

SPRING/SUMMER 2026

RSE *The Royal Society
of Edinburgh*
KNOWLEDGE MADE USEFUL

ReSource

THE MAGAZINE OF SCOTLAND'S NATIONAL ACADEMY

A portrait of Professor Nicole Busby, a woman with short blonde hair and glasses, wearing a blue knitted cardigan. She is smiling and standing in front of a blurred background of golden columns.

THE DUTY OF CANDOUR

Professor Nicole Busby on how the university sector
can help to rebuild public trust in institutions

ALSO IN THIS ISSUE:

New Fellows | First African research agreement | Smartphone tech | Nanomedicine

KNOWLEDGE MADE USEFUL



Welcome to the Spring/Summer 2026 issue of *ReSourceE*. This time we have put the focus on the theme of trust – that of institutions, of norms, of healthcare, of one another in society.

Trust is an intangible asset, and all too often something we only appreciate or notice once it has been tested and found to be present, or broken. Once broken it is either gone forever, or it can take years to be earned back. In personal relationships it requires reciprocity and shared experiences, and in institutions it requires demonstrable integrity, and transparency, at all times and in all places.

If, like me, you have seen the ground shifting beneath your feet amid a world changing at a rate we can scarcely imagine, I would argue that trust is one of the touchstones we must reach for when the architecture of institutions seems to be creaking under this weight. We must reach for it and hope we find it, and if we do not, we risk much more than we will know. Ask yourself in what and in whom do you put your trust, and how does this sense shift over time and through events, and how can we regain it where it is lost or bolster it when it is ailing?

It is to this particular wheel that I believe we must all put our shoulders.

Elsewhere in this issue, you will also find news of the new RSE Fellows, the annual MacCormick European Lecture with journalist Gavin Esler and updates on our presence on the international stage – in Malawi, Taiwan and Lower Saxony.

Now more than ever, we welcome your feedback and ideas for future themes or individual articles. Please share your thoughts by emailing comms@theRSE.org.uk

Professor Sir Anton Muscatelli PRSE

PLEASE NOTE: The opinions expressed in *ReSourceE* are those of the contributors and do not necessarily represent those of the Royal Society of Edinburgh.



ON THE COVER:

Professor Nicole Busby FRSE, Professor of Human Rights, Equality and Justice, University of Glasgow.
Copyright: Stewart Attwood Photography

Global leaders in health science and research elected as RSE Fellows

The RSE announced in April that 43 individuals deemed excellent in their field were elected as RSE Fellows this year.

Of the 43 new Fellows elected to the RSE, 14 have a background in public health, reflecting the RSE's commitment to supporting and mobilising its influence to improve the lives of all Scots and the wider global community.

Professor Sharon Hutchinson FRSE is Professor of Epidemiology and Population Health at Glasgow Caledonian University. She is also a consultant scientist at Public Health Scotland and an adviser to the World Health Organization (WHO).

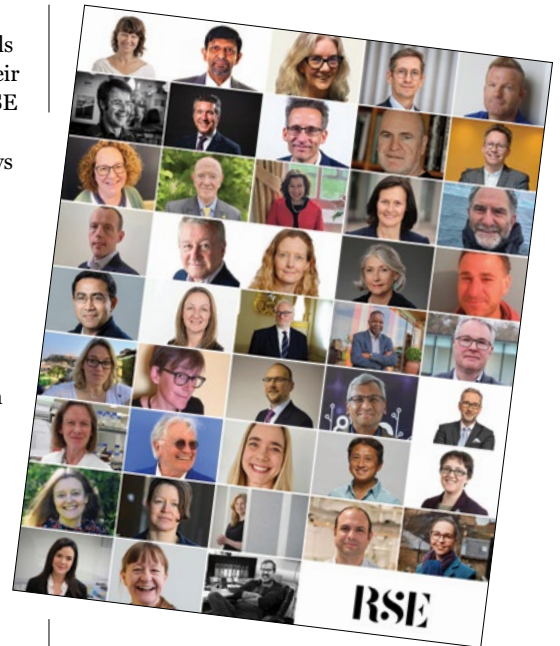
She said: "It is true privilege to be elected as a Fellow of Scotland's National Academy. For the past 30 years, I have had the good fortune to work collaboratively with dedicated individuals and teams across academia, the health service and civil society in support of evidenced based responses to major public health concerns.

"As part of the RSE's Fellowship, I look forward to working with the diverse range of expertise to bring multidisciplinary perspectives to the most pressing issues facing society."

Professor Kei Sakamoto IntFRSE is currently Vice Executive Director at the University of Copenhagen's Novo Nordisk Foundation Center for Basic Metabolic Research. Professor Sakamoto's research now focuses on prevention and treatment of cardiometabolic diseases at the cellular level.

He said: "I am deeply honoured to be elected as a Fellow of the Royal Society of Edinburgh. This recognition reflects a journey shaped by inspiring mentors, wonderful colleagues, and the many talented students, researchers, and administration staff I have had the privilege to work with over the years.

"I am especially grateful to my own team, whose intellectual curiosity, deep commitment, and passion continue to drive our research forward every day. I share this honour with them. It inspires me to keep pursuing meaningful science and to contribute to the Society's mission of advancing knowledge and creating a positive impact on society."



"I AM ESPECIALLY GRATEFUL TO MY OWN TEAM, WHOSE INTELLECTUAL CURIOSITY, DEEP COMMITMENT, AND PASSION CONTINUE TO DRIVE OUR RESEARCH FORWARD EVERY DAY"

As well as public health leaders, the RSE has also elected leaders in business, engineering, the arts and journalism.

In addition to the newly elected RSE Fellows, Professor Sir James Hough has received the RSE's highest accolade, Honorary Fellowship, in recognition of his continuing contributions to experimental physics and public service in science and education. Professor Hough was first elected an Ordinary Fellow in 1991.

The full list of new Fellows of the RSE is available at: www.rse.org.uk/global-leaders-in-health-science-and-research-elected-as-rse-fellows-in-2026

RSE signs landmark agreement with Malawi

Scotland and Malawi signed a landmark agreement in February 2026 to promote and strengthen cooperation between researchers across a diverse field of disciplines.

The agreement was signed in Malawi's capital of Lilongwe on Wednesday, 18 February, by Dr Christine Whyte of the Royal Society of Edinburgh's Africa Working Group and Dr Elizabeth Bandason, General Secretary of The Academy of Sciences, Malawi (TAS).

The official signing of the memorandum of understanding (MoU) was held at the same time as the first inauguration of Fellows to TAS.

It is the first agreement between TAS and any other nation. It is also the first agreement between the RSE and any African nation. TAS was inaugurated in 2021.

Dr Christine Whyte, of the Africa Working Group, said: "This is the first MoU for the RSE in Africa. We are entering the partnership with humility, with enthusiasm and with a genuine desire to build something together. Partnerships are not defined by the documents we sign, but by the relationships we nurture and the trust we build over time. We look forward to working side by side, learning from and supporting one another."

The agreement will forge a powerful research alliance between Malawi and Scotland, driving joint workshops, deep and long-lasting collaborative projects



Dr Christine Whyte (left) with Dr Elizabeth Bandason © Trevor Nyondo

and active participation in major international research programmes.

Dr Kondwani Katundu, on behalf of TAS, said: "This memorandum of understanding is a moment of great pride and excitement for Malawi's scientific community. It builds on the deep and historic relationship between Malawi and Scotland and now translates that shared history into a forward-looking partnership for science, research and innovation."

"We are particularly encouraged by the

strong emphasis on collaboration that delivers real impact to our communities. This agreement creates a powerful platform for scientists and researchers in both countries to work together, share knowledge and co-develop solutions to challenges that matter to our societies."

According to the Scotland-Malawi Partnership, some 45 per cent of Scots personally know someone with a connection to Malawi, as it remains one of Scotland's strongest bilateral links.

The McCormick European Lecture – The Un-Enlightenment with Gavin Esler

Veteran writer, journalist and broadcaster Gavin Esler delivered the annual McCormick European Lecture at the Royal Society of Edinburgh in March this year, on the topic

of misinformation and how it is affecting each of us.

Introduced by Professor Alison Phipps FRSE, the lecture was an evening of discourse

about how the very idea of "fact" has become contested, how "truth decay" – a concept posited by Jennifer Kavanagh and Michael Rich – has become rooted in society and then how society can turn the tide.

In his remarks, Esler explained: "The deluge of information helps some people in public life – and I mean leaders who have the skills to cut through the deluge

and make headlines – they do so with stories that are engaging, entertaining, striking, shocking, memorable and perhaps, but not always, true."

Following his address, Esler sat with Professor Phipps for a question-and-answer session, with questions invited from the audience. The discussion touched on the role of journalism and the differences between the classic 'gotcha' reporting, which highlights when a public figure has genuinely misled people, and when they have changed course due to new circumstances or information coming to light. Social media and the responsibility of platforms to curate who and what appears on their systems, as well as the role of trust and humour, were also touched upon.

Esler closed the lecture with a call to optimism in troubling times. He said: "Enlightenment values will survive, as long as we recognise the dangers. Un-Enlightenment is a choice, it's not a certainty, so keep shining the light. Darkness is available, but light will be provided."



Gavin Esler © Stewart Attwood Photography

Trust – the connective tissue of our lives



I met a murderer when I was seven years old in 1960. My family and I were on a sea voyage from Adelaide to Southampton. We had emigrated to Australia five years earlier as “£10 Poms”. But now we were returning to the UK, because Mum had become homesick and Dad disliked his new job.

Life aboard the P&O liner *SS Himalaya* was exciting. Adults and children ate separately. Flying fish landed on deck. There was a ceremony for Poseidon when we crossed the Equator.

The Bradleys were fellow passengers. I have smudged memories of playing with their children. But when we reached Ceylon – now Sri Lanka – everyone aboard received a big shock. The Australian police were on the quayside. They arrested and charged Mr Bradley with the murder of a child.

The crime was linked to the construction of the Sydney Opera House. Its costs were part funded by a lottery. On 1 June 1960, the Australian newspapers reported that a Mr Basil Thorne had scooped a jackpot of £A100,000. In accordance with then normal practice, they published his name and address. Mr Bradley noted all those details and saw a way to deal with his financial problems. He conceived a plan to kidnap Graeme Thorne (aged eight) and hold him to ransom. He abducted the boy on his way to school. But then he bungled matters. In consequence, no monies were paid. After the *SS Himalaya* departed from Sydney, Graeme’s dead body was found dumped in bushes.

After his arrest, Mr Bradley was extradited back to Australia for trial. He admitted kidnap but denied murder. The jury disbelieved his account of accidental

asphyxiation and convicted him of murder. That was largely due to the exemplary forensic investigation. I have never forgotten this man, nor what he did. For me, his actions have also illuminated several aspects of trust.

Put short, trust means that we expect persons upon whom we rely not to take unfair advantage of us. Trust arrives early in life. Children implicitly trust their parents. Of course, they are also taught distrust – “stranger danger” is a mantra instilled in most children.

“TRUST MEANS THAT WE EXPECT PERSONS UPON WHOM WE RELY NOT TO TAKE UNFAIR ADVANTAGE OF US. TRUST ARRIVES EARLY IN LIFE”

A central feature of trust is its pervasiveness. It is the connective tissue of our lives. It informs our relationships with other individuals, institutions, ideas, the media and government. We rely on the oncoming motorist not to drive on the wrong side of the road. We expect bank notes to be accepted for goods and services, even though they have no intrinsic value.

Once lost, trust is only regained slowly and with great effort. Taking responsibility for a breach can be a good first step. In politics that’s reflected in the concept of ministerial responsibility, but it is rarely encountered in the flesh. In academia, a single mistake can have significant consequences. Hugh Trevor Roper began his brilliant career with *The Last Days of Hitler*, published in 1947.

But his wrongful authentication of the (fake) Hitler Diaries in 1983 did lasting damage to his reputation. People questioned his judgement. They lost trust in him.

Breach of trust engenders powerful feelings of betrayal. The premeditated murder of a child is a gross breach of trust. It had a major effect on the other passengers of the *Himalaya*. They shunned the remaining members of the Bradley family for the rest of the voyage. I think that sad but understandable. Graeme’s murder had a profound effect on the Australian population, that can be gauged from one detail – the Sydney underworld collaborated with the police in tracing the kidnapper.

