

Healthcare Technologies Strategy Engagement Events Summary Notes

Background

In March 2023 the Engineering and Physical Sciences Research Council (EPSRC) Healthcare Technologies Theme published its new Health Technologies Strategy. The new strategy is a refreshed vision for EPSRC to stimulate advances in transformative engineering and physical sciences research to have a significant impact in health and ultimately enable people to live healthier lives.

The new strategy was developed in response to community advice and changes to the healthcare landscape since the original strategy was published in 2015. The strategy was developed over a year in consultation with many academic, industry and policy experts.

The strategy focuses on three areas:

- improving population health and prevention
- transforming prediction and early diagnosis
- discovering and accelerating the development of new interventions

To make sure these challenges are realised in a way that is responsible and most likely to lead to impact in the health space, the strategy also outlines several enablers that research within health technologies should address:

- responsible approaches to data
- patient and public involvement and engagement
- sustainable healthcare and health systems
- improving translation readiness
- reducing health inequalities
- supporting knowledge and skills in health technologies

To launch and engage the community in our new strategy, we held a series of engagement events. These events took place in person across the UK between May and October 2023. The engagement events took place in:

- Cardiff (18 May)
- Manchester (7 June)
- London (27 July)
- Edinburgh (7 September)
- Belfast (4 October)

Almost 600 people registered to attend across the five engagement events, the majority from academia but also with representatives from industry, government, policy and the healthcare sector.



Objectives

The objectives of the strategy engagement events were to:

- disseminate and socialise the new strategy and for stakeholders to share their different perspectives
- gather input on short-term and long-term priorities and how EPSRC can best support the activities needed to start to implement the strategy

Agenda

Below is an overview of the agenda at the engagement events.

10:00	Arrival & Registration
10:30	EPSRC welcome and overview of our Strategy
11:20	Speaker presentations reflecting on the 3 challenge areas in our Strategy
12:05	Panel discussion on the enablers
13:00	Lunch and networking
14:00	Keynote: What does the future of healthcare look like and how does EPSRC help achieve that?
14:30	Workshop session
	Key questions:
	 What do you see as the short- and long- term priorities in the strategy?
	- What might success look like in 3-5 years and 10 years+?
	 How can EPSRC best enable or support each challenge and add value?
15:45	Wrap up and next steps
16:00	Finish



Overview of Discussions at the Engagement Events

Over the five events, a range of speakers from across the health technologies research and innovation system shared examples of current and recent research and offered personal perspectives of the opportunities and challenges for transforming future health and the healthcare system.

Speakers and panel members across the events felt strongly that better public involvement should be a priority for the health technologies strategy. The importance of incorporating patient and public involvement and engagement (PPIE) at an early stage in healthcare research was highlighted, as well as the importance of engaging with a diverse range of patients and the public. Suggestions for how to do this included being creative and adapting to people's needs when planning engagement, for example subsets of patients may find it easier to engage online rather than in person. Further skills and training for researchers to enable them to carry out meaningful PPIE would be welcomed.

Consideration of health inequalities was also highlighted as important and panel members discussed the significance of considering this throughout the lifecycle of the development of a health technology.

The challenges of navigating and accessing data for health research was also discussed across the events and panel members raised the importance of thinking about a personcentered approach for this, as well as ensuring knowledge of the regulations around data. More support and guidance from EPSRC to access health data is needed.

Support for collaborations was raised as important, not just with patients and health professionals but also with researchers from other scientific disciplines.

Another point raised by panelists was that EPSRC should provide support and resources to fill the gaps between research and translation. Concerns were raised that there are gaps between the different research funders in terms of a smooth pathway from research to translation.

The keynote speakers at all five events discussed the future challenges in healthcare, some of the challenges noted were the escalating costs needed to deliver care and the longer waiting times for patients, the challenges of caring for an increasingly ageing population and for people living with multiple long-term conditions. Some opportunities highlighted where engineering and physical sciences could play a role were tools and technologies to help people manage their health in their own homes and technologies to allow earlier detection of disease which could have a significant impact on better outcomes for patients.

Please find a list of speakers and panelists in annex 1.

At all five engagement events there was a facilitated workshop session where attendees discussed the following questions:



- what do you see as the short-term and long-term priorities in the strategy?
- what might success look like in three to five years and 10 years+?
- how can EPSRC best enable or support each challenge and add value?

A summary of the discussions from the workshop sessions over the five engagement events can be found in annex 2.

The outputs of the strategy engagement events will inform the development of an action plan against which EPSRC can monitor progress and evolve and adapt future plans.

Attendee List

A contact list of those who registered to attend the strategy engagement events can be found in Annex 2.



Annex 1- List of speakers and panelists

Special thanks to our panel members and speakers for their insightful contributions.

