

How can the National Science and Technology Council and the Office for Science and Technology Strategy direct S&T priorities?

Date and Location: 26th January 2022 at The Royal Society

Chair: The Rt. Hon, the Lord Willetts FRS
Chair, The Foundation for Science and Technology

Speakers: Sir Patrick Vallance FRS FMedSci FRCP
National Technology Adviser & Government Chief Scientific Advisor
Professor Dame Ottoline Leyser DBE FRS
Chief Executive, UKRI
Naomi Weir
Programme Director - Innovation, Confederation of British Industry
Professor James Wilsdon
Director, Research on Research Institute, University of Sheffield

Report Author: Liz Wainwright
Foundation Future Leader, University of Bristol

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LORD WILLETTS, welcomed participants both in-person and online, commented on the novelty of holding an in-person event, and welcomed the evening's four speakers.

Sir Patrick Vallance started the talks. He was the Government's Chief Scientific Advisor (GCSA), Head of the Government Science and Engineering (GSE) profession and was primarily in attendance today as the National Technology Adviser (NTA) and lead of the NSTC.

Sir Patrick introduced the context by reflecting on previous discussions and government strategies. An FST event in 2018 debated the topic, *What is the best way to achieve the Government's target of spending 2.4% of GDP on R&D by 2027?*¹, which concluded that no other country had managed to increase the percentage spend on R&D without major contribution from **the private sector**. The Government's Science

Capability Review in 2019² made a number of recommendations such as increasing the number of scientists in government departments. The Integrated Review³ published in 2021 had S&T at the core of the document and captured how Britain should see itself going forward in a global competitive position.

Quoting Fiona Murray, Director of MIT Innovation Initiative and Associate Dean for Innovation & Inclusion MIT, "advantage was most significant when ideas in the lab were combined with the ability to deploy them in the world". Sir Patrick said that the UK needed to develop S&T to a point where it became impactful, relevant to society, and beneficial to wealth, health, and national security.

To demonstrate, he gave two examples where UK industry and research had deployed

1. <https://www.foundation.org.uk/Events/2018/What-is-the-best-way-to-achieve-the-Government%E2%80%99s-t>

2. <https://www.gov.uk/government/publications/government-science-capability-review>

3. <https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy>

scientific and technological ideas well and less well. The first example offered was the deployment of 5G. Despite there being good work on 5G being undertaken in both academia and industry, the deployment of 5G became largely dependent on one company. Had the UK used the Own-Collaborate-Access framework in advance, we would have recognised our position in the 'collaborate' space (collaborate: where the UK was not able to establish a dominant position, but could provide unique contributions that allowed us to collaborate with others to achieve our goals), and avoided being forced into a position where decisions had to be reconsidered and the fast, effective deployment of the technology compromised.

The second example was the development of the Covid-19 vaccine in the UK. At the time, there was no substantial vaccine industry in the UK with investment in both research and industry having been neglected over the previous two decades. Sir Patrick identified the key to the success of the vaccine procurement and deployment was the Vaccines Taskforce and identified seven key points as to why the taskforce model worked, including bringing content experts in early, having clear outcome objectives, a single-point of accountability and private sector involvement.

If government was to learn from these examples to gain strategic advantage from S&T, bodies such as the NSTC needed the ability to think long term about end-to-end requirements. The NSTC must take a rounded, long-term view, ensuring continuity over the funding of S&T. This long-term perspective did not fit with parliamentary cycles and would cross more than one governmental term.

To be successful the NSTC must first make enabling decisions (such as, what infrastructure and skills were required), set its missions (e.g. Net Zero), establish international relationships, and identify specific areas of interest (e.g. engineering biology, quantum technology).

Sir Patrick concluded that the NSTC cannot be about "directing basic science", but taking decisions around the big opportunities and it needed other parts of the system joined up (around Human capital, public and private funding, infrastructure, demand and implementation) to create a successful environment.

PROFESSOR OTTOLINE LEYSER opened her talk by identifying that the emergence from the instabilities of the pandemic presented a once in a lifetime opportunity to deliver a more sustainable and inclusive knowledge economy and to capitalise on the breadth and depth of talent in the R&I system.

Professor Leyser gave an overview of the UKRI as UK's largest public funder of R&I, with nine councils spanning all sectors and research disciplines and worked across academia, business and international partners. The UK was unique in having a UKRI-like institution which connected bottom up science with innovators and delivers value into public services. The UKRI's investment portfolio showed it funded diverse activities, attracted talent globally, supported infrastructure, and its 'open, agile' funding supported universities to direct their research agenda as best suited them. Innovate UK was the UK's main innovation agency supporting business-led innovation in all sectors, technologies and UK regions and the Industrial Strategy Challenge Fund (ISCF), which granted challenge-led awards, addressed big societal challenges faced by UK businesses.

Professor Leyser outlined three ways in which the UKRI helped get the most out of the R&I system: it balanced investment in current priorities with those more open calls that addressed investment in future S&T; it fed into the Science Insights function, identifying strength and opportunities so that strategic investment could be made; the UKRI also made connections, brought together people and ideas across academia and the innovation sector.