Turning to commerce, Adam Smith considered that trust, reputation and moral sympathy are necessary to avoid market failure, by reducing transaction costs and ensuring fair dealing. Earning a reputation for trustworthiness is therefore a valuable asset. City traders like to boast that “my word is my bond”.

Warren Buffet (the Sage of Omaha) has emphasised that he is prepared to make handshake contracts for large sums. But he warns: “Look for three things in a person. Intelligence, energy and integrity. If they don’t have the last one, don’t even bother with the other two.”

Trust determines some of the bigger questions in life – who to marry, who to employ, where to place our vote and how to spend our money. My favourite ending of an Alfred Hitchcock film is *North by Northwest*. Eve Marie Saint is in mortal peril on Mount Rushmore. Cary Grant reaches out just as she’s just about to slip off the rock face. She takes his hand. That’s real trust. Only a cynic would point out that she had no other choice.

Rt Hon Lord Stephen Woolman FRSE, former Senator of the College of Justice



Lord Stephen Woolman FRSE

Should we trust AI?

The wrong question may be holding us back

Imagine you apply for a loan and are rejected. You ask why. The bank explains that their AI system – let's call it SmartCredit – has assigned you a low credit score, but beyond pointing to the input data, nobody can tell you more. Not the bank. Not the software engineers. The system makes reliable predictions, yet its inner workings are simply too complex for any human to comprehend. How do you feel? Understandably frustrated, and probably deeply reluctant to trust the verdict.

Cases like this have fuelled a major movement in AI research: the push for *explainable* AI, or XAI. The core idea is straightforward – if people can't understand how an AI reaches its conclusions, they won't trust it, and if they won't trust it, they won't use it. Given how much AI has to offer (cancer-screening algorithms, for instance, have proven remarkably effective). The prescription from XAI advocates follows naturally: make AI systems transparent and trust will follow.

My team¹ and I think this diagnosis, though understandable, is wrong – and that getting it wrong has practical consequences for how we think about building trustworthy AI.

Consider the following. You stop a stranger on the street and ask for directions. They tell you the nearest tube station is two streets away. You thank them and set off. At no point do you ask them to explain *how* they know this, let alone demand a justification of their answer. You simply trust them and, in ordinary circumstances, that's entirely rational.

This points to something fundamental that the XAI movement tends to overlook:

rational trust almost never requires explanation. When we defer to experts in fields we'll never fully master – quantum physicists, oncologists, structural engineers – we are typically in a situation much like you were with the SmartCredit example above: the inner workings are, for us, a black box. Yet trusting expert testimony remains perfectly rational.

The real question, then, isn't whether AI can *explain* itself. It's whether AI can be *trustworthy*.

Reliability is not enough

Here things get philosophically interesting. Trustworthiness, most people agree, is more than mere reliability. Trust proper requires that the thing being trusted is not just reliably doing something, but evidence that it is disposed to *fulfil an obligation* to do it. This is where most philosophical accounts of trustworthiness run into trouble when applied to AI. Accounts that require goodwill, virtuous character, or sensitivity to the fact that someone is depending on you all presuppose features of inner mental life that current AI systems simply don't have.

Our proposal cuts through this difficulty. AI systems are subject to what we call *functional oughts* – generated by norms derived from what they are designed, or have come, to do. A cancer-screening AI ought to detect cancer; that is its function. A credit-scoring system ought to assess creditworthiness accurately and fairly. These functional obligations are real, and a system with a robust disposition to meet them is, in a perfectly meaningful sense, trustworthy.

This reframing has practical upshots. If trustworthiness – not explainability – is the core concept, then the best way to increase rational trust in AI mirrors how we learn to trust any artefact: through exposure. We learn to trust a sharp knife by using it, consistently and successfully, in appropriate circumstances. The same applies to AI: allowing people to witness and interact with AI systems in lower-stakes situations, where those systems can demonstrate their disposition to fulfil their function reliably, is likely to be more effective than demanding explanations that may be technically unattainable.

None of this is an argument that people should trust AI uncritically. Whether any given system deserves trust depends on whether it actually is trustworthy – and that is a question about design, deployment, and accountability. But by asking the right question, we put ourselves in a far better position to answer it.

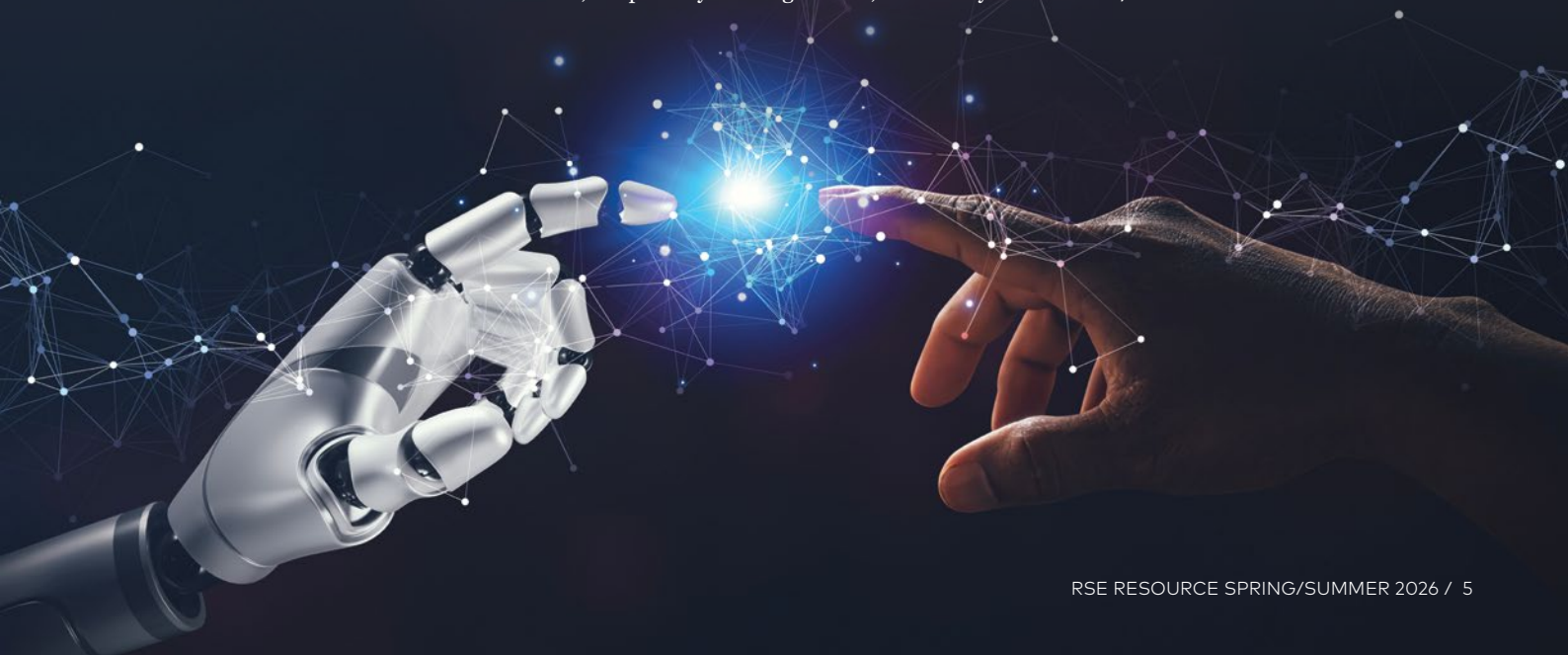
Mona Simion, Professor of Philosophy at the University of Oxford and Young Academy of Scotland member

References

¹ ERC KnowledgeLab www.knowledgelab-research.com/ is a European Research Council-funded project based at the University of Oxford and the University of Glasgow. For an academic article defending this claim at length, see Simion, M and Willard-Kyle, C. (forthcoming). Trusting AI: Explainability vs. Trustworthiness. *Communication with AI: Philosophical Perspectives*, (eds. Herman Cappelen and Rachel Sterken), Oxford University Press.



Professor
Mona Simion



Trusting an education in Computing Science

A few years ago, while standing at a stall during an open day, a prospective student asked me a simple question: “What is Computing Science?”

I hesitated, I attempted an answer, then turned to two colleagues. Their responses were no more convincing than my own. One eventually offered that Computing Science was a “passport for life”, a degree that would open doors everywhere. Cute. Compelling. Convenient. It did not, however, answer the question.

In the end, we consulted the university prospectus, as if the answer must surely be written there. It was not. We leafed through the glossy document. There was some text about Computing Science, again compelling but rather generic. We spent time trying to guess who in our department wrote it. Nobody we knew. Overall, what struck me was how much the prospectus had shifted from the documents of my memory. It emphasised student experience, the environment and opportunity. It spoke fluently about belonging and employment, littered with metrics and percentages. Yet, the document was remarkably silent on the intellectual outcome or the fundamental impact of studying the subject.

Prospectuses are a far more important instrument for university inhabitants than they appear. They are both a map and a mirror. In theory, students are promised a journey of intellectual formation, an outcome that will benefit them and society. Staff are the architects of this journey, laying out incentives, agreeing rules and scaffolding

the paths through a broad landscape to a sharpened peak. The prospectus is a map in that it sets out the principles of that journey, but it is also a mirror: it reflects what we, the staff, believe is the best way our discipline can be used to shape a person. Students must trust this promise of transformation. Trust in a university education is, ultimately, trust in the integrity of that journey.

I should have corrected that student at the stall. I should have said, a better question is: “What sort of person will I be after studying Computing Science?”

That is the vital question, but I would not have had an answer for that and obviously neither did the prospectus. As an academic in Scotland, the home of the Enlightenment, that is slightly embarrassing.

The Scottish Enlightenment gave us the modern ideal of university education: forming people who could *think*, not just people who could do. The ancient universities produced graduates who could move between science, philosophy, commerce, and civic life because those spheres were understood as connected. A degree was not merely a certificate of competence or a collection of disparate courses, it was evidence of having been drawn into shared traditions of inquiry about nature, morals and society. That idea took root in Scottish universities and shaped higher education for centuries.

Computing Science arrived late to this tradition, barely 70 years old as a formal discipline, and has perhaps never fully settled into it. The result is a discipline that knows exactly what it *teaches*, but struggles to articulate what it *is for*.

The concern is that Computing Science has developed a technical canon faster than

an educational philosophy. There is broad agreement on the mechanics, the algorithms, data structures, and architectures that comprise the subject, but far less clarity on the person we are forming. Are we producing scientists, engineers, digital citizens, or something else entirely?

