Militarising research: The dark side of Global Britain's science agenda

The British government wants the nation to be a 'science superpower' – but, asks **Stuart Parkinson**, SGR, is this just a smokescreen to hide the expansion of military and economic priorities within the science and technology sectors?

As part of its post-Brexit 'Global Britain' agenda, the UK government wants the nation to be a 'science superpower'.[1] To this end, it announced[2] in early 2020 – just as the COVID-19 pandemic was beginning to take hold – a major increase in its own R&D spending by 2025 and longer-term targets for this spending across the whole economy. Various science bodies have analysed these spending targets and concluded that they are not ambitious enough – but there is arguably a much greater problem: that those guiding Britain's science and technology agenda are more concerned about narrow military and economic objectives than wider social and environmental goals. Indeed, with Russian forces invading Ukraine, the clamour for more military technology is getting louder.

Is UK science spending large enough?

The UK's total spending on R&D – across the public and private sectors – was £38.5 billion in 2019 (the latest year for which figures are available), which was just over 1.7% of Gross Domestic Product.[3] The Royal Society and other research bodies have pointed out that this expenditure was well below the average for both the European Union (2.0%) and the OECD group of industrialised nations (2.4%).[4] The government response was to set a target to increase this figure to 2.4% by 2027 – the first step being to raise public spending on R&D to £22bn by 2024–25.[5] Arguably, this spending increase is ambitious given that, in 2019, only £10.5bn was spent[6] – and, of course, the pandemic has caused considerable damage to the economy in the time since. Still, some bodies – such as the Council for Science and Technology[7] – argue that the government should aim higher as the economic returns on such investment could be correspondingly larger.

The military quickly muscles in

One thing that was especially striking about the government announcement on the R&D spending increase was the lack of detail on how it would be spent. Four months after this, in July 2020, the Department for Business, Energy and Industrial Strategy (BEIS) published a UK Research and Development Roadmap – but many elements were deferred to future strategy papers.[8]

One government department that was quick off the mark, however, was the Ministry of Defence (MOD). In October that year, it published its new Science and Technology Strategy[9] (STS) identifying several 'capability challenges' that R&D should focus on, including 'asymmetric hard power' and 'securing advantage in the sub-threshold'. I'll say more about the implications of this military jargon shortly, but first it's worth considering which scientific and technological areas are seen by the MOD as a priority. The STS discusses these in terms of seven 'technology families'[10] which it seeks to exploit:

- Advanced materials – including using nanotechnology and synthetic biology;
- Artificial Intelligence (AI), machine learning and data science;
- Autonomous systems and robotics;
- Power, energy storage, conversion and transmission – including nuclear power and batteries;
- Sensors;

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- Advanced electronics and computing – including quantum computing; and
- Effector technologies – including for cyber weapons and directed energy weapons.

These families cover an enormous range of current R&D and demonstrate the MOD's intent to bring most areas of UK science – including academic research – within its sphere of influence.

Just weeks after the publication of the STS, Prime Minister Boris Johnson announced the largest increase in British military spending for 70 years, including a particular emphasis on developing and deploying new weapons technologies. As I discussed in the last edition of *Responsible Science*,[11] this was part of the Integrated Review (IR) of Security, Defence, Development and Foreign Policy – with the main strategy documents not being released until March 2021.[12] A key element of the IR is that a new more aggressive UK military posture is to be followed below the level of armed conflict – called 'persistent engagement' – and it includes a more belligerent nuclear weapons posture,[13] more warships deployed to the seas around Russia, China and the Middle East, an increase in offensive cyber activity, the further development of military robots with autonomous capabilities, new UK launch sites for military satellites, and much more besides.[14]

Deeply embedded within the IR is the UK's ambition to be a 'science superpower' by 2030. One key way in which this is reflected is by a large increase in military R&D spending – to at least £6.6bn over four years.[15] However, in a striking example of how ill-thought the strategy was, it also led to an immediate cut of £120m in the 2021–22 R&D budget on international development – including work which helps improve security such as poverty alleviation programmes – with the promise of reduced annual budgets thereafter.[16]

