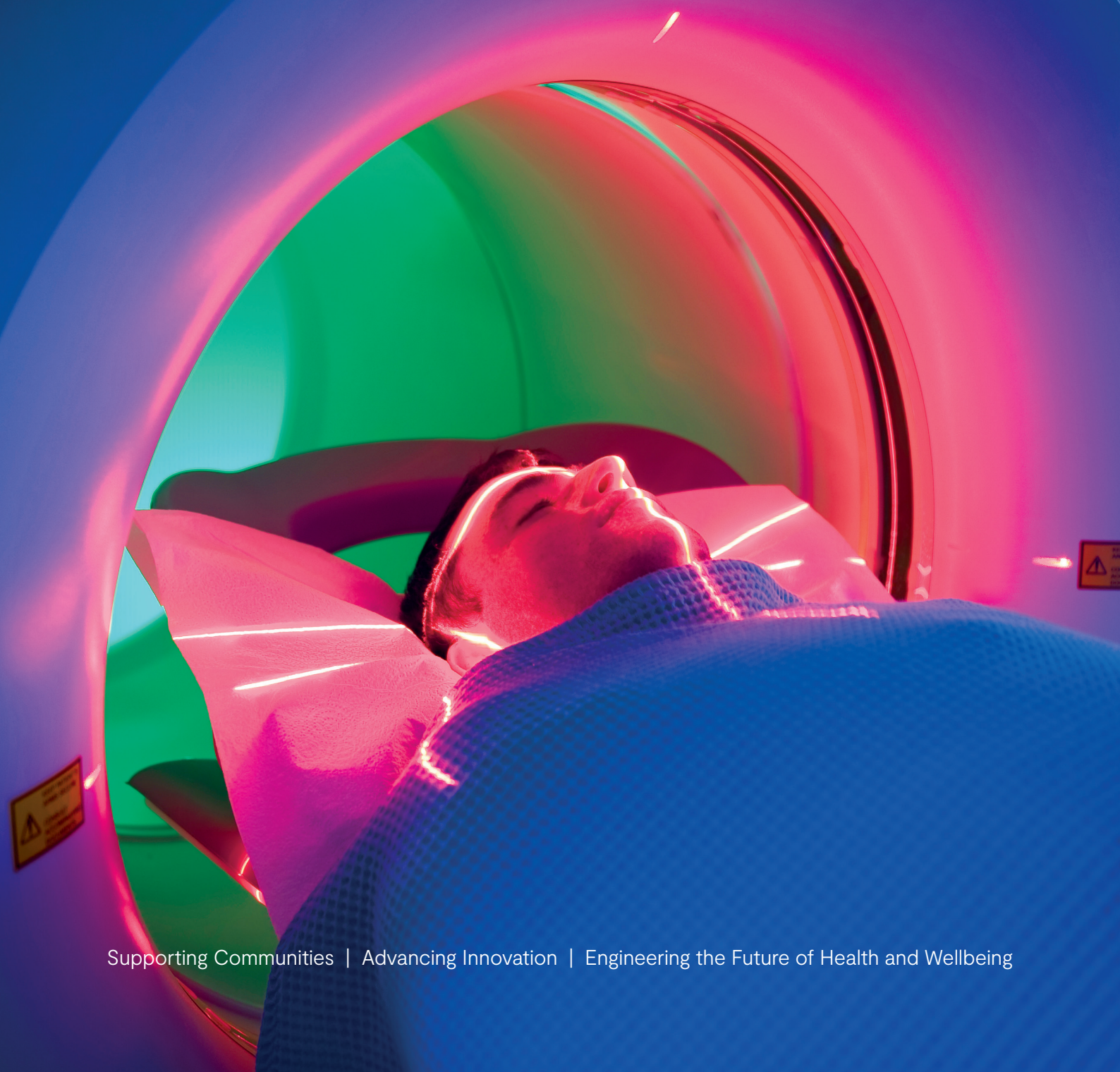


IPEM

Institute of Physics and
Engineering in Medicine

Engineering the Future of Health across the UK

A Manifesto for Clinical Engineering in the
Age of AI, Prediction and Prevention



Supporting Communities | Advancing Innovation | Engineering the Future of Health and Wellbeing

Clinical Engineering has a proud legacy of enabling safe, effective, and innovative healthcare across the world. The challenge and opportunity now lie in building upon that foundation to become a strategic driver of healthcare transformation.

