SynSci

Synergy for Science 2026
Meeting for a Healthier Future

12–16 July 2026
Scottish Event Campus, Glasgow, UK

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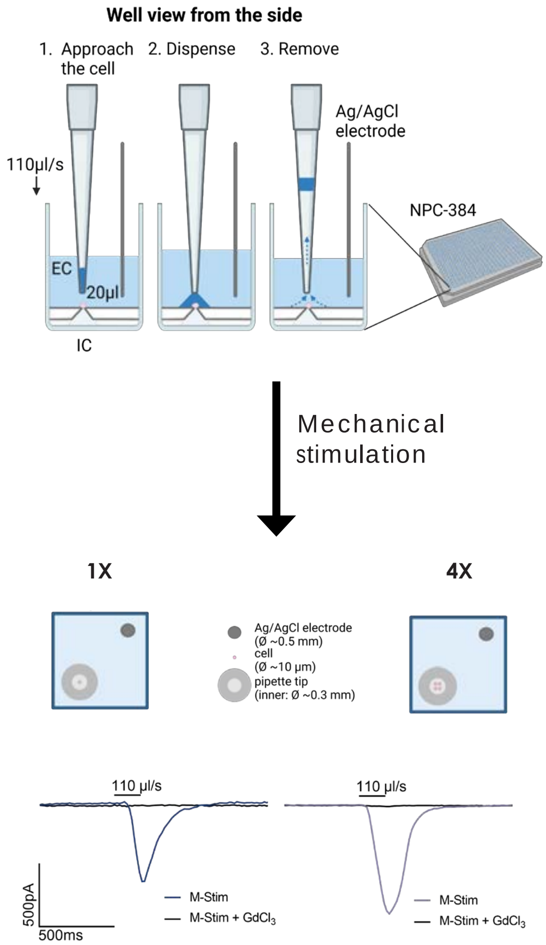

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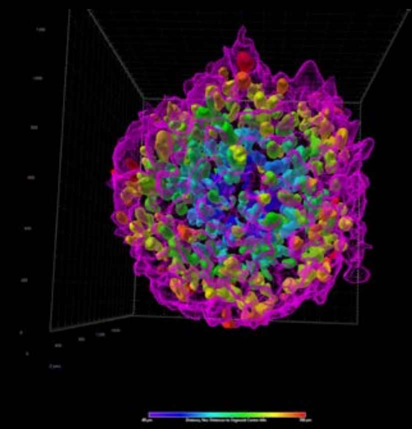

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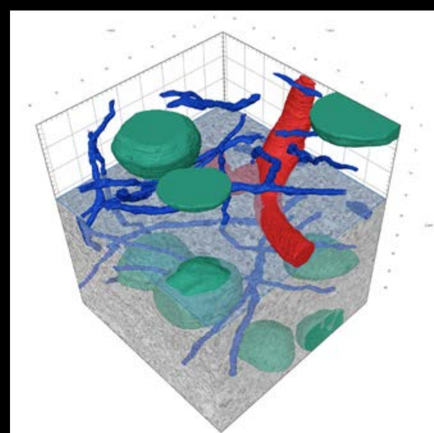

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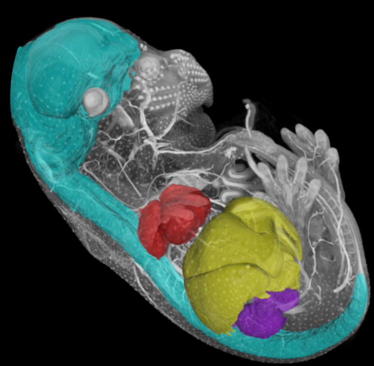