Another of the key documents published as part of the IR was the Defence and Security Industrial Strategy (DSIS).[17] This defines 'Capability and Technology Segments' which are the equipment priorities for the UK armed forces:[18]

- nuclear – including warheads, reactors and the submarines that use them;
- cyber – including for offensive and defensive purposes, and cryptography;
- complex weapons – including missiles and bombs;
- novel weapons – including directed energy weapons;
- air capabilities – including combat planes and helicopters (some of them robotic craft);
- maritime capabilities – including warships;
- land capabilities – including artillery, armoured vehicles and general munitions;
- space capabilities – including launch sites;
- CBRN – defences against chemical, biological, radiological and nuclear weapons;
- test and evaluation; and
- cross-cutting capabilities – including ISR (intelligence, surveillance and reconnaissance), C4 (command and control, communications and computers), and sensing and detection.

Aerial drone use during Royal Marines exercise
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This list reveals – more overtly than in the STS – how the R&D and equipment programmes feed into both military and industrial ambitions, intertwining them and making each more dependent on the other. Indeed, the traditional distinction between military and civilian programmes is deliberately blurred within the strategy, especially in areas such as shipbuilding, space technology and AI.

These joint ambitions become even clearer in another of the key aims of the DSIS – to "maximise the economic potential" of what it calls "one of the most successful and innovative sectors of British industry".[19] So, in another example of the IR's doublespeak, it encourages an expansion of UK arms exports while failing to acknowledgement any of the human rights issues which have plagued these exports for decades. One recent example is, of course, the export of strike planes and bombs to Saudi Arabia where they have been used in the ongoing war in Yemen, despite contributing to war crimes.[20] Another concern is that, as Britain develops armed robots with more autonomous capabilities, this will undermine international efforts to ban the development of lethal autonomous weapons systems (LAWS).[21]

The speed at which the MOD seeks to utilise some of these emerging technologies is disturbing, and was emphasised in a presentation by the Defence Chief Scientific Advisor at the notorious DSEI arms fair held in London in September:[22]

- the first test of a drone swarm for British military use – using AI for control – was carried out in 2020;
- the use of 'big data' analysis in a recent NATO exercise accelerated decision-making speeds by an order of magnitude;
- three contracts have already been issued to industry for directed energy weapons – specifically high energy lasers and radio-frequency weapons – for UK navy and army deployment, with testing scheduled to run from 2023 to 2025;
- research in synthetic biology is being used to create new durable materials for military use; and

- efforts are being made to expand links with the 'security' industry, including exploiting overlaps with border control and policing technologies.

It's also important to remember the large level of international collaboration within the military technology arena, not least the rapidly expanding National Technology and Industrial Base (NTIB), a joint programme between the USA, UK, Canada and Australia.

Arguably, however, the most controversial new international programme is AUKUS – a joint programme between Australia, the USA and the UK to build the next generation of submarines for the Australian Navy. The controversy surrounds the fact that these will be nuclear-powered – for a military which does not yet have any nuclear-powered craft. (Indeed, Australia has no civilian nuclear power stations either.) To make matters worse, the type of reactor most likely to be used in these submarines would run on highly enriched uranium – i.e. nuclear weapons-grade – thus undermining the Nuclear Non-proliferation Treaty.[23]

Military influence on Net-Zero Strategy?

I've highlighted the growing number of industrial programmes which intentionally include both military and civilian technological development – such as in shipbuilding and space – but what about the military influence on programmes that are funded only by civilian agencies?

Let's start with the new Advanced Research and Invention Agency (ARIA), which is being set up with £800m of public money.[24] The ARIA's focus is on high risk, but potentially transformative, R&D which could "create industries of the future". It will operate outside of the UK's mainstream science funding system and, critically, be subject to fewer ethical controls. Significantly, it is modelled on DARPA, the US Defense Advanced Research Projects Agency.

This risk-orientated approach also reflects that found in the MOD's STS, which seeks to "invest in new, riskier activities".[25] The discussion of risk in these programmes relates to the risk of failure to achieve an economically viable product. But there are, of course, wider risks – that the rush to deliver a product to market risks any potential health and environmental impacts being marginalised. I will return to this point below.