Through scientific leadership in technology adoption, research, innovation, data, and system design, Clinical Engineering can advance health and wellbeing, support more sustainable healthcare delivery, and ensure that emerging technologies deliver tangible benefits for patients, communities, and society.

A Vision for Clinical Engineering

Across the UK, health systems are entering a period of profound change. Excellent treatment will remain essential, but the future increasingly depends on earlier identification of risk, prevention, timely intervention and diagnosis, enabling people to live healthier lives in their own homes and their communities.

Artificial intelligence, advanced analytics, robotics, connected medical devices, wearable technologies, digital platforms and precision health are creating new possibilities. Data from health records, diagnostics, imaging, genomics, remote monitoring and consumer technologies can increasingly be brought together to support earlier, more personalised intervention.

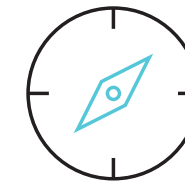
Technology, digital infrastructure and data are becoming the foundations of modern health and wellbeing. However, technology alone will not transform health systems. Delivering safe, effective and equitable technology-enabled health requires Clinical Engineering expertise to assess need, design and evaluate solutions, recommend or prescribe technologies, integrate systems and data, assure safety and performance, support users and optimise value throughout the technology lifecycle.

This is where Clinical Engineering makes the difference.

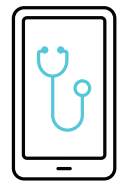
Clinical Engineering already delivers its greatest value through three complementary roles, which will become increasingly important as healthcare evolves:



Technology Stewardship
Ensuring technologies are governed safely throughout their lifecycle.



Technology Navigation
Helping the right technology reach the right person, in the right place at the right time.



Technology Prescribing
Recommending technologies that best meet individual and population needs.

The profession brings together healthcare technology management, rehabilitation engineering, clinical measurement, the design, development, adaptation and manufacture of engineering solutions for individual patient need, digital and software assurance, research and systems engineering.

Clinical Engineers are technology stewards, navigators and technology prescribers. They help choose the right technology, integrate it into clinical pathways, get it to the people who will benefit, support its effective use, monitor its real-world performance and advise when it should be adapted, replaced or de-adopted.

That responsibility is increasingly extending beyond hospitals. Clinical Engineers work increasingly with patients and carers, supporting home-based and community technologies, helping people use equipment safely, and enabling patient-generated data to inform care. They also help health services distinguish between regulated medical devices and wider health and wellbeing technologies, manage risk proportionately and address digital exclusion. Clinical Engineering services extend their established expertise in the safe and effective management of healthcare technology to primary care, community providers and other organisations delivering care outside acute hospitals.

Building on the legacy of rehabilitation engineering, the profession will develop a broader model of technology recommendation and prescribing. This includes physical devices, assistive technologies, software as a medical device, AI-enabled systems, wearables and connected care – always grounded in evidence, patient need, informed choice and equity of access.

Innovation must be translated safely into practice. Digital systems must interoperate. Artificial intelligence must be trustworthy, explainable and appropriately governed. Predictive tools must support proactive intervention without embedding bias or widening inequalities. Technology must reduce burdens, improve outcomes and enhance experience – not simply add complexity and cost.

Clinical Engineering remains an essential operational profession that is increasingly recognised as a strategic partner in shaping future health and care systems. Its future is to support and advance healthcare: maintaining trusted services while shaping the technologies, pathways and health systems of tomorrow.

Our Vision

We see a future where Clinical Engineering is recognised across the UK as a strategic clinical profession and an operational cornerstone of safer, smarter, more equitable and sustainable health and care systems.

Engineering leadership:

informs major technology, digital, data and infrastructure decisions.

Technology reaches the point of need:

with Clinical Engineers helping patients, carers and professionals choose, access and use it effectively.

Prediction and prevention become routine:

through safe, equitable use of AI, analytics, remote monitoring, wearables and connected technologies.

The whole profession contributes:

from technical and practitioner roles delivering high-quality services to senior leaders shaping strategy, policy and investment.

Research and innovation translate safely into practice:

including responsible in-house development where appropriate.

Software, AI and medical devices governed consistently throughout their lifecycle:

with SaMD and AI included in inventories, clinical safety cases, lifecycle controls and post-market surveillance.