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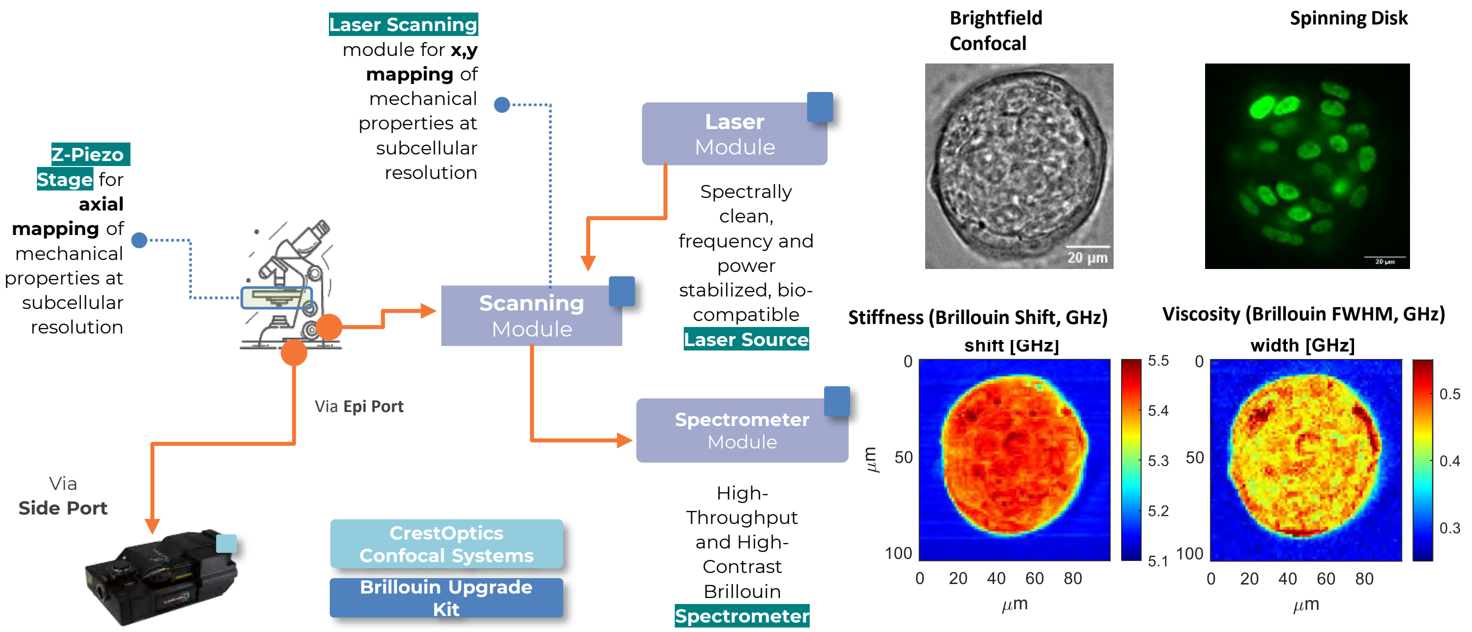
The CrestOptics Brillouin System provides non-invasive, non-contact, live-cell-compatible, sub-micrometric mapping of viscoelastic properties (stiffness, viscosity) in biological samples and 3D structures via Brillouin Light Scattering (BLS) spectroscopy. It couples a Nikon Ti2-Eclipse microscope with a CrestOptics X-Light V3 Spinning Disk in a correlative Brillouin–confocal workflow under unified software, with Z-focal-plane matching for reliable pixel-to-pixel correlation: 3D maps where viscoelastic properties are probed precisely where fluorescently stained structures reside.



Schematic representation of the system architecture. Representative data acquired on the CrestOptics Brillouin System.

Automated calibration routine

Automated, sample-free, programmable calibration, a **patented** CrestOptics technology delivering real-time stability over days.