Cardiff Event

- Professor Ian Craddock, Department of Electrical and Electronic Engineering, University of Bristol
- Professor Emma MacPherson, Department of Physics, University of Warwick
- Professor Jonathan Rossiter, Department if Engineering Mathematics, University of Bristol
- Trish Menash, PPIE representative
- Professor Matt Jones, Morgan Advanced Studies Institute, Swansea University
- Dr Liba Sheeran, School of Healthcare Sciences, Cardiff University
- Professor Liam Grover, School of Chemical Engineering, University of Birmingham

Edinburgh Event

- Professor Linda Bauld, College of Medicine, and Veterinary Medicine University of Edinburgh
- Professor Maiwenn Kersaudy-Kerhoas, School of Engineering and Physical Sciences, Heriot Watt University
- Professor Manuel Salmeron-Sanchez, James Watt School of Engineering, University of Glasgow
- Professor John Girkin, Department of Physics, Durham University
- Mr Eric Deeson, PPIE representative
- Professor Duncan Hand, School of Engineering and Physical Sciences, Heriot Watt University
- Professor Abi Durrant, School of Computing, Newcastle University
- Dr Ana Talbot, Consultant in Older Peoples Services, University Hospital Monkland
- Dr Andrew Fraser, Public Health Scotland

London Event

- Dr David Crosby Head of Prevention and Early Detection Research, Cancer Research UK
- Professor Malcolm Skingle Director Academic Liaison, GSK
- Miss Celia Theodoreli Riga Consultant Vascular Surgeon and Clinical Senior Lecturer in Surgery at Imperial College London
- Abigail Needham Project Manager, NIHR Devices for Dignity MedTech Co-operative
- Professor Dan Stoyanov Professor of Robot Vision, Department of Computer Science, University College London
- Professor Rebecca Shipley Professor of Healthcare Engineering, Department of Mechanical Engineering, University College London

Manchester Event

Professor Catherine Noakes, School of Civil Engineering, University of Leeds



- Professor Richard Hall, School of Mechanical Engineering, University of Leeds
- Professor Russell Harris, School of Mechanical Engineering, University of Leeds
- Professor Ian Hall, School of Mathematics, University of Manchester
- Professor Rory O'Connor, School of Medicine, University of Leeds
- Professor Niels Peek, School of Health Sciences, University of Manchester
- Professor Rachel Cooper, Lancaster Institute for the Contemporary Arts, Lancaster University
- Jay Hamilton Programme Director / Industry & Commercial Partnerships, Health Innovation Manchester
- Professor Neil Hanley, Vice Dean for Research and Innovation, University of Manchester

Belfast Event

- Professor Carmel Moran, Centre for Cardiovascular Science, University of Edinburgh
- Professor Chris Nugent, Director of the Computer Science Research Institute, Ulster University
- Professor AJ McKnight, School of Medicine, Dentistry and Biomedical Sciences, Queens University Belfast
- Professor Chris McCabe, Centre for Public Health, Queen's Business School, Queens University Belfast
- Professor Jim McLaughlin, School of Engineering, Ulster University
- Professor Frank Kee, School of Medicine, Dentistry and Biomedical Sciences, Queens University Belfast
- Dr Joann Rhodes, Health Innovation Research Alliance Northern Ireland (HIRANI)



Annex 2- Summary of discussions at engagement events

Below is a summary of the feedback and discussions shared at the engagement events.

What do you see as the most pressing priorities in the strategy?

Improving Population Health and Prevention:

- Indoor pollution
- Tackling obesity
- Mental health post-COVID-19
- Improving lifestyle at the population level gamification apps
- Holistic approach to health economics
- Measuring outcomes 'prevention' makes it difficult.
- Longitudinal studies
- Addressing health inequalities (digital divide)
- Digital twins
- Preparing for next pandemic learn from innovations during the pandemic
- Built environment and relationship to health
- Lifestyle habits/diet
- Healthier living and working environments.
- Community based interventions
- Utilising sensor rich wearables and environmental sensors
- Research to better understand risk factors
- Personalized monitoring methods (smart homes)
- Epigenetic causes of disease
- Patient level awareness on digital health
- Automatic screening genotype from birth understanding risks
- Healthy ageing

Transforming early prediction and diagnosis:

- Early diagnosis of chronic disease
- Identify current problems in diagnosis
- Better diagnostic tests
- Development of non-invasive sensors for good quality data/diagnostics
- Responsible diagnosis diagnosing a disease earlier for effective treatment/good outcome
- Prevention multiplexed diagnostic technologies
- Sensing technologies non-invasive
- Developing a holistic approach to diagnostics
- Non-invasive diagnostics via use of data from devices etc