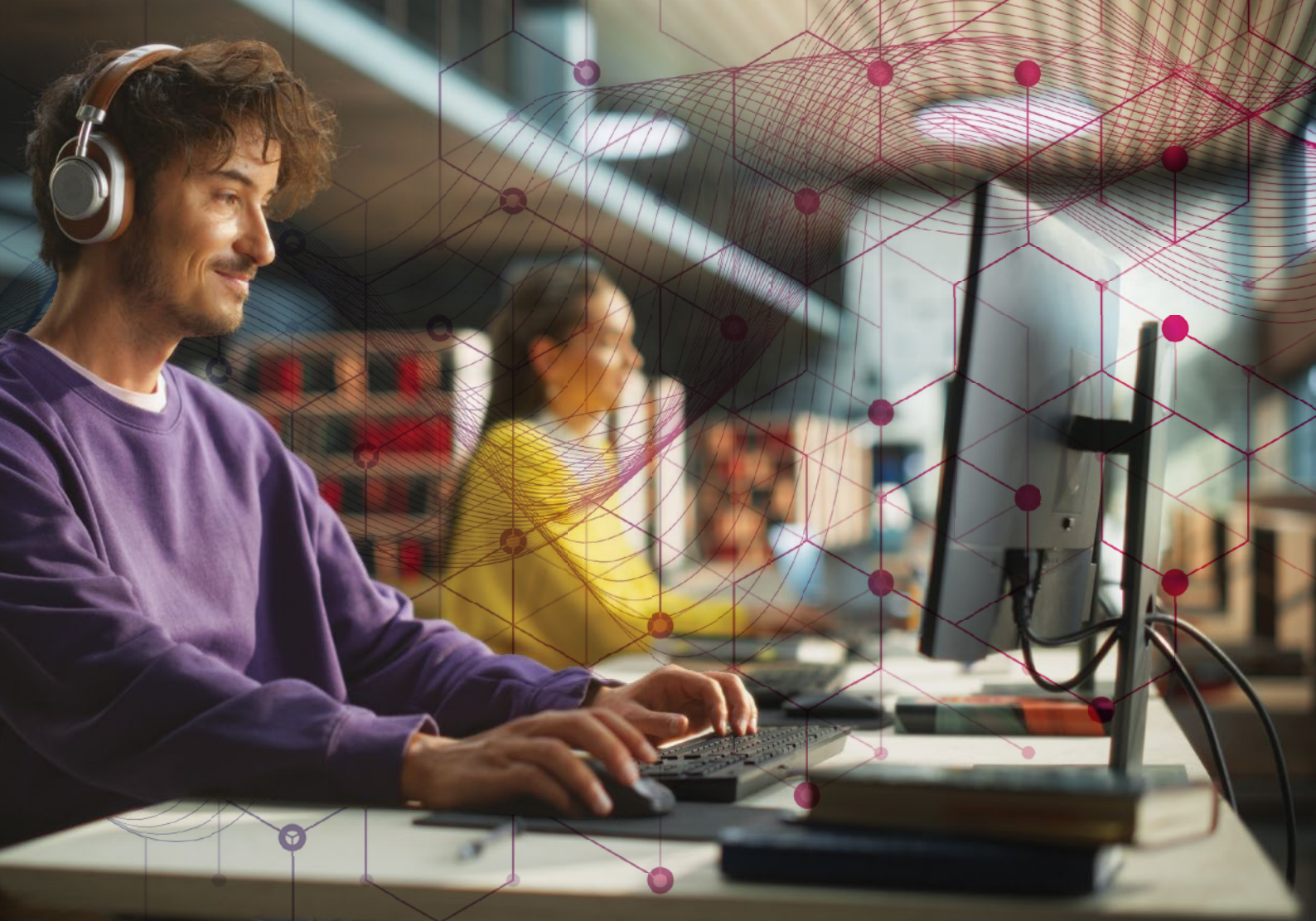
The vestigial blueprint of the Enlightenment remains visible in our four-year degrees, yet the curricula have become paradoxical: they are simultaneously stagnant and hypersensitive. This is a failure of design. While the early years of a programme often look unchanged since the 1970s, the later years are a reactive patchwork of emerging trends such as IT Architecture or Digital Forensics. This suggests a lack of intentional sequencing; it looks less like an architected journey and more like a series of market-driven responses or additions.

This happens because the discipline does not operate in a vacuum. Universities are increasingly framed as engines of economic growth, and education as an economic instrument. Consequently, narratives centre on outcomes like employability, productivity, start-ups and spinouts. Universities are incentivised to respond to the blinking lights of a dashboard rather than the philosophy of education. The discipline begins to be defined externally by those using it, rather than internally by those designing it.



Dr Joseph Maguire





“I SEE IT IN MY COLLEAGUES: THE MOST ENGAGED AND INSPIRING MINDS IN THE FIELD. THEY LOOK AT THE WORLD DIFFERENTLY, CURIOUS TO UNDERSTAND IT, UNAFRAID TO CHANGE IT AND DEEPLY MINDFUL OF THE IMPACT OF THEIR WORK”

In this world, trust becomes transactional. We see a rise in proxy indicators with rankings, ratings, and employment data. Students weigh the degree as a cost-benefit calculation, focusing on the destination rather than the journey. Employers, sensing a lack of depth, put less trust in the four-year degree journey and rely instead on two-day assessment centres to find the “readiness” they need. These are signals of a slow erosion of trust. Trust is lost when universities focus on serving indicators they cannot truly control, rather than the intellectual formation they can.

The concern is that staff and students focus more on serving indicators and metrics, rather than spending time on what is the philosophy of education for a given discipline. Consequently, universities spend less time devising an answer to the question the student should have asked at the stall.

The solution lies in reclaiming the degree programme as our primary intellectual lever.

The journey that a student takes connects all stakeholders, and its shape and architecture reflect the educational philosophy of Computing Science. The aims, principles, and methods for a nearly 70-year-old discipline are not going to be answered at the end of this article.

But a viable starting point is to adopt a 50-year horizon for

our graduates, focusing on the timeless knowledge and mental models that will endure throughout a human career.

Reflecting on this four-year journey is critical. Computation now underpins the modern world. The more it becomes ubiquitous, society may become less curious about the science behind it, but will have to trust it more than ever. Universities are responsible for forming the architects who build that infrastructure. To do that, we must ensure students can trust their degree programmes and their outcomes. Computing scientists need protected space to debate and construct this journey, shielded from immediate metrics to focus on long-term reflection.

Most mornings, I encounter the answer to the student’s question. I see it in my colleagues: the most engaged and inspiring minds in the field. They look at the world differently, curious to understand it, unafraid

to change it and deeply mindful of the impact of their work. My colleagues are the sort of people a degree in Computing Science shaped. They are the answer – not because of what they say in a prospectus or at a stall, but because of who they are. The world would be enriched by more people following their path. All they need is the time and space, and a little more trust, to design that journey for others.

Dr Joseph Maguire, Reader in Computing Science at the University of Glasgow and Young Academy of Scotland member



$$ax^2 + bx + c = 0$$

$$b^2 - 4ac$$

$$(x-1)(x+2) = 0$$

$$4x^2 + 4x - 1 = 0$$

Trust in mathematics

Mathematics makes a tremendous difference in the world. A major source of its power, influence, and appeal is that it often does not seem to matter whether you trust the mathematics or not. Mathematical methods and conclusions ideally work the same for everyone, no special equipment or privileged information or exclusive conditions required.

Look underneath that ideal universality, however, and the problem of trust is everywhere. In different ways for different people, from the schoolhouse to the university lecture theatre, to the server bays and back rooms where mathematical theory and application happen, mathematics is often tremendously difficult to produce, explain, and understand. The community of experts on any given subject at the forefront of mathematics can number in the dozens or fewer, and even they will have variations and gaps in their command and confidence in their quarry. Trust lets them persevere past those gaps, turning variations in their expertise into a shared resource that lets lots of partial understandings amount to something bigger.

Some decades ago, Professor Donald MacKenzie FRSE analysed the role of trust where theoretical mathematics met computers. He showed how variations in proximity to technologies, including conceptual technologies like mathematical reasoning, promoted variations in confidence or scepticism, with those closest to a technology more sensitive to its potential failings than those at a slight remove. This was true even for mathematical demonstrations, whose many forms of difficulty invite many kinds of scepticism.

Users and producers of mathematics (a far broader category than mathematicians) rely on a complex variety of social, formal, and technological means to establish the requisite trust in their mathematics. Those affected by mathematics (a far broader category still) rarely see the mass of idiosyncratic human judgements and institutions that underwrite that ideally universal knowledge.

MacKenzie's work and mentorship first drew me to Edinburgh as a postgraduate student in 2009. Together with the mentorship and work on social studies of mathematics of Professor Dame Ursula Martin FRSE, they were a major reason I returned to make my academic career here in 2018 as a historian of science and mathematics. In a sense, my research revolves around tracing the many varieties and settings of trust across modern mathematics, from the intimate interpersonal interactions in front

of a mathematical seminar blackboard to the political and institutional dynamics of international and global research.

This interest has forced me to considerably broaden what I view as part of understanding mathematics. Believing a sequence of deductions or the result of a calculation remain important, as does the kind of

bigger-picture conceptual understanding around which mathematical communities are organised. But these sometimes take a back seat to the working understandings people form about mathematical careers and workplaces – a form of understanding especially prioritised by funders – and the assumptions they make about counterparts in faraway places that they may only encounter through letters and publications.

Mathematicians have sometimes tested the limits of these institutional assumptions in their bid to shake up the intellectual core of the field. The most important mathematician of the 20th century was Nicolas Bourbaki. Not one brilliant mathematician, but a collective pseudonym through which his animators

used parody and imposture to make a discipline-transforming point about how mathematical ideas fit together and how they should be justified.

Social, political, and ideological forms of understanding and arenas for trust in mathematics predominate where people come up against the limits of formal comprehension. Starting from the significance of ambiguity and incomprehension in the history of mathematical theories, I have found different ways of accounting for what kinds of understanding matter in wider public (including national, international, and transnational) contexts.

Much that is called public understanding of mathematics starts from a point of understanding mathematical techniques or their outcomes and attempts to build trust by explaining these. By contrast, the predominant experience most people have of most mathematics is not based on technical or conceptual understanding, and may include significant elements of faith, indifference, intimidation or hostility. Some of the most consequential interactions between publics and mathematics of various kinds rely on ways of comprehending mathematics that we do not tend to see as mathematical, but I think very much need to be seen as part of mathematics.



Dr Michael J Barany

Dr Michael J Barany, the University of Edinburgh and member of the Young Academy of Scotland

FURTHER READING:

The Mathematical Pranksters behind Nicolas Bourbaki

www.dailyjstor.org/the-mathematical-pranksters-behind-nicolas-bourbaki/

The treachery of small numbers

www.doi.org/10.51428/tstr.igtz5084

A Very Brief Political History of American-hosted International Congresses of Mathematicians

www.ams.org/journals/notices/202604/noti3314/noti3314.html

Trust, the transatlantic partnership and the future of Europe

For decades, the transatlantic relationship rested on a simple but powerful foundation: trust. After the Second World War, European states trusted the United States to safeguard them – initially from themselves and the Soviet Union, and later from the uncertainties of a changing international order.

That trust endured throughout the Cold War and well into the post-Cold War era. Europeans trusted that the US would provide for their security – allowing them to scale back their own military capacities – and uphold the multilateral global order from which Europe benefited so profoundly.

Over time, that trust encouraged Europeans to outsource vast areas of strategic importance to the United States. Beyond defence, Europe relied on American companies for technology, AI, military equipment, and essential services for which no equivalent European alternatives existed. The US is also an important export market for European firms. As long as the US maintained a largely benign hegemony in these fields, there appeared little incentive to adjust the arrangement.

Donald Trump's first presidency exposed the fragility of this dependency, and his return to the White House fundamentally upended it. America could no longer be trusted to maintain the free trade system it had once championed, with tariffs imposed unpredictably. Multilateralism suffered as the US withdrew from key international agreements. Washington's ambivalence toward international law sharpened – whether through its intervention in Venezuela or its war against Iran. Trump's

disregard for the existing international system found further expression in his proposed de facto UN alternative, the so-called "Board of Peace".

Simultaneously, the Trump administration's criticism of European societies and democratic systems, coupled with its courting of far-right movements, deepened the sense of estrangement. Most troubling, perhaps, were shifts in security policy. Trump's reluctance to reaffirm NATO's Article 5 guarantee sent shockwaves through European capitals, while rhetoric about invading Greenland – after all, part of Denmark, a NATO ally – further eroded trust. Whether it can be rebuilt remains to be seen.

Yet Europe still needs the United States. Nuclear deterrence remains largely in American hands. Washington is also indispensable for Ukraine's defence and any future peace settlement. This dilemma – needing an ally that may no longer be dependable – now sits at the heart of European strategic thinking.

Europeans, including the United Kingdom, will therefore have little choice but to pursue greater strategic autonomy: building the capabilities to defend their own continent, reducing dependencies not only on China but increasingly on the US, and nurturing European champions in key technological and industrial sectors. For decades, deference to the US was convenient because American and European interests and values largely aligned. Today, that assumption no longer holds. Strategic autonomy will require Europe to confront – rather than appease –

US, Russian or Chinese actions when they conflict with European interests.

Achieving this autonomy will require Europeans to trust one another, despite a fragmented political landscape across the continent and increasingly polarised domestic politics. Persistent fault lines, such as recent Franco-German disputes over the next-generation fighter jet, show how difficult cooperation remains. Meaningful autonomy will demand compromise on sensitive issues: integration, decision-making, sovereignty, debt mutualisation, and industrial strategy.

