



UK Research
and Innovation

EPSRC Update for Mathematical Sciences

Katie Blaney, Head of Mathematical Sciences, UKRI EPSRC



Some of the reasons we engage

So we know our community

To identify emerging areas of science

To understand what's important to different groups

To get advice on future plans

To communicate what we're doing

To develop partnerships / co-investment opportunities



UK Research
and Innovation

UKRI Strategy

Transforming tomorrow together



The UKRI Strategy in context

The UKRI Strategy:

- Is a huge opportunity to shape how the research and innovation system works at a critical time for the UK and the world, and will be instrumental in shaping the role of research and innovation in responding to many of the greatest challenges we face
- Covers the period 2022-27, corresponding to the period for reaching the government's R&D public spending target of £22 billion per annum
- Crosses two UK spending review cycles, including UKRI's first 3-year settlement from 2022-25; the combination of Strategy and multi-year spending settlement will enable us to deliver in more systematic ways over longer timescales
- Reflects UKRI's role as an essential connecting institution between researchers and innovators, governments, investors, and communities
- Involves working in more collaborative, effective and efficient ways, with improved connections across UKRI, and a new operating model
- Will be supported by Strategic Delivery Plans developed by each of our nine Councils, and the shared Corporate Plan for UKRI – all to be published later in 2022



Our Vision and Principles for Change

Our **vision** is for an outstanding research and innovation system in the UK that gives everyone the opportunity to contribute and to benefit, enriching lives locally, nationally and internationally.

To achieve this we will foster a system built on four key **principles for change**, which we will embed across all our work:

- **Diversity** of ideas, people, activities, skills, institutions and infrastructures advances knowledge, increases quality and creativity.
- **Connectivity** across disciplines, sectors and borders catalyses new ideas and approaches to deliver impact.
- **Resilience** ensures the agility, capability, and flexibility needed to withstand shocks, deliver focus long-term goals and capture new opportunities.
- **Engagement** shapes research and innovation to reflect the needs, perspectives and motivations of diverse stakeholders and the public.



Our Strategic Objectives

Our **strategic objectives** provide the framework for how we will achieve our vision and realise our principles through world-class:





Engineering and
Physical Sciences
Research Council

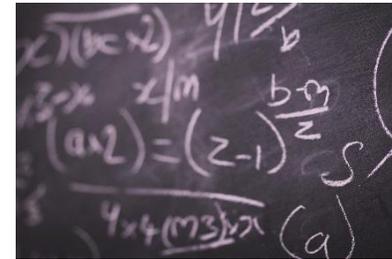
EPSRC vision and priorities

A snapshot of EPSRC's areas

materials



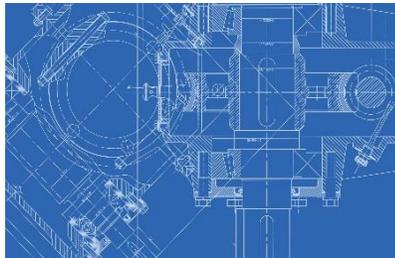
mathematics



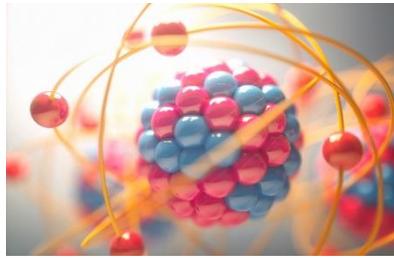
chemistry



engineering



physics



healthcare technologies



digital economy



cybersecurity



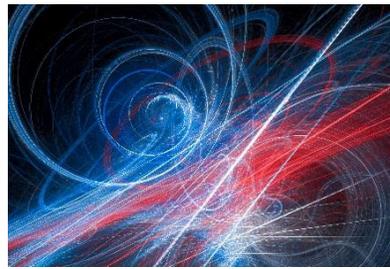
AI & robotics



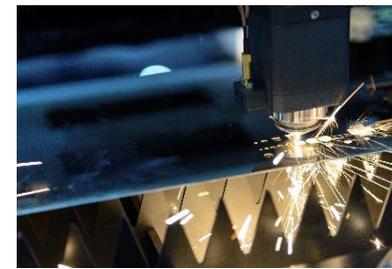
ICT



quantum technologies



manufacturing



energy & decarbonisation



EPSRC Remit

- Our remit covers engineering and physical sciences: we fund research into chemistry, engineering, information and communications technologies, materials, mathematical sciences and physics.
- The majority of research we support must be in engineering and physical sciences.

