

Welcome and logistics

Thank you for attending today's workshop; we need community support to help us inform our strategies and decisions.

- **Timing:** 10:00 – 16:00
- **Refreshments:** tea, coffee, and lunch will be served in the Arnold Room
- **Toilets:** IN the corridor outside
- **Fire Alarm:** No alarm test planned for today – nearest fire exits are upstairs. Once outside the main entrance turn right. Muster point is Tavistock Square.
- **Coat racks:** In the corridor next to registration
- **Outdoor space (small):** door next to coat racks

Agenda for today

10:00 – 10:30	Arrival and coffee		
10:30 – 11:00	Introduction from EPSRC		Tony Chapman
11:00 – 12:00	EM Roadmap – summary of findings to date	Followed by a Q&A session	Rik Drummond-Brydson
12:00 – 12:45	Lunch		
12:45 – 14:15	Workshop session 1	Training and development, access to infrastructure, data issues	EPSRC
14:15 – 14:45	Coffee		
14:45 – 15:45	Workshop Session 2	Opportunities for improved working, gaps in provision	EPSRC
15:45 – 16:00	Closing remarks		Tony Chapman
16:00	Close		



Engineering and
Physical Sciences
Research Council

A view from EPSRC:

Electron Microscopy

A series of thin, orange, hand-drawn style lines of varying lengths and orientations, some intersecting to form a grid-like pattern, set against a teal background.

Tony Chapman
26 March 2025

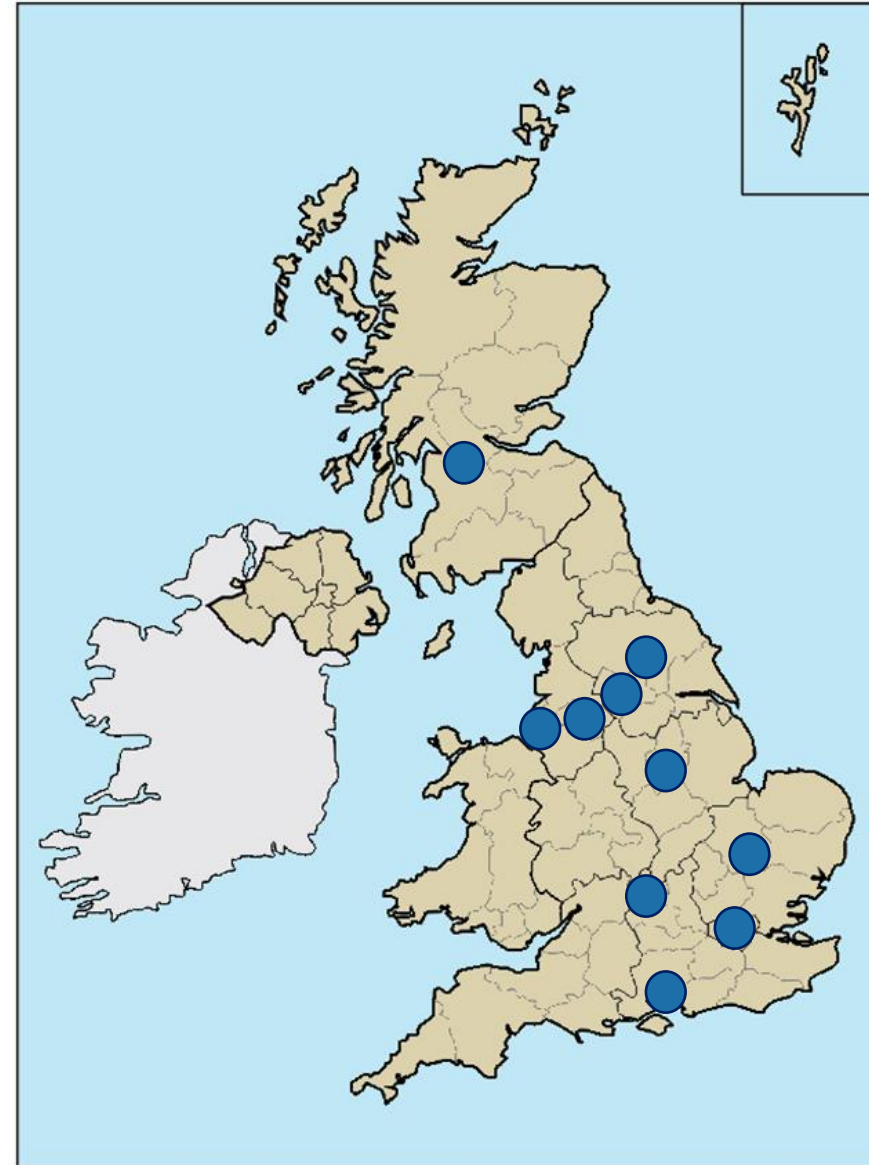
Introduction

- **Electron Microscopy is a core method for much of the scientific research funded by EPSRC.**
 - EPSRC has invested a substantial amount of funding in this technology over an extended period, which reflects that value.
 - In the future we want to consider the nature of future support for EM in the UK.
 - How best can we help the community?
- **The EM community has been preparing a roadmap for the technology.**
 - Covering the current landscape, training and RTP development, access to infrastructure, data management and storage, and horizon scanning.
 - Today is an opportunity to see the first results.
 - It is also an opportunity to contribute to the discussion around the major issues currently affecting the EM community.