Still, Europe has overcome far greater challenges. A century ago, war among European nations was not only possible but recurring. Half a century ago, civilisation-erasing nuclear conflict between Eastern and Western Europe hung over the continent like the sword of Damocles. Today, such scenarios are largely unthinkable. Dense networks of social, economic, academic,

and political ties form a mycorrhizal-like web of interdependence – the substrate from which trust grows. It must be nurtured.

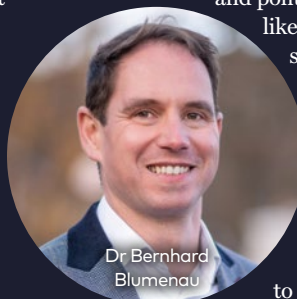
Strategic autonomy begins with citizens, which is why maintaining exchanges among Europeans – such as through Erasmus – is crucial.

For Britain, this reality points to a clear conclusion: deeper

engagement with the EU is imperative.

Trust has suffered due to Brexit, and must be rebuilt, including re-establishing deeper economic, political, and military cooperation. Europeans, for their part, must advance trust that the UK will continue to honour new arrangements negotiated.

In a world shaped by geopolitical competition, great power politics and the uncertainties of a Trumpian America, European countries cannot stand alone. Only by working together – and investing in trust, solidarity and shared purpose – can they navigate the turbulent seas ahead.



Dr Bernhard Blumenau

Dr Bernhard Blumenau, Senior Lecturer in International History and Politics at the University of St Andrews and Young Academy of Scotland member

Exploring trust in a rural context

The topic of trust feels particularly important at this moment for our society, given the current instability within government and the Scottish election in May this year.

While Central Belt post-industrial deprivation attracts attention, rural poverty is both persistent and under recognised across Scotland and is often hidden behind the picturesque landscapes, and dispersed communities.

The consequences are no less serious with rural families on low incomes, young people leaving and not returning due to lack of opportunities weakened by public service decline and withdrawal. We should also recognise that truthful communication is the bridge between policy and results and, done well, it can be a powerful tool for promoting understanding and engagement.

As a farmer's wife, I have participated in rural discussions for much of my professional career, triggered by probably the most important piece of work I was involved in. It was an analysis funded by the Scottish Consumer Council entitled *Consumer Problems in Rural Areas* by G. A. Mackay and G. Laing, published in 1978.

It demonstrated strategically, for the first time, that rural Scotland, from Muckle Flugga to the Mull of Galloway, had major deprivation issues which were not being seriously recognised by government. The

Highlands and Islands Development Board (HIDB) was up and running, but this, of course, served the north. It took many years to have it recognised that the whole of south Scotland suffered from similar challenges.

Brexit and COVID also made it even slower that these areas could be recognised, and indeed it was not until 2020 that

South of Scotland Enterprise (SoSE) was launched, giving it its own development board outright. Scottish Enterprise did exist, started in 1991, as did Highlands and Islands Enterprise (HIE), but SoSE is exclusively for the Scottish Borders and Dumfries and Galloway.

Trust in negotiation is vital and includes addressing work and worklessness, family breakdown, educational failure, addiction, debt, and housing. It should be framed not just honestly and politically, but institutionally and territorially.

I would like to highlight the work leading independent think tank The Centre for Social Justice (CSJ) has done to tackle the root causes of poverty and social breakdown and has majored on research across the South of Scotland.

It is recognised that charities do work hard to deliver their objectives, but acknowledge that rural dimensions make it so much more challenging to deliver. It is hoped that they will strengthen and support grassroots charities by connecting front-line charities with policymakers and philanthropists.

The CSJ analysis revealed that official statistics often understate rural hardship, with dispersed deprivation masking

poverty in small towns, villages, and remote communities.

Across all measures of poverty, Dumfries and Galloway and the Scottish Borders perform poorly. Child poverty remains stubbornly high, fuel poverty affects 30 per cent of households, and the reality is widespread in-work poverty, low wages, and insecure seasonal work. Transport costs and poor connectivity act as powerful poverty multipliers restricting access to work, education, healthcare, and childcare. Educational disadvantage persists, compounded by digital exclusion, while family breakdown, addiction, housing affordability, poor-quality tied housing, and rising problem debt all contribute to deepening hardship.

I would also advocate that the environment and agriculture must be integrated as structural economic drivers and create opportunities to be strategic partners going forward. For example, the role of renewables should be to urgently address rural poverty. Wind farm trust money is an important area that needs to be part of the wider conversation on poverty. Community wind farm trusts have significant impacts on various rural communities in Scotland.

The Royal Society of Edinburgh has a strong programme tackling so many of these challenges and seeking solutions to problems. I want to ensure that we will be tackling rural poverty as more than an afterthought.



Dame Barbara Kelly
FRSE

Dame Barbara Kelly FRSE, civic activist and former Chair of the Scottish Consumer Council

A new and fun way of doing politics

Inspiration from a Nordic success story

Scotland's links with Scandinavia are ancient and deep. Large parts of Scotland were under Nordic rule until the 13th century – and much later for Orkney and Shetland. Many Scottish words, such as “bairn” and “kirk”, are Scandinavian imports. Scottish kings sailed brides from Denmark and Norway.

More recently, Scandinavia has become fashionable: from world-leading design to gritty crime drama. And the Scandinavian countries regularly top the global happiness indices. They are small, prosperous countries with a high level of social cohesion and trust. If you lose a full wallet in Denmark, there is more than a 70 per cent chance of it being handed into the police.

Democracy is also flourishing up north. The five Nordic countries rank among the top seven democracies in the world (the UK is a respectable 17th). Turnout at the recent local elections in Denmark was 70 per cent.

One part of the democratic culture is that democracy festivals have become a highlight of political life. The basic idea is that politicians, businesses, press, NGOs, and, most importantly, citizens come together for free-of-charge seminars and encounters. They are a place where politicians can meet their constituents face-to-face. They provide a forum for slow discussion of difficult issues. Most importantly, they make politics fun.

The Swedish, Danish and Norwegian events each attract more than 100,000 visitors. The biggest – and arguably most

successful – is the Danish Folkemødet (or The People's Meeting), held on the Baltic island of Bornholm. As Denmark's *Locallist* website summarises:

“It's a unique event in that it is the one time of year where practically everyone who's important in politics is gathered in the same place at the same time. This allows a large variety of events, debates, and networking to happen in a transparent fashion that includes the voting public. Everyone wins; the politicians, interest groups and other organisations are given a platform that helps them reach thousands of people, politics is made more accessible to the people, and a little part of peripheral Denmark (the island of Bornholm) suddenly gets to have its moment in the sun.”

The Folkemødet is understood as a safe zone. It is low key and non-threatening: a place to try out new ideas. It is not a place for big announcements or party-political conflict. According to the Communications Director, it is a “place for long answers and not social media soundbites”. The media also understands that this is a safe zone. Challenging party dogma is a virtue and not a headline.

The event is also of considerable interest for the local Bornholm economy, attracting tens of thousands of high-spending visitors in a period (mid-June) before the peak tourist season. A 2025 study found that the event generated a five per cent increase

in total tourism and created more than 100 jobs. And then there are the marketing and PR advantages: the once sleepy Bornholm attracts the country's top economic and political leadership once a year, helping it become a fashionable destination.

A group of democracy enthusiasts – a mix of Scots with Danish links and Danes with Scottish connections – decided to see if this successful formula could inspire a similar Scottish event. With the support of the late – and much missed David Gow FRSE – the RSE hosted a launch event in February 2025. There was a lot of interest and many questions. Could this type of friendly politics really work in the polarised Scottish context? The launch was followed by a

study visit to Denmark and support grew from politicians, civil society organisations, and other festival organisers. The project team refined the concept and both Pitlochry and Rothesay expressed a strong interest in hosting the event.

There is still a long way to go. But the follow-up seminar in March, again hosted by the RSE, confirmed there was a real enthusiasm for trying a new and fun way of doing politics. The plans are for the first Scottish People's Meeting to take place in spring 2027.

Martijn Quinn is a senior European Commission official, currently responsible for developing the EU's Green Diplomacy



Martijn Quinn

Trust in public institutions and the role of universities

People's trust in public institutions has been declining in recent years both globally and within the UK.¹

According to the World Values Survey, confidence in the UK Parliament has halved since 1990², and the British Social Attitudes Survey has reported record lows in levels of public trust and confidence in political institutions.³

We are losing confidence that institutions which are supposed to represent our interests and protect us against harm will deliver on their obligations.

The reasons for this loss of trust are complex, but it is certainly the case that a series of scandals and related cover-ups across the UK have had a negative impact on public perceptions, leading to questions about whether it is even possible to hold public institutions to account.

The Horizon/Post Office scandal and the infected blood scandal had massive ripple effects, not only for those directly affected, but for the wider public.

This loss of trust manifests itself in a number of ways. For those directly affected by the denial of truth, the deep trauma already endured, for example, due to the loss of a loved one, is exacerbated.

Think of the families of those who died in the 1989 Hillsborough disaster who have been campaigning for more than three decades to bring those responsible to account. For the wider public, reading about scandals and cover-ups at the heart of public institutions can lead to dissatisfaction in public services and a loss of faith in politicians and formal political structures.

This was clearly evident in the fallout resulting from the public's realisation that those in power who, having imposed severe lockdown restrictions during the Covid-19 pandemic, with devastating outcomes for many, had failed to follow the rules themselves.⁴

The longer-term effect of this loss of trust among the general public lies in the threat that it poses to democracy. Disenchantment with established political and law-making structures turns people off voting

altogether or drives them towards more populist movements whose appeal lies in the casting-off of what is seen as an elite and corrupt establishment.



Professor
Nicole Busby FRSE

The role of education and research

Universities are not immune from this loss of trust. As public institutions, their legitimacy is increasingly being questioned and the rise of populist sentiment has ignited a debate about their purpose and continued status, with the authors of a recent report noting that public patience is wearing thin.⁵ As universities struggle to shape the national conversation and instead adopt a “defensive and economically reductionist” position, they risk alienating their existing supporters across the political spectrum while failing to engage meaningfully with populist movements, whether on the left or right, so that, “it turns out to be surprisingly hard to explain precisely what the sector does”.⁶

In their critique of the higher education sector, Venning and Beech make a call for universities to lead the fightback against the public's loss of trust by attending



to the relational dimension of their work – put simply, by showing how they act for society. The sector must also reaffirm its moral legitimacy by engaging in knowledge exchange and innovative processes of “ideas, values and priorities”.⁷

This all signals an urgent need for better public engagement by which a wider range of stakeholders, beyond those seen as out-of-touch elites, are involved in education and research through meaningful collaboration and participation.

The Centre for People's Justice

In doing my bit to bring law and policymaking closer to those who are directly affected by their operation, I am proud to be a convenor of the Centre for People's Justice (CPJ)⁸ alongside my co-convenors at the Universities of Liverpool, London, Sheffield, Swansea, Wrexham and Ulster. Funded by the Arts and Humanities Research Council and established in 2025, the Centre pursues change-making research that responds

care, trust, action, and change and our mission to improve law and lives through community-led research across the four nations of the UK. Our work seeks to connect the public more closely with the ways in which the law is made, improve accountability for how the law is put into practice, and enhance people's understanding and use of their legal rights.

At the heart of the work being undertaken by the CPJ is the Hillsborough Law Project. Co-delivered with the families and communities directly affected by scandals and disasters linked to public authorities' lies, this project is about public access to truth and information and explores how research can help the public to meaningfully participate in the making of law in the UK.

The Public Office (Accountability) Bill (POAB), also known as Hillsborough Law, currently making its way through the UK Parliament, will impose a duty of candour on everyone who works for public services, institutions, and public authorities to act with transparency, frankness, and honesty. The project uses social media and digital platforms, as well as other creative methods, to enable the public to learn more about law-making as it follows the progress of POAB through Parliament.

When enacted, POAB will have direct impacts in Scotland across many areas, including the operation of the criminal justice system. The project 'Nothing to See Here?'⁹ highlights that Scotland sees four deaths per week of people in the care or custody of the state, from prisons and police deaths to those in mental health and children in care settings. Few of these deaths involve public investigations and, even when this does happen, corrective action that might prevent deaths is rarely recommended.