Another civilian area in which military fingerprints can be found is the Net-Zero Strategy (NZS) for reducing the UK's carbon emissions, published in October 2021.[26] For example, the strategy only gives limited attention to the expansion of onshore wind, solar and marine renewable energy – with no clear targets for deployment or funding – while the reverse is true for nuclear technologies, which also feature prominently in IR strategy documents. There's a target for another new large-scale nuclear project to reach 'final investment decision' by 2025 (most likely Sizewell C), while a fund for the development of advanced nuclear technologies is given £385m of public money. This is despite the poor economic, technological and environment case in favour of the nuclear options, while across the world, and increasingly in the UK, renewables are outcompeting fossil fuels, let alone more expensive nuclear.[27]

As pointed out in the previous issue of *Responsible Science* by academics at the University of Sussex, it's hard to explain such distorted thinking without considering the very close links between Britain's military and civilian nuclear industries.[28]

Another example from the NZS is the focus on developing and deploying so-called 'sustainable aviation fuels' such as

Royal Navy testing of marine drone
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biofuels and synthetic fuels. While these can be manufactured from renewable resources, there are serious technological, environmental and economic obstacles still to be overcome (see Finlay Asher's article on p.25). The main focus for the reduction of carbon emissions from aviation should be – according to the government's climate advisors – reducing the demand for flying,[29] but this is completely missing from the NZS. Strikingly, shortly after the publication of the NZS, the Royal Air Force announced[30] its 'NetZero ambition' – also heavily dependent on sustainable aviation fuels, and again without any attention to the need to reduce demand.

A narrow economic focus?

Returning to the concern that narrow economic goals are being prioritised at the expense of environmental and health ones, it's instructive to look at broader government policies.

For example, the new 'Brexit Freedoms' Bill – making its way through parliament at the time of writing – is aimed at 'cutting red tape' partly to accelerate the development of new technologies, such as AI and gene editing. However, the very real concern is that it will undermine important social, environmental and health safeguards.

Another example relates to the new Environment Act, under which a post-Brexit watchdog, the Office for Environmental Protection, is being set up. Here too, there are significant fears about the new regulatory structures.[31] This is especially worrying given the criticisms that whistleblowers have already levelled at the existing Environment Agency over its recent poor enforcement record against businesses which have broken the law.[32]

Overall, it seems that the balance between R&D focused on narrow economic and military objectives or more on wider health, environmental and social goals will be decided by the new Office for Science and Technology Strategy (OSTS) set up in June and attached to the Cabinet Office in central government.[33]

It has four priorities:

- Sustainable environment
- Health and life sciences
- National security and defence
- A digitally and data driven economy

While it's good to see environment and health as leading priorities, this is blunted by the language of 'green growth' and 'life science business' within the description of the OSTS's role – and the lack of attention to issues of inequality. Hence, it's hard not to fear the prominence of economic and military priorities given the concerns above.

Taking a stand

With Putin's war on Ukraine, the political push to increase UK R&D spending on military technologies – rather than on supporting broader efforts to improve international security – is only getting stronger. Indeed, the latest ten-year Defence Equipment Plan – published in February – includes an increase of £48bn – a massive 25% rise over the previous year's projection.[34] This will add to the growing arms races between the major military powers – especially in nuclear and robotic technologies – making the world less secure and continuing to fuel human rights abuses in places like Yemen. At the same time, it will divert expertise and funding away from poverty alleviation programmes and distort our efforts to tackle global environmental crises like climate change.

We need to increase the resistance to this agenda. We need more scientists and engineers to take a personal stand by refusing to work on military-funded programmes. We need more non-governmental science and technology bodies to support these efforts. We need more partnerships between scientists and advocates working in peace, human rights, environmental protection, poverty alleviation, and health. Only then will we be able to shift the UK's science agenda back towards a more ethical path.

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As this edition was going to press, new UK energy policies were due to be announced – driven by the desire to reduce fossil fuel imports from Russia. The disturbing signs are that a further entrenchment of nuclear power will be part of these policies.

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