Engineering and Physical Sciences
Research Council

EPSRC
Investing in research for discovery and innovation

EPSRC Centres for Mathematical Sciences in Healthcare – aim of the call, opportunities and anticipated outcomes

Derek Craig

Investing in world leading research

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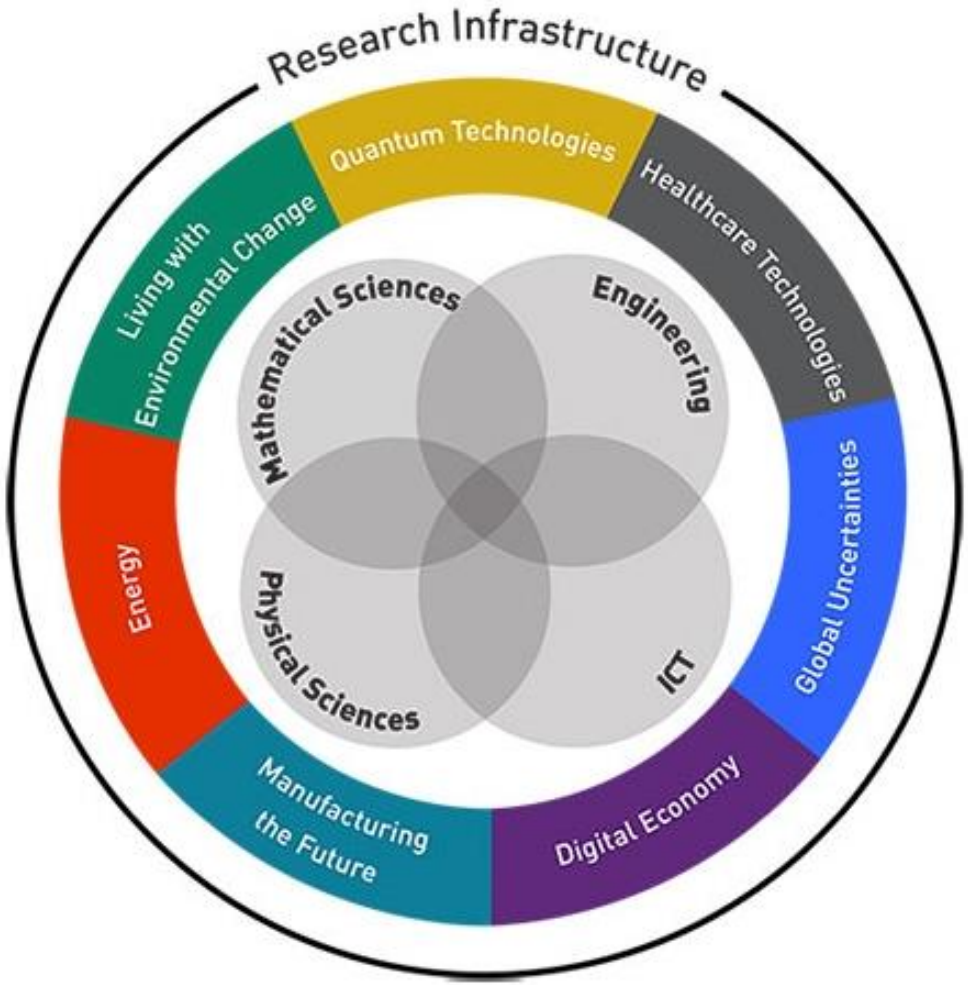
£2.5bn
RESEARCH PORTFOLIO

£800m
ANNUAL BUDGET

42%
OF PORTFOLIO
IS MULTIDISCIPLINARY



Theme aims

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Mathematical Sciences:

To sustain core research capability, while promoting transformative and cross-disciplinary research that has the potential for significant impact.

Healthcare Technologies:

Provide solutions that underpin the Healthcare and Life Sciences sector. Specifically, invest in basic research into techniques and technologies which can:

- Advance the prevention, diagnosis, treatment and management of health conditions.
- Enable greater biomedical understanding and pull-through to therapy.
- Have the potential to transform future health delivery systems.

