Five years of UKRI
Sir John Kingman, 14.07.21

Last week I stepped down after three years as Chair (and before that two years as shadow Chair) of UK Research & Innovation.

This has been a wonderful privilege.

If we are ruthlessly objective, the UK has relatively few genuine standout global assets. UK science and research is clearly one of them.

Perhaps not since wartime has the very practical value to the country of our great research strengths been more powerfully evident than through the Covid crisis:

- The Oxford/AstraZeneca vaccine, whose pre-clinical and early clinical studies UKRI funded together with NIHR, builds on decades of publicly-funded research
- UKRI supported the world's largest clinical trial into Covid-19 treatments, the RECOVERY trial, which established Dexamethasone as one of the world's first effective treatments – estimated to have saved a million lives worldwide
- The UK's world-leading genomic sequencing capability has really come into its own, tracking mutations of the virus in real time to a degree many countries cannot
- Even before anyone had heard of Covid-19, UKRI had already begun work on the UK's new Vaccines Manufacturing and Innovation Centre, and
- Sophisticated publicly-funded epidemiology and statistical modelling, much of it based on long-term investments by MRC, has been at the heart of framing the very difficult choices policy makers have had to make in managing the crisis.

All this alone has - I suggest - handsomely repaid the value of all the Government has spent on financial support for UK science over many years.

As to UKRI itself, it is too early to give a firm verdict yet on our execution of Paul Nurse's original vision. Nevertheless, I should like to venture a few parting thoughts, on where we have come and where we have yet to go.

Paul's founding concept was:

"*An evolution of Research Councils UK into a formal organisation with a single Accounting Officer, which can support the whole system to collectively become more than the sum of its parts, through: speaking with a strengthened voice to Government; taking responsibility for delivering cross-Council strategy; and simplifying transactional operations, aimed at reducing the burden of administration*"

So, have we done these things? Broadly speaking, yes, I believe we have:

- Effective advocacy by UKRI at the outset resulted in a very large increase (of roughly a third) from the budget we inherited.

- More recently, UKRI was also able to play a very active role, working with Ministers and the Government's Chief Scientific Adviser to limit the combined financial damage to science from overseas aid reductions and the Brexit financial settlement.
- So even after this year's difficult cuts, UKRI's budget this year is still more than £1bn higher - 7% in real terms – than the budget we inherited in 2017/18.
- We have developed major new cross-council interventions – I am thinking for instance of the Industrial Strategy Challenge Fund, the Strength in Places Fund, and the Future Leaders Fellowships Scheme – all of which would have been extraordinarily difficult, probably in practice impossible, to pull off under the old Research Councils UK structure.
- Particularly through the new Strategic Priorities Fund, we have been able to prioritise a whole range of genuinely interdisciplinary and potentially very exciting work – on everything from the physics of life, to understanding the complexity of chronic pain, to the UK populations lab, to living with machines, to every aspect of air quality, to modern slavery.
- And we have made a serious assault on the bureaucracy burden our processes impose on the research community.

One other point. A major worry in the science community at the outset was that creating UKRI, particularly with Mark Walport as a strong first CEO, risked emasculating the Research Councils – and specifically, that strong scientific leaders would no longer be willing to take the key Research Council leadership roles. I would argue that, on the contrary, the cadre recruited by Mark to lead Councils – Lynn Gladden, Fiona Watt, Jen Rubin, Mark Thomson, Christopher Smith – has been formidable, at least as strong as the cadre they succeeded, if not stronger. And the current Research Council leaders in turn have done more to bring heavyweight scientists and scholars into senior roles within the Councils, something Mark and Ottoline have both been very keen to encourage.

So – all in all, five years on, I would argue that UKRI has a pretty decent score against the "Nurse test".

And yet – there is inevitably much more to do. And there are, also inevitably, challenges. Some of them are pretty serious.

First, funding.

With one or other hat on, I have been involved in negotiating the research budget many times over 20 years or so. In the Treasury I handled five spending reviews on research – and at UKRI, I have been involved in several more.