Candour and Communities

As part of its commitment to co-producing research and public legal education with individuals, groups, and organisations outside of the university sector, the CPJ has developed an in-person and digital exhibition which explores the devastating impacts of institutional lies and cover-ups, and which highlights the opportunity for change offered by the proposed new legal duty of candour.

Using a range of case studies, 'Candour and Communities' outlines how institutions which are intended to represent and support us have lied to the public and covered up those lies.

Across a 100-year timeline, it connects just some of the many disasters and scandals that have had devastating impacts across the UK. It is a story of how hard it is for ordinary people to get to the truth.

But, in seeking to engage the public with the change offered by POAB, Candour and Communities also shines a light of hope.

Co-developed with the communities directly affected by the events that it features, the exhibition encourages members of the public to express their views on the proposed changes to the law. Candour and Communities has been exhibited at locations in England, Wales, and Northern Ireland, where it has attracted a high degree of public engagement and received extremely positive feedback. We hope to be able to bring the exhibition to audiences in Scotland later in the year.

Those of us who work closely with law and legal processes are often the most sceptical about its ability to effect real change in improving people's lives. At the same time, it is recognised that the imposition of legal obligations, such as a duty of candour, can have a very powerful normative effect which, over time, can impact positively on the cultural change necessary to improve public services and win hearts and minds to restore faith in public institutions.

However, without knowledge of and inclusion in related processes to identify priorities for reform and to draft and implement laws, members of the public can too often feel that law and policy are made remotely for the benefit of others, thus reaffirming and entrenching a lack of trust.

It is imperative that the university sector rises to the challenge by sharing resources and locating research and public education within communities whenever possible. The most powerful expression of people power might be seen to be that exercised at the ballot box. The road ahead is long and uncertain but it is only by pledging to tell the truth that politicians and others who serve us all can begin the process of regaining that trust.

Nicole Busby FRSE, Professor in Human Rights, Equality and Justice, University of Glasgow School of Law

References:

- ¹E. Kolpinskaya and O. Bennett (2024) Democratic engagement and trust in parliament, UK Parliament Post, King's College London (2023)
- ²B. Duffy, K. Hewlett, R. Mortimore and B. Wilkinson (2023) Trust in trouble? UK and international confidence in institutions. King's College London
- ³J. Curtice, I. Montagu and C. Sivathanan (2024). Damaged Politics? The impact of the 2019-24 Parliament on political trust and confidence, National Centre for Social Research
- ⁴K. Dewsnip (2025) Trust Lost, Lessons Learned: Outcomes of the COVID-19 Inquiry, The Constitution Society
- ⁵E. Venning and D. Beech (2026) Preparing for Populism, Higher Education Policy Institute.
- ⁶Note 5, Venning and Beech, p. 4
- ⁷Note 5, Venning and Beech, p. 21
- ⁸centreforpeoplesjustice.org S. Armstrong, L. Allan, R. Cobain
- ⁹D. Russo & B. Barkas (2025) Nothing to See Here? SCCJR

to the public's need and desire for fairer, safer and more inclusive societies.

The CPJ is a coalition of more than 45 organisations from community, business, philanthropic, cultural, artistic, charitable, legal, government, and university sectors which all share our values of empowerment,

Medical mistrust and vaccination

Trust in the medical profession is crucial for maximal health benefit, for example, following medical advice, attending cancer screening, and adhering to treatment.

However, in a recent article in *The Lancet*, Marcello Ienca et al claim that, across the world, trust in medicine has plummeted and is facing a historic crisis. They describe what they call “the paradox of trust”, where “*the very institutions that most rigorously develop and apply science are viewed as untrustworthy, politicised, or elitist. Meanwhile, uncredentialed and often unaccountable internet influencers with financial conflicts are increasingly trusted to interpret science*”.

An example where trust in medicine is crucial for effectiveness is vaccination. This discovery has proved to be one of the greatest interventions in the history of medicine. It is a mainstay of disease prevention and the World Health Organization (WHO) estimates that, since 1974, vaccination has averted around 154 million deaths.

Despite the overwhelming evidence regarding the efficacy of vaccination, distrust of vaccination programmes has been steadily growing over the past 50 years and vaccine hesitancy has been declared by the WHO as one of the top ten threats to global health.

A hugely influential study that made a major contribution to the rise of the anti-vax movement was conducted in 1998 by Andrew Wakefield and reported in *The Lancet*. He falsely claimed a link between the MMR vaccine and autism in nine of the 12 children studied. The paper attracted huge media interest and scrutiny and was later identified as fraudulent and retracted. Despite this, the consequences of his research have been disastrous. The paper has been described as “*perhaps the most damaging medical hoax of the 20th century*”.

Suspicion about safety and a decline in MMR vaccination has continued, despite consistent refutations of the link with autism by major bodies, such as the NHS in the UK and the Centers for Disease Control and

Prevention (CDC) in the US. In 2024–25, only 84.4 per cent of UK children received both doses of the MMR vaccine – considerably below the 95 per cent required for herd immunity. The WHO reported that the UK had eradicated measles in 2017, however, in January 2026, confirmed that the UK had lost its measles-free certification.

Challenging anti-vaccination beliefs has proven no easy undertaking. Unfortunately, we seem to know more about how to increase vaccine hesitancy than how to reduce it.

A further challenge in promoting vaccination is that it suffers from what Marcello Ienca et al in their *Lancet* piece call the “invisibility paradox”.

The more successful medical interventions are at preventing disease, the more invisible their benefits become. This absence of evidence is misread as evidence of absence.

Commonly used interventions to reduce hesitancy such as myth debunking, employing scare tactics, and communicating certainty have limited efficacy. Furthermore, there is evidence that such interventions can provoke *reactance* in that they can paradoxically stiffen resolve and strengthen anti-vax attitudes. A major limitation of most studies in this area is that the primary outcome has almost always been vaccination attitudes or intention, rather than actual vaccination *behaviour*.

Behavioural scientists have known for many years that intention very often does not translate into behaviour – the well-recognised intention-behaviour gap. However, in January 2026, Matthew Whitaker et al published an important study of more than one million people in *The Lancet*. It was the first study that linked Covid vaccination attitudes before vaccination with subsequent vaccination behaviour.

Vaccine hesitancy is not a unitary phenomenon and the authors identified eight stable sub-categories of vaccine hesitancy, including concerns about effectiveness and side-effects, perception of low risk from Covid, mistrust of vaccine

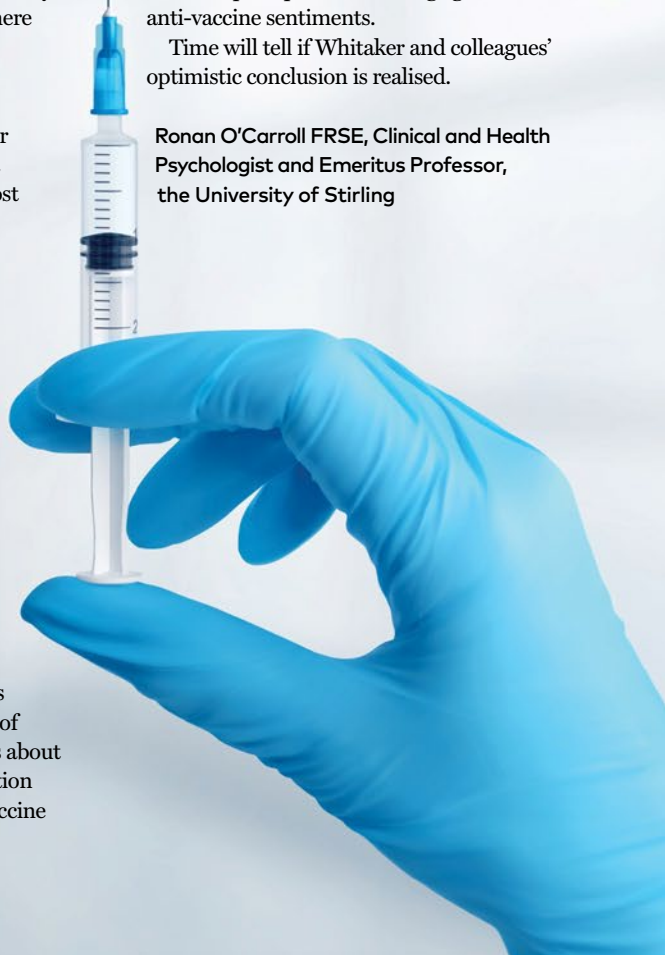
developers and fear of vaccines and reactions. Most hesitancy reduced over time following vaccine roll-out. Longitudinal analysis was conducted in the vaccine hesitant cohort and 65 per cent of those went on to receive one or more vaccinations. The most common categories of hesitancy, related to effectiveness and health concerns, declined substantially over the vaccine roll-out period and were not strongly associated with the likelihood of later vaccination.

However, those who were hesitant because of a generalised anti-vaccine sentiment, had low trust in vaccine developers or low perception of risk from Covid were particularly unlikely to change their minds and get vaccinated.

Whitaker et al concluded that most Covid vaccine hesitancy was “*rooted in concrete concerns that can be addressed and successfully overcome with time and increasing availability of information*”. However, we do not yet have convincing evidence from behavioural science as how to increase trust in vaccine developers, increase Covid risk perception and change general anti-vaccine sentiments.

Time will tell if Whitaker and colleagues’ optimistic conclusion is realised.

Ronan O’Carroll FRSE, Clinical and Health Psychologist and Emeritus Professor, the University of Stirling





The Gift Relationship

Just under 120 million blood transfusions are given each year worldwide, saving and enhancing the lives of tens of millions of people. Around 40 per cent of these occur in high-income countries comprising only 16 per cent of the world's population. These are largely from altruistic non-remunerated donors who will never know the people whose lives they have helped to save.

In the UK, just under two per cent of the population are regular blood donors, whereas 25 per cent of the population will receive a blood transfusion at some point in their lives and all of us are 'at risk' of requiring a transfusion. Unfortunately, the blood donor base across most high-income economies has been declining and ageing over the past several decades, raising concerns around the sustainability of the current blood donation model.

Across most of the rest of the world, particularly in low-income countries, blood supply is already insufficient to meet clinical demand, requiring reliance on family, friends, or paid donors for those who can afford it and failure of supply for those who can't.

Similar considerations pertain to donors of other substances of human origin, such as cells used for bone marrow transplantation, tissues such as bone, heart valves, and corneas and organs such as kidneys and livers.

So why not pay donors? First, there are clinical considerations. Substances of human origin are not free of the risk of transmission of infections circulating in the general population and this risk is managed

through a combination of donor selection and microbiological screening. In the past, failures in these procedures have led to the infection and deaths of many thousands of people worldwide. Donor selection is predicated on trust in the honesty of the donor in respect of potential risk factors in the context of which financial inducement provides a conflict of interest. Blood testing can only partially compensate for weaknesses in donor selection and, in some countries, comprehensive testing may be unaffordable or alternative donors unavailable.

"HUMAN COMMUNITIES ARE BUILT ON MUTUAL TRUST"

Second, there are ethical considerations. Is it right to commercialise parts of the human body? The international consensus is that it is not. For example, the World Health Organization (WHO) *Guiding Principles on Human Cell, Tissue and Organ Transplantation* forbid the purchase, sale, or offer to purchase cells, tissues, or organs for human transplantation.

There are also societal considerations. Human communities are built on mutual trust. In 1970, Richard Titmuss, a Professor at the London School of Economics, published *The Gift Relationship: From Human Blood to Social Policy*. He argued that altruistic gift-giving enhances social cohesion and supports mutual trust, reciprocity, and

equity. In many ways he builds on the work of the early French sociologists Émile Durkheim and Marcel Mauss on exchange systems in societies, where gift-giving and receipt involve obligations in respect of reciprocity and mutual solidarity. Even in modern societies, there is a material difference between giving someone a gift for their birthday and selling someone a gift for their birthday...