EPSRC in the healthcare landscape

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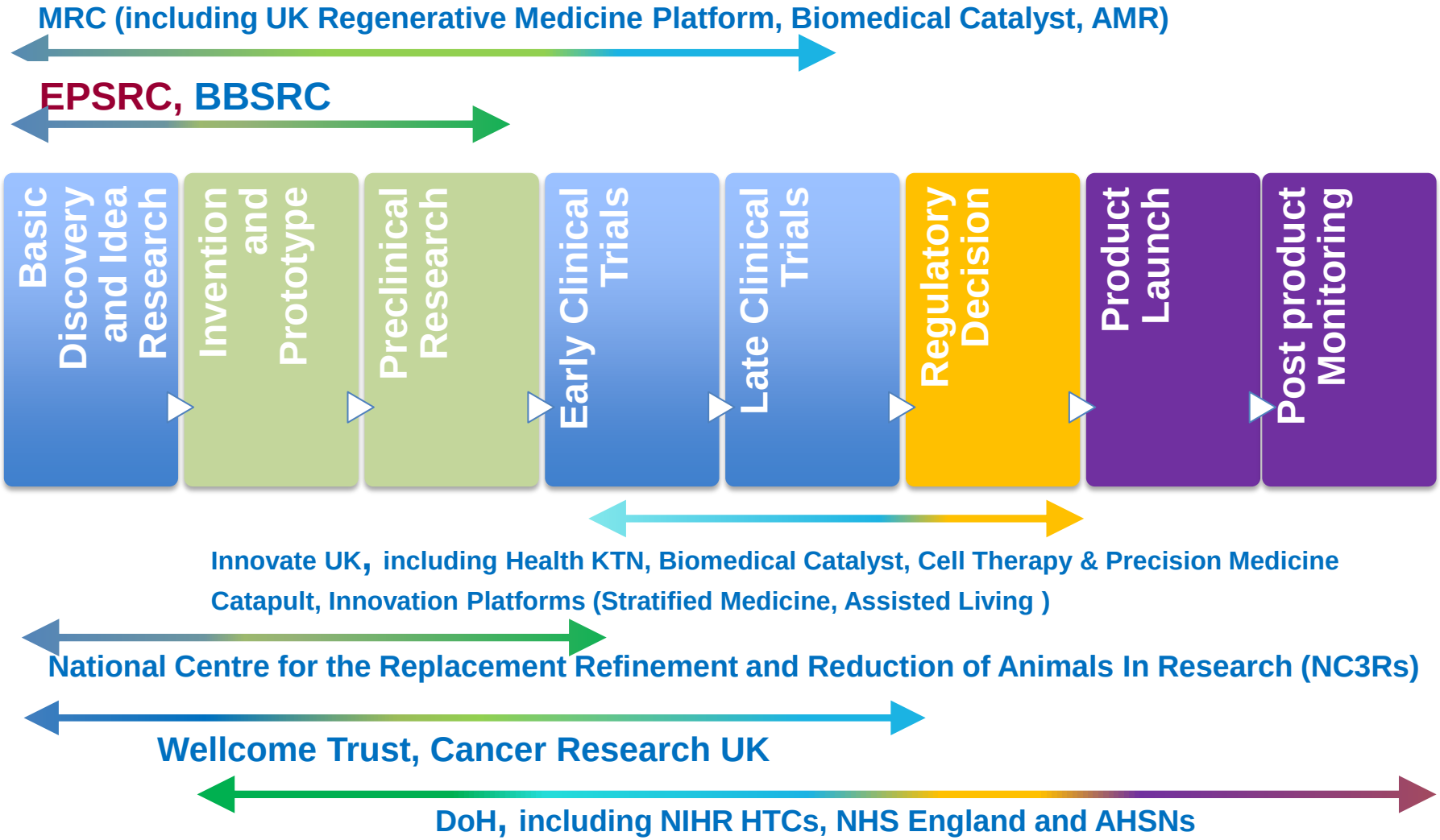