- Non-intrusive technologies
- Computational modelling for predicting patient status
- Improved bioelectronic and sensing devices
- Making early diagnostic tools more accessible in the home
- Extracting data from chat bots and reuse for later appointments
- Cheap sustainable degradable sensors and diagnostic tools
- Family and friends support how can technology help?
- Non-invasive diagnostic technology for long term health monitoring
- Integration of artificial intelligence (AI) with advanced diagnostic tools
- Pre-empting disease technologies to diagnose that are low cost and affordable
- Monitoring, data to model predict strokes
- Digital twin for medical data
- Better identification of co-morbidities so we can apply screening in a more effective way
- Personalised early prediction and diagnosis based on social determinants of health
- Putting diagnostic tools in everyday things that people use
- Need data collection representative of population so diagnostic predictions hold true for whole population
- Imaging + Al

Discovering and accelerating the development of new interventions:

- Manufacture at scale
- Managing multimodality
- Non-invasive personalised interventions
- More low-cost initiatives
- Long term smart drug delivery for chronic conditions (Inflammatory Bowel Disease, endocrinological conditions)
- Ageing society
- Road to manufacture
- Reusing, repurposing technologies already out there
- Miniaturization of interventions
- Targeted drug delivery
- Improved supply chain
- Cell therapies
- Drug delivery
- Personalized Al algorithms for patient specific solutions
- Robotics for interventions
- New surgical imaging
- Systems engineering for hospitals
- Materials technologies to address foreign body response to implants



- Barrier to long term implants such as bioelectronics
- In vitro disease models for human on chip for large scale device + drug testing
- In silico models for rational design of organ specific implants
- Application of quantum computing
- Enabling remote care by moving interventions into home and community
- Virtual medicine
- Understanding patient behaviour and attitudes
- Merging of data and advanced manufacturing

How can EPSRC best support these priorities within the strategy?

- 1. Ensure cross disciplinary collaboration and work with appropriate partners (across UKRI and other funders) when developing funding opportunities.
- Require partner organisations
- Collaborative conversations between academics and clinicians
- Funding schemes for cross sector and cross region collaboration
- Networking events and opportunities
- · Facilitation, match making
- Network grants funding
- International collaboration
- Connecting with policy
- Charitable engagement on specific diseases
- Have clinical focus groups
- Showcase events for people to meet around calls, topics etc
- 2. Explore mechanisms to fund high risk, disruptive research in health technologies.
- Sandpits
- Pilot grants or small transformative grants
- 3. Encourage and support the translation of health technologies research into the clinic.
 - Support innovation with existing technologies
 - More early translation and implementation funding
 - Work with other funding providers to cover later technology readiness levels (TRLs)
 - Improve visibility, plus usability of health translation plus impact toolkits
 - More translation schemes
 - Clarify which costs you can request for translation
 - Support for clinical studies to translate research (without needing to switch to another funder)



4. Identify skills that need to be developed within health technologies.

- More discipline hopping
- Train more clinicians in engineering and AI (Centres for Doctoral Training)
- Post Doctoral Fellowships plus training
- Multidisciplinary training
- Career development opportunities in priority areas
- Secondments to support translation
- Train new researchers in translation skills

5. Peer Review Process.

- Consider funding processes, for example, fair deadlines, not after school holidays etc
- Ensure reviewers and panel members are multidisciplinary and equipped to assess health technology proposals
- Diversify funding portfolio to less funded centres
- Educating reviewers about multidisciplinary proposals

6. Improve guidance and support for embedding PPIE in health technologies research.

- Investing in PPIE agnostic to the university, for example, like VOICE (Valuing our Intellectual, Capital and Experience) at Newcastle University
- Matchmaking PPIE for researchers
- Funding to develop PPIE
- Sign posting to existing PPIE resources, for example, National Institute for Health and Care Research (NIHR)
- Business models for charities to provide PPIE service to researchers
- Better co-production with patient partners organisations to understand priorities
- Funding for Equality, Diversity and Inclusion (EDI) approach in PPIE
- Regional teams that support PPIE
- Creative approaches to public engagement
- Seed funding for PPIE
- Public engagement support, as an example, for science festivals

7. Decide principles for embedding sustainable healthcare practices into the research we fund and encourage sustainability throughout the portfolio.

- Increase emphasis on responsible sustainable research
- Embed sustainability of materials and devices in assessment criteria

8. Support for data infrastructure and guidance on data.



- Collation of existing data
- Support for trusted research environments and data fusion functionality
- More projects entirely on making data sets
- Clarity around EPSRC data strategy
- Support data driven analytics research
- Support data sharing
- Encouraging more inclusive data collection (so it's representative of the population)
- Funding for access to data
- Some data challenges common to other sectors? Could there be cross learning?
 For example, finance
- Promote data sharing and open access make mandatory in some calls
- Data sources
- Data banks
- Library of data sets
- Mandate better open data curation
- Understand access to data and potential solutions
- Guidance on ethics, data sharing, Intellectual Property etc
- Transparency
- Build trust
- Co-ordinate and collaborate across UKRI and Health Data Research UK (HDRUK) in relation to data availability and platforms

