

Commons Science and Technology Committee: inquiry into the creation of a new UK research funding agency

Written evidence submitted by the Royal Astronomical Society

1. This is the official response from the Royal Astronomical Society (RAS) to the inquiry by the House of Commons Science and Technology Committee into the creation of a new UK research funding agency.
2. The RAS represents more than 4,000 astronomers and geophysicists, in the UK and around the world, in occupations in academia, industry, education and public engagement, and journalism, as well as others in the wider economy. Our members are described as 'Fellows'.
3. This written evidence was shaped by input from our governing Council, and more generally from RAS Fellows and others in universities and research establishments.
4. *In summary, the RAS cautiously welcomes the plan for a new ARPA style body, able to offer medium- to long-term for innovative scientific projects. The proposed agency could unlock the potential of fundamental research, including in astronomy, space science and geophysics.*
5. *We would however note that the creation of the new agency should not compromise promised growth in research funding elsewhere (such as in the recently announced uplift to the UKRI and UK Space Agency budgets¹) and that scientific projects it backs should still be supported on the basis of peer review. It should also not be seen as an appropriate substitute for UK membership of the EU Horizon programme, currently a source of significant funding for astronomy, space science and geophysics researchers².*

What gaps in the current UK research and development system might be addressed by an ARPA-style approach?

6. Delivering the serendipitous results from fundamental research often requires the commitment of resources on timescales far longer than electoral or budgetary cycles. The new agency could engender confidence in scientists working in these areas that they could see projects through to completion, with government underpinning the associated risks.

¹ BEIS research and development budget allocations 2020 to 2021

<https://www.gov.uk/government/publications/beis-research-and-development-rd-budget-allocations-2020-to-2021/beis-research-and-development-budget-allocations-2020-to-2021#:~:text=As%20a%20first%20step%20to,BEIS%20programmes%20and%20partner%20organisations.>

² Astronomy and geophysics obtained at least €18 million from the 2019 ERC call alone. See

<https://erc.europa.eu/projects-figures/erc-funded-projects> for details.

What are the implications of the new funding agency for existing funding bodies and their approach?

7. A UK ARPA should not be established at the expense of either the core budgets of the research councils in UKRI (STFC and NERC are most relevant to our interests). These existing bodies deliver an excellent return on investment, with for example research output in the sciences we represent consistently ranked third in the world³. In some cases, such as STFC, they also provide direct support for scientific facilities that would be beyond the remit of the proposed new agency.
8. Applications for grant funding to these bodies are also increasingly oversubscribed, with a narrowing of the programme they can support⁴, so there remains a strong case for increasing their resources in line with the growth in public investment in R&D. Additional investment in the research councils, and thus reducing the oversubscription rate for high quality grant applications, worthy of funding, is a complementary way of being able to support higher-risk projects alongside the new agency.
9. The new research body would also not be a substitute for UK membership of the EU Horizon programme, including the European Research Council (ERC), whose grants have been a lifeline for UK astronomy and geophysics research groups in recent years (amounting to a third of resource funding), and its support for Marie Skłodowska-Curie actions⁵ that support researcher mobility.

What should be the focus be of the new research funding agency and how should it be structured?

10. The new agency should support a diverse range of high-risk, high-reward, fundamental research projects. There are excellent examples of these in our fields, like the ultimately successful search for gravitational waves using instruments like LIGO, discovered a century after their prediction by Einstein's General Theory of Relativity. (UK technology used in the detectors was then applied in medicine.)⁶
11. As a result of their work in blue skies projects, astronomers and geophysicists are a group with collective expertise in areas like imaging, big data, space weather, natural

³ Astronomy and astrophysics country ranking

<https://www.scimagojr.com/countryrank.php?category=3103&area=3100&year=2019&order=itp&ord=desc>

Geophysics country ranking

<https://www.scimagojr.com/countryrank.php?area=1900&year=2019&order=itp&ord=desc&category=1908>

⁴ See e.g. "Report on the 2019 Astronomy Grants Round", <https://stfc.ukri.org/files/agp-community-report-2019/>

⁵ Marie Skłodowska-Curie actions: <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/marie-sklodowska-curie-actions#:~:text=The%20Marie%20Sk%C5%82odowska%2DCurie%20actions,transnational%2C%20intersectoral%20and%20interdisciplinary%20mobility.>

⁶ STFC: "British technology at heart of gravitational wave discovery"
<https://stfc.ukri.org/news/british-technology/>

hazards and climate change, all of which could be appropriate for the new body. We recommend that the agency is founded with a diversity of contributors in mind, including those listed, rather than being too closely tied to particular sectors of the economy.⁷

What funding should ARPA receive, and how should it distribute this funding to maximise effectiveness?

12. The reported £800 million investment in UK ARPA over five years is a relatively small component (less than 1%) of the UK public sector science budget, set to rise to £22 billion per annum by 2025. The Committee should consider whether this is sufficient to have the transformative effect intended, or whether a larger scale programme is required.
13. Irrespective of the level of investment, appropriate governance and oversight will be crucial if the new agency is to succeed. The UK ARPA should coordinate its work with UKRI and other research organisations, with a board or steering group with a broad membership from academia and industry, encompassing geographic and personal diversity.
14. That board should be responsible for agreeing the societal and scientific themes for support. The decisions on funding individual programmes should though be on the basis of peer review of their merits, unconstrained by considerations like the age of the researchers, or the prestige of the institution they work in. (This type of approach, centred on excellence, is positively attributed to the ERC by a number of RAS Fellows who commented on the inquiry.)

What can be learned from ARPA equivalents in other countries?

15. The best comparable example is the original ARPA (now DARPA) in the United States, which has supported projects of enormous benefit to astronomy and geophysics, such as the detection of asteroids by the Space Surveillance Telescope⁸, the construction of the Arecibo Observatory⁹, the World-Wide Standardized Seismograph Network¹⁰, radar mapping and elevation measurement¹¹, and the precursor to the Internet¹².

⁷ UK astronomers and geophysicists are responsible for numerous spin outs, and crucially the transfer of highly skilled people into the wider economy. Examples are set out in our booklets on wider impact <https://ras.ac.uk/ras-policy/impact-and-industry>

⁸ <https://www.darpa.mil/program/space-surveillance-telescope>

⁹ <https://www.darpa.mil/about-us/timeline/arecibo-observatory>

¹⁰ <https://pubs.usgs.gov/of/2014/1218/pdf/ofr2014-1218.pdf>

¹¹ <https://www.darpa.mil/about-us/timeline/geographic-synthetic-aperture-radar>

¹² <https://www.darpa.mil/about-us/timeline/arpnet>

16. Notably DARPA is tied to a US national security remit, and the Committee should consider whether this is appropriate for the UK, given the global nature of scientific problems, and our history of successful international collaboration.

What benefits might be gained from basing UK ARPA outside of the 'Golden Triangle' (London, Oxford and Cambridge)?

17. As a learned society representing scientists across the whole of the UK, and around the world, the RAS is not in a position to express a preference for the location of UK ARPA. We would however note that expertise in science, including in astronomy, space science and geophysics, is found in all the nations and regions of the UK, and that many towns and cities would benefit from and be good homes for the new agency.