

2.4% R&D target: how to maximise the impact of R&D investment

Introduction

Central to the UK Government's Industrial Strategy White Paper, published in 2017, is the target to increase the UK's spend on research and development (R&D) to 2.4% of GDP by 2027. UK Research and Innovation (UKRI) has organised a series of workshops with our stakeholders, to explore the biggest questions for UKRI and the UK research and innovation landscape more broadly over the coming years. Workshop outputs are being used to develop our evidence base and inform our policy and analysis work.

On 11 March 2019, Sir John Kingman chaired a workshop in Edinburgh, hosted for UKRI by the Scottish Funding Council. This workshop gathered experts from research, innovation and business to explore a series of questions on how to maximise the impact of R&D investment across the UK. Annex A contains a full delegate list. The discussion covered a wide-ranging series of topics including people, commercialisation, access to finance and regional investment.

Background

Investment in R&D, both public and private, achieves significant overall returns and leads to impact on knowledge, the economy and society. The UK is a world-leader in research and innovation, ranking first amongst comparable nations for research quality and in the top four of the Global Innovation Index. R&D performed in UK-based businesses directly supported 210,000 jobs in 2016 and 13 of Europe's 34 Unicorns (startups valued over \$1bn) are located here. Moreover, as well as direct economic returns and avoided costs, investment in R&D delivers significant societal benefits through new products and services.

Summary of discussion

People

One of the most important challenges the UK faces in increasing its R&D intensity is ensuring there are enough STEAM-trained individuals to engage in research and innovation across sectors. Delegates drew particular attention to the Institute for High Speed Rail and System Integration, established by the University of Leeds in direct response to the UK Government's High Speed rail 2 (HS2) commitment. The Institute is designed to create a centre of excellence for high speed rail innovation and address the skills needs of the rail industry through specific undergraduate and postgraduate programmes. Delegates noted that higher education institutes and industry both had complementary roles in developing a skilled R&D workforce; the higher education sector provides degree qualified personnel and industry directly participates in the talent development and upskilling of individuals, including those at the practitioner level.

Commercialisation

Delegates highlighted that a critical aspect to commercialisation is industry-academia collaboration and co-location, which stimulates business growth and increases the likelihood that the benefits of R&D will be realised. For example, the University of Strathclyde has created industrial research centres (including the Advanced Forming Research Centre and Advanced Nuclear Research Centre), which generate economic impact and create a positive feedback loop with the fundamental research that informs their focus. Such collaborations support interdisciplinarity and encourage the adoption of novel technologies and innovation.

Delegates observed that incentives linked to the Research Excellence Framework (REF) drive particular behaviours within academia and can hinder real world impact. It was suggested that

incentives for commercialisation and talent development that work alongside the REF system could be explored. Additionally, delegates felt that universities should be strategic in setting their research directions; identifying and focusing on areas of existing strength to create maximum impact.

Delegates agreed that innovation, by its nature, is inherently risky and will not always succeed. This should not deter investment, with some of the biggest potential gains originating through investing in risky projects with high potential rewards. Delegates highlighted the approach taken by Japan, where investment is targeted at the cutting edge of technology with an acceptance that with impact will not be generated until considerable time has passed. However, it was also noted that the UK should not be afraid to redirect funding to alternative priorities if R&D projects show no potential for progress or success.

Support for innovation and access to finance

Delegates highlighted that SMEs often have limited capacity to engage in innovation and commercialisation. It was also noted that a significant proportion of these enterprises have restricted cash flow and would require significant support or investment from external sources (for example large companies, public support through grants or other mechanisms, or venture/patient capital) to innovate. Delegates suggested that large businesses have a responsibility to engage with the SME supply chain to encourage innovation and help SMEs understand the benefits of investing in innovation (such as improving their profitability).