Working in partnership

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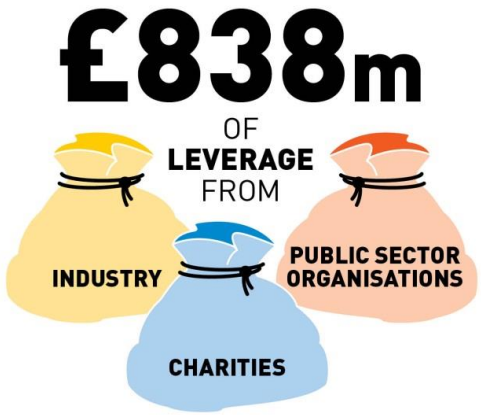

Universities

RESEARCH COUNCILS UK

CANCER RESEARCH UK

Innovate UK
Technology Strategy Board

Government Departments

wellcome trust

28

Strategic Partnerships

Science for a healthy nation – The Maxwell Review

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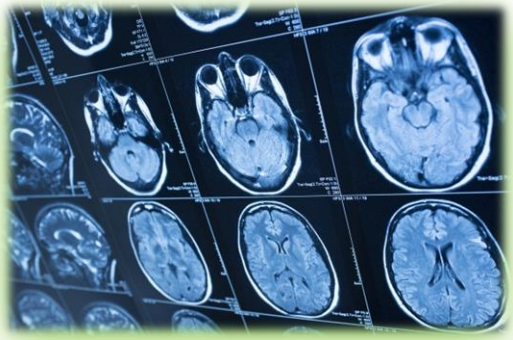
"To achieve the UK's potential in HLS it is also important to invest in other disciplines such as engineering and physical sciences, from which many new developments in HLS originate."



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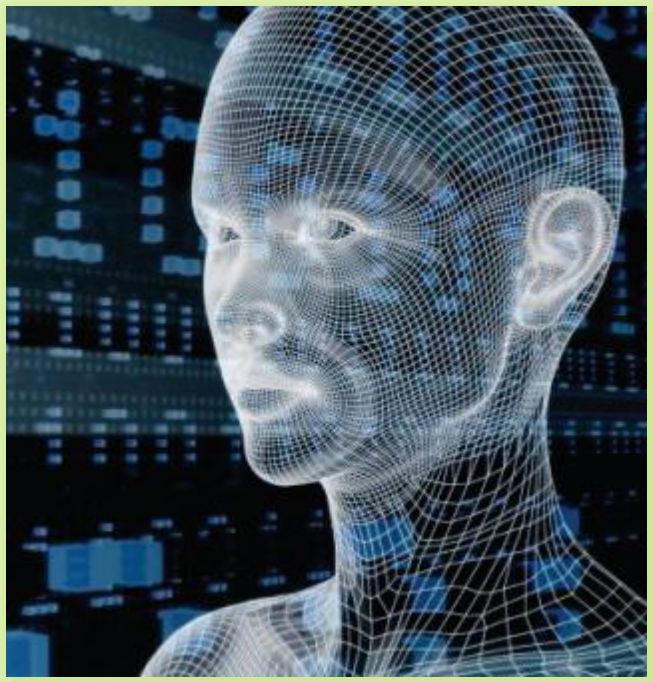
Policy implications

"A key conclusion is that to fulfil its vision for the UK to be an outstanding location for research and innovation in health and life sciences, the government must nurture […..] the full spectrum of disciplines on which HLS draws, including mathematics, statistics, physical sciences and engineering."



Science for a healthy nation – The Maxwell Review

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- Recommendation 2:
- "Effectiveness at the EPS/HLS interface depends in part on focussing effort on the right challenges. Funders and research organisations should play a major role in identifying and defining important challenges…"