In his seminal work *After Virtue* (1981), Scottish-American moral philosopher Alasdair MacIntyre reconstructed Aristotle's virtue ethics, which focus on the qualities one should encourage to support human flourishing, rather than the rules one should follow (deontology), or that give rise to the best consequences (utilitarianism). He argued that moral virtues arise from social practices embedded in communities which sustain internal goods such as honesty, integrity, trust, and compassion.

I would argue that the altruistic non-remunerated donation of blood and other substances of human origin is more than an effective and safe way of providing vital lifesaving and life-enhancing medicines. It is fundamentally a gift relationship, which supports human flourishing and enhances the mutual trust and compassion that underpins the cohesion of our communities. Our world needs more altruistic donors.

Professor Marc Turner FRSE, Director of the Scottish National Blood Transfusion Service



Professor
Marc Turner FRSE

Growing trust

Some insights from compassion research

Insights and practices from compassion research help to alleviate the social stresses that are diseases of industrial nations: anxieties about not getting ahead, of not being enough, or producing enough.

These social stresses undermine trust and are symptoms of what economists call zero-sum thinking: that if I am to win, you must lose; if you succeed, I fail; if I am to have enough, you must be put in need.

Zero-sum thinking generates fear of losing out and engenders a sense of threat: someone else's success can feel undermining; cooperation becomes viewed as risky; ambiguous behaviour may be assumed to be hostile; and instead of extending trust, people may expect exploitation. These are features of a scarcity mindset, which assumes there is not enough to go around. Scarcity thinking pervades our outlook, our economic and immigration policies, our education and health systems, and it erodes social trust.

We want to look out for the younger generations growing up in a scarcity-minded world. Professor Ben Ansell at the University of Oxford comments upon the rising levels of zero-sum thinking in younger people, given worsening economic prospects and the likelihood that they will be less well-off than their parents. Winners and losers thinking creates what Harvard Law School Professor Michael Sandel writes of as *The Tyranny of Merit*. He argues that students arrive at university already damaged by the toxic competitiveness of their schooling.

There is good news coming from compassion research for how we might regain and grow trust.

Clinical psychologist Professor Paul Gilbert OBE, creator of compassion-focused therapy and compassionate mind training, identifies three different emotion-regulation systems within us:

- 1. Threat and self-protection**
- 2. Incentive and resource-seeking**
- 3. Soothing and contentment.**

We need all three. Gilbert argues, though, that much in modern society overstimulates the threat and incentive systems, leaving little rebalancing from the soothing system. Hence, we feel we must do more, want more, and achieve at the cost of others.

The practice of compassion – noticing suffering and being motivated to relieve it – can help to take us out of a spiralling interaction between the threat and incentive systems (where we may view others as competitors to be distrusted), and returns us to the soothing attentiveness of the third emotional system. Not only that, but we can also receive with compassionate understanding the stress and drive emotions that are necessary to systems 1 and 2, so that we are not bringing judgement to ourselves or others. Systems 1 and 2 are themselves necessary to our surviving and thriving.

The fears and impulses we feel when in them (that is, when our nervous system is in either threat and self-protect mode, or incentive and reward-seeking mode) are not always warranted, but they have been triggered. We can acknowledge the feelings and impulses of ourselves and others with a kindness to our understanding, rather than

with disapproval. The removal of judgement itself reduces the sense of threat and nurtures trust.

Would we lose our edge and become ineffective, individually or collectively, if we did not hold ourselves in threat and incentivisation modes, or assume a scarcity mindset? No. We can loosen the grip of

zero-sum thinking if we consider how broader cultural gains work.

Not everybody can win the prize for best dissertation (for the winner to get that prize, others have not to get the prize), but everyone can win from a culture that prizes dissertation writing and supports independent thinking. Not everybody can

win a consultancy bid, the football trophy or the lottery, but perhaps everyone benefits (or could be supported to benefit) from a culture in which consultancies are competitive, football tournaments are played, and lottery money is raised.

We can choose to cultivate a sense of enough-ness within ourselves individually and collectively, and the realist economics of doing so is that people who have a sense of enough-ness are in fact more likely to have more because they take actions that grow more. Rather than close in on resources, they collaborate, share ideas, look for partnerships. These behaviours stimulate growth and rely on trust.

Dr Harriet Harris MBE FRSE is Principal of Ripon College Cuddesdon, Oxford, and provides compassionate leadership training to universities, the NHS, and other organisations



Igniting trust and inspiring change with CLD

Community Learning and Development (CLD) in Scotland refers to a distinct educational-based approach to lifelong learning that aims to empower individuals and communities to participate actively in, and shape their own, learning and development. At its core, CLD is rooted in the values of inclusion, participation and social justice.

The CLD family consists of adult learning, community development and youth work. It is a collaborative and inclusive process that involves various stakeholders including adult learners, young people, community members, community volunteers, local authorities, voluntary and charity sector organisations, educational institutions, and other bodies across the public and third sectors.

At a time when public trust in public bodies, institutions (including education) and politicians is at an all-time low, CLD offers a powerful approach to rebuilding confidence, while inspiring individuals to pursue positive change within their communities.

For example, Dundee City Council CLD service has a dedicated Community Empowerment Team which works in the most deprived communities to support individuals and communities to participate effectively in decision-making processes which impact directly on them.

In 2024-25 the team delivered successfully on the new Neighbourhood Capital Fund, resulting in 2,668 people being supported to generate ideas for capital investment in communities. Of those, 1,724 were young

people, demonstrating a commitment to ensuring young people's voices are heard in community planning matters. This compares to approximately 100 citizens who would have been involved under the previous model of capital allocation. An example of the direct benefit of this work is the Kirkton Community Centre SCIO being supported to bring in £1.5 million of Levelling Up funding to build a community enterprise hub on the site of a former community centre in the area.



Alan Sherry OBE

Through a person-centred approach, CLD practitioners can ignite a passion for learning and education within the adult learners, young people, and communities they serve, which traditional models of formal classroom-based teaching has failed to do. The

professional practice model of CLD meets individuals where they are in their own learning journey; it values lived experience, encourages debate and deliberation, and is flexible within its delivery style and timescales, to enable re-engagement in Scotland's education system.

This can be seen in the Dumfries and Galloway Council area, where a pilot project between the council's Lifelong Learning Team, Dumfries and Galloway College, and the Employability and Skills Service has funded parents seeking SCQF qualifications required for a college placement. This has resulted in several individuals gaining the qualifications required for Learning Assistant posts with guaranteed interviews with the Council. Support is targeted at individuals who are unemployed and have barriers to employment, and those who are employed in low skilled, low paid jobs, or are underemployed.

Importantly, CLD practice builds critical thinking and awareness. The adult learners,

young people and communities supported by CLD practitioners are encouraged to question, reflect on and explore issues that affect their lives and their communities.

This critical thinking helps develop greater understanding of the social, economic, political and educational challenges that they face on a day-to-day basis. As a result, the learning they develop and gain through involvement with professional CLD practitioners becomes a tool for transformation, rather than simply a qualification they have been able to achieve.

At the Fuse Youth Café in Glasgow, there is an extensive STEM programme led by a staff member studying Aeronautical Engineering at university, who previously attended youth work activities as a young person. The group also makes use of online modules on STEM subjects via the Glasgow Kelvin Learning Portal and the young people visited a British Airways engineering facility. This collaborative approach is an example of how making best use of expertise and the available resources ensures that learners are provided with engaging activities which support their goals.

CLD is uniquely placed as a professional education intervention, sited within the Education and Social Justice agendas, to ignite and inspire trust in public services, institutions, and in education. Its focus on empowerment and enablement of adult learners, young people, and communities is key to unlocking the learning potential and the value placed upon learning and demonstrating how learning and public institutions shape and impact everyday life. By building trust, encouraging participation and promoting social justice, professional CLD practice changes lives and transforms communities.

**Alan Sherry OBE, Chair of the
CLD Standards Council Scotland**

Is the IV dream over?

Why the future of nanomedicine should move from the vein to the gut

For decades, the pharmaceutical industry has adhered to a principle of elegant simplicity for intravenous (IV) products, prioritising high drug concentrations with minimal excipients.

The logic was clear – the fewer variables in the bloodstream, the safer and more predictable the outcome. However, the rise of targeted nanomedicine appeared ready to disrupt this paradigm. It promised “intelligent” polymeric nanoparticles that would realise Paul Ehrlich’s vision of the “magic bullet” – sophisticated carriers capable of ferrying complex therapies directly to tumour sites, while bypassing the destructive environment of the gastrointestinal tract.

However, as these technologies transitioned from the lab to the clinic, a sobering reality emerged. While the IV route remains a vital pioneer for high-stakes interventions like oncology, the very sophistication that made IV targeting possible has hit a biological and regulatory wall. For the next generation of medicine, particularly in the management of chronic disease, the oral route is proving to be the more sustainable frontier.

The primary bottleneck for IV nanomedicine lies in the collision between synthetic intelligence and human physiology. Once injected, these sophisticated carriers are immediately cloaked by a protein corona; a layer of blood proteins that masks targeting ligands and renders the nanoparticle’s internal GPS effectively blind. Furthermore, the sheer volume of synthetic material required to move a small therapeutic dose often creates a toxicological tax that skews the risk-benefit profile toward undesired systemic effects. From an industrial perspective, scaling multi-component, ligand-decorated structures while

maintaining batch-to-batch consistency is a manufacturing nightmare.

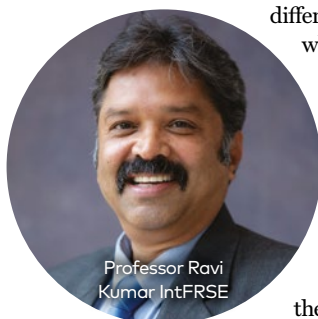
This progress has been further delayed by a generalised fear of nanotoxicology, a myth rooted in the misunderstanding that any material at the nanoscale is inherently dangerous. To move forward, we must abandon the pursuit of universal safety and focus instead on the probability of success, the balance of desired versus undesired effects.

It is vital to distinguish between materials that change their inherent properties at the nanoscale and those that do not. For instance, a polyester nanoparticle and a microparticle exhibit the same degradation pattern; the only difference is the rate. This is fundamentally

different from materials like gold, which undergo a radical physical shift when reduced to the nano-level. Recognising these distinctions allows us to move away from one-size-fits-all platforms and toward customised excipients tailored for specific drugs and the biological barriers they must cross.

The oral route offers a far more robust landscape for this customisation than the fragile equilibrium of the bloodstream. While the gastrointestinal tract presents its own harsh obstacles including extreme pH gradients and proteolytic enzymes, it is a biological machine designed to process diverse and complex matter.

By engineering nanoparticles with protective enteric coatings or pH-responsive shells, we can utilise the ‘biological room’ of the gut to function without triggering a systemic crisis. For chronic conditions like lupus, rheumatoid arthritis, or Type 2 diabetes, oral nanomedicine stabilises the erratic bioavailability of conventional therapies, enabling minimum effective concentrations that reduce systemic toxicity. By engineering steady-state absorption, these platforms mitigate the peak-and-trough shocks, such as inflammatory flares or



Professor Ravi Kumar IntFRSE



glycemic drops, that drive vascular damage. This customisation, facilitated by the disease pathology itself, allows nanoparticles to mirror endogenous transport without competing for ligands, ultimately reducing the pharmaceutical load on the liver and kidneys.

The promise of oral nanomedicine isn’t just a win for biopharmaceutics; it’s a driver for patient-centric care. By leveraging receptor-mediated transport across intestinal barriers, we can transform clinic-only treatments into home-based solutions, especially for those managing complex chronic conditions and polypharmacy. However, translating these technologies from bench to bedside requires overcoming a final commercial hurdle. The pharmaceutical development of nanomedicines in industry remains caught between the desire for plug-and-play modalities and the inevitability of needing to tailor the platform to the desired quality target product profile. This disconnect between tailored nanomedicine and its originating platform technology, complicates the exit strategy for startup companies, restricting investment and progress. To realise the dream of the magic bullet, we must accept that the delivery system is as critical as the drug itself.

The magic bullet is within reach, but only if we stop treating the delivery system as an afterthought. By integrating nanotechnology into the very fabric of the drug itself, we aren’t just improving biopharmaceutics; we are redefining the patient experience.

