

People

The access and availability of diverse people with the experience and expertise to deliver technical and challenging projects to market



Can we access the skilled workforce to do late-stage R&D in the UK?

Education policy delivering a skilled and diverse workforce

Immigration policy including cost and processes to hire international talent

Knowledge exchange and ease of access to the UK's excellent research base

A clear path to access the necessary people is key to a business's management of the risk of R&D³⁴. For multinational or mobile businesses, the ability to access the right people for a project, whether internally through training or through hiring nationally or internationally, will in part drive the decision on where to locate R&D activities.

“The UK Innovation Survey 2019 found that 38% of UK businesses were innovation active, down from 49%³⁵ in 2016–18. Lack of qualified personnel was one of the barriers cited”

Late-stage R&D draws upon a wide range of skills

The skills for late-stage R&D can be broadly grouped into technical and non-technical^{36,37}:

- **Technical:** from the apprentice to the technician, mid-career engineer and chief technology officer, late-stage R&D draws on specific technical expertise relevant to the project, and wider engineering experience and problem solving are essential to progress development.
- **Non-technical:** management, risk analysis and finance, marketing, creative and design skills support the smooth delivery of late-stage R&D projects to commercialisation.

Both technical and non-technical skills are needed for any late-stage R&D project, for example, bringing together digitalisation technologies with medical technology and regulatory expertise, manufacturing, fast-paced problem solving, logistics and accountancy to smoothly deliver an upscaling of ventilator production. ▶[Ventilator challenge UK](#)

People

An international and diverse workforce

International diversity is strongly valued by many organisations, including specifically for R&D³⁸. Businesses actively seek R&D staff from across the world, to provide the skills needed and to benefit from diversity³⁹. Diversity in teams provides cultural understanding, language skills, and a diverse source of ideas, facilitating the development of goods and services for a global market. UK immigration, education policy and skills availability influence businesses' decisions to locate late-stage R&D activities in the UK.

Absorptive capacity

Businesses need to have the capacity to absorb external knowledge and develop internal skills and talent. This absorptive capacity is linked to a business' ability to adapt to technical change and innovate^{44,45}. In return, conducting R&D supports the development of skills and know-how within an organisation to be more competitive and innovative. Small innovative businesses may have more unbounded absorptive capacity and potential for growth, which can benefit innovation across the broader sector and supply chains through collaborative partnerships.

Even if a late-stage R&D project does not result in a successful commercial outcome, the business will have acquired valuable new experience, skills and expertise.



Where can the UK government play a role?

Businesses will want to assemble the best team to deliver their R&D projects. While large businesses may be able to invest and build their own pipeline of talent, sometimes in spite of government policy, that option is not open to all.

The UK talent pool and pipeline, from early age education through to vocational learning, higher education and lifelong adult learning, as well as visa conditions for international talent, must compete internationally to attract R&D from multinationals and SMEs into the UK. It must also meet the needs of UK SMEs to incentivise them to grow to scale in the UK.

“Diverse and inclusive workspaces promote innovation and financial performance^{40,41,42}. Companies with higher-than-average total diversity were found to have 19% higher innovation revenues⁴³”

INNOVATION, THE PRODUCTIVITY PUZZLE AND JOBS



UK productivity growth has been effectively non-existent since 2008⁴⁶. Before the financial crisis between 2000 and 2008, innovation accounted for 51% of productivity growth⁴⁷. Late-stage R&D includes improving processes, making them more efficient, often through automation. Process innovation can improve productivity, reduce costs and help the UK solve the productivity puzzle. However, innovation is not limited to processes only, and product innovation opens up new markets and jobs. The combination of process and product innovation has been found to produce an overall positive effect on employment^{48,49,50}. There are opportunities for employment growth through innovation.

STRATEGIC WORKFORCE PLANNING



The UK has a long-standing skills shortage in STEM and most of the engineers and technicians who will be practising in 2030 have already left education^{51,52}. Industry 4.0, net zero and emerging technologies all bring new skills demands to deliver innovative solutions into commercial use. A strategic workforce planning function is needed to ensure the supply of key skills to support the whole economy, prioritising and incentivising education, training and upskilling in engineering, sustainability and digital skills^{53,54,55,56,57,58}.

CASE STUDY

VENTILATOR CHALLENGE UK: ASSEMBLING THE SKILLS TO DELIVER VENTILATORS TO THE NHS IN RECORD TIME

Following a call from the UK government to supply the NHS with ventilators in March 2020, Dick Elsy FREng, Chief Executive of the High Value Manufacturing Catapult, assembled a consortium of 33 significant UK industrial, technology and engineering businesses. The consortium brought together expertise from across the aerospace, automotive, motorsport and medical sectors and the wide range of skills needed to deliver the endeavour, including:

- Smiths and Penlon, the two medical device manufacturers at the heart of the consortium. The Ventilator Challenge UK consortium scaled-up the Penlon ESO2 Emergency Ventilator device, which modified proven clinical equipment, and the Smiths paraPAC Plus™. Both businesses brought expertise in the ventilator design space and an understanding of the clinicians' and regulators' requirements.
- Airbus in Broughton, Ford in Dagenham, GKN Aerospace in Luton and Cowes, McLaren in Woking, Rolls-Royce in Filton and STI in Hook, Smiths Medical in Luton and Penlon in Abingdon adapted manufacturing facilities and trained staff to produce and assemble the ventilators at speed.
- Siemens Healthineers supported the project with medical engineering and regulatory expertise to gain rapid MHRA regulatory approval.
- Siemens provided digital design skills and technology, including the use of digital twins for rapid problem-solving to deliver the project at speed.
- UK-based Formula 1 teams brought a rapid engineering problem-solving capability and culture to drive the pace of the project.
- Accenture was responsible for accountancy across the collaboration. A cloud network was built and used to track the progress of parts through the supply chain and manufacturing facilities.
- DHL supported project by setting up a complex logistics network that saw them implement an end-to-end supply chain in only 1.5 weeks. Despite global competition for parts and lockdown challenges during the pandemic, the supply chains of the different organisations also became key to delivering parts across the consortium. The consortium sourced parts from more than 22 countries, with the furthest distance travelled by a single part being 5,226 miles.
- Microsoft HoloLens mixed reality headsets were used to capture the highly specialised ventilator production process to train and upskill the consortium's new 3,000+ workforce in multiple manufacturing sites across the UK and to aid in adhering to social distancing guidelines.



Photo © thisisjude.uk 2020

The Ventilator Challenge UK consortium delivered 13,437 ventilators to the NHS by July 2020, reaching a peak production of 400 ventilators a day.

“National Grid estimates that 260,000 new roles will be created in the energy sector by 2050 to deliver net-zero energy⁵⁹”