Healthcare Technologies Strategy

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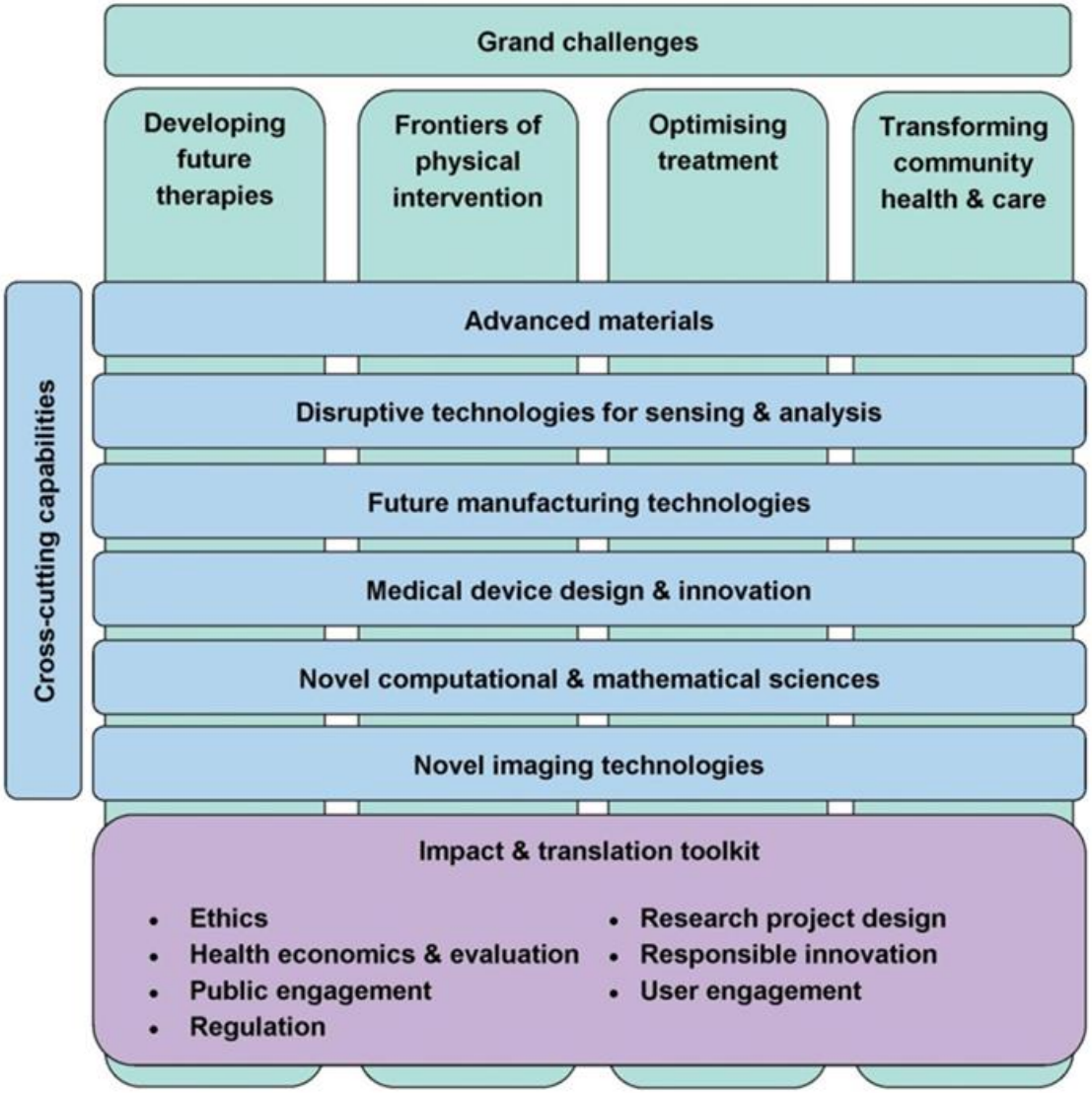

Developing Future Therapies

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Supporting the development of novel therapies with technologies to enhance efficacy, minimise costs and reduce risk to patients.

Through this challenge we aim to support the novel engineering, ICT, mathematical and physical sciences research required to develop the drug, biological, cell and regenerative therapies of 2050. Research supported by EPSRC will seek to enhance the efficacy and precision of therapies, improve the efficiency of discovery, lower the cost of manufacturing and reduce the risk to patients from side effects

Frontiers of Physical Intervention

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Restoring function, and optimising surgery and other physical interventions to achieve high precision with minimal invasiveness.

Through this challenge we aim to support the novel engineering, ICT, mathematical and physical sciences research required to develop prostheses and devices to restore normal function, and develop precise, minimally invasive physical interventions to repair damage or remove disease. Interventions may include established techniques such as surgery, radiotherapy or high field ultrasound, but we also encourage new approaches to physical treatment.