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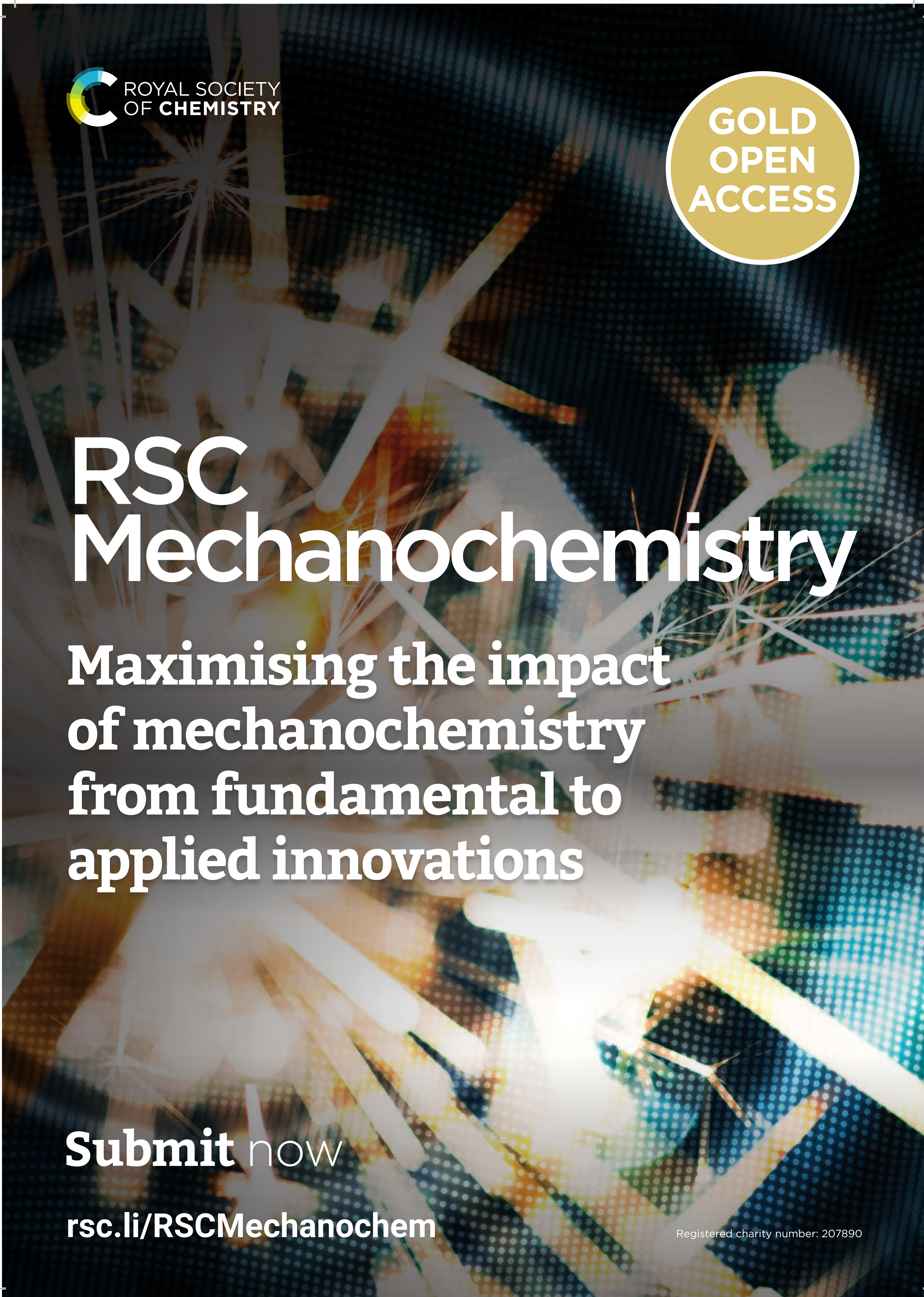
SCAN TO DISCOVER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ALBA brings **Brillouin microscopy** to standard microscopes, enabling **non-contact optical maps** of **local viscoelasticity** in **living cells, 3D models and native tissues.** By detecting mechanical contrast directly from light scattered by the sample, ALBA adds a new **quantitative readout for mechanobiology**, complementing fluorescence, brightfield and structural imaging.

ALBA is an **ultracompact, on-chip spectrometer** for **plug-and-play Brillouin spectroscopy**, combining **minimal footprint** with **uncompromised performance** for **all-optical, label-free and three-dimensional biomechanical analysis**

INTRACELLULAR BIOMECHANICS

Measure local elasticity inside living cells and track changes during mitosis, drug exposure and liquid-to-solid phase transitions.

ORGANOIDS AND 3D CULTURE MODELS

Monitor mechanical changes during growth and differentiation and evaluate drug efficacy based on stiffness changes

TISSUE ENGINEERING AND BIOMATERIALS

Quantify polymerisation dynamics, monitor scaffold remodelling without damaging the sample, characterise co-culture systems

TUMOR MICROENVIRONMENT AND EXTRACELLULAR MATRIX

Visualize 3D mechanical gradients in tumours, stroma and extracellular matrix to study invasion, heterogeneity and response to treatment.

MULTILAYERED/NATIVE TISSUES

Add mechanical contrast to tissue imaging for fibrosis, cardiovascular disease, ageing, regeneration and mechanomedicine studies.