9. Health inequalities.

- Fund research in areas where health inequalities are most acute
- Include diverse communities in research- PPI

10. Funding.

- Funding for applied Al
- Predictive analytics for healthcare diagnosis research and Centres for Doctoral Training (CDTs)
- Targeted funding streams with commercial data providers
- Early detection sandpits for primary and pre-primary care
- Calls for sustainable (materials) in healthcare
- Funding for microsystems miniaturised medical implants minimally invasive for implantation
- International grants and collaboration funding
- Maintain funding for blue skies research
- Continue to support improved computation for chemistry and biology.
- Al for drug discovery
- Reintroduce panel observers



Antimicrobial Resistance

What will success look like in five years?

More sustainable healthcare practices

- Less medical waste
- Sustainable healthcare needs no plastics

Broader use of Al and digital tech solutions

- Use of AI in healthcare (at General Practitioners)
- Smart watch telling us to see a General Practitioner (GP)
- More evidence of Al driven diagnostic tools used in clinical settings
- From AI to responsible AI
- Education of health professionals in interpretation Al derived data
- Policy developments for trustworthy Al

Reliable data

- Reliable data collection
- Managing the bias in data
- Better data capture and storage
- Medical data currently inadequate or missing. So collection and organization of bigger and better datasets
- Diverse datasets, representative datasets and population datasets
- Streamlined data access across the healthcare system
- Dedicated funding to support longitudinal studies

Better Public engagement in research

- Public awareness and community engagement
- Upskilling around PPIE
- PPIE coming through all research

Innovative technologies

- Self-care improvements
- Neurodiagnostics and decision support for epilepsy
- Innovative approaches to treating diseases that are not just iterative
- Better real time trials access
- Multiple streams tackling waiting lists- diagnosis, systems, efficiencies
- Better remote care and enabling self-management and independence
- Stratification systems linked to earlier diagnosis making better use of data
- Technologies available in the home, for example mini GP at home and 'her for health'



- High energy density and compact batteries (and better solutions for energy)
- Novel biosensors
- New chemical tools for the study of 1000 new proteins de-risks many areas for pharma (this is currently not possible in five years)
- Quantum Computing for design to get failures identified quickly
- Increased funding in nano sensing diagnostics and therapeutics
- Missed areas, including rare diseases, artificial organs

Being more agile to support innovative technologies

Bridging translation gap

- Cross-council calls
- Clear funding mechanism for translation from research to clinical studies

Trust in health data

- Patient access and sharing of own data
- Trust in data management
- Data storage patient involved sharing

Equity of access to health technologies

- Equality of health
- Inclusion of all regions of the UK in the portfolio of funding
- Addressing health inequalities in a more impactful way

More preventative less reactive healthcare

- More research directed to prevention
- Behavioural interventions

Improvements in peer review

- Peer review coping with interdisciplinarity
- Matched clinicians to projects

Healthier society

- Fewer people with chronic diseases
- Fewer prescriptions for mental health problems
- · Better ability to impact health outcomes and plan for care
- Earlier diagnosis
- Percentage decrease in chronic disease prevalence and the burden of those that are lifestyle related
- Healthier population
- Improved quality of life



Infrastructure for facilitating and validating new technologies for interventions and getting engineers, clinicians and other research stakeholders 'in the room'

What will success look like in 10 years?

- Primary care mainly at home
- · Increased technologies actually reaching the patient
- Healthier society
- Shorter waiting lists
- Lower sickness related unemployment
- Al systems impacting healthcare at a large scale
- Hospital admissions for acute trauma (all scheduled care in community settings)
- Clear assessment criteria and guidelines for PPIE
- Regular facilitated mixed domain meetings across sectors
- Solutions for more extensive access to population groups, in terms of recruitment and engagement
- Repository of standardized data
- Improved translation pathways
- Personalized recommendations based on personal risk (social determinant or health + genetics)
- Preventative care the norm
- Better diagnosis
- Better data access that is representative of the population
- Use of data to select diagnostic tests.
- More easily accessible sensor systems. For example, low-cost systems for home care
- More available accessible prediction tools
- Clinically validated predictive biomarkers for risk stratification for better intervention
- Improved sustainability full life-cycle analysis
- Reduced costs for the NHS
- Support for lobbying policy makers to help us sustain implementation of healthcare technologies
- Chemical tools for the study (in cells) of all proteins
- Tailored interventions based on personal risk factors
- Self-management of disease at home (low-cost technology)
- Lowering health inequalities, improving patient quality of life
- Transformative healthcare devices
- One health circular ecosystem
- Number of life years created thanks to digital innovation



- Quality of life overextending life
- Efficient integrated healthcare system
- Improved patient outcomes

Annex 2- Registration List

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