Innovate UK has a strong track record of supporting capital intensive firms to succeed through innovation grants, especially in the engineering sector. However, delegates suggested that changes to funding processes (such as a simpler grant application process) and mechanisms could be considered to further advance the innovation and growth of smaller businesses. Delegates also suggested that support could be focused on smaller, innovative firms without the capacity to invest in innovation. Further consideration of the whole pipeline of follow on funding could also help bridge gaps to market and the so-called 'valley of death'.

Delegates discussed access to finance for innovative firms in the UK. They identified a need to further increase the availability of venture capital (VC) and other patient capital, including 'intelligent' capital experienced in investing in innovative, high-growth businesses and identifying R&D-intensive companies with the greatest potential. Businesses are more likely to be able to access this type of finance internationally, such as in the United States or China, where delegates agreed that the appetite for risk is higher. This means that small businesses can be drawn abroad as they scale. Delegates highlighted the important role of the British Business Bank in addressing these issues through its British Patient Capital programme, designed to enable long term investment in high growth companies across the UK.

Regional investment in R&D

Scottish delegates highlighted the strengths of Scotland as a strong R&D performer within the UK, noting that it had the capacity to receive significant capital investment, similar to that seen in the south of England (e.g. the Wellcome Sanger Institute and Francis Crick Institute). Delegates suggested that regional investments needed a clear strategy to ensure they capitalise on existing strengths and leverage co-investment from the private or third sector at scale.

How do we maximise impact?

For the UK to drive economic growth and prosperity through increasing its R&D intensity, it must maximise the impact of investments across the country. Delegates proposed a number of ideas that could contribute to meeting the 2.4% R&D target:

- ensure the UK develops its talent pipeline to produce enough STEAM-trained individuals to engage in R&D across sectors;
- foster partnerships between academia and industry and develop training programmes that support transitions across and between sectors;
- consider how universities can be even more strategic in their research endeavours and identify areas of success to maximise the impact of their research;
- develop interdisciplinary research centres between universities and industry to accelerate potential impact;
- understand if the REF could be complemented by innovation and talent incentives to support and encourage commercialisation and the development of skills;
- be prepared to wait significant lengths of time for the impacts of R&D investments to be materialised;
- explore how support through Innovate UK could evolve to ensure it continues to meet the needs of innovative firms;
- consider developing defined and flexible pathways of follow on funding to bridge gaps in the R&D and innovation landscape;
- understand how the UK's patient capital landscape can be further developed to ensure innovative firms can access the finance they need to scale; and
- encourage universities to seek to develop research and innovation clusters and generate regional centres of excellence.

In summary, Sir John Kingman emphasised that the workshop conversation was just a starting point. UKRI has a responsibility to rise to the opportunity, and challenge, of the target to increase the UK's investment in R&D to 2.4% of GDP by 2027, and 3% in the longer term, improving productivity and economic growth across the UK.

Annex A – Delegate List

Name	Organisation
Sir John Kingman	UK Research and Innovation
Karen Watt	Scottish Funding Council
Dr Stuart Fancey	Scottish Funding Council
Keith McDonald	Scottish Funding Council
Adrian Gillespie	University of Strathclyde
Aileen McKechnie	Scottish Government
Dr Alessandro Rosiello	ACT Blade
Dr Allan Colquhoun	Leonardo
Professor Andrew Mount	University of Edinburgh
Ann Lewendon	University of Aberdeen
Professor Dame Anne Glover	Royal Society of Edinburgh
Dr Bettina Becker	Aston University
Professor Dave Petley	University of Sheffield
David Lott	Universities Scotland
David Smith	Scottish Enterprise
Dr Deborah O'Neil	NovaBiotics Limited
Professor Eileen Wall	Scotland's Rural College
Professor Gareth Pender	Heriot-Watt University
Dr Ian Archer	Industrial Biotechnology Innovation Centre
Professor Nick Plant	University of Leeds
Dr Rebekah Widdowfield	Royal Society of Edinburgh
Professor Sheila Rowan	University of Glasgow