Of all these, resolving UKRI's budget for the current financial year was easily the most difficult negotiation I can remember.

Thanks to heroic efforts by various Ministers, Ottoline Leyser, Patrick Vallance and others, the outcome was absolutely not as bad as it might have been.

Nevertheless, the results were clearly not good. UKRI's total budget in 21-22 is 8.2% below 20-21.

The most severe consequences are falling on research of benefit to the developing world.

I greatly regret this. If the pandemic has underlined anything, it is about the global interconnectedness of the problems we face.

Let me give one very concrete example: the UKRI-funded work on phase one of the Oxford vaccine project allowed Sarah Gilbert and Adrian Hill quickly to shift their work onto a Covid-19 vaccine – but this built directly on their existing work around the development of a viral vector vaccine for MERS in 2015, funded through the MRC and DHSC. This 2015 MERS work was strategic overseas aid funding.

In practice, in the very short term (ie this year) UKRI should just be able to protect the remaining (ie non-ODA) vital work of the research councils – but only by making very substantial reductions in capital spend, which is clearly not a sustainable financial strategy.

Taking a longer term view, I am particularly concerned about the "core" work funded through the day-to-day work of the Research Councils and Research England – the bedrock of Government support for British science. Even leaving aside the much deeper ODA cuts, looking across the decade from 2010-11 to 2020-21, support for the mainstream work of the Councils and Research England has been cut in real terms by 6%.

So I'm afraid this Autumn's spending review really is now a make-or-break moment.

In principle, the Government's intention to spending more on science could not be clearer. This was recently re-emphasised by the Prime Minister, who again promised to grow total public R&D spending to £22bn. This sits alongside the Government's wider aspiration to grow all-economy R&D to 2.4% of GDP from its present (by international standards very low) 1.7%. To put the scale and ambition of this latter target into perspective, it requires the UK to lift total economy R&D from £37bn a year now to £68bn in 2027.

This is not a small ambition to embrace – and therefore these words of the Prime Minister's are incredibly positive and welcome.

Moreover, one would think the wider political environment could not be more positive for the cause.

It is science that is showing the way out of the pandemic.

Memorably, Sarah Gilbert got a standing ovation at Wimbledon.

And meanwhile, both the US and China are very aggressively growing their support for science – already much higher than ours as a % of GDP.

And yet.

The £22bn figure sometimes appears with a date (2024-5) attached, sometimes without.

It is a commitment that tends to be conspicuously absent from recent Treasury documents.

And it is a number that offers plentiful scope for definitional jiggery-pokery.

Moreover, the hard fact remains that if the Government really does intend to grow R&D spending in this way in a relatively small time, to cut UKRI's budget by 8% this year is a very peculiar way to start.

My blunt advice to those who care about research funding is to take nothing at all for granted. And to focus on real decisions and real budgets, not medium-term promises.

I don't believe the Treasury can't be persuaded. The Government badly needs a growth strategy. And the Chancellor has been willing to embrace other even more ambitious measures – notably dropping a cool £24bn on enhanced capital allowances in the last Budget, a "growth" measure which is likely to be nearly 100% deadweight – and vastly more speculative in its impact than spending much lesser sums on science and research, whose economic impact has been evidenced in countless studies.

That then brings me to my second challenge – the ever-shifting political environment.

There is nothing outlandish or inappropriate about Ministers taking a close interest in UKRI's work – in fact I welcome it. A body which spends £8bn a year of public money cannot expect elected Ministers not to have every right to have views on how this money is best spent. And whatever some might think, nothing in the Haldane principle says - or ever has said - that, when it comes to the big choices across the system, as opposed to individual research projects, they should not.