Distribution of EPSRC EM investments

The total investment by EPSRC through the Strategic Equipment/Infrastructure scheme over the last 9 years is £38.9m.

- A broad geographical spread.
- A variety of technologies and applications.
- This is just one scheme:
 - SuperSTEM
 - Core Equipment (for lower end EM)
 - ePSIC
- Other funders across the UK and EU, as well as other RCs will also have funded additional capability and capacity.
- Some of this may also be available for EPSRC researchers.



EPSRC – Investments in Electron Microscopy

Reference	PI	Institution	Title	Value	Year
EP/Z531078/1	McVitie	Glasgow	MAGTEM2 - the next generation microscope for imaging functional materials	£4.9m	2023
EP/X041204/1	Haigh	Manchester	A Smart Automated TEM Facility for Large Scale Analysis of Atomic Structure and Chemistry	£5.86m	2023
EP/W036401/1	Nellist	Oxford	A Versatile, high-throughput, Analytical Transmission Electron Microscope (VATEM)	£2.75m	2022
EP/V05385X/1	Browning	Liverpool	An Aberration Corrected STEM with Integrated Science Driven AI to Quantify Dynamic Functionality in Advanced Energy Technologies and Biomaterials	£4.85m	2021
EP/V028855/1	Brydson	Leeds	3D Nanoscale chemical analysis: a FIBSEM-SIMS facility optimised for soft and composite materials	£1.73m	2021
EP/V007629/1	Bartlett	Southampton	Correlative Raman, SEM and EDX for operando electrochemistry research	£0.7m	2021
EP/V007661/1	Giuliani	Imperial	A Facility for Cryo-Enabled Multi-microscopy for Nanoscale Analysis in the Engineering and Physical Sciences (Cryo-EPS)	£10.3m	2020
EP/S033394/1	Lazarov	York	Aberration-Corrected Scanning Transmission Electron Microscope with atomic resolution spectroscopy under controlled environmental conditions: AC-eSTEM	£3.25m	2019
EP/S021434/1	Khlobystov	Nottingham	High resolution, cryogenic analytical and transfer scanning electron microscope (HR-CAT-SEM)	£1.56m	2019
EP/R008779/1	Midgeley	Cambridge	Multi-Dimensional Electron Microscope	£3.01m	2017

Relativistic Ultrafast Electron Diffraction and Imaging

RUEDI will be a national user facility using MeV electrons for imaging and diffraction on ultrafast timescales

Transformative Science Themes Accelerating UK Technologies

- Dynamics of Chemical Change
- Materials in Extremes
- Quantum Materials & Processes
- Energy Generation, Storage and Conversion
- Biosciences



**World leading advances in accelerator, lens, operando stages and detector designs
coupled to advances in artificial intelligence**

MICROSCOPY EUROPE

Application for entry into the ESFRI Roadmap 2026

A distributed research infrastructure to provide access to state-of-the-art electron microscopy to accelerate materials design.

- Beyond ESTEEM and e-DREAM which are included in the ESFRI Landscape document 2026.
- Single point of access to pan-European facilities.
- Needs to be aligned to any / all National roadmaps where these exist.
- MOU in preparation between 15 Partners with The Czech Republic leading.
- 3 statements of formal political support received which is sufficient to enter the ESFRI roadmap.
- Other partners including the UK (via UKRI / EPSRC) currently reviewing their position based on the ESFRI questionnaire.
- Political support does NOT imply and current / future funding commitment.