EPSRC – Our Vision



- To invest in world-leading research and skills to advance knowledge and **deliver a sustainable, resilient and prosperous UK**



- We **support new ideas and transformative technologies** which are the foundations of innovations that improve our economy, environment and society



- **In partnership and co-investing with industry**, we work to deliver both national and global priorities, and boost R&D spend beyond 2.4% of GDP

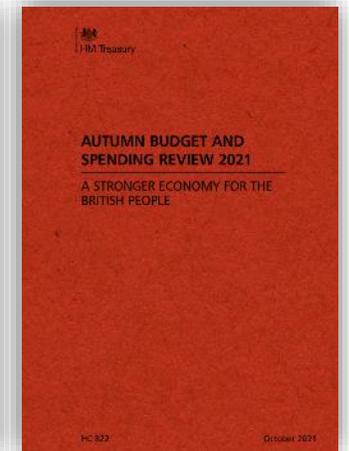
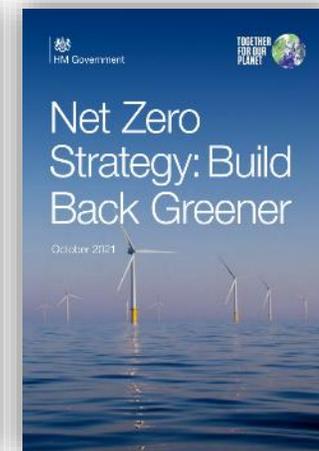
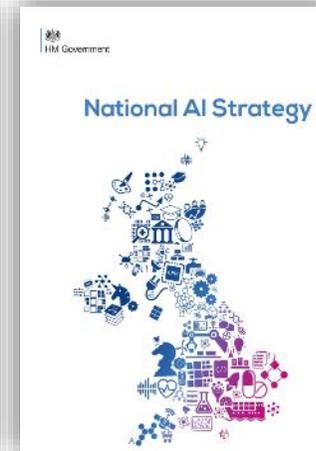
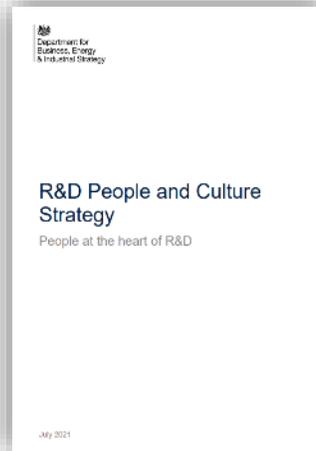


EPSRC – Our ambitions

In partnership across UKRI, government departments and the wider research and innovation landscape, we will:

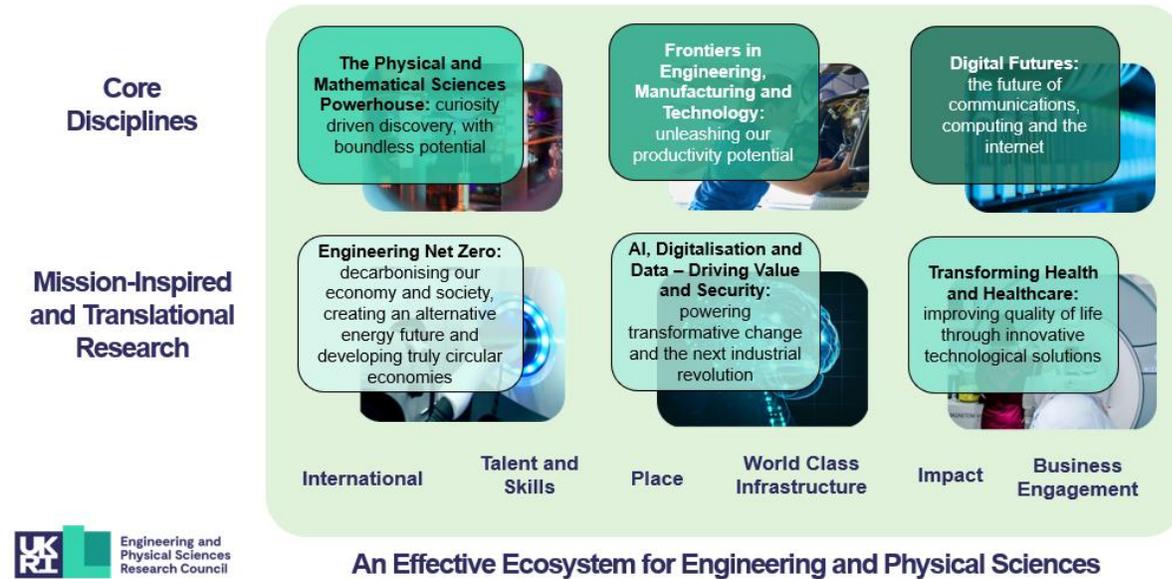
- **Enable a more equitable, connected and sustainable world-class ecosystem**, to deliver excellent research and innovation, catalyse industry investment across the UK, and facilitate diverse career paths
- **Lead and underpin UKRI strategic priorities** including in AI, quantum technologies and net zero, to deliver government strategy and resilience to future challenges
- Attract, upskill and retain the next generation of global research and industry talent, **developing the skills that underpin multidisciplinary research and deliver economic growth** to level up across the UK