Nevertheless, the policy shifts can be extreme. To give you a flavour, in my short five years as UKRI chair:

- Greg Clark as Secretary of State was a great supporter of UKRI, was very closely involved in its work, and secured a huge increase in UKRI's budget. However he was overwhelmingly focussed on the creation of the Industrial Strategy Challenge Fund – an important and potentially very exciting development in UK R&D policy. The core work of the research councils was, in his view, not a priority for marginal funds (though after long debate I am delighted to say he did support the creation of the Strategic Priorities Fund which did allow a small increase in funding for the councils' work).
- With the departure of the Theresa May government, everything changed and the driving force in UK R&D policy became Dominic Cummings. He was coming from the opposite extreme. Like Greg he wanted to see a lot more money spent on UKRI (alongside and in addition to the creation of ARIA). But his prioritisation was completely different – his interest was in funding

the best pure science – indeed he once told me he couldn't see why all applied research wasn't best left to the market (I should say that Cummings would be the first to acknowledge the well-known problems of terms like "pure" and "applied", but crude though the terms are, you get a sense of where he was coming from).

- Now, with the departure of Cummings, I would say the current Government has yet to show its hand on where it stands on these big questions. I have had numerous good conversations with Kwasi Kwarteng, but I do not sense he has yet made his choices – and of course, it remains to be seen whether there will be money available to make meaningful choices possible.

My point in recounting this is not that either the Greg Clark view or the Dominic Cummings view is right or wrong. (Personally, for what it is worth, I think both are too extreme and that we would do better with an approach which falls somewhere in between.)

My point though is a different one – it is a very serious question for UK R&D policy whether it can possibly be conducive to success (however defined) for policy to lurch so widely in a small time, driven by the inevitably random walk of political personalities.

Whatever approach the UK wants to take, science, research and innovation policy is a long-term game. As a nation, I suggest we are much more likely to make progress in this area if we pick a broad strategic approach and a strategy and stick at it for a decent period - as for instance I would argue the US has broadly done for many, many years.

My third point is about pace, process and treacle.

As I say, it is perfectly reasonable for Ministers to want UKRI to operate within a framework of political control and Government approvals. But there is a very real issue about the pace with which Government operates these controls – a problem that has steadily worsened in recent years, even well before the pandemic understandably distracted Ministers from other priorities.

For instance, the NAO's recent report on the Industrial Strategy Challenge Fund described in painful detail the delays in executing that important initiative – for the most recent wave (this was pre-pandemic) there were four consecutive Government approval processes, which managed to take a total of 33 weeks (8 months) to execute. This was obviously frustrating to our industrial partners.

Meanwhile people decisions, in particular, can be exceptionally slow.

Take for instance the appointment of the head of Innovate UK – Britain's national innovation agency, with a budget of over £1bn a year. We have now finally made a terrific appointment, in Indro Mukerjee. But until Indro's appointment, his post had been left vacant for more than three years as Government process took us round and round in circles. It is just not sensible that an organisation of Innovate's importance can be left without a permanent head for three years.

Or take, more recently, the role of head of the ESRC, Britain's social science funder (Britain is of course spectacularly strong in the social sciences). Jen Rubin announced last November that she was stepping down from this job. That was eight months ago. The post has now been vacant for months. But Ministers only in the last few days agreed to even initiate the (inevitably lengthy) process to start to search for a replacement.

How is this possible? A number of interlocking factors are at work.

One is the culture of the Business Department. The Business Department employs many brilliant and long-suffering people. But however good some of the individuals, the Department has a very strong and embedded institutional culture: it is by habit a perpetual motion machine of internal process; it treats time as a free good; and it does not focus on outcomes.

Then, overlaid on all that, is the current Government's intense suspicion of appointments proposals that come through the institutional machine, and the deployment of many political advisers around Government, all of whose views are thought to be needed before every stage of every process for every minor appointment can proceed. There are a lot of appointments, and special advisers are very busy. As a result, they tend to do their collective political policing job extremely slowly.

These processes can also lead to strange unexplained decisions - surprisingly often, rejections of people who are clearly world-class. Ministers of course have every right to appoint whoever they want. Nevertheless there are costs to the UK, and to UK science, in turning superb people down. One does wonder whether this is a luxury the country can really afford.

I have also repeatedly urged Ministers to reflect on the cat's cradle of micro-controls to which UKRI is subject, and whether these are achieving the effect they want.