Plenary Speakers

Innovation for global justice

Patricia Osseweijer[1]
[1]Delft University of Technology, Netherlands
Plenary Session: Patricia Osseweijer, July 13, 2026, 11:00 - 11:45

The transition from a fossil- to a bioeconomy has long been promoted as a way to mitigate climate change by reducing carbon emissions. However, progress has been slow. At the same time, competing uses of biomass - for food, feed, plastics, fuels and chemicals - became the subject of intense public and political debate. The sustainability of biomass production was increasingly questioned, feedstock availability became a major concern, and the renewable products proved often more costly than the fossil products they aimed to replace. These criticisms weakened support for the bioeconomy and shifted attention towards alternative technological pathways. While science and innovation in the bioeconomy domain continued to improve biomass conversion technologies, logistics and market development, transition agendas became increasingly dominated by wind and solar energy and renewed interest in nuclear power with large enthusiasm for hydrogen as novel energy storage system.
This shift risks overlooking the broader societal contributions of research and innovation for the bioeconomy. Sustainable agriculture, including soil and water management and biodiversity conservation, is essential for health, for food and water security, while the responsible use of biomass and waste streams can simultaneously strengthen energy security, rural development and social resilience. Wind, solar and nuclear energy based transitions cannot provide these wider benefits, while hydrogen remains only an energy carrier.
The bioeconomy can therefore be considered to be much more than a substitute for fossil resources. It spans the entire innovation chain, from fundamental research in biological processes and biotechnology to sustainable production systems and circular value chains. Providing valuable insight in life itself and the complex ecological system on our globe. Importantly, biomass utilisation uniquely provides opportunities for improving livelihood and social development for rural communities. However, reaching such objectives requires other design principles and integration with social sciences.
This places an important responsibility on scientists and innovators. Rather than focusing solely on technological performance or carbon reduction, research should be designed from the outset with societal objectives such as human wellbeing, resilience and global justice in mind.
In this lecture, I will examine the assumptions underlying the bioeconomy debate and reflect on lessons from public communication and stakeholder engagement around genetic modification (GM). I argue that scientists have an essential role not only in developing new technologies, but also in considering the societal directions in which they evolve. This requires integrating moral questions ex ante into research and innovation, while engaging more proactively with society, policy and industry. Drawing on several interdisciplinary projects, I will show how scientific research can be organised to maximise technological performance while simultaneously advancing sustainability, social development and global justice.

May the Force be with you! Piezo channels in mechanosensory biology

Ardem Patapoutian[1]
[1]Howard Hughes Medical Institute, Scripps Research, United States

Plenary Session: Ardem Patapoutian, July 13, 2026, 09:00 - 09:45

Mechanotransduction was perhaps the last major sensory modality not understood at the molecular level. Proteins/ion channels that sense mechanical force are postulated to play critical roles in sensing touch/pain (somatosensation), sound (hearing), shear stress (cardiovascular function), etc.; however, the identity of ion channels involved in sensing mechanical force had remained elusive. The Patapoutian lab identified PIEZO1 and PIEZO2, mechanically activated cation channels that are expressed in many mechanosensitive cell types. Genetic studies established that PIEZO2 is the principal mechanical transducer for touch, proprioception, baroreception, bladder, and lung stretch, and that PIEZO1 mediates blood-flow sensing, which impacts vascular development and iron homeostasis. Clinical investigations have confirmed the importance of these channels in human physiology. Current work in Patapoutian continues to explore the role of mechanosensation and interoception in physiology and disease.

The human organ atlas as a resource for open biomedical research

Claire Walsh[1]
[1]University College London, United Kingdom

Plenary Session: Claire Walsh, July 13, 2026, 09:45 - 10:30

Understanding the human body across scales remains one of the central challenges in biomedical research. Clinical imaging can visualise whole organs but lacks microscopic detail, while histology reveals cellular structure but only within small, physically sectioned samples. The Human Organ Atlas was formed to bridge this gap: to create an open, multiscale, three-dimensional reference of intact human organs in health, ageing and disease.
The Atlas grew from the development of Hierarchical Phase-Contrast Tomography, a synchrotron-based imaging approach established through an international collaboration between clinicians, imaging scientists, engineers and data specialists. Initially driven by the urgent need to understand organ-level pathology during the COVID-19 pandemic, the project rapidly evolved into a broader open-science effort. By imaging intact organs non-destructively, while retaining the ability to zoom into selected regions at near-cellular resolution, the Atlas preserves the spatial context that is often lost when organs are reduced to small samples or two-dimensional sections.
This talk will describe the history of how the Human Organ Atlas was formed: from method development and early biological discoveries, to the creation of an open-access data and visualisation platform, and the building of a wider community around this technique. I will discuss how technical work in large-scale data formats, metadata, web-based visualisation and reusable analysis pipelines has made these complex datasets accessible beyond the original imaging teams. I will also highlight how clinical and biological collaborations are turning the Atlas into a resource for health impact, supporting anatomical discovery, disease research, validation of clinical imaging, education, and the development of AI models trained on high-quality, spatially contextualised human data.