Sustainability is engineered through:

better selection, maintenance, utilisation, refurbishment, reuse, waste reduction and responsible decommissioning.

The UK helps shape global practice:

with the opportunity to strengthen its global influence by increasing Clinical Engineering contributions to research, innovation, standards development, and the sharing of best practice across international health systems.

Why Action is Needed Now

Across all four nations, health systems are seeking to move from a predominantly treatment-based model towards prevention, early intervention, personalised support and population health. Identifying people at risk earlier creates opportunities to improve outcomes and experience, reduce avoidable admissions and long-term demand, and deliver wider social and economic value.

At the same time, healthcare delivery is increasingly shifting from traditional hospital settings into communities and patients' homes. Patients are making greater use of consumer health technologies and connected devices, while health services are becoming increasingly reliant on complex ecosystems of connected medical devices, software, data platforms, and digital infrastructure. These developments present significant opportunities to improve access, personalisation, efficiency, and health outcomes. However, they also introduce new challenges and risks relating to patient safety, interoperability, cyber security, algorithmic bias, digital exclusion, environmental sustainability, data governance, and accountability. Addressing these issues will be essential to ensuring that innovation is implemented safely, equitably, and effectively across health and care systems.

Clinical Engineering is uniquely positioned to support this transformation due to its ability to bridge technological innovation and clinical practice. The profession provides expertise across the lifecycle of healthcare technologies, enabling the integration of data systems, evaluation of predictive and connected technologies, assurance of artificial intelligence and software-enabled solutions, and redesign of clinical pathways to support more efficient and patient-centred models of care. Clinical Engineering also plays a critical role in supporting the safe use of technologies by both patients and healthcare professionals, while generating real-world performance, usability, and safety evidence that informs continuous improvement, regulatory decision-making, standards development, and future innovation. Through this systems-level perspective, Clinical Engineering helps ensure that emerging technologies deliver measurable benefits while maintaining safety, effectiveness, equity, and public trust.

Yet the profession's contribution remains under-recognised and it is not consistently positioned as the strategic partner it already has the capability to be. Workforce pressures are increasing; services are often treated as technical support rather than strategic partners; and engineering expertise is not routinely present when technology, digital services and models of care are designed.

Our Future

Building on its existing strengths, Clinical Engineering will continue to evolve to:

- Build further on excellent operational services while extending technology stewardship, navigation and prescribing across the patient pathway.
- Continue to lead robust governance of medical devices, SaMD, AI-enabled systems and connected technologies.
- Further enable earlier diagnosis, risk prediction, prevention, and personalised care through equitable access to innovative services and technologies, while supporting the ambitions of all four UK nations to improve population health, reduce health inequalities, and deliver care closer to home.
- Strengthen contributions to research, innovation adoption, and learning health systems by supporting the generation and application of new knowledge, fostering evidence informed service transformation, and enabling the development of real-world evidence through robust evaluation, continuous learning, and quality improvement.
- Strengthen post-market surveillance by collecting and sharing real-world performance, safety and usability evidence with manufacturers, regulators and standards bodies, supporting continuous improvement in technologies and their regulation.
- Expand direct support for patients and carers to support safe, confident and effective use of technology.
- Continue developing a sustainable, inclusive workforce and create meaningful career opportunities from entry-level technical roles to consultant and executive leadership.
- Improve productivity, resilience and environmental sustainability across the technology lifecycle.
- Support the UK Government's ambition to establish the UK as a world-leading hub for life sciences, accelerating the development, evaluation, and adoption of innovative health technologies and standards.

Now is the time to realise the full potential of Clinical Engineering.



Delivering this vision will require leadership, collaboration and investment.

Delivering the Vision

Through four strategic priorities, IPEM will work with governments, health services, patients and carers, academia, industry, regulators, standards bodies and professional partners across the UK.

Elevate

Building a recognised, respected and future-ready profession.

We will strengthen professional identity, standards, leadership and career development so that Clinical Engineering is recognised as a strategic clinical profession at the forefront of preventative, digitally enabled healthcare. As healthcare shifts towards prediction and prevention, Clinical Engineers already play a fundamental role in prescribing, governing and optimising technologies such as AI, predictive analytics, digital platforms and wearable devices. We will champion the development of a workforce that is equipped to guide technology adoption, assure patient safety, reduce health inequalities and deliver measurable improvements in patient outcomes, patient experience and value.