2021 strategy landscape



EPSRC's priorities and UKRI strategy

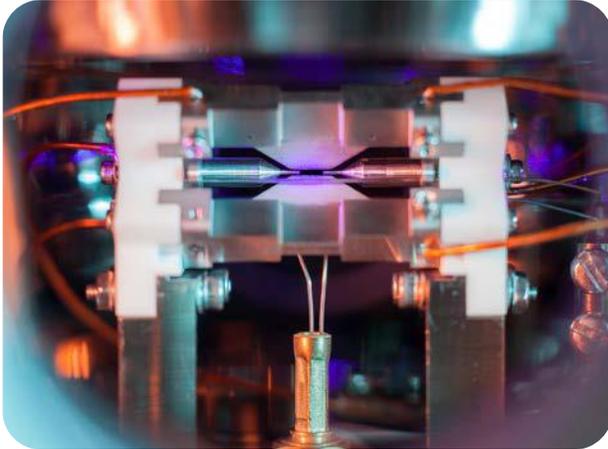
- EPSRC's delivery plan will set our vision for the future of engineering and physical sciences research and innovation
- We will frame our vision for the delivery plan around our 7 priorities
- We will also demonstrate EPSRC's unique role in delivering UKRI's strategy



People and careers	Places	Ideas	Innovation	Impacts
Making the UK the top destination for talented people and teams.	Securing the UK's position as a globally leading research and innovation nation with outstanding institutions, infrastructures, sectors and clusters across the breadth of the country.	Advancing the frontiers of human knowledge and innovation by enabling the UK to seize opportunities from emerging research trends, multidisciplinary approaches and new concepts and markets.	Delivering the government's vision for the UK as an innovation nation, through concerted action of Innovate UK and wider UKRI.	Focussing the UK's world-class science and innovation to target global and national challenges, create and exploit tomorrow's technologies, and build the high-growth business sectors of the future.
Supported by a world-class organisation – making UKRI the most efficient, effective and agile organisation it can be.				

Core disciplines

We are **science focused** to reinvigorate the engineering and physical sciences research pipeline



The Physical and Mathematical Sciences Powerhouse

- **Catalyse new ideas** and creativity in discovery science to nurture and enable advances across science areas
- **Transform science capability** through new technological advances, improved skills and infrastructure, and convening communities to accelerate impact



Frontiers in Engineering, Manufacturing and Technology

- **Develop advanced transformative technologies** to deliver a greener, healthier, more resilient future
- **Create breakthrough tools, techniques and materials**, and apply systems thinking – to address industrial and societal challenges



Digital Futures

- Support a **resilient, sustainable, secure and internationally competitive future** for computing, communications and the internet
- Exploit the quantum computing advantage and **making the UK the first quantum ready nation**

Mission Inspired and Translational Research

Mobilising the engineering and physical sciences research community to address national priorities and global challenges



Engineering Net Zero

- Taking a whole systems approach to reduce demand and increase efficiency across polluting sectors
- Deliver **high risk, high reward** research to stimulate entirely new and transformative low and zero carbon and zero pollution technologies



AI, Digitalisation and Data – Driving Value and Security

- Securing the **UK's position at the forefront** of AI science and technology development, adoption and regulation
- **Developing future networks** to be resilient, secure and which create a trusted, safe data system