Key points from an EPSRC perspective

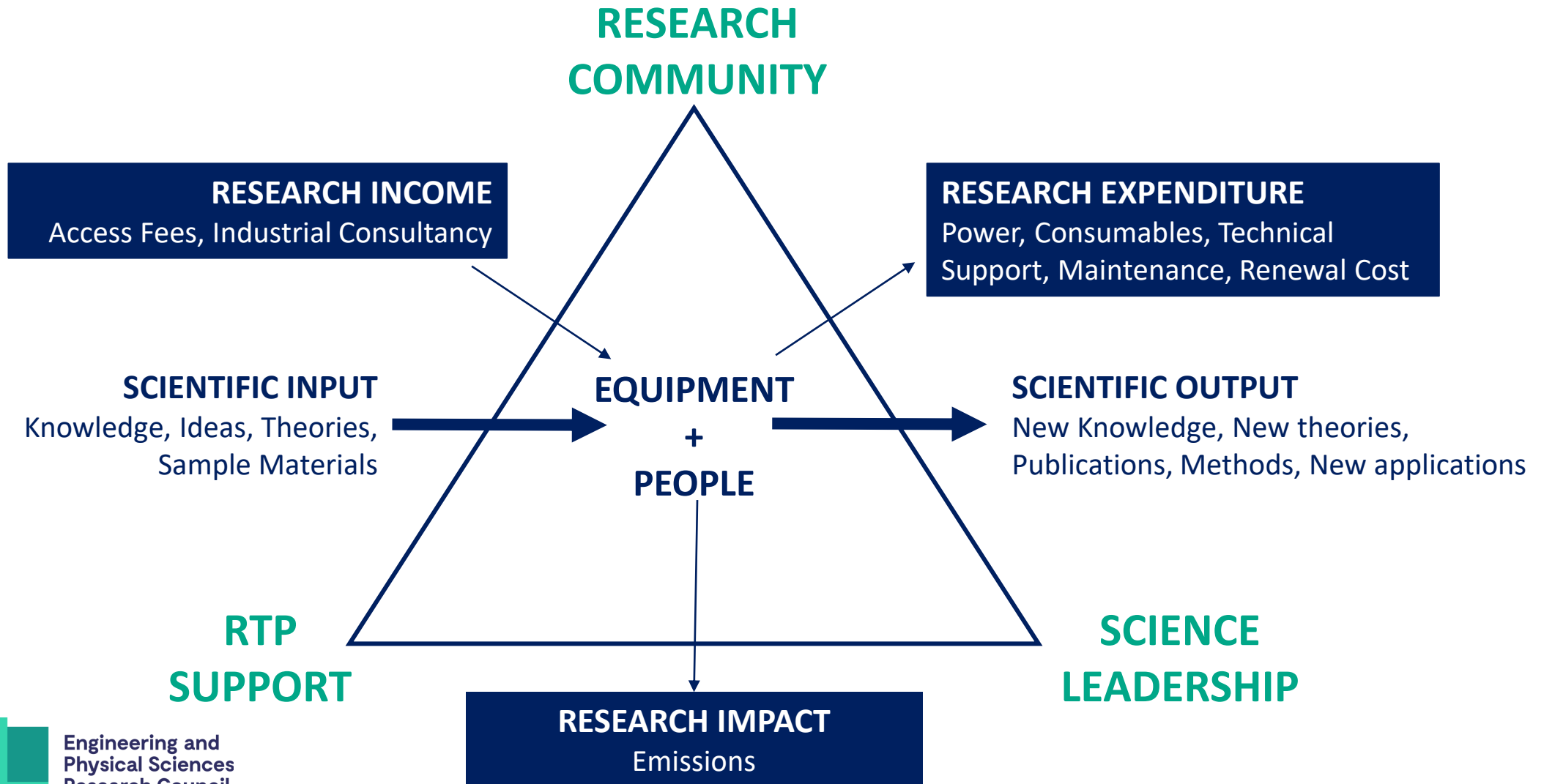
- **Questions:**

- What is the balance of capability and capacity within EM in the UK?
- What are the key challenges affecting EM in the UK?
- What can EPSRC help do to address these?
- What is beyond EPSRC's control?
- What does the future look like?