M. N. V. Ravi Kumar IntFRSE, PhD,
Distinguished University Research Professor,
College of Community Health Sciences,
The University of Alabama

How a single word cracked the code for fibromyalgia

Academics involved in a Scotland-Taiwan research partnership have formally established an international collaboration scheme for research into the treatment of chronic pain.

Dr Guy Bewick, Senior Lecturer in Neuroscience at the Institute of Medical Sciences at the University of Aberdeen, was UK co-ordinator at the recent joint Scotland-Taiwan workshop funded by RSE and Taiwan's National Science and Technology Council (NSTC). Dr Bewick's research was key to identifying a specific neural pathway for communicating chronic pain, which is entirely separate from the pathways that communicate acute pain.

Dr Bewick's research counterparts in Academia Sinica in Taiwan had been studying a model for chronic pain and fibromyalgia for many years. This was aided by the fact that there is, as in many Eastern

cultures, a specific word in Taiwan to describe this type of chronic discomfort. Such chronic pain-specific terms are widely culturally understood, while the Western pain diagnostic criteria do not communicate this sensation specifically and separately.

Dr Bewick explained: "Professor Chih-Cheng Chen spotted that our work was overlapping with theirs. We were working on one neural system, and they were working on another, and we couldn't work out why there were so many similarities, yet we were working on such different things."

He added that his counterparts in Taiwan had been studying this issue, which they show is due to tissue acidosis, for more than ten years, but it was not gaining any traction in the West due to language and cultural barriers.

The Taiwanese word *sng* refers to a specific type of pain felt by people suffering with fibromyalgia. There is no equivalent word used in Western medicine, nor widely understood by people in Western countries, so describing the nuances of discomfort is a challenge in itself, and presents a hurdle in diagnosing, treating and managing chronic pain.

Dr Bewick explained: "We in the West don't recognise the sensation - that is we don't have a category for it either as a clinician or the person in the street recognises, whereas in the East it is culturally embedded.

"*Sng* is a particular type of sensation which is embedded, and the word for pain is a different type of pain which is embedded as well, and they know that the pain will respond to painkillers, but the *sng* does not.

"When they go to the doctor they have a conversation between equals. The patient knows they are getting the appropriate advice and treatment because of the specific category of pain that they are dealing with, and the doctor knows what the patient is feeling because it is culturally embedded. This sensation is different from that sensation.

"But in the West pain is a spectrum. It is an unpleasant discomfort, sometimes it is chronic, sometimes it is acute, sometimes it responds to painkillers,

sometimes it doesn't, sometimes it is across the entire body, sometimes it isn't.

"It seems like this concept needs to be defined and translated here in the West. You've got this challenge of this cultural difference as well as the search for a treatment. In order to make advances in it you need the patient to know what it is they are trying to describe, and the GP or clinician to ask the appropriate questions to determine what the sensation is."

A fuller understanding of the concept of *sng* has now led to advances in the field of study. Dr Bewick's research was focused on areas of proprioception – the sense of where your limbs are in space – while researchers in Taiwan were researching this specific type of pain, or *sng*. The research has shown the mechanisms involved in sensing *sng* become chronically active when they interact with those

used in sensing movement. Research has now identified the specific neurons involved in chronic pain.

The workshop in Aberdeen – funded by the Royal Society of Edinburgh and the NSTC under the Scotland-Taiwan Research and Innovation Workshop Grant scheme – was specifically on the topic of translating *sng* from the point of view of language, culture, and science to the whole range of key Western stakeholders.

Dr Bewick said: "Without the funding, this meeting probably could not have happened. It has been absolutely essential and instrumental in allowing us all to get together to establish IC-SPRinT, the International Collaboration for *Sng* Chronic Pain Research into Treatment Development. That is what we were doing with the workshop, trying to get traction for researchers in the East with clinicians, researchers, chronic pain charities, and those with lived experience in the West. We know how the mechanism to cause chronic pain works and how it turns on, but we don't yet know how to turn it off, so that is the next stage.

"We know now where to look, it may not explain all of chronic pain, but it explains some of chronic pain. To me it expands a horizon, it tells us where to look and what sorts of things to look for."



Dr Guy Bewick



Marking one year of the Scotland-Lower Saxony Research and Innovation Scheme

Just over one year ago, the Royal Society of Edinburgh signed an agreement with the Ministry of Science and Culture of Lower Saxony in Germany, inaugurating the Scotland-Lower Saxony Research and Innovation Scheme.

The goal of this partnership – initially to run for two years – was to enable cooperation in research, technology and innovation, and to strengthen the bonds between Scotland and Lower Saxony. Two separate funding streams were set up, totalling over £1m. The first, the development track, administered and funded by the RSE, RSE Foundation and Caledonian Research Fund, allows early and mid-career researchers to foster new research collaborations between Scotland and Germany. The second, the excellence track, entails larger grants funded by the Ministry for Science and Culture of Lower Saxony, the European Centre for Academic Research and the Volkswagen Foundation, and is designed for existing academic projects to expand their work.

The agreement was formalised in February 2025, signed at the RSE by Professor Anne Anderson FRSE and State Secretary for the Ministry for Science and Culture for Lower Saxony Professor Joachim Schachtner. It was later recognised in a UK-Germany treaty, the Treaty on Friendship and Bilateral Cooperation, which itself was signed on 17 July 2025.

Exploring new approaches to animal welfare

Professor Catherine Dwyer, of Scotland's Rural College (SRUC) in Edinburgh, with collaborator Dr Lisa Jung at the University of Veterinary Science in Hannover, is working on exploring the impacts of positive animal welfare.

Prof Dwyer said: "We are a small, stage one project and it involves a group of us at the Edinburgh University vet school and SRUC vet school, and the vet school in Hannover. We have put this together because there were some interesting ideas that we wanted to explore, and a lot

of the work so far has been developing the collaboration.

"The theme of the project is positive animal welfare. A lot of animal welfare in the past has really been minimising negatives, or eliminating suffering, but that just gets you to a neutral place. And so there has been a lot of interest in the past 10 or 15 years about whether we should go beyond that. Particularly for managed animals, is a neutral position actually okay, or should we be moving to a more positive place? Which in turn leads to questions about what that looks like, how would we measure it, how would we make it happen? And so that was one part of the idea for setting up the project.

"The other is a One Welfare concept of thinking about the linkages between animals, humans and the environment."

Managed animals are animals that are in some ways "looked after" by humans – for example farm animals or animals in zoos, as opposed to free-roaming wildlife, which will likely still be affected by human activity, but is not actively managed.

The emerging definition, the One Welfare concept, and the field of positive animal welfare provides a wide scope for research.

At a workshop in March this year, Prof Dwyer, together with colleagues from a range of disciplines from Scotland and Germany, discussed various aspects of animal welfare. They drew upon new definitions from European Cooperation in Science in Technology (COST) Action research networks.

This work has defined positive welfare not simply as the absence of suffering, but considering what this concept might mean, including providing opportunities for play and enrichment. The workshop also included discussions about ethics and philosophy, positive psychology in humans and how past animal welfare plans were informed by human psychology.

Prof Dwyer added: "We were a multidisciplinary group, with colleagues from human psychology, ethics and philosophy, as well as animal science and veterinary science, so it brought different things to the table by having this multidisciplinary collaboration.

"One of the words that appears now in definitions of positive animal welfare is 'flourishing'. What do you have to do in any environment to ensure that an animal is flourishing, and what does that actually mean? We talked a little bit about what that means for a wild animal versus a managed animal, and there is quite a lot of discussion in there to unpack."

The emerging definition and field of positive animal welfare provides a wide scope for research. Prof Dwyer explained that her group's discussions touched on new concepts and how they may be applied.

She added that her counterparts from Hannover added a strong ethical bent to the discussions, bringing different opinions.

"Whereas I think what Edinburgh brings is that we have quite a big critical mass in terms of behaviour and welfare science and human psychology. So I think that bringing that philosophical dimension was really valuable."

Prof Dwyer also explained the direct impact that the Scotland-Lower Saxony agreement has had. "It brought together a group of people who may not otherwise have met to discuss this topic. The initial collaboration was between animal behaviour and welfare scientists, and then we drew in our wider networks and that's when it became quite diverse and we also had some synergies that we may not have had otherwise. Even locally, I think some of the team in Hannover may not have been working with ethics or philosophical people, but our discussions on the topic sparked that linkage as well, so both together, and individually, it has brought in other partners."

Social connectedness and wellbeing among young refugees

Professor Marcia Vera-Espinoza is an expert on migration and refugee studies at Queen Margaret University. She, along with her research partner Professor Cordula von Denkowski, of the Faculty of Social Work and Healthcare in Hannover, received funding from the Scotland-Lower Saxony Partnership to look at the experiences of refugees and asylum seekers across different regions. She explained that social connection and wellbeing studies in this area have



Professor Catherine Dwyer

mostly been done as separate studies. This new research project is known as CONNECT-WELL, and looks at adapting existing methods to assess both social connectedness and wellbeing among young refugees in both Scotland and Lower Saxony.

She said: “This is a seed programme that came out of our collaboration, specifically to test different qualitative methodologies to allow us to understand better the role between social connections and wellbeing.

“Cordula has been doing a lot of work in Germany – her expertise, coming from a psychology background – on wellbeing, and my experience working with refugee populations for a long time here in Scotland, but also in other settings, has always been about social connections and the interplay between governance structures, experience of inclusion of people on the move. So we joined forces in our understanding of different methodologies.

“Cordula has a lot of experience working with young people and children, I do not. I have mainly worked with adults, so we really tried to find areas of common interest in our lines of inquiry.”

Prof Vera-Espinoza explained that the research topic has layers of complexity, given that it involves working with displaced people which requires ethical and sensitive consideration, added to which there is an extra layer of safeguarding practice that must be done in order to work with children.

“The entire purpose of this collaboration is to inform methodological development, and hopefully improve a larger project that allows us to explore this more in depth,” she added.

Prof Vera-Espinoza explained that the team conducted a scoping review of the existing literature to identify existing qualitative and participatory methods. The methods were then tabulated and mapped for identifying which were useful with young people, which useful with children, which were used to assess social connection, which used to assess wellbeing, and so forth.

She explained how the research workshops involving young refugees are conducted in partnership with them, having them involved in the process as they shaped the research process as much as participated in it.

“So far, we have conducted two workshops, one with children and one with young people, and Cordula did a couple of visits in advance to ensure that any other necessary safeguarding measures were taken.

Prof Vera-Espinoza added that a lot was learned from conducting the workshops. In a body-mapping exercise where they were

required to draw the shape of their bodies, and then think of things that made them feel good, and then show where in their bodies it existed.

She added: “It was quite interesting with this particular group, for example there was one question asking them to reflect on the time they first arrived in Germany, and you could see how the mood shifted, the conversation became very monosyllabic, some said they don’t remember, they were very little, but another said ‘we don’t want to talk about that’ – and we

didn’t. That shows you that children have agency in terms of their own discussions and their own wellbeing, which is an important learning for us as well.”

It is a research project that allows the children to shape the discussion and participate only to the degree they feel comfortable, with the children even adding their own questions that the researchers had not intended to ask, and conducting interviews with one another, rather than have a researcher interview them.

“It is amazing to see how many opinions young people have, how insightful they are, how they understand their own reality in ways that sometimes we adults don’t. Even young children are so clear about what they want, what they don’t want to talk about, while being reflective about how the exercise might have been useful or not.

“For us as researchers to understand ‘what do we need, what do we need to provide in order to work with them?’ It was very valuable.”

Professor Anne Anderson FRSE, Vice President of Research, said: “I am thrilled to see the progress of the Scotland-Lower Saxony Partnership as it enters its second year. The breadth and depth of expertise is frankly breathtaking, and I am gratified to see just how much work has been borne of this partnership.

“I am extremely proud to see how many research projects have been started, or continued, that involve interdisciplinary work. This really puts the need and appetite for open discussion and research collaboration into sharp focus.”



