

Cutting the future?

Past and current RAS presidents **Mike Lockwood** and **Jim Wild** respond to yet another STFC funding crisis – one that threatens the future success of both our research community and the national economy.

Once again, we face a research council funding crisis and, once again, it is the careers of younger scientists that are taking the brunt of it. This is a direct result of how UK science funding is structured. At present, when a research council budget is stressed, whether by over-commitment, exchange-rate fluctuations, inflation, cuts or flat-cash budget allocations, too often the only available way to balance the books is to reduce the 'blue skies' grants line. This may be a short-term fix, but it does lasting and serious damage to career development and to the transfer of fundamental research into wealth creation and innovation.

The Government aspires to be a 'science superpower', which requires not only world-class facilities but also first-class scientists to use them. Crucially, the timescales of facility readiness and human capital development must be aligned. Major facilities take many years, often over a decade, to move from concept to full operational capability, and early-career scientists typically take six to ten years from starting a PhD to becoming fully independent researchers.

We must also look beyond the research to what the nation as a whole stands to lose, because far more than national scientific prestige is at stake. Scientific research and facilities generate value outside academic research through the skills and techniques that they develop. If we fail to support the pipeline of people during the long gestation periods of facilities, the UK loses much of the knowledge transfer, skills diffusion and economic return such facilities are meant to enable. Evidence shows that early-career scientists trained on STFC-supported projects convert infrastructure, techniques and discoveries into innovation, economic growth and high-value skills. A significant proportion – around 30% – of UK astronomy

and physics PhD graduates move into the private sector, many into roles in software, data science and operational research, bringing advanced analytical and computational skills to high-growth industries. The problem is that young scientists cannot develop these transferable skills if funding periodically dries up. They are forced to leave either science or the country – and once they have left, persuading them to return becomes extremely difficult, especially if the financial support they need remains volatile.

Catching the Big Bang

What we have said is always true and important – but it is especially critical at times when the nation requires particular skills to meet major societal or economic challenges. A striking historical example is the deregulation and computerisation of the City of London's financial markets in the mid-1980s. The financial 'Big Bang' of 1986 created a huge demand for experienced and skilled computing professionals, especially those familiar with UNIX-based multiuser systems, networking, and data processing. In very large part, that need was met by individuals who had, up to that point, been involved in fundamental research and research computing. The period of particularly acute demand for these skills spanned roughly 1983–87, encompassing the lead-up to, and aftermath of, the Big Bang.

Now we face an analogous situation with artificial intelligence. Both to exploit the opportunities AI presents and to help solve the complex challenges it poses, the country will need people with deep experience in machine learning (ML), data analytics, model validation, and systems integration. AI and ML are already widely used in fundamental science, and learning how to use them safely and wisely is a steep curve that many

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young scientists are actively navigating. The skills that drive breakthroughs in research are those that will be essential for national capability in the coming decade.

In response to the present crisis, RAS Council has tripled the number of research fellowships we offer. This is a small drop in the ocean compared with the scale of job losses that the levels of grant cuts under discussion will cause; however, it is a gesture of our support for early-career scientists. The box 'Reaction and action' lists other actions the RAS has taken to try to prevent the loss of a generation of scientific talent.

Wealth creation in the modern world is much less about natural resources than it used to be, and much more about skills and innovation. Hence structural change to stop this cyclic loss of talent is vital. After the previous crisis on this scale in 2008, Lord Drayson and others tried to put measures in place to prevent recurrence. That those measures were either abandoned or circumvented points to the need for more substantial systemic reform of how UK research funding protects people and skills as well as projects and infrastructure.

Astronomy and space science are uniquely important in setting young children on a path towards careers in science or technology. Both of us know well the great power they have to inspire young people and so we both regularly give talks in schools and colleges in which we can honestly tell of how rewarding and fun a life in science can be. However, it is deeply troubling not to be able to be so open about how it is also an insecure life that can be blown off course through no fault of the young scientist. Reorganising science funding to reduce the jeopardy that over-commitment generates for young careers would remove a major dissuading factor that robs the nation of so much of the talent it needs.

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Reaction and action

Since the proposed cuts surfaced in January, the RAS has moved quickly and decisively to safeguard UK astronomy. We are confronting policymakers and fundholders with the stark reality of the catastrophic damage these cuts will cause, particularly to the futures of early career researchers. We are coordinating with key partners, including the Institute of Physics (IoP) and community groups such as the Astronomy Forum, IoP Heads of Department Group, MIST Council and UK Solar Physics, and have joined forces with the Astronomer Royal for Scotland and other influential figures.

Our strategy includes:

- **Political pressure:** briefing the Science, Innovation and Technology Committee and the media; supporting a direct ministerial open letter; and equipping MPs with targeted parliamentary questions that were put to ministers Liz Kendall and Lord Vallance, Astronomer Royal and STFC executive chair Michele Dougherty, and UKRI chief executive Ian Chapman. We have also voiced our concerns to Lord Vallance, who acknowledged that some missed grant rounds and delayed starts were mistakes that needed to be rectified, but has not yet commented on the wider cuts to funding for early-career researchers.
- **Strategic transparency:** filing five Freedom of Information requests to expose UKRI's budget breakdowns and the removal of critical funding protections. We have also provided evidence to counter misleading political spin that blue-sky research is not being cut.
- **Community mobilisation:** uniting university heads and community leaders, launching 'Save UK Astronomy' campaign stickers, creating an open letter for teachers, and providing Fellows with the tools to lobby their MPs directly.
- **Direct investment:** tripling the number of RAS Research Fellowships as a gesture of our support for the next generation of researchers.

Can you help? We have established a high-level action group to execute this strategy.

To contribute vital insights or strategy ideas, please email saveukastronomy@ras.ac.uk.

At the time of writing, despite intense lobbying, no clear solution to the present crisis has emerged. Any effective action needs to include restoration of the number of post-doctoral researchers supported by the grants line that has already been cut by 30%. To be clear, we are not facing a small leak in the talent pipeline; this is a major rupture. There are also serious concerns that we will not garner the benefits of investment made over several decades by not funding the next generation of instruments for major facilities. Compared to other areas of Government funding, the cost of a solution that keeps our national aspiration to remain a science superpower alive is minuscule. Beyond that we will still need systemic reform to prevent a recurrence. There is a saying about never wasting a serious crisis – maybe the present one can finally bring much-needed reform. ●