Evidence

Making a new ARPA-style agency work in the UK
February 2021

The Royal Society of Chemistry held a workshop with 26 members of the chemical sciences community to explore the challenges and opportunities in creating a new UK funding agency based on the US ARPA/DARPA model, referred to herein as "UK ARPA".

Delegates were drawn from the RSC's community policy group, the Research and Development Landscape Collective, and represented a diverse cross-section of the chemical sciences community in terms of size and type of business, university and public sector research body, career stages, gender, and experiences of either or both the UK and overseas funding systems.[1]

Our recommendations

Integrating UK ARPA into the existing R&I funding landscape
- Establishing UK ARPA's unique role within the wider UK R&I landscape should be a key focus of the government's engagement with the research and innovation community.
- UK ARPA must not be restricted to the remit of its sponsor department and must have the flexibility to invest on timescales beyond parliamentary horizons and to move investments, where appropriate, between budget years.

Creating a funding agency as agile and flexible as private R&D funding
- UK ARPA investments should have appropriate contingency and flexibility to support the movement of people between investments when early-stage projects are terminated, supporting stability in research careers and diversity of research opportunity.
- UK ARPA should provide seed corn funding in addition to the proposed longer-term grants to support diversity of ideas and participants.
- Expertise in intellectual property, commercialisation and routes-to-market should be embedded in UK ARPA's operating model.

Building diverse research programmes
- UK ARPA will need to build an advisory structure which reflects its strategic context, its desired agility and the long term focus of its funding.
- Decision-making in project selection and termination/ continuation should be recorded and monitored to continuously refine the process and to detect and challenge inconsistencies or bias.

Managing risk and tolerating failure
- UK ARPA's operating model needs to help drive a shift in research culture that sees the strategic termination of a project as part of the research process, not a failed endeavour.

Equality, diversity and inclusion
- Inclusion and diversity should be embedded in UK ARPA's practices and procedures from the beginning.

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[1] ~50/50 split between industry and academia with several researchers who had worked across both sectors; range of career stages from early career researchers in both industry and academia (30%) to established and senior researchers and business leaders (55%); 20% of the delegates were female.

Background

According to its recent submission to a House of Commons Science and Technology Committee inquiry, the UK government plans to invest "*at least £800m*" of public funding by 2024-25 through a new ARPA style agency. This approach is intended to "*back basic science and breakthrough technology across long time horizons by experimenting with new funding models*". The government has signalled that in the coming months they will focus on recruiting the leader of the new agency, whilst continuing to scope its operations. UK ARPA is intended to have a unique and complimentary role in the current UK research and innovation landscape.

Workshop Summary

1. Integrating UK ARPA into the existing R&I funding landscape

Establishing UK ARPA's unique role within the wider UK R&I landscape should be a key focus of the government's engagement with the research and innovation community. This engagement should draw on expertise from researchers, entrepreneurs and investors.

There is a concern that UK ARPA's mission, as currently stated, will significantly overlap with the work of UKRI, particularly Innovate UK, and duplicate existing funding mechanisms such as the Industrial Strategy Challenge Fund, Global Challenges Research Fund and the EPSRC's New Horizons programme. To ensure that UK ARPA avoids duplication and adds value to an already complex funding landscape, it should:

- Have a unique and well-defined mission and purpose. An important characteristic of DARPA is that it sits firmly outside the scope of normal academic grants;
- Be globally facing, leveraging UK expertise, technologies and companies to solve global challenges.[2]
- Enable streamlined collaboration across organisations, internationally and between industrial and academic partners, with the ability to move funding between partners to meet the changing needs of research projects as they develop.[3]
- Address specific gaps in the R&I funding landscape such as fast-response grants, grants that allow the research to change direction in response to emerging findings, and support for entrepreneurialism.
- Be able to support the needs of both blue-skies and translational research, and learn from the existing experiences in the wider UK R&I landscape.[4]

UK ARPA must not be restricted to the remit of its sponsor department and must have the flexibility to invest on timescales beyond parliamentary horizons and to move investments, where appropriate, between budget years. This will support the agency to follow technologies as they develop, maximise the benefit of stop/start approaches for projects in flight, and allow flexibility in the support provided to attract and retain talent.

Advantages and disadvantages to locating UK ARPA within UKRI or creating a new, independent body were identified. Wherever UK ARPA sits, there was strong agreement that it must be carefully integrated into the existing UK R&I landscape, avoid duplicating existing structures and be comparatively less bureaucratic.