Take, for interest, the Cambridge Laboratory of Molecular Biology – one of the true jewels in Britain's scientific crown, which has chalked up 16 Nobel prizewinners to date – this is, like a number of world-class institutes and facilities, part of UKRI. If it were in a publicly-funded university, it could run itself however it (or at least the university) wanted. But because it happens to be part of UKRI, BEIS insists that any pay decision the LMB (or any other of our institutes) wants to take above £100k must be put for approval to an (inevitably slow) committee of generalist BEIS civil servants. Quite what purpose the committee process serves is unclear – of course the LMB like any other publicly funded body must operate within its budget. So why, within this budget, have a civil service committee second-guess individual pay decisions for scientists, none of whom are very fat cats? It is genuinely a mystery. Yet no-one seems willing to unpick it.

Now, interestingly, the Government has itself recognised that this web of controls can be a serious inhibitor to funding good science. After all, central to the Government's case for the special status of the new ARIA is that, in order for ARIA to be successful in funding great work, it must be free from the Government's own many controls and processes. There is of course something slightly Alice in Wonderland about this chain of logic. But it leaves a big unanswered question: if

these controls and processes are so counter-productive as to get in the way of ARIA funding the best work, might the same or at least similar logic not also apply to Britain's main research funder, UKRI?

The fourth challenge is more specific. It relates to Innovate UK.

When UKRI's founding legislation was being debated in Parliament, there was a major debate about whether Innovate UK should be in or out of UKRI. In the event it was included – but the debate has not altogether gone away, and some continue to argue that it should be taken out.

I would only say that, having seen at close hand the way Innovate and the Research Councils have worked together, I believe the inclusion of Innovate has had a powerful, beneficial and even transforming effect – in both directions.

Most obviously, the ISCF - a massive programme which was invented by Innovate, and all of whose individual programmes represent collaborations between Innovate and one or more Research Councils - simply would not have happened if Innovate had been excluded. This includes major national programmes such as the Faraday Battery Challenge, including the new Faraday Institution and the UK Battery Industrialisation Centre, or the UK National Quantum Technologies Programme, , or the Audiences of the Future programme – programmes like these all span across both the Research Councils and Innovate, and it is core to their design and purpose that they do.

Moreover, because Ministers found ISCF persuasive, they were willing to invest in it – so that, under UKRI, Innovate's budget has grown very substantially as a result.

There are some who look back to an earlier era when Innovate reported directly to the Business Department, and was not part of UKRI. I am not sure they all remember the 2015 Spending Review when Sajid Javid decided to cut Innovate's budget by a third.

The fact is that Innovate has many more levers at its disposal to achieve its objectives when it is working with the Research Councils and the rest of UKRI.

And likewise, I believe Innovate has been a thoroughly positive influence on the Councils. The biggest single problem with British science policy over many decades, after all, has been that we are brilliant at churning out highly-cited papers in *Nature* - much less good at putting these ideas to work in the real world.

If Innovate were to be taken out of UKRI now, there would inevitably be a much bigger risk of UKRI's institutional culture becoming much more exclusively academic. This would, I believe, be a historic misstep.

So these, I think, are the four biggest exogenous challenges.

But at the same time UKRI itself has to continue to evolve. This will be for Ottoline and my successor to shape. But I'd like to offer five departing thoughts.

First, UKRI needs to identify, and engage Ministers around, a positive way forward for the Industrial Strategy Challenge Fund. The ISCF has had surprisingly little attention - given that it is by some distance the biggest departure in UK R&D policy in decades. By next March, UKRI will have spent £2bn on it.

The ISCF has, to my mind, some very compelling characteristics, including:

- The focus on a portfolio of specific challenges, where there is both good science to be done and commercial opportunity for the UK;
- The insistence on proper match-funding from industry, for every challenge; and
- The willingness to empower "challenge directors" to make real choices about what to fund – something we very loosely based on the DARPA model.

