



**Comprehensive Spending Review 2020**

**Representation from AIRTO (The Association of Innovation, Research & Technology Organisations)**

**Thursday 24 September 2020**

## Introduction

AIRTO, the Association of Innovation, Research & Technology Organisations, on behalf of its members, has prepared the following response to the government's request for a written representation that comments on government policy or suggests new policy ideas for the Comprehensive Spending Review.

AIRTO represents the UK's extensive [Innovation, Research and Technology \(IRT\) sector, which employs 57,000 highly skilled people, has a combined annual turnover of £6.9Bn and contributes £34Bn to UK GDP.](#) Organisations in this critical sector work with industry, government and academia to promote and implement innovation, and provide technical solutions to challenges and crises.

AIRTO has [welcomed the renewed commitment to increase levels of public investment in science and innovation, made in the 2020 Budget](#) aimed at boosting and levelling-up economic growth. It is vital that this public investment is used to maximum effect, both to address the economic recovery from COVID-19, and to underpin the UK's long-term prosperity. AIRTO's recommendations in this representation are made in order to address these objectives.

The continuing support for fundamental research in the UK is important for the long-term strength of UK science, but it is immediate support for innovation and applied research and development (R&D) that is vital for the short- and medium-term economic and societal recovery from COVID-19. In the longer term, a better balancing of the support for development and innovation activities, when compared to that made available for fundamental research, will ensure that the UK's science and innovation infrastructure will better deliver national productivity and prosperity by meeting industries' needs for solutions to innovation challenges.

The IRT sector is a key vehicle for delivering this vital assistance to industry.

AIRTO advocates an innovation-led strategy both for the UK's immediate economic and societal recovery from COVID-19, that will 'build back, better', and for the long-term development of the UK economy. This requires government actions to:

- **Retain the levels of research** activity in our publicly funded institutions.
- Support **more development** activities.
- Invest in **increased innovation**.

## **UTILISING THE IRT SECTOR**

The UK has a range of organisations that comprise the IRT sector, which are agents for driving innovation in industry. Some of these organisations are government owned, some are not-for-profit entities, and others are fully private research organisations. All are a key part of the nation's science and technology infrastructure, working closely with industry, but also collaborating with academia. The sector has huge potential for significantly increasing its support for government and industry in the short- and medium-term as part of the post COVID-19 economic recovery and in the longer term as an integral part of the country's science and innovation strategy aimed at achieving the goal of 2.4% of GDP invested in R&D by 2027.

In order to achieve this increase in the level of R&D undertaken across the UK, there are changes needed in the government's financial support for the sector that will have a catalytic effect on the resources and capability that can be delivered. AIRTO proposes four main areas that should be included in the CSR:

- A nationwide programme of technical support for SMEs from AIRTO members - £20m per annum for three years. Continuation of the programme after three years to be based on ongoing need.
- A recapitalisation fund for independent research and technology organisations which do not have recourse to shareholder financing - £50m -70m per annum, to be reviewed after five years.
- Funding for underpinning applied R&D programmes that develop the knowledge, capabilities and practical solutions needed by industry to meet national objectives such as improved productivity, zero carbon and digitalisation - £100m per annum for five years.
- Investing in skills to develop innovation leadership and capability and an innovation-ready workforce – (£5m per annum initial investment for a pilot level initiative rising to £50m over 5 years to scale-up and roll out across the whole IRT sector).

Each of these proposals is discussed in the representation below and form a part of the overall strategy for increasing funding in applied R&D and to support innovation to be translated, thereby balancing the existing levels of investment in fundamental research, and thus dramatically increasing the UK's commercial exploitation of science and innovation. The rationale behind this proposed innovation-led strategy is discussed in detail in AIRTO's recent Position Paper '[More D!](#)'.

### ***ECONOMIC RECOVERY FROM COVID-19***

Technology, research and innovation can play a vital role in supporting the UK's economic recovery from COVID-19. This role includes ensuring that the economic recovery is built on improved, 'greener' processes, products and services, rather than just the resumption of activities that are the same as undertaken before the pandemic hit the UK. Positioning the UK as a world-beater to play a leading role in the pioneering of such 'greener' innovative processes, products and services, will raise productivity and result in significant new export opportunities for UKplc and help position the UK as a world-leading Science and Innovation Superpower.

Some of the improvement in business processes and productivity will come from innovation in working practices and methods that result from the changes that had to be introduced to ensure work continued during the lockdown. However, there is a significant opportunity to introduce technical innovation in companies as they resume and continue full activities. In many cases, this will need external support to provide companies with the practical expertise they require for adopting technical innovations with confidence and for mitigating the risks. The IRT sector is key to providing this support to industry – support that must be appropriate and immediately applicable. It is a role the sector already undertakes, but the economic recovery creates substantially increased need, demand and opportunities for providing innovation support for companies from the smallest SMEs to the largest multinationals. It is support that needs to be immediately provided and immediately applied if the opportunities from the recovery are to be realised.

