

# To secure the UK's innovation future, ethics cannot be optional



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We are living through one of the most fast-paced and disruptive technological periods in history. This is creating huge opportunities, but as scientific progress accelerates, the challenge for policymakers, regulators and innovators cannot simply be how quickly new technologies can be brought into use; it must also be about ensuring they are responsible and deliver for society.

At a recent meeting with the Science and Parliamentary Committee, the Nuffield Council on Bioethics (NCOB) examined three ways ethics can help strike this balance: supporting trustworthy and equitable science, aligning innovation with societal needs and expectations, and helping build consensus on complex and contested issues.

## Ethics helps build consensus on complex and contested issues

We live in an increasingly polarised world, where navigating difficult questions about contested innovation means confronting competing values, interests and perspectives. Where this happens without a clear process for working through disagreement, decisions risk lacking the legitimacy they need to stick – either stalling entirely, or proceeding without public backing and trust.

Ethics offers a way to bridge those differences and find a path through issues that can otherwise seem intractable. One way the NCOB does this is by bringing together multidisciplinary working groups, deliberately convening experts with diverse perspectives to work through difficult ethical questions collectively.

Our current project on Solar Radiation Modification (SRM), a form of geoengineering, is an example of this approach (see figure). The Government has committed over £67 million to SRM research. Yet the field remains highly contested, with deep divisions within the scientific community and beyond over whether and how it should proceed. Our working group brings together experts

from across that divide, including critics of SRM and researchers directly involved in the science. The aim isn't agreement on the technology itself, but consensus on the principles and governance that should guide future decisions and earn public confidence in them, with recommendations due early next year.

Ethics can also create space for informed public deliberation on difficult questions. The NCOB's work on assisted dying illustrates this. Amid growing public and political debate on questions of autonomy, dignity and the role of the state, the NCOB commissioned England's first Citizens' Jury on assisted dying in 2024. Over eight weeks, the jury heard a wide range of evidence and deliberated carefully together.

One of the most striking reflections from jurors was that this process enabled them to move beyond their initial reactions and engage with the issue through a broader societal lens – a powerful illustration of how ethics can create the conditions for more informed, legitimate and trusted decision-making.

## Ethics supports equitable and trustworthy science

Ethics plays a central role in supporting equitable and trustworthy science, in two distinct ways.

First, by seeking to ensure the benefits of research are fairly distributed. If we take genomics as an example, the NHS 10-Year Plan places genomic medicine at the centre of its ambition for personalised, predictive and preventative care, promising earlier diagnosis, more precise treatment and better disease

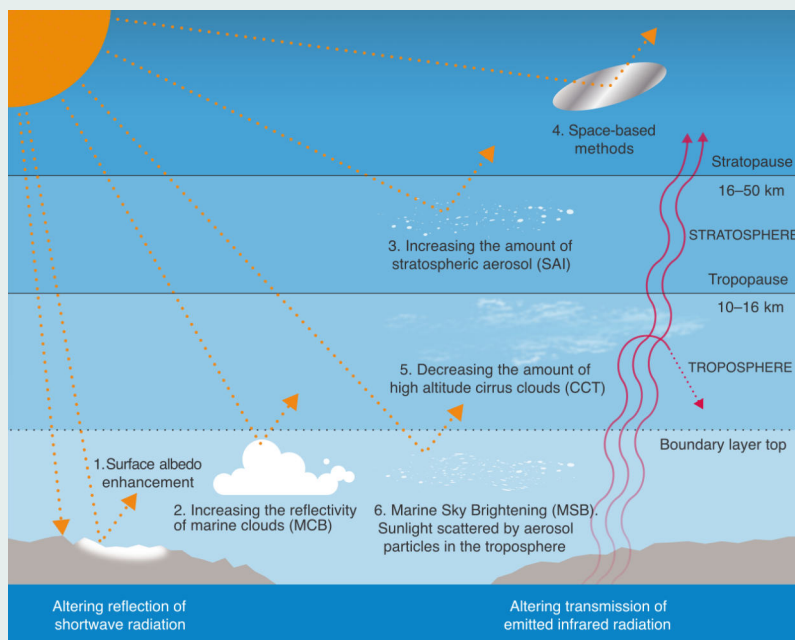
prevention. However, potential is not performance, and performance depends on the quality and diversity of the data behind these tools.

