whether contributing case studies, sharing lessons learned, or participating in discussions, early engagement will be key to building a vibrant and impactful community.

The AI SIG is open to all InstMC members and free to join. For those working at the intersection of measurement, control and emerging digital technologies, it offers a timely platform to engage with one of the defining challenges – and opportunities – of modern engineering.

Get involved, contribute, and help define the future of AI in measurement and control. For further information and details of how to join the SIG, visit https://www.instmc.org/sigs/artificial_intelligence

Nick Houghton
Chair, AI SIG

HIGHLIGHTS FROM TOMORROW'S ENGINEERS LIVE 2026

For the fifth year running, the Institute of Measurement and Control attended Tomorrow's Engineers Live. Hosted by the Institution of Engineering and Technology (IET) and supported by Thales, the event brought together engineers, educators and outreach professionals to explore the future of engineering careers in the UK.

Looking Ahead – Not Just Ahead of Tomorrow

The day opened with a question that resonated with the audience. Mike Sewart from Thales asked: what does "tomorrow's engineer" actually mean?

Engineering has evolved significantly over the past three decades. The 1990s were shaped by the rise of the internet, transforming how systems and industries connected and exchanged data. The 2000s brought scale and integration, as digital platforms, automation and mobile technologies created increasingly complex and interconnected environments.

Today, the defining theme is intelligence. Engineering is no longer only about connecting or scaling systems; it is about embedding intelligence within them. For disciplines such as ours, measurement and control sit at the heart of this shift, ensuring AI-enabled systems are not only capable, but reliable, traceable and worthy of trust.

A clear theme throughout the opening session was the need to look beyond the short term. EngineeringUK Chair Iain Conn challenged organisations to move away from competing for the same talent and instead invest earlier in future pipelines. Helping young people see STEM careers as real and achievable demands sustained commitment.

That message was reinforced by Mike Sewart, who reflected on the pace of technological change and what organisations must prioritise to navigate it successfully. He highlighted three core principles: diversity, problem-solving and collaboration. Diversity must be embedded in workforce planning to attract a broad range of talent and drive innovation. Problem-solving remains the defining skill of effective engineers, transferable across sectors. Collaboration, described as the "superpower of tomorrow", will be essential as systems grow more complex.

For measurement and control, these principles are grounded in everyday practice rather than theory. Trust in intelligent systems depends on diverse thinking, rigorous analysis and close collaboration across engineering disciplines.

Understanding Young People – and the People Who Influence Them

The lightning talks brought important research into focus. Baz Ramaiah from Youth Employment UK shared findings from the Youth Voice Census 2025.

Baz described what he called the rise of "generation meh" – a cohort of young people caught between ambition and uncertainty. Wellbeing appears to be stagnating, and this fragility is visible even among those already in employment. Around 49% reported that their work had been disrupted in the past 12 months, most frequently due to mental health challenges, illness or personal issues.

At the same time, career experiences and wider opportunities are narrowing. While many young people are gaining confidence in skills such as teamwork and creativity, this is not always translating into confidence about employment. The future of work can feel uncertain and conflicted. Young people are ambitious and clear that they want careers, yet many are navigating work stress, insecurity and blurred boundaries.

Rather than discouraging the audience, the findings prompted constructive debate about what more can be done through earlier engagement, clearer pathways and better coordination.

This was complemented by Nicola Hall, Director of Education at The Careers & Enterprise Company, who explored how work experience is evolving. It cannot be one-size-fits-all. Young people need flexible, well-designed and meaningful experiences that integrate with their education and reflect modern working environments. Crucially, work experience must foster a genuine sense of belonging. As organisations, we are not simply hosts for a week or two; we help shape how young people perceive the workplace and their place within it.

National Apprenticeship Week: Real Stories from the Front Line

Hearing directly from apprentices added important perspective. Arjun, a degree apprentice in digital and technology solutions at E.ON; Kirsty, an electrical fitter apprentice at UK Power Networks; and Natasha, a civil engineering degree apprentice at Transport for London, shared candid reflections on navigating apprenticeship pathways, from application through to progression.

All three spoke about the importance of soft skills. Communication, teamwork and problem-solving are key during assessment centres, yet many applicants struggle to articulate the skills they already possess. The challenge, as the apprentices described it, is not a lack of ability but a lack of familiarity with the process. Apprenticeship recruitment can feel opaque and highly competitive, and schools are often better equipped to guide university applications than vocational routes.

Arjun spoke about turning that experience into action by creating a mock assessment centre at his college. By recreating the format and expectations, he helped future applicants build confidence in how they present themselves and engage in team-based tasks. It was a practical intervention with tangible impact.

Kirsty's journey challenged assumptions about who an apprentice can be. Her path into engineering wasn't linear. From studying psychology to working in a zoo before entering the sector, her experience was a reminder that career paths are not fixed.