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[2] The Biotechnology and Biological Sciences Research Council was cited as an example of good practice in its transatlantic cooperation with the US National Science Foundation.
[3] The Councils for Scientific and Industrial Research in India and South Africa were identified as examples of good practice in facilitating international collaboration.
[4] UK Research and Innovation and The Wellcome Trust were cited as examples of good practice in supporting both blue-skies and transformational research.

2. Creating a funding agency as agile and flexible as private R&D funding

UK ARPA investments should have appropriate contingency and flexibility to support the movement of people between investments when early-stage projects are terminated, supporting stability in research careers and diversity of research opportunity. The private sector's agility stems in part from the freedom to stop and start funding relatively easily and the flexibility to redirect people and investments to new research avenues. Gateway models with clearly defined criteria for each stop/ start gate can allow rapid project termination or refocusing of resources. There are concerns that this management model in public funding could result in significant career uncertainty, particularly at early career stages. Provision within the agency's funding model to support the redirection of talent could help mitigate this.

UK ARPA should provide seed corn funding in addition to the proposed longer-term grants to support diversity of ideas and participants. Early-stage, pre-competitive funding could be deployed by ARPA to support diversity in its applicant pool and in the breadth of ideas available for investment over the longer term. This should be in addition to the longer-term grants already proposed for UK ARPA.

Expertise in intellectual property, commercialisation and routes-to-market should be embedded in UK ARPA's operating model. Realising the benefits of Intellectual property (IP) is seen as less of a barrier in the private sector because companies have clear pathways to accessing specialised support, for example through in-house expertise. The provision of support for research translation in academia can be less consistent and not always clearly signposted. This means researchers can find it difficult to know where to go for support.

3. Building diverse research programmes

UK ARPA will need to build an advisory structure which reflects its strategic context, its desired agility and the long term focus of its funding. Ensuring that funding priorities reflect the opportunity and potential at the cutting edge of science and innovation is challenging. Programme managers will play a critical role in identifying emerging trends and opportunities but UK ARPA will need a transparent approach which allows them to reach out beyond the 'usual suspects.' To provide a range of short, medium and long term inputs to inform decision making, a combined model could include:

- A specialist board capturing the diversity of industry R&D, investors as well as academic researchers,
- Learning from the continuation or termination of existing projects;
- Longer term grass roots engagement beyond the traditionally engaged.

Decision-making in project selection and termination/ continuation should be recorded and monitored to continuously refine the process and to detect and challenge inconsistencies or bias. Enabling UK ARPA to operate with agility and low bureaucracy will require programme managers to have significant autonomy and authority to select, evaluate, and terminate or continue projects. To balance agility and transparency, decisions should be routinely monitored by other programme managers and periodically independently reviewed.

4. Managing risk and tolerating failure

UK ARPA agency's operating model needs to help drive a shift in research culture that sees the strategic termination of a project as part of the research process, not a failed endeavour. Suggestions for supporting this change include:

- Ensuring effective recognition through the funding process of the entire project team, not just the principle investigator. This is an important feature in supporting early stage research careers as well as research technicians.
- Recognising the value in learning from terminated projects, and ensure that knowledge isn't lost, e.g. by recording terminated projects in the public domain, so that the same research isn't repeated.
- Working with other agencies in the sector to redefine the metrics for success, for example by recognising winning seed funding as a metric for success, regardless of whether that project is subsequently terminated.

5. Equality, diversity and inclusion

Inclusion and diversity should be embedded in UK ARPA's practices and procedures from the beginning. Transparent and inclusive recruitment practices, drawing on the widest possible talent pool, and a framework that allows programme managers to cycle in and out of industry or academia are essential. Once fully established UK ARPA's programme managers should be a diverse team with a range of experiences in different technologies, disciplines, and sectors, from within the UK and internationally.

Equality, diversity and inclusion monitoring should be built into the UK ARPA model from the outset ensuring it is well equipped to identify barriers to entry and bias in decision making processes, supporting the delivery of its own ambitions and compliance with the Public Sector Equality Duty.

Our work with researchers in the US highlighted programme managers' use of existing networks as a risk management technique reduced diversity of outcome and access to opportunity. Ensuring a facility that expands UK ARPA's networks in a low risk, low burden way could facilitate its ambitions to deliver diversity of ideas and support a diversity of people.

Contact

We would be happy to discuss any of the issues raised in our evidence in more detail. Any questions should be directed to policy@rsc.org.

About us

With around 50,000 members in over 100 countries and a knowledge business that spans the globe, the Royal Society of Chemistry is the UK's professional body for chemical scientists, supporting and representing our members and bringing together chemical scientists from all over the world. Our members include those working in large multinational companies and small to medium enterprises, researchers and students in universities, teachers and regulators.