Connect

Creating one connected Clinical Engineering community.

We will strengthen the connected UK Clinical Engineering community that shares expertise, data, innovation and best practice across the four nations. By strengthening collaboration between clinical engineers, data scientists, digital professionals, clinicians, industry and academia, we will accelerate the safe deployment of connected technologies. A unified professional community will support the spread of innovation, develop future leaders and create the collective capability needed to deliver more predictive, personalised and preventative models of care.

Influence

Shaping the future of health and wellbeing.

We will position Clinical Engineering at the heart of health and care system transformation, ensuring engineering expertise informs policy, digital strategy, technology regulation, research, innovation and patient safety. We will strengthen recognition of the profession's leadership in technology prescribing, pathway redesign and population health, while advocating for proportionate regulation and medicines governance that enables appropriately registered professionals to practise to the full extent of their competence, including the use of Patient Group Directions where appropriate. We will also strengthen UK Clinical Engineering's contribution to national and international standards, helping shape the standards that underpin future healthcare technologies.

Enable

Providing the capability to succeed.

We will equip the profession with the workforce intelligence, education, standards, research capability and practical tools required to evaluate, prescribe, implement and continuously improve healthcare technologies. This includes developing expertise in AI, digital health, interoperability, wearable technologies and real-world evidence. We will strengthen the profession's capability to fulfil its role as technology navigators and stewards, ensuring that the right technology reaches the right patient at the right time and continues to deliver benefit throughout its lifecycle. Through robust evaluation, continuous improvement and evidence-based adoption and de-adoption, the profession will help realise the full potential of technology-enabled healthcare.

Our Calls to Action

Realising this vision requires collective action. We call on governments, health services, regulators, universities, industry and professional partners across the UK to:

- ✓ Recognise Clinical Engineering as a strategic clinical profession and an essential operational service.
- ✓ Invest in the workforce, education and leadership needed for sustainable career pathways at every level.
- ✓ Embed Clinical Engineering expertise in organisational leadership, service redesign, digital programmes, infrastructure planning and technology investment decisions.
- ✓ Enable Clinical Engineering services to extend safely into community and home settings, with patients and carers as active partners.
- ✓ Strengthen governance for medical devices, SaMD, AI and connected technologies across their full lifecycle.
- ✓ Support Clinical Engineering-led research, innovation and stronger national feedback into regulation, standards and post-market surveillance.
- ✓ Use procurement, maintenance, refurbishment, reuse and decommissioning to reduce waste, carbon and whole-life cost.
- ✓ Measure success by better outcomes, safety, equity, patient experience, productivity, resilience and sustainability – not technology adoption alone.

Engineering the Future Together

The future of health will not be defined by technology alone. It will be defined by whether we choose the right technology, manage it well and enable the people who will benefit to use it effectively.

Clinical Engineering transforms engineering excellence into better outcomes, healthier lives, stronger communities and more sustainable health systems.

The profession's long-standing contribution to healthcare remains fundamental. The opportunity now is to build on it – to advance health and wellbeing through engineering, shape change and lead where engineering expertise can make the greatest difference.

- Steward >** Safe throughout the lifecycle
 - Navigate >** Right technology, right person
 - Prescribe >** Technology matched to need
- This is where Clinical Engineering makes the difference.**

Together, we will engineer the future of health across the UK.

Acknowledgements

This Manifesto has been developed by IPEM in collaboration with the Clinical Engineering community, drawing on the expertise and experience of colleagues working across healthcare, academia, innovation and the wider profession.

Clinical Engineering Manifesto Development Group

- Dr Anna Barnes CSci FIPEM
- Mr John Boulter MIPEM EngTech
- Prof Chris Hopkins FIBMS FAHCS FLSW FIPEM CEng CSci
- Mr Mark Knight FIPEM CSci FSRP
- Ms Ladan Najafi CSci CEng MIPEM
- Prof Richard Scott CEng CSci FIPEM FAHCS FCMI
- Prof Mark Tooley CSci FREng FIPEM
- Prof Paul White CSci Hon FAHCS FIPEM

IPEM would like to thank the Development Group for their significant contribution to shaping the vision and priorities of this Manifesto, and everyone across the Clinical Engineering community who contributed their expertise, insight and feedback during its development.