Natasha highlighted the importance of encouragement and influence, particularly from family. Her decision to pursue an apprenticeship, supported by her mother, reinforced how critical role models and trusted voices are in shaping career choices.

A broader challenge also emerged: are schools and colleges fully equipped to prepare young people for apprenticeship recruitment? Many teachers have not experienced these processes themselves, which strengthens the case for closer collaboration between education and industry. There were also discussions about how government and employers, particularly small and medium sized enterprises (SMEs), can be better supported, recognising the diversity of organisations across the engineering sector. As apprenticeship routes grow in popularity, preparation, guidance and employer support must evolve alongside them.

Collaboration in Practice

The breakout sessions moved the conversation from insight to implementation. Discussions ranged from widening participation in engineering pathways to embedding social value more meaningfully within outreach activity. What stood out was the willingness to share practice openly – what is working, what is not, and where collaboration can strengthen impact.

A recurring theme was sustained engagement. Short-term interventions may raise awareness, but long-term partnerships between industry, schools and community organisations are what ultimately shift outcomes. Delegates reflected on how to coordinate efforts more effectively, support teachers with relevant industry insight and ensure outreach activity is embedded in organisational culture rather than treated as a one-off initiative.

The unconference hour reinforced this appetite for honest exchange. Participant-led discussions created space for practical problem-solving and peer learning. The tone was constructive and candid, with practitioners openly challenging assumptions and sharing lessons learned. Across the day, one message remained clear: preparing tomorrow's engineers requires collaboration that is deliberate, sustained and genuinely shared.

FOUR LESSONS FROM THE INSTMC CV CLINICS

Over the past month, I've had the opportunity to run CV Clinics in partnership with the Institute of Measurement and Control.

I met professionals from across the global engineering community, including instrument technicians, EC&I engineers, senior instrument engineers, EC&I managers, technical project managers and data analysts.

While every conversation was different, the same challenges surfaced. What became clear is that most people didn't lack experience or capability. The issue was how that experience was being presented.

If I had to condense everything discussed into four points that make the biggest difference, it would be these.

1. Make it immediately clear who you are, where you are, and what you want

One of the quickest ways for a CV to lose momentum is ambiguity. Recruiters should not have to hunt for basic information.

Your CV should clearly state your location, your right to work status, and what type of role you're targeting. This includes permanent or contract work, your working preferences (remote, hybrid or site based), and whether you are open to relocation.

This clarity helps remove early filtering issues and reduces unsuitable calls. It also ensures the right opportunities come to you, rather than relying on chance.

2. Put the most important information where attention is highest

Recruiters skim. Knowing this changes how a CV should be structured.

Page one is prime real estate. That is where your professional summary, qualifications, training, and core technical skills should sit. These allow the reader to quickly confirm that you meet the brief before they commit to reading your work history.

Burying qualifications or technical competencies later in the document risks them being overlooked entirely, particularly in busy or competitive markets.

3. Show impact through scale and scope, not job descriptions

The most common question I was asked was how to quantify achievements without sales or revenue figures.

In engineering and technical roles, impact is shown through responsibility and complexity. This might be project value, facility capacity, number of loops or panels, project lifecycle stage, or the size of the team you worked in. Even outcomes such as reduced rework, smoother commissioning and on time delivery add weight.

You don't need a number for every bullet point. One or two well placed examples are enough to turn a list of duties into evidence of capability.

4. Less detail, more clarity

Many CVs fail not because they say too little, but because they say too much.

Long lists of generic responsibilities are difficult to scan and do little to differentiate one candidate from another. A more effective approach is to highlight key projects, keep control systems and platforms clearly listed, and remove repetition.

If you have strong hands on experience, such as commissioning or start up work, a single line in your summary will often say more than several paragraphs further down.

The biggest lesson from the CV Clinics is that most people don't need a complete rewrite. Small, well judged changes to clarity, structure and emphasis often have the greatest impact.

I'm looking forward to continuing to support individuals through future clinics and beyond the workshops.

Strong experience exists across our industry.

Making it clear and easy to recognise is what ultimately makes the difference.

Kirsty Brewer
MD, Technical Partners

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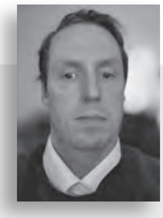

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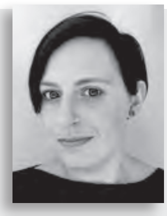

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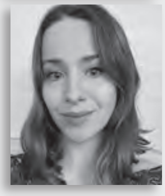

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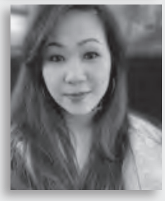

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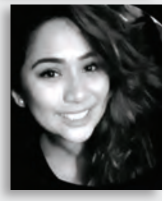

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