Cardiac mechanics to cure cancer

Serena Zacchigna[1]
[1]International Centre for Genetic Engineering and Biotechnology, Italy
Plenary Session: Serena Zacchigna, July 13, 2026, 11:45 - 12:30

The talk will focus on the mechanisms that prevent the spontaneous regeneration of the heart after damage and discuss mechanistic link with the rarity of cardiac cancers, to eventually move to therapeutic solutions to both promote cardiac repair and treat cancer.

Ethics and Innovation Forum Invited Speakers

A taxonomy of trust

Dr John Donaldson[1]
[1]University Of Glasgow, United Kingdom

Science, Trust and the Common Good 1, July 13, 2026, 14:00 - 15:30

In the experimental sciences and industry a concept of non-interpersonal trust is increasingly invoked, particularly in relation to artificial agents, cryptographic processes, and information technology more generally (e.g. Szabo 1999; Ferrer et al. 2021; Conitzer and Oesterheld 2023; Denning 2025; Scaling Trust Team 2026). In analytic philosophy, by contrast, most analyses of trust focus on interpersonal trust (e.g. Baier 1986; Holton 1994; Jones 1996; O'Neill 2002; Hieronymi 2008; Hawley 2014; Potter 2020; McLeod 2023), and there is widespread agreement that the most central concept of trust is interpersonal (McLeod 2023: Section 0; Simon 2020a: 2-12). Indeed, there is a fair amount of scepticism in the philosophical literature towards the idea that there can be genuine trust that is not interpersonal (see Simon 2020b; McLeod 2023). At the heart of that scepticism is the thought that trust is not mere reliance and that non-interpersonal trust is mere reliance by another name. If correct, then this would entail that the relevant uses of "trust" in the experimental sciences and industry are little more than rhetorical flourishes that are not to be taken literally.

I argue, however, that this is not entirely correct. I offer a taxonomy of these different concepts of trust that explains their relationship and argue that there is a serviceable concept of trust involving non-persons, at least where those non-persons are agents in a sufficiently substantial sense.

A bioethics for the post-liberal world

Ellen-Marie Forsberg[1]
[1]Østfold University of Applied Sciences, Norway

Engineering a New Bioethics, July 14, 2026, 11:00 - 12:30

The last years have seen a rapid growth of populist movements questioning the legitimacy of the liberal state and society. Anti-liberal movements are found both on the left and right of the political spectrum, but most pronounced is the growth of the far right. Though diverse in their primary concerns and commitments these movements seem to share doubts in current expertise-based governance systems, which are seen to represent the values and opinions of a small, unrepresentative liberal elite, undermining traditional values of ‘the people’ at large. Bioethics and research ethics broadly rely on committees or expert groups that conduct assessments and form opinions on issues within human or animal biotechnology that touch on substantive ethical values in society. Different ‘tools’ have been developed for making such assessments systematic but may not be effective for increasing the public legitimacy of moral judgements in a polarized world with decreased trust. In this contribution, I reflect on ways forward for bioethics with new methods for deliberation, including the use of AI.

Thinking machines or thoughtless bots? The Risks of Anthropomorphising LLMs

Michael Hicks[1]
[1]University of Glasgow, United Kingdom
Emerging Ethics for Emerging Technologies, July 14, 2026, 10:15 - 11:00

Large language models write and chat just like humans. This makes it very natural to talk as if they think just like us, and they are often described as believing, knowing, hallucinating, making mistakes, and having goals or desires. In this talk I will argue that these descriptions are, strictly speaking, false. But there are sometimes advantages to using anthropomorphic language when describing the design of complicated systems. I'll argue that some metaphors are more perspicuous than others, and discuss the dangers of uncritically adopting descriptions which support an industry-driven narrative of LLM's abilities and applications.