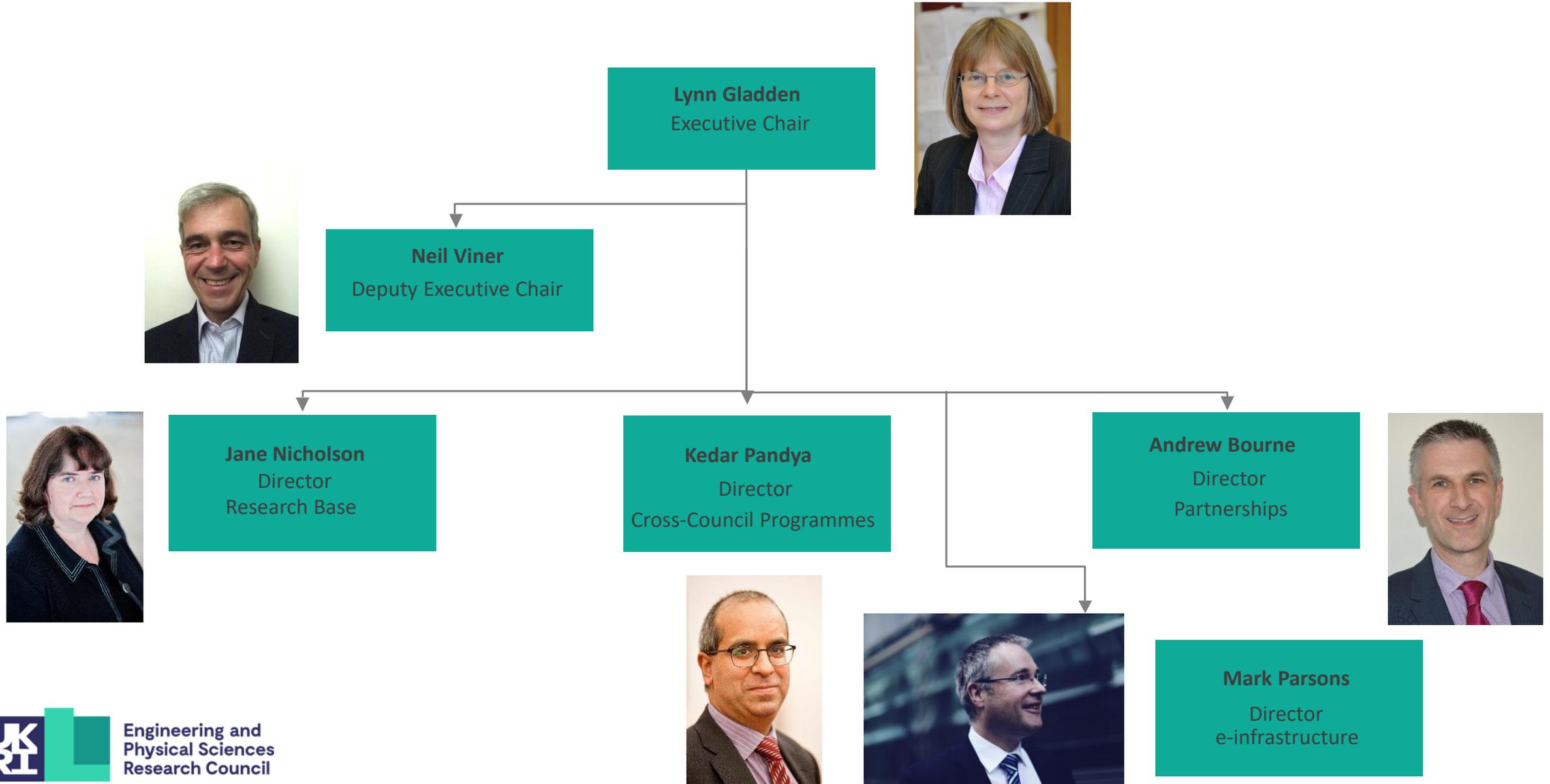
Transforming Health and Healthcare

- **Cutting edge and affordable** technologies, from diagnostics to therapeutics, including cost effective manufacturing approaches
- **New knowledge and skills** to engineer healthier environments in the home, workplace and the community