Professor Marcia
Vera-Espinoza



An exercise
for children to
describe their
social relationships
and interactions

Flipping the logic



War-based video games receive too much attention. That's why we've designed one about peace, writes Dr Rebecca Sutton

Consider a video game scenario. Deep in a parallel universe, blob-like beings are locked in a war over colour, as they struggle to control teal. This once-abundant resource is essential for survival, and it is rapidly diminishing.

In a modern first-person shooter version, players would descend into the game universe with the goal of winning more teal. Throughout gameplay, attention would be focused squarely on victory, the mentality zero-sum: more teal for you means less for me. The main character would be a military soldier, pitted against an enemy whose vilification only enhances the motivation to triumph.

This is certainly the version that sells, and that keeps players coming back for more. But what is this framing of conflict and its resolution doing to our collective imagination? How does it constrain our ability to advance creative solutions to preventing war and addressing its violence?

The answer lies in flipping the wargaming logic upside down.

Imagine now that the player is a local community leader, humanitarian, or peacebuilder. This civilian protagonist takes a different view of conflict, appreciating the immediate and long-term damage war inflicts on communities. Suddenly, a straightforward material 'win' appears hollow: more teal for me, yes, but to what end?

In addition to having a different professional identity from the militarised version, this player notices different things in the surrounding environment and asks different kinds of questions. They wonder: Is my presence here beneficial? What kind of leadership is needed in this moment and how could it be cultivated? How might violence be avoided?

'Peace-gaming' offers a fresh template for this alternative hero(ine)'s journey. Innovative new games that could be grouped under this umbrella are rapidly emerging on themes

including sustainability, climate change, peacekeeping, and peacebuilding competencies. The resources devoted to peace-gaming cannot (yet) compete with the billions annually invested in war-gaming, but focusing on dollar value misses the point.

The limits of what a peace game is, and what it can do, are now being tested by the interdisciplinary team behind the CEASEFIRE! peace game project. Our team includes industry partner Education Evolved, serious game designer Daisy Abbott and graphic artist Sarah Ahmad.

We have created CEASEFIRE!, a 2D video game that positions the player – a representative of the fictional Humanitarian Initiative for Safe Schools – in a negotiation with an armed group representative. The player's mission is to persuade their 'blob'

"PEACE-GAMING HAS THE POTENTIAL TO TRANSFORM GLOBAL RESPONSES TO VIOLENT CONFLICT, AND GIVE SOCIETIES A FIGHTING CHANCE AT PEACE"

counterpart that a Back-to-School ceasefire would protect education from attack in the war over teal.

Responding to the emotional displays of their counterpart – which are coded to reflect trust and frustration levels – the player must navigate pushback and other pressures relevant to frontline humanitarian negotiations.

Co-created with international ceasefire negotiation experts and youth peace gamers in Scotland, the game is informed by real-world conflicts and by cutting-edge academic research on humanitarian negotiations. The game intentionally

breaks with reality, however, by immersing the player in a greyscale blob universe very different from our own. This abstraction helps players avoid projecting current conflicts and making false assumptions driven by bias.

The blobs have adopted human-made laws, such as the Geneva Conventions, and they participate in international institutions like the UN. These conceits allow the game to serve its purpose as a training tool that cultivates legal literacy and emotional intelligence in high-stakes negotiations.

The prototype has now been demonstrated in the UK, Norway, at the Thai-Myanmar border, and, most recently, in Nairobi as part of a Solutions Showcase in the 5th Conference of the Safe Schools Declaration.

This declaration is an important political instrument that players of CEASEFIRE! learn how to deploy to protect education from attack. The game's roll-out as a training tool is now being piloted in classrooms and training spaces globally.

The long history of war-gaming has made it easy for us to play with ideas of how a soldier is made, how a nation arms and prepares for war. It is time now to move the conversation on and to ask instead: what does it take to cultivate a peacebuilder, to make peace manoeuvres, and be on a peace footing?

Peace-gaming's ascendancy has the potential to transform global responses to violent conflict, harnessing human ingenuity and unleashing imaginative potential that could secure better humanitarian outcomes, bolster civilian protection, and give societies a fighting chance at peace.



Dr Rebecca Sutton

Dr Rebecca Sutton, Professor of International Law, the University of Glasgow and Young Academy of Scotland member

Use a smartphone to take photos?

Thank RSE Fellow Professor Robert Henderson...

Every day the users of smartphones rely on RSE Fellow Robert Henderson's innovations to deliver sharp in-focus photographs.

Professor Henderson, who was a key engineer at the Edinburgh imaging division of ST Microelectronics, designed what became known as complementary-metal-oxide-semiconductor (CMOS) digital image sensors prior to joining the University of Edinburgh in 2000. Here, he invented a new optical detector, known as the single-photon avalanche detector (SPAD), which is used to facilitate low light level detection.

His patented design meant that SPADs could eventually be used in two-dimensional consumer imaging devices – consumer-grade cameras and in smartphones.

ST Microelectronics began a partnership with the university, in return for the assignment of Henderson's patents. This led to the first full-scale industrialisation of large 2D SPAD arrays. This innovation secured the transition of ST Microelectronics' imaging business, from CMOS to SPAD production, with it rapidly becoming the major supplier worldwide of SPAD devices.

ST Microelectronics combined a semiconductor laser with a 2D SPAD array, along with signal-processing electronics, all realised within a compact circuit. By measuring the time difference between infrared photon transmission and the reflected optical return, images could now be effectively brought into sharp focus. This system works with only low power, independent of the target size, colour, or how reflective the subject is, and has been commercialised, making inroads into the

laser autofocus market for both still and video cameras.

This autofocus system was initially incorporated by 15 different smartphone manufacturers, which let many billions of users enjoy high-quality focused images.

"Few people know that mobile phones are now equipped with quantum light detectors (SPADs) taking invisible near-infrared images at the speed of light to guide the camera to a well-focused snap."

Today these systems have been integrated into more than 170 different smartphone models and more than two billion parts have been sold. With its portfolio of 210 patents, the ST Microelectronics FlightSense product range continues to support some 130 staff at the Edinburgh imaging division.

Henderson then pioneered a novel time-to-digital converter electronic circuit which sped up the data acquisition from the many parallel sensor devices. This enabled him to design the first 32x32 array of per-pixel converters, ensuring the extension of his SPAD applications to multi-zone sensing.

This complicated advancement has enabled a number of new tools, for example gesture recognition. Algorithms can track



Professor Robert Henderson FRSE

and interpret human gestures as commands, which in effect allows able-bodied and disabled individuals to interact with machines through movement.

Another tool brought on by Henderson's new technology is used in obstacle detection in robotics and drones. This is a major technological advance, and

these innovations have the potential to revolutionise robotics, machine vision, and defence sensing, as well as application in the automotive industry.

"SPAD technology being developed in Edinburgh is set to be the eyes of all future autonomous technology across industrial, robotics, smart infrastructure, or automotive domains."

Henderson's pioneering innovations were recognised with the Best Academic Research Team award at the Image Sensors Europe 2018 conference, and the 2019 IEEE Jan Van Vessem Outstanding EU Paper award. Henderson served as Chief Scientific Officer at the US Sense Photonics Edinburgh start-up, where he generated a portfolio of patents on flash laser radar.

These now form part of Ouster's Digital Flash SPAD sensor technology, as adopted into their infrared laser radar, which can identify traffic and pedestrians, enabling the safe operation of self-driving cars.

The story of SPADs in Edinburgh is a great example of strong links between a university and a major semiconductor company enabling an efficient technology transfer to a killer mass-market application. That continues with the innovative directions being explored by local spin-off and start-up companies.

"SPAD TECHNOLOGY BEING DEVELOPED IN EDINBURGH IS SET TO BE THE EYES OF ALL FUTURE AUTONOMOUS TECHNOLOGY"

We know how to eliminate cervical cancer – but we must win back trust to do it

Every year in Scotland around 100 women die from cervical cancer and up to 400 women are newly diagnosed with the disease.

This should not happen.

For decades, cervical cancer has been detectable and treatable at an early stage and recently it has become preventable. The World Health Organization (WHO) calculates that if 90 per cent of girls are vaccinated each year, at least 70 per cent of women are screened, and if 90 per cent of women with pre-cancer are treated and those with invasive cancer managed appropriately, cervical cancer can be eliminated as a public health problem.

Cervical cancer is caused by the human papillomavirus (HPV). Since 2008, girls in Scotland have been offered vaccination against HPV in their first year at secondary school and, since 2016, the vaccine has been offered to boys. To date, in Scotland there have been no reported cases of cervical cancer caused by the types of HPV against which the vaccine provides protection, among women fully vaccinated between 2008 and 2010, and the vaccine continues to be effective more than 12 years after it was given.¹

Cervical screening allows early detection of cervical changes which, left untreated, may become malignant. Currently screening (testing for HPV infection) is offered every five years to women from age 25.

So, the systems are in place to eliminate cervical cancer in Scotland. However, cervical screening rates remain stubbornly below the required threshold for elimination of cancer and vaccination rates fell dramatically during the Covid pandemic. Although they have recovered somewhat, the rate remains below the requisite 90 per cent, thanks, in part, to a growing mistrust of institutions and public health messaging.

Confusing or conflicting messages coming from different sources, particularly from social media, fuel misinformation and disinformation and undermine public trust, which is difficult to counteract.

According to mathematical modelling, with current levels of HPV vaccination coverage and screening uptake, Scotland could reach elimination within the next 25 years. If an immense effort were made to increase vaccination and screening uptake, it could be done within just 15 years.²

However, the incidence of cervical cancer in Scotland has a clear deprivation gradient. Women living in the most deprived areas of the country are almost twice as likely to be diagnosed with cervical cancer. They are more likely to present at a later stage of the disease and are almost four times more likely to die from it than women living in the most affluent areas. And there is a clear deprivation gradient in the uptake of both vaccination and screening. In the school year 2024/25, more than 80 per cent of pupils at schools in the most affluent areas of Scotland were vaccinated – still below 90 per cent – while in the most deprived areas, that figure barely reached 60 per cent – again, well below the 90 per cent the WHO says we need to hit.

Likewise, age-appropriate cervical screening coverage was above 70 per cent in the most affluent areas, but below 60 per cent in the most deprived areas. Projections indicate that without an enormous effort, cervical cancer may never be eliminated as a public health problem in Scotland among women living in the most deprived areas.²

The Health and Wellbeing Community of Interest of the RSE recently held a meeting entitled Eliminating Cervical Cancer – a task of reaching the missing. Through presentations and roundtable discussions, we talked about the reasons for the inequalities, alongside interventions designed to reduce

them among women living not only in deprived and black and minority ethnic communities but also homeless and physically disabled women.

In years to come there will be many other cancers for which vaccination and early diagnosis will enable elimination. Uptake of those interventions will likely face the same issues as vaccination and screening for cervical cancer – perhaps redoubled, if we continue to leak trust in expertise.

To reach the communities that are seemingly less engaged or less able to engage in health prevention, and to eliminate many diseases equitably, we need to change beliefs, change behaviour and win back trust, and that is not easy to do. Events like our recent meeting, enabling experts from different specialties to come together, are vital to our understanding of how to achieve success.

References:

¹Palmer TJ, Kavanagh et al. Journal of the National Cancer Institute, Volume 116, Issue 6.

²Cervical Cancer Elimination in Scotland Expert Group Final Report, December 2025.



Professor Anna Glasier FRSE, a world-leading physician, is currently working for the Scottish Government as Scotland's first Women's Health Champion



THE ROYAL SOCIETY OF EDINBURGH

22–26 George Street, Edinburgh EH2 2PQ

Tel: 0131 240 5000 | www.rse.org.uk

Please send your comments on the magazine, or suggestions for future content, to the Editor at: comms@theRSE.org.uk

The Royal Society of Edinburgh, Scotland's National Academy, is Scottish Charity No. SC000470



[f RoyalSocEd](https://www.facebook.com/RoyalSocEd) [in RoyalSocEd](https://www.linkedin.com/company/RoyalSocEd) [@royalsoced](https://www.instagram.com/royalsoced)
[TheRoyalSocietyofEdinburgh](https://www.youtube.com/channel/UCTheRoyalSocietyofEdinburgh)

ReSource designed by www.connectmedia.cc