Innovation Under Pressure: Ethical Challenges for the Bioeconomy in the Age of Synthetic Biology and AI

Laurens Landeweerd[1]
[1]Radboud University Nijmegen, Netherlands
Engineering a New Bioethics, July 14, 2026, 11:00 - 12:30

The emergence of synthetic biology, artificial intelligence, and data-driven life science research is transforming both the possibilities and the governance of the bioeconomy. While advances in biological engineering have expanded opportunities for sustainable materials, industrial biotechnology, and biomedical innovation, they have also challenged established ethical, legal, and institutional frameworks.
This presentation examines how developments in synthetic biology and AI are reshaping the relationship between scientific discovery, technological innovation, and societal governance. It considers a range of ethical questions concerning biosafety, public participation, distributive justice, and the ownership of biological resources, before analysing how patent systems, platform-based infrastructures, and proprietary data ecosystems increasingly influence the direction of research and innovation. Particular attention is given to the convergence of biotechnology and AI, where computational platforms, foundation models, and large-scale biological datasets are becoming integral components of scientific discovery, raising new questions about intellectual property, responsibility, and accountability.

Rather than treating these developments as isolated ethical issues, the presentation argues that they reflect broader structural changes in contemporary innovation systems. It explores how increasing concentration of technological capabilities and infrastructure affects scientific autonomy, public governance, and the distribution of benefits arising from biotechnology. Suggestions will be discussed on how to balance scientific innovation with openness, democratic legitimacy, and long-term societal resilience.

Grassroots to Strategy: Building an AI Ethics, Literacy & Impact Community

Lydia Bach & Ciorsdaidh Watts[1]
[1]University of Glasgow, United Kingdom

Ethics, Risk and Governance 2, July 14, 2026, 15:30 - 16:30

How does an AI ethics initiative grow from a collection of grassroots activities into a strategic institutional theme? This talk reflects on the development of the AI Ethics, Literacy & Impact Theme within the Centre for Data Science & AI at the University of Glasgow, exploring how interdisciplinary collaboration, community building and educational innovation have combined to create a human-centred approach to AI.

The theme emerged through a series of connected initiatives spanning teaching, research, public engagement and institutional practice. These include the Lovelace–Hodgkin Symposium, the AI Ethics Book Club, the Ethics & Innovation Forum, and the AI Ethics, Inclusion & Society MOOC, each creating opportunities for dialogue between disciplines, sectors and communities. Together, these activities have fostered spaces where questions of trust, transparency, participation, sustainability and social justice can be explored alongside technological innovation.

The talk will examine how collaborative leadership, strategic partnerships and a growing portfolio of funded initiatives have enabled this work to develop from local projects into a coherent programme of activity. Particular attention will be given to the AI Ethics, Inclusion & Society MOOC, which has demonstrated significant reach and impact through engagement with learners across higher education, industry and the public sector, providing a platform for extending conversations around responsible and inclusive AI.

By sharing lessons learned from building interdisciplinary communities around responsible AI, the presentation offers a practical model for embedding ethics, literacy and societal impact within AI ecosystems. It argues that meaningful and sustainable approaches to AI require not only technical expertise, but also communities of participation that bring diverse perspectives into conversations about the futures we are collectively creating.

Shaping responsible AI in local government and public services

Denis Newman-Griffis

Ethics, Risk and Governance 1, July 14, 2026, 14:00 - 14:45

The UK public sector is pushing (or being pushed) to adopt AI at a record pace. What this transformation should look like in practice, however, or how local authorities should act to ensure AI use is responsible and public-centred, remains ill-defined. Local government authorities are complex organisations managing a wide range of public services, with AI technologies poised to play varying roles across these. Getting a handle on responsible AI in local government—and taking it from best principle to everyday practice—therefore requires working closely with local authorities and service delivery partners to make responsible public sector AI real and actionable. This talk will bring together key insights and lessons learned from ongoing partnerships with local authorities to develop usable responsible AI policy and practice. I will examine the challenges in understanding and implementation that hinder cross-team communication in local authorities, and illustrate sector-led priority areas for building sustainable communities of responsible AI practice. Taking the growing, high-impact area of AI use in education for children with Special Education Needs and Disabilities (Send), I will show how tensions between national policy and local practice illustrate the need for wider conversations to re-vision the future of AI in the public sector.