Creating an Effective Ecosystem for EPS



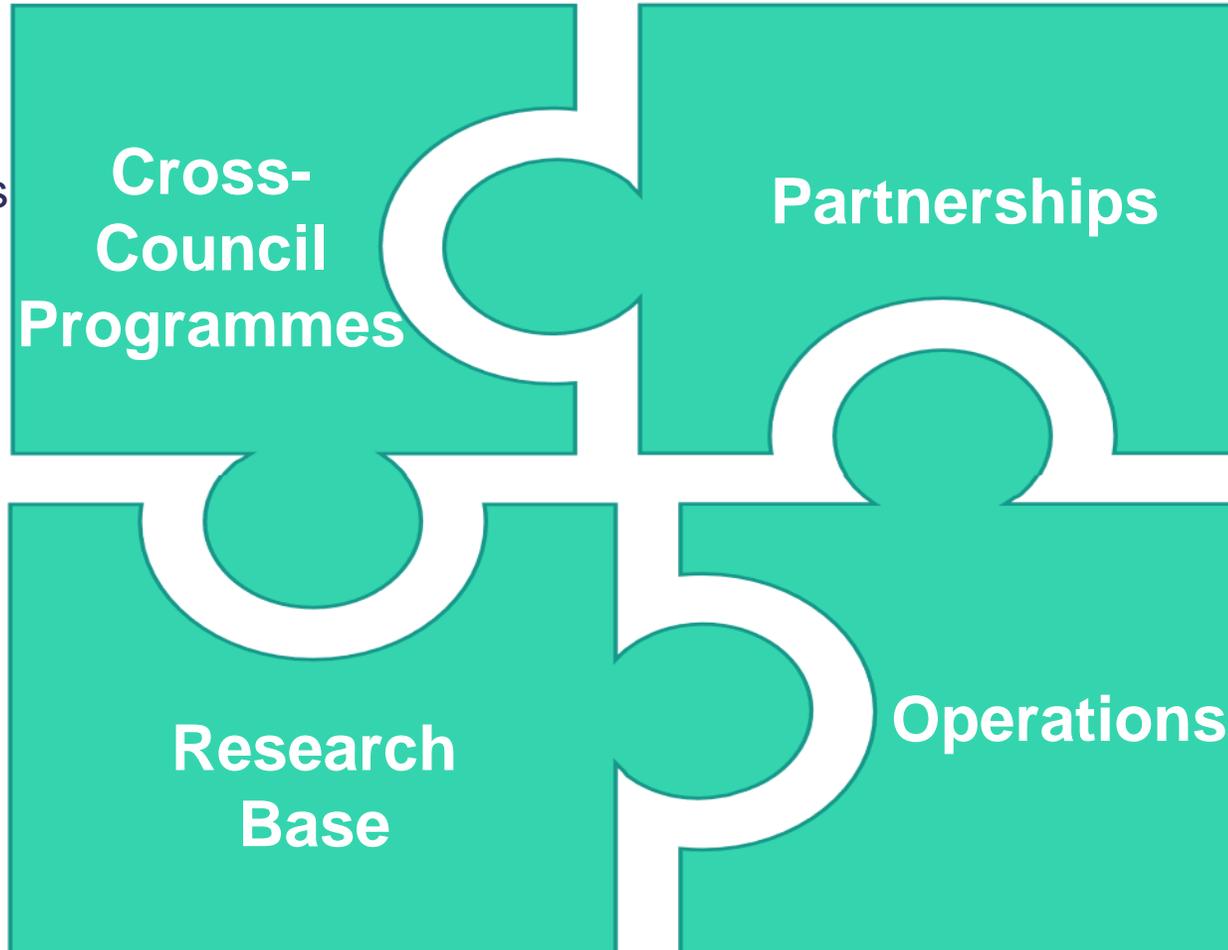
EPSRC Executive Board



EPSRC – 4 Directorates

Cross – Council programmes

Lead on and promote a positive culture of cross-council working that builds on the disciplinary strengths in the research base and the strength of our partnerships



Partnerships

Lead on engaging with stakeholders to identify and maximise opportunities, ensuring the community are connected in the regional, national and global research and innovation system

Operations

Lead on our corporate planning, ensuring the effectiveness and improvement of our systems and procedures, and evaluating and demonstrating the impact of our investments

EPSRC

4 Directorates - Our directorates are the key route by which we define and deliver specific aspects of our mission

Teams regularly collaborate across directorates and no team or directorate works in a silo. For example, we often have cross directorate teams where there is a specific need (such as delivery of funding for Covid-19 initiatives).