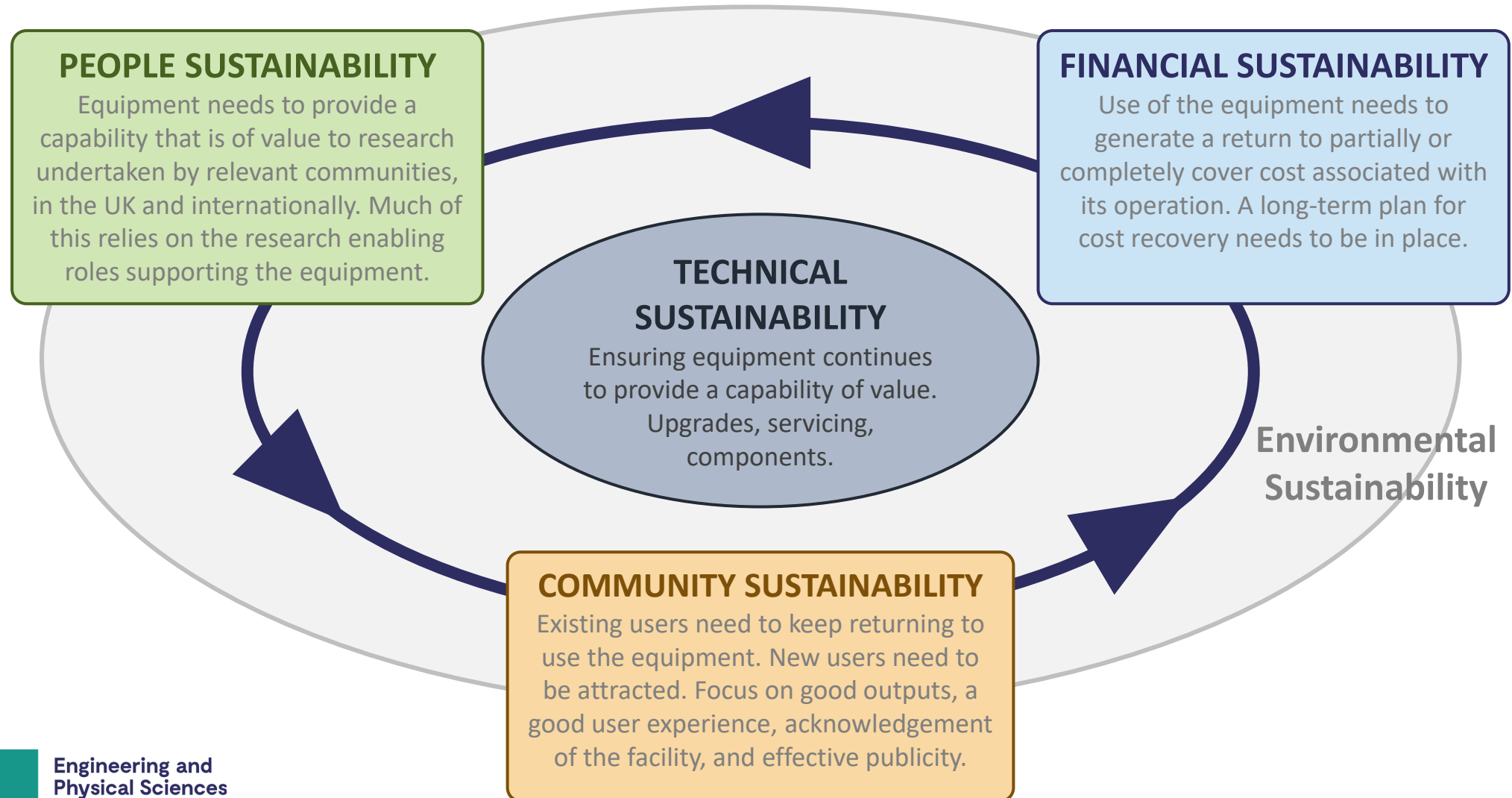
- **Messages:**

- Our previous investments do not mean that we will not invest more in electron microscopy.
- Applications would need to take the national picture into account, as well as local interest. **Relevant** additions to capability and **necessary** additions to capacity would need to be demonstrated.
- Many issues affecting EM are not unique to EM.

Infrastructure as an Ecosystem



What is Scientific Sustainability?



People and Research Sustainability

- **Research Technical Professionals (RTPs) are a vital element in successful operational sustainability.**
 - Equipment operation and technical support.
 - Advice to users on experimental design and feasibility.
 - Understanding of and ability to work with users from diverse scientific fields
 - Method development.
 - Interpretation of outputs.
 - Major point of contact for users, therefore vital in providing a good user experience and repeat requests for access.
 - Principal providers of training to users.
 - Experienced in maintaining equipment.
 - A go-between with the manufacturer.
 - Business and sales skills
 - Proactive communication and promotion

Challenges for Research Sustainability

RECRUITMENT & RETENTION

People with a high level of technical skill, broad scientific understanding, capable of training and engaging with industry are in short supply and high demand. Continuity of experience is an issue.

DATA

Storage costs, storage capacity, data analysis, responsibility, ownership. The cost and skills of managing data required for sophisticated scientific equipment is an increasing challenge.

ENERGY COSTS

Increased costs in recent years. Many types of equipment have a heavy energy demand, which is unavoidable.

CONSUMABLES

Costs of non-renewable consumables, such as helium, as well as other bulk gases, lab consumables, and replacement components such as sample holders or cartridges.

MAINTENANCE

Investment in the equipment to ensure it remains available to the user base for the maximum amount of time. Includes routine maintenance and replacement of components.

RENEWAL & DEVELOPMENT

Maintaining the scientific capability of the equipment, as well as expanding its range, if possible, to ensure it continues to be of value to its user base.

COMPETITION

If a facility or piece of equipment is one of several comparable facilities available, competition may reduce the user bases in each case.

FUNDING AVAILABILITY

Funding from all sources (RCs, Industry, University, Third Sector) is not guaranteed in the long term. Changes in budgets may affect what it is possible to afford.

POLITICAL LANDSCAPE

Wider political drivers and goals may influence what funding is available in what areas.

QUESTIONS?