What Computation Has Always Been

Dr Kimia Witte[1]
[1]University Of Strathclyde, United Kingdom
Science, Trust and the Common Good 2, July 13, 2026, 16:00 - 17:15

What does a cell do when you push it out of equilibrium and it returns? What is that return? It is not error correction. It is not the execution of a recovery program. It is the persistence of the relations through which the system continues to exist under perturbation. This is computation. Not by analogy. As a precise physical description of what organised matter does when it persists.

Computation has been defined as symbol manipulation over abstract representations. That definition was built for machines. Even there, computation is physical. The work is done by material state transitions and physical constraints. The logical level is an abstraction over that physical reality, not a separate domain. Applied to living systems, that abstraction fails entirely. There is no logical level separate from the material process. Memory, processing, and execution are not stages. They are the same thing happening continuously through constraint, force, boundary, and energetic exchange.

Organisation is the persistence of relational constraints that delimit what a system can do next. Information is relational invariance, a difference that persists by shaping future possible transitions. When a cell is perturbed and its relational structure holds, information persists. When organisation fails, information ceases. The informational is not a description of the physical. It is the physical, under constraint.

The limits of computation are the limits of organisation. They are structural, not algorithmic. The question is not whether living systems compute. The question is what computation has always been. Every system we are building at the boundary of computation and life rests on an answer to that question. That question is not only a scientific problem. It is where the ethics begins.

Trust in science, social fragmentation and epistemic inclusion

Hub Zwart[1]
[1]Erasmus University Rotterdam, Netherlands

Science, Trust and the Common Good 1, July 13, 2026, 14:00 - 15:30

Trust in science is never a given nor should it be. Scepticism and critical reflection are an integral part of the scientific ethos and method. The purpose of societal debate on science likewise is to offer the floor to critical reflection, allowing researchers to become aware of possible biases or blind spots. Trust in science can be fostered through participatory research, making research more inclusive, transparent and responsive to societal values, questions and concerns, lowering barriers between academic and societal knowledge, use societal concerns and scepticism as a source of inspiration and information. This is not an easy approach, as we are facing emerging challenges: societal polarisation (often in response to disruptive technologies), growing inequalities and the replacement of a common public sphere by communicative bubbles and social media. Yet, to the extent that participatory approaches work, they may enable societal stakeholders to distinguish valid from unsubstantiated trust, healthy from unfounded distrust, while enabling researchers to conduct relevant, engaged and value-driven research, – opening up to multiple perspectives while foregoing partiality, ideological biases. In short, rather than promotional activities, trust in science requires epistemic inclusion, as well as collaboration between science, technoscience, social science and humanities. In particular I will zoom in on recent developments in life sciences fields. Rather than seeing societal engagement and interaction as the final stage of a research trajectory, research must build on mutual learning, involving societal dialogue as part of the “empirical cycle” and as an intrinsic component of participatory research methodologies.

Ethics and Innovation Forum Oral Presentations

Translating Interdisciplinary Discourse into an Open Curriculum: Development of the 'AI Ethics: Inclusion and Society' Massive Open Online Course

Nicholas Smoliak[1] & Abbie Thorpe[2]
[1]University Of Glasgow, United Kingdom, [2]University Of Glasgow, United Kingdom

Ethics, Risk and Governance 2, July 14, 2026, 15:30 - 16:30

The 2024 and 2025 Lovelace-Hodgkin Symposia at the University of Glasgow provided the foundation for a Massive Open Online Course (MOOC) on artificial intelligence ethics, inclusion, and society. The course translates symposium themes into a structured, accessible learning resource on the FutureLearn platform. The development process emphasised inter-disciplinary collaboration, producing a curriculum that captures diverse lived experiences and academic expertise representative of the student population at the University of Glasgow.

The MOOC was designed to distil key symposia discussions covering diverse themes and complemented them with wider perspectives and topics. Content is structured around three core elements: (i) exploration of artificial intelligence concepts and ethical frameworks; (ii) integration of the student experience in higher education, encompassing issues of bias, opportunity, and digital literacy; and (iii) curation of resources to encourage the application of acquired tools to fields such as legislation and healthcare, consolidating articles, podcasts, and expert interviews.

