




Building a vision of the future for UK Mathematical Sciences research

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Format of the session

- Opening remarks from me: 10 mins (or less)
- Discussion around tables: 15 mins
- Reporting back / final comments: 10 mins

Strategy

Key elements of a strategy include (Rumelt^{1,2}):

- Diagnosis (the challenge, the external environment)
- Policy (objectives and priorities, including ‘saying no’)
- Actions

¹ Rumelt, R.P. 2011. Good Strategy / Bad Strategy. Crown Business. ISBN 978-0-307-88623-1. <https://en.wikipedia.org/wiki/Strategy>

² Grindrod, P. 2021. Research Strategy and Strategic Options for Mathematics Departments. Unpublished.

https://www.researchgate.net/publication/352093015_Research_Strategy_and_Strategic_Options_for_Mathematics_Departments

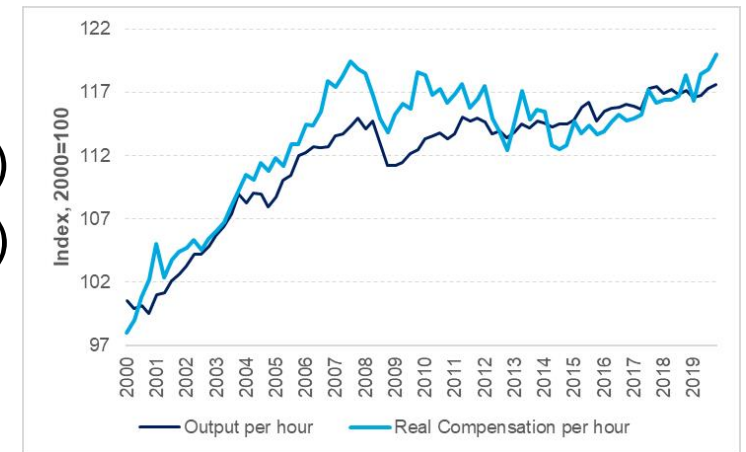
Diagnosis – the external drivers

Science

- Data: Omics, LHC, Space¹, Citizen Science
- Eroom's Law² (cost of a new drug doubles every 9 years)
- “More theory is needed” in biology (Nurse, 13 Sept 2021)³

National context

- 2021 Integrated Review (‘Global Britain in a competitive age’)
- 2021 Innovation Strategy ⁴ (‘Leading the future by creating it’)
- UKRI Strategy 2022 – 2027 – a focus on diversity



Source: Innovation strategy ⁴, page 14

¹ Space includes JWST, SKA, Earth Observation, and small satellites

² https://en.wikipedia.org/wiki/Eroom%27s_law

³ Paul Nurse, Biology must generate ideas as well as data. *Nature* **597**, 305 (2021) <https://doi.org/10.1038/d41586-021-02480-z>

⁴ <https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it>

“The order is rapidly fadin’ ” (example)

R&D Tax Credits
(issued 2004,
updated 2010):

Noted by the
Bond Review
(recommendation
#24)

Projects that count as R&D

The work that qualifies for R&D relief must be part of a specific project to make an advance in science or technology. It cannot be an advance within a social science - like economics - or a theoretical field - such as pure maths.

<https://www.gov.uk/guidance/corporation-tax-research-and-development-rd-relief>

4.54 Finally, the government recognises the growing volume of R&D being undertaken which is underpinned by pure mathematics. Spring Statement announces an expansion of the qualifying expenditure to include all mathematics. This reform will support nascent sectors where the UK has a comparative advantage such as Artificial Intelligence, quantum computing and robotics while also supporting strong sectors such as manufacturing and design.

Spring Statement 2022, HM Treasury, March 2022, page 41

Dylan, R. The times they are a-changin’. [https://en.wikipedia.org/wiki/The_Times_They_Are_a-Changin%27_\(song\)](https://en.wikipedia.org/wiki/The_Times_They_Are_a-Changin%27_(song))

See also: <https://www.gov.uk/government/publications/guidelines-on-the-meaning-of-research-and-development-for-tax-purposes>

Policies 1 / 2

- Relations with the sciences:
 - ‘warehouse’ metaphor (J.-P. Serre) ¹
 - UKRI cross-programme funding streams (be ready!)
- Industry links - R&D Tax Credits / Prosperity Partnerships
- Outcomes – tell stories about MS research
- Research training agenda:
 - distinctive partnerships in place already (e.g. APTS, TCCs)
 - Sara Lombardo (SAT Chair) plans a CDT-related questionnaire

¹ Kirsch, M. (2010). Jean-Pierre Serre: Mon premier demi-siècle au Collège de France. In: Holden, H., Piene, R. (eds) The Abel Prize. Springer. https://doi.org/10.1007/978-3-642-01373-7_3. Quoted in the Bond Review.

Policies 2 / 2

- Develop new ways to value our culture:
mentoring, teamwork, persistence, simplicity, reproducibility
- Aim to preserve geographical and size diversity in UK MS departments (explain why)
- Look outside academia to find new ways to make the case for public benefit, e.g. creative arts sector

Questions for discussion

- Which changes in the external environment matter the most ?
- What should be your dept's objectives and priorities within the UK MS 'ecosystem' ?
- What should MS research in the UK look like in 2030 ?