RESEARCH BASE

Advanced
Materials

EDI & People

Engineering

ICT

Infrastructure

Managing our Portfolio

Mathematical
Sciences

Physical
Sciences

CROSS COUNCIL

AI &
Robotics

Digital Security &
Resilience

Energy and
Decarbonisation

Healthcare
Technologies

Manufacturing and
the Circular Economy

Quantum
Technologies

PARTNERSHIPS

Business Engagement
& Partnerships

Impact

International

Regional Engagement

Universities

OPERATIONS



Engineering and
Physical Sciences
Research Council

Business Improvement

Corporate Development

Governance & Planning

Performance & Evaluation

The Mathematical Sciences Team

Role	Name	Mathematical Sciences Responsibilities
Head of Programme	Katie Blaney	Theme strategy and budget
Senior Managers	Marianne Rolph	Institutes, Discipline Hopping
	Rebecca Williams	Equality, Diversity and Inclusion (EDI), People Support
	Vacancy	
Portfolio Managers	Nishtha Agarwal	Numerical Analysis, Mathematical Analysis, Logic and Combinatorics, Fellowships, ECRF convenor, EDI
	Victoria Lund	Algebra, Geometry and Topology, Number Theory, Lead Agency Agreement, SAT convenor
	Rachael Pittaway	Mathematical Physics, Continuum Mechanics, Mathematical Biology, Small Grants, Discipline Hopping
	Jacob Wood	Statistics and Applied Probability, Operational Research, Non-linear systems, AI interface, Outcomes, Programme Grants

Mathematical Sciences Strategy

Maximising the Mathematical Sciences Powerhouse by harnessing curiosity driven discovery with boundless potential for UK prosperity

- Building a more diverse and inclusive community
- Investing in investigator-led discovery
- Ensuring support for our leading researchers
- Developing Partnerships
- Capturing the benefits of the work we fund

Our EDI journey: activities and progress

Developed diversity data analysis tools - continuously evolving our **data capabilities** to monitor our advisory structures, investigate our grants portfolio (**scheme and thematic**) and peer review participation.

Improving underrepresented gender diversity of EPSRC advisory and peer review bodies by clearly stating our ambitions and working towards **targets** and, where necessary, intervening by utilising **positive action**.

Challenging bias ensuring fair and inclusive funding processes - an independent investigation of our peer review and policy decision-making processes, to identify and remove any potential barriers and biases.

EDI Strategic Advisory Group – to provide advice and challenge as we progress our EDI strategy and activities

Inclusion Matters Portfolio - 11 ambitious and inspiring projects to address and accelerate the pace of culture change and challenge current thinking within the engineering and physical sciences community.

Revised guidance on processes and improved consistency across our documentation

Reduced the number of proposals being assessed at a meeting

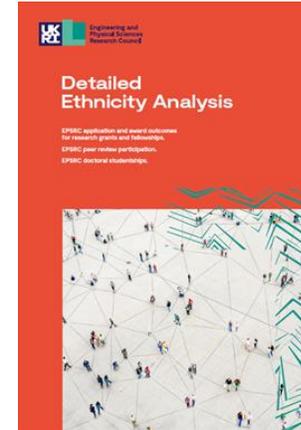
Made sure the criteria are visibly available to panel members throughout the meeting

Changed interview guidance - e.g. introducing silent scoring time

Introduced equality impact assessments for funding opportunities

Introduced unconscious bias training and briefing to Convenors, Panel Chairs and members

EPSRC priorities and action



Gender disparity:

Analysis on gender, linking grant size by value to award rates. Published our findings '**Understanding our portfolio: a gender perspective**' with a community survey. Next step: analysis & action.

Race equality:

Published our detailed **ethnicity data analysis** and launched a race equality initiative with **community engagement**. Immediate actions in progress.

Neurodiversity:

Explorative piece – how do we engage with our stakeholders and community, is it inclusive?

Enabling and empowering our community to embed EDI

Embedding good practice EDI principles in our portfolio – developing guide of expectations and examples to support our grant holders. Building up knowledge/action in specific disciplines working with colleagues in our themes.

Intelligence gathering and dissemination of the Inclusion Matters portfolio.

Investing in investigator-led discovery and ensuring support for our leading researchers