The resulting course, AI Ethics: Inclusion and Society, is freely available online and actively maintained since inception. To date, it has attracted 1,269 joiners and 894 learners internationally. Engagement metrics indicate sustained participation, with an average of 10 comments posted per user (totalling 2,230 comments) and 387 learners achieving ≥90% step completion. Following presentation at VicePHEC 2025, the course has been adopted by colleges in science and engineering at the University of Glasgow, complementing its independent online reach.

Key contributions comprise the translation of interdisciplinary discourse into an actively engaged pedagogical output and the integration of AI ethics into university teaching and learning. Presentation at SynSci26 is well aligned with the conference mandate to 'transcend scientific silos' by equipping a diverse populace to critically evaluate the broader societal impacts of AI.

A Shared Language for Hard Problems: The Cell Crypto Outcomes Graph as a Model for Collective Deep-Tech Literacy

Thane Campbell[1]
[1]Deep Science Ventures, United Kingdom

Science, Trust and the Common Good 2, July 13, 2026, 16:00 - 17:15

Modern digital trust rests on a fragile assumption: that the physical hardware executing our code is reliable. Nature solved an analogous problem billions of years ago; a living cell continuously proves its existence through energetic expenditure. Translating this biological insight into cryptographic infrastructure requires reasoning rigorously across quantum physics, bioengineering, philosophy, and venture creation simultaneously. This is not primarily a technical challenge. It is an epistemological one.

Living Proof, an ARIA-funded Discovery Project, takes this as its organising question. Through a series of Trust Tech Scoping Studios delivered by Deep Science Ventures, 27 PhD researchers and deep tech founders learned a shared language and process. Rather than beginning with solutions, participants begin with societal outcomes and work backward mapping the requirements of an ideal solution, barriers to reaching it and solutions using a structured ontology. Insights feed back across generations of inquiry, with each iteration revising the map. The Scoping Ontology has been used in this way to find the most important questions in a field and address them with new, high impact science companies.

The community's artifact, the Cell Crypto Outcomes Graph, spans 11 "approaches" including post-quantum biological keys, organoid computing infrastructure, and genomic foundation models for writing security primitives into DNA. Not simply "ideas", approaches are structured arguments, each carrying unresolved constraints alongside hypothesised solutions.

The ethical questions surface through the method. Can black-box biological authenticators ever be truly trusted? What accountability structures apply when living systems fail? Whose biological data anchors the encryption key? Scoping raises these questions systematically rather than deferring and establishes clear rules for robust disagreement and meaningful exchange.

The method is generalisable and urgently needed: the scoping ontology, offers communities an outcome-centric way to engage with and reason collectively about some of the hardest sociotechnical problems before the ethical stakes become irreversible.

Imagination, trust and how to explore the ethical horizons of research: the case of Frankenstein 2.0, or, an even more modern Prometheus

Dr Mark Haw[1]
[1]Department of Chemical and Process Engineering, University Of Strathclyde, United Kingdom
Science, Trust and the Common Good 2, July 13, 2026, 16:00 - 17:15

Public trust in science depends not just on ethical approaches to specific individual projects - which we try to assure via ethics committees and codes - but on the bigger picture, what might be called the ethical 'horizon' of a given field. But 'rationally' predicting the wider impacts of an idea or way of thinking is very challenging, because there are too many possible outcomes: could we have logically derived the current impacts of AI, for example, as scientists took the first steps in machine learning? Taking the example of modern developments in the biophysics field, I argue that exploring the wider ethical horizons of research demands as much imagination as prediction. Recent conferences in biophysics, with titles such as 'Designing biology', 'The artificial cell', indicate the broad ambition of the field: to understand how collections of inert chemicals turn into living systems. When it comes to imagining the possible social, cultural and philosophical horizons of this ambition, we have a precedent: Mary Shelley's 1816 novel, 'Frankenstein'. While today's science far outstrips that of Shelley's time, the ethical issues she raised remain both just as relevant to modern biophysics, and largely unresolved. Meanwhile the Frankenstein 'industry', replacing the original story's social and cultural concerns with sensational horror, has arguably damaged public trust in the science. If we wish to explore the possible ethical horizons of this revolution--how science divides the living from the lifeless--and assure ongoing public trust in where the science will take us, I argue that we should follow Shelley, and re-imagine, tell a new story, the story of 'Frankenstein 2.0'. I discuss what this means for the skills researchers will require as we close in on 'artificial life', and how to ensure this new exploration of the ethical horizon does not morph into damaging, unscientific, Hollywood sensation.