Now clearly the "industrial strategy" brand is no longer fashionable. But it doesn't matter what the intervention is called. Whatever the brand, I would have thought the substance of ISCF (a) makes good sense (b) is clearly additive to the traditional "bottom up" approach of most UK research funding (c) offers real economic possibility, evidenced by the clear willingness of the private sector to co-fund what we are doing, and (d) should resonate with the current Government's interests and priorities, at least as I understand them.

Of course ISCF is not perfect. It needs to continue to evolve. In any portfolio of 23 challenges, there is bound to be a distribution – some challenges very promising; some too early to tell; some nice ideas which aren't really working out. A venture capitalist would be ruthless in triaging between these categories. Up to a point we should be willing to do this, too.

What would make no sense at all would be for the UK to blow a few billion on this initiative and then let it quietly wither. The challenge for UKRI is to capture the imagination of the current Government around a vision for the future of this programme – I suspect this could for instance involve:

- a new brand
- more dynamic management of the portfolio, focussing resource more ruthlessly and probably ending up with fewer, better-resourced challenges
- but equally, almost certainly adding some new challenges which engage the priorities of current Ministers and also command matched private sector financial support.

Second, the business-facing aspects of UKRI's role can be significantly further developed.

One of the practical challenges for the senior leadership of UKRI is that, understandably, everyone who cares about funding of academic science relentlessly bangs on our door. Nothing wrong with that. But business tends not to do this so much – why should it? Yet in an ideal world, for UKRI to do its job really well I would say we should have deeper and wider relationships at senior levels with: the UK's most R&D-intensive businesses; smaller tech and science-based businesses which could be the Unicorns of the future; the venture capital community; internationally mobile R&D-based businesses, and international tech investors. We do of course already have some of these, both through Innovate UK and the Research

Councils. But it is patchy. I suspect this is an area where my successor Andrew Mackenzie's appointment can help UKRI further raise its game.

Third, UKRI is not, and should never be, a lobby group. But privately within Government it should have an intelligent position, analysis, ideas and something informed and interesting to say on a whole range of policy issues which are directly relevant to the health of UK research and innovation – and ultimately, to delivery of the 2.4% target. I am thinking about issues like:

- The design of the R&D tax credit, as well as tax issues which affect venture capital flows;
- Opportunities proactively to reshape regulation in R&D-based sectors, in ways which would promote innovation, particularly post-Brexit;
- The very severe challenges around the state of STEM teaching in schools;
- Ditto on training for technicians;
- Visa availability for mobile scientists and researchers;
- And so on and so on.

UKRI does of course contribute within Government on many of these topics, as you would expect - but it does so in quite a limited and hand-to-mouth way. It could do more and better.

Fourth, for a variety of reasons - some of them historic, some of them current – UK publicly-funded research is particularly highly concentrated in universities, as opposed to other forms or structures – free-standing institutes, Frauenhofers and the like.

It is hard to say from first principles what the "right" ecology of structures should look like. Certainly I have nothing against universities – the UK is blessed with many extraordinary ones.

But I do think the funding system should not artificially favour any one institutional form over another.

And at the moment, it does – most obviously, because research council grants currently cover only 80% of full cost. If research is undertaken in a university, the university then also receives separate parallel financial support from Research England through the so-called QR system. But if the research is not carried out in a university, there is often nothing else to fill the gap. Thus research bodies outside universities can find it extremely difficult to find a sustainable funding model. This cannot be good. The funding system should, as far as possible, operate a level playing-field, promote plurality and make high-quality research financially viable wherever it is carried out.

This could be fixed reasonably easily without any fundamental change in the strengths of the dual support system. To implement a fix would, though, require the availability of some financial resource - which is currently rather scarce.

Fifth, a final smaller point. If I look back on many years of involvement in political decision-making and policy-making around science, innovation and R&D, I am struck by how much of it tends to turn on gut feel of the individuals involved, than on

hard evidence and analysis. This is of course ironic, since good science is all about testing hypotheses against data, empirical results and facts. I do believe there is a potential role for UKRI here - at modest cost - to take a deliberate strategic decision to sponsor and promote more good research, analysis and evidence-gathering on "what works" in policy on science, R&D and innovation.

We should, in short, live by our values!

Thank you very much.