Around 85% of genome-wide association study participants are of European ancestry, while African populations – the most genetically diverse globally – remain significantly underrepresented. As a result, tools such as polygenic risk scores are markedly less accurate in non-European populations.

The consequences are already visible in clinical practice: warfarin dosing, built largely on European data, has not always accounted for genetic variants more common in people of Asian ancestry, contributing to historic over-dosing in these groups. This pattern repeats across pharmacogenomics – unrepresentative data produces outcomes that are less accurate, and sometimes harmful.

Ethics has a key role to play in addressing these limitations and ensuring any potential benefits are equally distributed. Before any genomic tools are implemented at population scale within the NHS, we need robust ethical assessment and minimum reliability standards to ensure they do not reinforce existing health inequalities. Ethics guidance also plays a key role in responsible research and improving the diversity of datasets, through more inclusive study design, meaningful engagement with communities, and stronger data governance.

Getting this right matters. If we don't, instead of improving health outcomes, we risk the opposite: new harms, deeper inequalities and a loss of public trust.



Schematic diagram showing the interaction of solar radiation (orange arrows) and emitted infrared radiation (wavy red arrows) with the various proposed SRM techniques.

Source: The Royal Society. Solar Radiation Modification. Policy Briefing, October 2025.

Second, ethics can provide researchers with clear and accepted boundaries to work within. The NCOB's work has identified areas of emerging science where researchers are operating in regulatory and ethical grey areas, including human stem-cell-based embryo models and neural organoids, which raise complex ethical questions.

Without a clear framework, researchers are left to navigate these questions case by case – creating uncertainty, inconsistent decision-making across the field, and a chilling effect where individual scientists, unsure of where the ethical lines lie, may hesitate to pursue legitimate research. Clear ethical guidance avoids this by giving researchers the confidence and protection to get on with their work, knowing they are operating within understood and accepted parameters.

These benefits of clarity also extend beyond the lab. The public's trust in science depends on it too: the recent Public Attitudes to Science report found that ethical behaviour is one of the public's most important expectations of scientists, and trust, once lost, is incredibly difficult to regain.

## Ethics helps align innovation with societal needs and expectations

The trajectory of a technology is not fixed from the outset. Decisions about what it is used for, who benefits, and what values shape its development are choices, often made implicitly. Ethics makes them

explicit – by surfacing the values at stake early enough for them to be debated, rather than locked in by default.

Regulation is a critical juncture in this process, where those values are translated into guardrails. Here ethics helps strike a proportionate balance: enabling scientific progress while ensuring it aligns with public interests, so that regulation neither closes off worthwhile innovation nor allows it to proceed unchecked.

Mitochondrial transfer is a clear demonstration of what that process can look like in practice. The technique, developed by UK scientists to prevent serious mitochondrial disorders from passing from mother to baby, generated controversial headlines about "three-parent babies" when it was the subject of a major ethical review by the NCOB in 2012.

The review weighed the benefit of preventing serious, often fatal disease against concerns about altering genetic material and the welfare of any resulting child. It concluded that, under certain conditions, the technique would be ethical.

That review, alongside the Human Fertilisation and Embryology Authority (HFEA) public dialogue, gave parliamentarians a clear sense of public expectations and the confidence to legislate. In 2015, the UK became the first country in the world to legalise the technique in the clinic, and remains one

of only two where it is legally available to patients today.

Despite the success of this approach in supporting responsible innovation, there is still a tendency to treat ethics as separate from innovation and regulation, rather than core to how emerging technologies are assessed, governed and implemented. This is a missed opportunity that will cost us greatly.

Across the UK's innovation ecosystem, we know the pace of scientific change is outpacing the regulatory frameworks built to govern it. We are at a key moment as government and regulators respond to this challenge: the Government has invested in new experimental governance approaches, including regulatory sandboxes – testbeds for designing the regulation of emerging technologies.

As these frameworks are redesigned, there is a real opportunity to embed ethical reflection into the process from the start, ensuring the choices being made about new technologies truly align with society's values, needs and priorities.

Advances coming through the UK's research pipeline hold enormous potential. But if that science is going to convert into technologies and products that deliver on their promise and share their benefits equitably across society, ethics needs to be treated as part of the core infrastructure for navigating these challenges – not a tick-box or an afterthought.