Standard Mode – All Portfolio Managers

Programme Grants

Jacob Wood, Portfolio Manager

Email: jacob.wood@epsrc.ukri.org

Telephone: 07925 348098

Fellowships

Nishtha Agarwal, Portfolio Manager

Email: nishtha.agarwal@epsrc.ukri.org

Telephone: 07511 403767

Small Grants

Rachael Pittaway, Portfolio Manager

Email: rachael.pittaway@epsrc.ukri.org

Telephone: 07874 88407

NSF Lead Agency Agreement

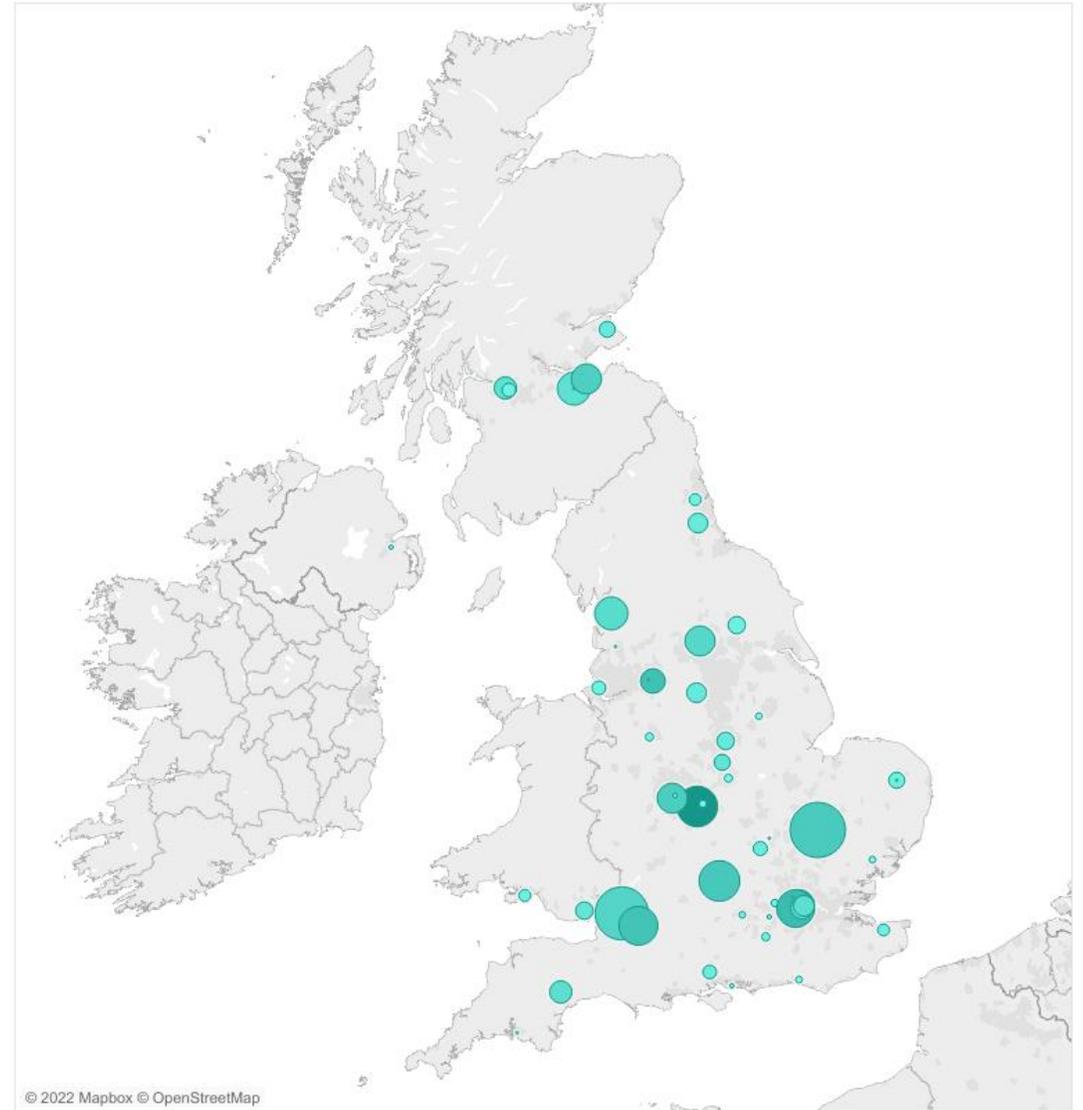
Victoria Lund, Portfolio Manager

Email: victoria.lund@epsrc.ukri.org

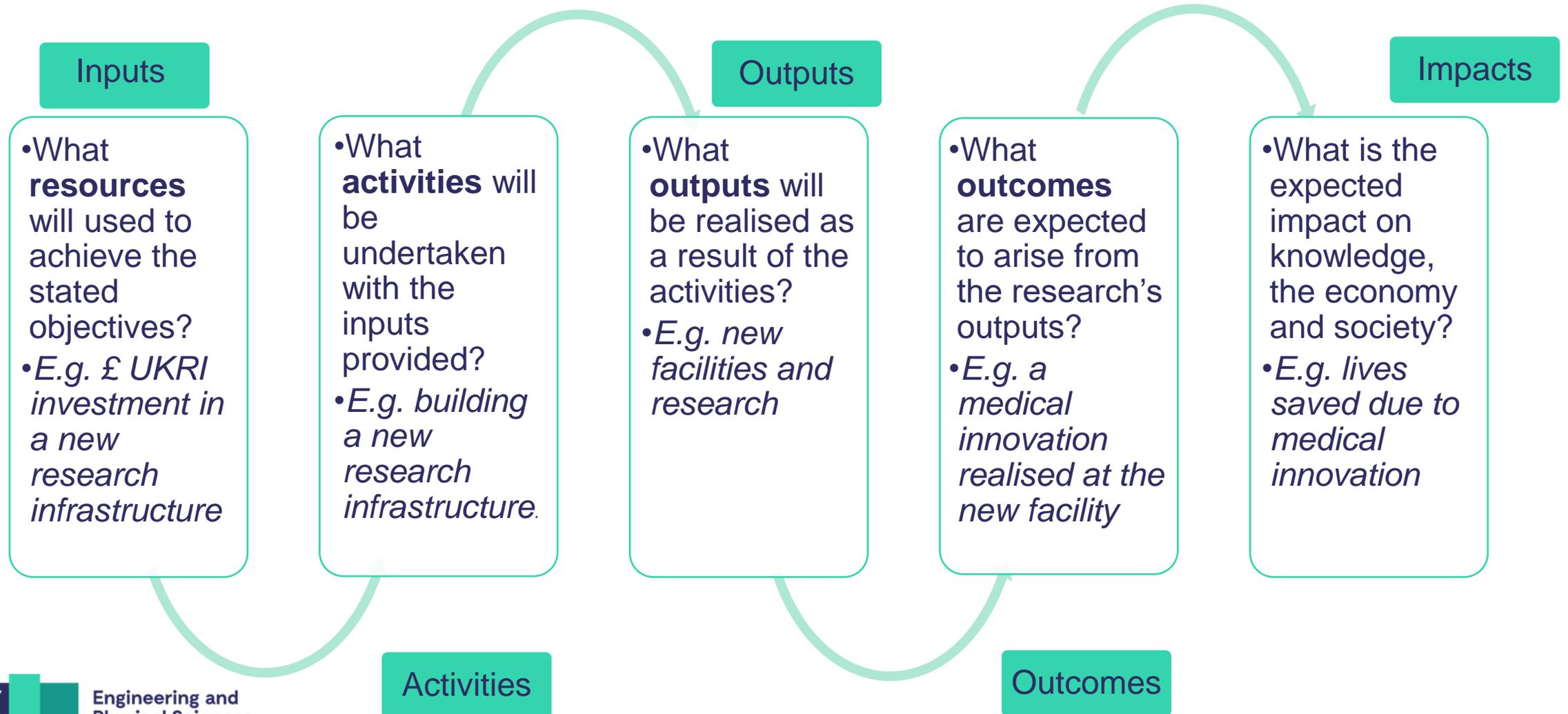
Telephone: 07514 622458

Geographical Distribution of Mathematical Sciences Grants

- Portfolio currently contains £251.2m grants
- This is made up of:
 - Programme Grants
 - Standard Mode
 - New Investigator Awards
 - Fellowships
 - Small Grants
 - Travel Grants
 - Institutes
 - Additional Funding Programme Allocations



Capturing the benefits of the work we fund



Mathematical Sciences SAT

- Professor Helen Balinsky – HP
- Professor Helen Byrne – University of Oxford
- Professor Peter Challenor – University of Exeter
- Mr Chris Daniels – Flarebright Ltd
- Professor Idris Eckley – Lancaster University
- Professor Mark Kambites – The University of Manchester
- Dr Alexander Kasprzyk – University of Nottingham
- Professor Sara Lombardo - Loughborough University (CHAIR)
- Professor Jason Lotay – University of Oxford
- Dr Lisa McFetridge – Queen’s University Belfast
- Dr Gueorgui Mihaylov – GSK
- Professor James Robinson – University of Warwick
- Professor Gregory Sankaran – University of Bath
- Mr Robert Shaw – AstraZeneca
- Professor Gwyneth Stallard – Open University
- Professor Arne Strauss - WHU

Coming Soon

- Team visits to:
 - Loughborough (with representation from ICT and PS) – 3rd May
 - Cambridge – 9th May
 - Warwick – 11th May
 - Imperial – 7th June
 - Southampton – 10th June
 - Cardiff (joint with ICT) – TBC
- Community workshops



Engineering and
Physical Sciences
Research Council

Thank you



Engineering and Physical Sciences Research Council



@EPSRC



EPSRCvideo