Optimising Treatment

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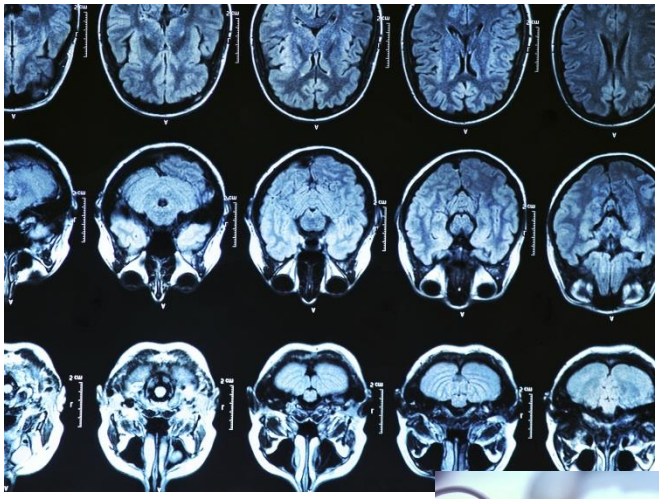
Optimising care through effective diagnosis, patient-specific prediction and evidence-based intervention.



Through this challenge we aim to support the novel engineering, ICT, mathematical and physical sciences research required to optimise treatment for the individual, improving health outcomes. Research supported by EPSRC will focus on technologies for timely and accurate diagnosis, stratification, predictive modelling, and real-time, evidence-based decision making. The aim is the right treatment at the right time.

Transforming Community Health and Care

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Using real-time information to support self-management of health and wellbeing, and to facilitate timely interventions.

Through this challenge we aim to support the novel engineering, ICT, mathematical and physical sciences research required to transform community-based health and care. Research supported by EPSRC will seek to integrate, interpret and communicate information from multiple sources, including real-time sensing, to help individuals stay healthy, and support a collaborative model of care involving patients, healthcare professionals and informal carers. This should empower individuals to self-manage effectively, and facilitate timely intervention when necessary.