Through the plans set out for the NSTC and the OSTs, the UK had the opportunity to build a global strategic advantage with a more holistic view on investment and incentivisation for key, nationally-defined priorities. Professor Leyser welcomed the OSTs and NSTC, which would enable a 'bottom-up, top-down' approach to capture S&T opportunities for the economy and public services as well as provided the infrastructure and regulatory environment to balance the flow of information and opportunities to achieve the strategic areas the OSTs and NSTC had set for itself.

NAOMI WEIR was the Programme Director for Innovation at the CBI and focused her talk on how business could be part of the ambitions of the NSTC. The UK's strategic aim was to achieve a high-investment, high-productivity economy, and therefore needed to be more ambitious about growth and the NSTs and OSTs would play a role in this.

Naomi continued that the three signs of success for the NSTC and the OSTs were enhancing the perception of the UK's competitive strength in R&D, inclusion of decision makers in the new structure, and taking strategic bold action.

Expanding on these three signs of success, there was an opinion held by some that the UK was good at research but less so at innovation. This perception contributed to the under-use and under-investment from private sector investors in R&I, public investment and added to the national skills gap and ubiquitous diversity challenges. The NSTC and OSTs should clarify the UK's strengths by helping to avoid short-termism in its approach to investment in our capabilities.

In terms of structure, it was essential for the structure of the NSTC and OSTs to include decision makers to avoid developing a strategic plan without any authority to take action or investment into them. Finally, the creation of the OSTs was recognition that a reevaluation of risk was necessary so we might take the 'big, bold, bets' required for success.

Naomi concluded by remarking that where there had previously been a lack of collaboration between private and public sectors, the CBI was keen to be part of changing this to enhance the agility of funding innovation at speed and would like to see the NSTC and OSTs help use resource to achieve our goal to move at pace to achieve national growth.

PROFESSOR JAMES WILSDON gave the final talk of the event, begun by thanking Sir Patrick for clarifying what the NSTC and OSTs covered as previous announcements had not been explicit enough on these points. The addition of the OSTs and its creation of a stronger link to central government was a familiar dynamic but further clarity was needed to understand how the NSTC and OSTs, UKRI and government departments (such as BEIS) would work together. Whilst adding new elements to this structure might bring about further complexity, the creation of the NSTC and OSTs could offer an opportunity to tie together years of structural change in the research policy system.

The case for a more 'distributed intelligence' across the system was made by Professor Wilsdon with specific reference to the dual-role of the GCSA and NTA in the architecture and design of such a funding system. He warned against the perception of conflict of interest between advisory functions and functions that influenced the spending of public money.

The Integrated Review balanced the competitive with collaborative elements of international research collaboration and the 'hard edge' of national strategic advantage. He would like the chance for the community to reflect on a change in policy which put emphasis

on 'science diplomacy' to that which seemed to move towards a more competitive position. There should be a balance between the notion of intelligent openness and strategic secrecy and that might bring about tensions between the relatively open culture found in research communities and the required closed one of the security agencies.

Professor Wilsdon concluded by emphasising the dichotomies of hard/soft power, open/closed cultures, competition versus collaboration, and that all of these phenomena were at the heart of S&T research policy. He highlighted the need for greater discussion and opened debate to strike the right balance between each of these as part of the establishment of the NSTC and the OSTs.

DISCUSSION

A number of questions received online and from the floor focused on how the NSTC and OSTs would fit into or affect the current structure. Whilst complexity in the RD&I system should be fought against at all costs, the creation of the NSTC was about coordinating what already existed, such as joining up all government department CSAs. However, it was agreed that the advisory function and policy-creating function should be distinct and the two roles of GCSA and NTA should be held separately in future. Organisations like the UKRI and OSTs helped connect disciplines and sectors, including charitable funders, that would otherwise risk becoming siloed. A survey of businesses found key to them investing more in innovation would be support in navigating the system, which demonstrated further complexity would discourage further business investment.

The panel also discussed how the UK might manage commercialising activities that also have applications in national security. Whilst elements needed to be confidential, there was little advantage to maintaining high levels of secrecy throughout S&T research. The NSTC should be involved in deciding our role of shaping safe deployment of dual-use technologies that served other interests beyond the purely economic, and decisions on matters of national security should remain outside of its remit. It was important to have a strong interface between the research base and the private sector business community to get the benefits of dual-use technologies. During the pandemic, businesses engaged with emerging technologies to help facilitate deployment at pace.

On the question of whether national priorities would mean defunding other research areas, the panel

discussed the importance of fundamental research. Encouraging a diversity of activity and ideas, by including private and third sectors, should benefit the entire community. It was seen as essential that funding for fundamental science should be protected and maintained separately to directed science and challenge-led funding. In order to achieve the 2.4% increase in R&D funding, private sector investment would be imperative and so science policy must be created to facilitate the ease of business being involved in R&D.

The final question was on diversity and how this new structure could introduce new and diverse voices into the wider R,D&I and S&T communities. It was agreed that a 'collective intelligence gathering' was required and that there needed to be a way to seek out those who did not necessarily identify as innovators. Part of the national strategy and the goal of the NSTC and OSTs should be to creating an inclusive innovation economy which meant everyone should feel they could be involved and that for the wider public, a change narrative was required from science being something that is 'done to you', to science being done 'by you or with you'.

Liz Wainwright