Healthcare Technologies Strategy – the translation pathway

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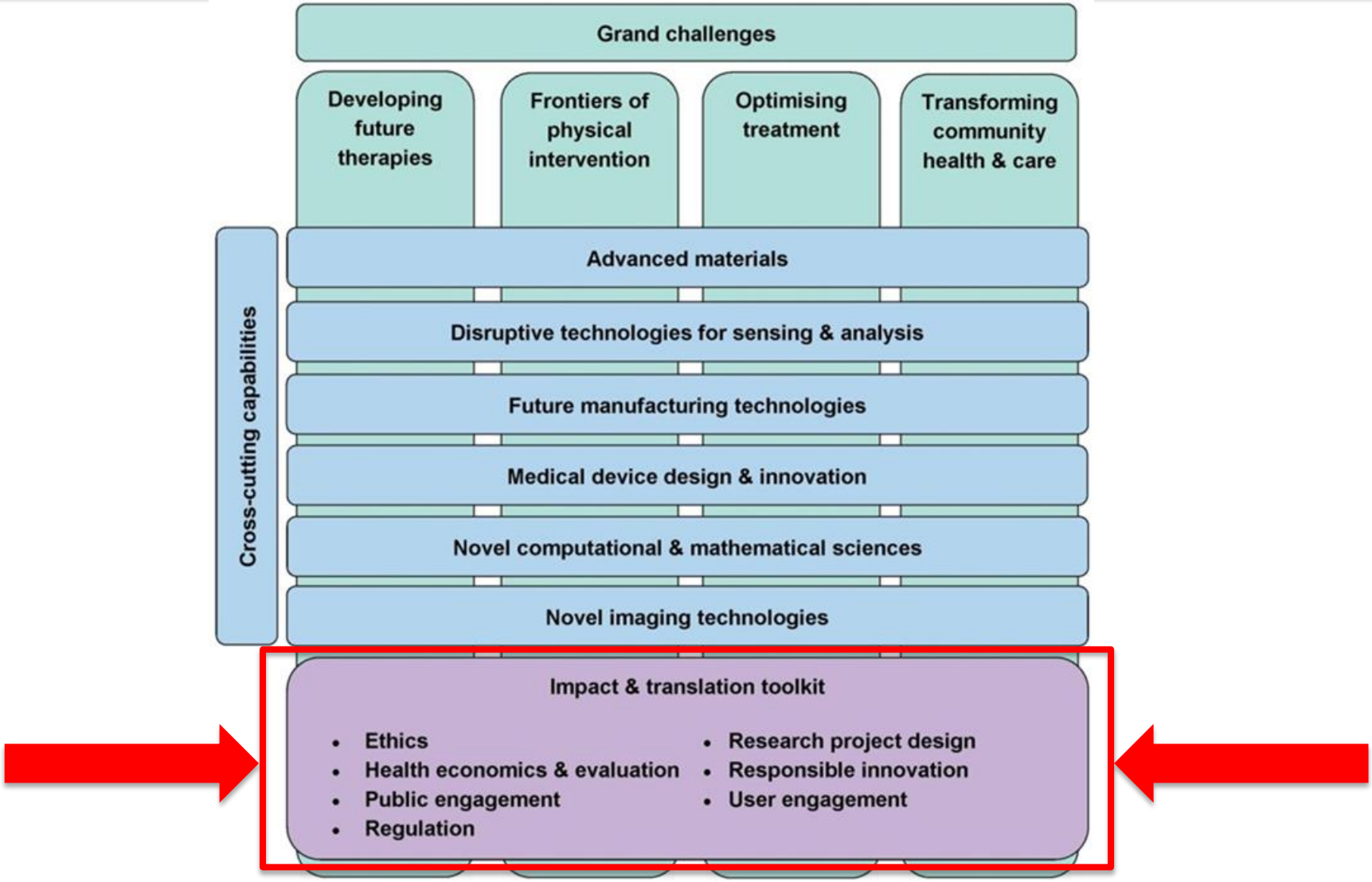

Impact and translation toolkit

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- To encourage researchers to embed thinking about translation and impact into the planning and development of research, in order to make impact more likely.

- Highlights a number of topics for researchers to consider:
  - Ethics
  - Health economics and evaluation
  - Public engagement
  - Regulation
  - Research project design
  - Responsible innovation
  - User engagement

- Should form part of the pathways to impact for proposals, and associated resources may be requested.

- Will be a key part of future HT calls for proposals

Centres for Mathematical Sciences in Healthcare

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- Multidisciplinary Research Centres, bringing together researchers working in the Mathematical Sciences with academics and stakeholders within the Healthcare Technologies space

- Focus - a programme of world leading, challenge led, novel research addressing significant mathematical or statistical challenges of direct relevance to Healthcare Technologies

- Networking and knowledge exchange activities also important within successful Centres

- Centres expected to engage new academic, industrial and/or clinical partners over the lifetime of the award

Funded Centres

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Glasgow - EPSRC Centre for Multiscale Soft Tissue Mechanics - with application to heart & cancer

Exeter - EPSRC Centre for Predictive Modelling in Healthcare (managing and treating chronic health conditions)

Liverpool - EPSRC Centre for New Mathematical Sciences Capabilities for Healthcare Technologies (cancer cell and tissue dynamics, drug delivery, image processing, antibiotic resistance)

Imperial College London - EPSRC Centre for Mathematics of Precision Healthcare (multiscale networks for data-rich precision healthcare and public health)

Cambridge - EPSRC Centre for Mathematical and Statistical Analysis of Multimodal Clinical Imaging

Some expectations

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- Engage with each other and the wider community to drive the national research agenda in the area of Mathematical Sciences in Healthcare
- Leverage additional funding from both EPSRC and other bodies, to support the work of the Centres and sustain them beyond the 4 year lifetime of the award
- Highlight alignment of research activities to the Healthcare Technologies Grand Challenges where appropriate
- Carry out outreach activities and public engagement to ensure impact is communicated from the Centres
- Work with EPSRC
  - Advise and work with us on our ongoing strategy
  - Act as advocates for EPSRC

EPSRC's aspirations for the Centres

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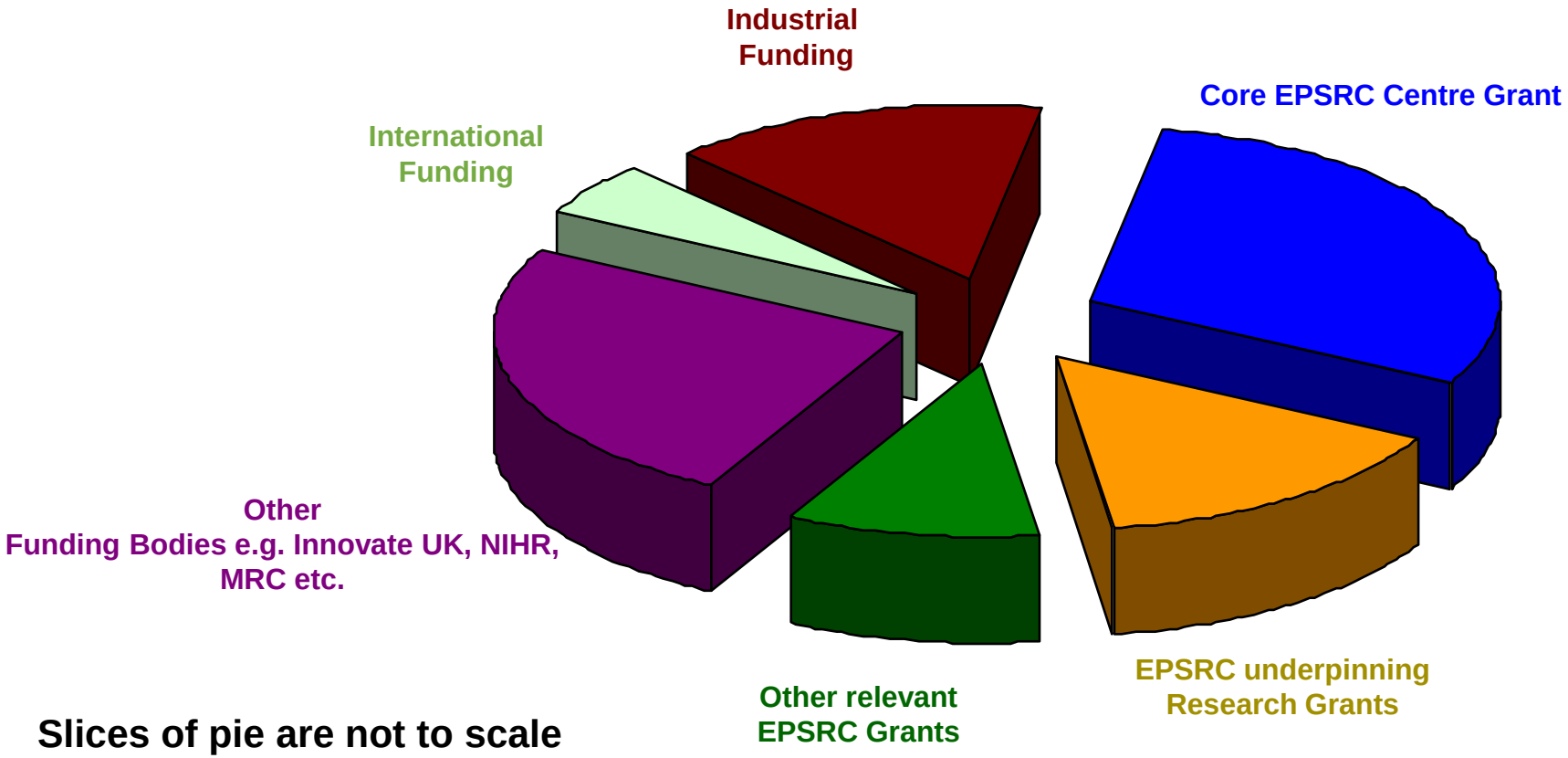
At the end of the 4 years of funding, this core grant would be have been supplemented by additional funding to ensure sustainability.



Slices of pie are not to scale

Questions