Such programmes will require collaboration and support from government to share risks and costs, which at this stage of uptake increase exponentially in the face of substantial remaining risks, and particularly to enable enrolment of SMEs and financially viable delivery on the part of specialist service providers. AIRTO members have demonstrated they can deliver hugely successful programmes of support for SMEs through initiatives such as the NPL led £4m "Analysis for Innovators (A4I)" scheme and TWI's 'Joining Forces' which have increased productivity, turnover and employment in SMEs through targeted interventions. A larger, nationwide programme involving the full range of AIRTO members will have a significant effect on industry in the short- and medium-term. Such a programme would allow increased co-ordination and collaboration between AIRTO

members around big challenges (such as tackling Covid-19 and working towards Net Zero, greatly enhancing the scope and effectiveness of the support for industry. The recent success of [VentilatorUK](#) has demonstrated the convening power of the IRT sector and what can be achieved when collaboration works effectively.

### **MAKING THE UK A 'SCIENCE AND INNOVATION SUPERPOWER'**

AIRTO believes that the UK should become an '**Innovation Superpower**' as well as a 'Science Superpower', which to a considerable extent it already is. The implication of this is the need to balance public spending on fundamental research with equivalent levels of funding on applied research, development and innovation ('More D!') as found in competitor nations. Whereas the UK currently spends 85% of its public funding on fundamental research and only 15% on translational R&D and innovation, global competitors divide their public investment approximately 50:50 between these two areas. Rather than achieving a more optimal balance by reducing the funding of fundamental research (which is critical to the UK's success), AIRTO advocates that the increased levels of funding announced by government for science and innovation in the 2020 budget should be targeted heavily towards applied translational R&D and innovation.

This will result, through the joint efforts of the IRT sector and industry, in a more balanced national infrastructure, with the ability better to exploit the reservoir of knowledge generated by fundamental and discovery research. The UK has been repeatedly seen as poor in this exploitation domain, in spite of its world class research capabilities. A 'Science Superpower' will represent a continuation of the current status quo with its imbalances and system level faults; a holistically driven '*Science and Innovation Superpower*' will address these faults and ensure the UK gets significantly increased benefit from its investment of public money in science and technology.

An integral part of the UK's 'Superpower' ambition is the target of increasing the national spend on R&D to 2.4% of GDP by 2027, thereby catching up with most of the UK's main global competitor nations. The achievement of this target should not be an end in itself, but the focus should be on the outcomes from this increased spend and how they will increase national productivity and prosperity. Public funding of R&D is an important part of achieving the target, but it must be used to ensure that industry is incentivised to grow its UK-based R&D investment at the rate required to achieve 2.4% of GDP, i.e., at approximately twice the rate at which government increases its public funding for R&D.

The IRT sector is a vital part of the infrastructure for achieving the 2.4% target, through its publicly funded programmes, its work with and for UK industry, its collaborations with academia and its ability to attract foreign direct investment for R&D into the UK.

In order to achieve the 2.4% goal by 2027, the whole IRT sector will need to double in size at the same time as industry's investment 'doubles up' on the government's increase in public funding of R&D. This will enable it to deliver the translational R&D activities that will be demanded by the increase in market-pulled applications of R&D and associated innovation in industry. It will be a national catastrophe if the demand is created but the IRT sector does not have the capacity to deliver its specialist capabilities to those needing them.

Proper capitalisation of the IRT sector is necessary to allow it to develop the resources and capabilities that will be needed in the future. This applies to the range of organisations that make up the IRT sector, but is particularly significant for the non-profit distributing RTOs (Research and Technology Organisations) which do not have the strength in their financial balance sheets to undertake such a rapid expansion unaided. This resource constraint has been exacerbated by the

COVID-19 crisis. There is no current government programme to support the capitalisation of the RTOs, although some core finance is available for government owned research organisations and the more recently created Catapult Centres.

Positioned in parallel with this investment in capability, is a need to invest in programmes that address the generic, market-led needs of industry for applied R&D and innovation. With severe restrictions on the ability of many industries to invest in the wake of COVID-19, publicly-funded programmes undertaken by the IRT sector will be a highly effective use and means of leveraging investment of public money because the results and outcomes of such programmes will be disseminated through the sector's networked relationships to all interested UK organisations/stakeholders. The themes for such programmes must address the UK's strategic challenges, priorities and targets and - although not directly involved in running such programmes - industry will have an important role to play in advising on and guiding the activities planned. It is important that programmes are not predominantly 'tied' to individual companies, in order that the results can be disseminated to all relevant/interested parties in the UK. The intention of such programmes is to target market-led R&D undertaken by the IRT sector, but they should be able to support academic-based research (via collaboration) where it is necessary to directly support the programmes aims.

### **LEVELLING-UP OF ECONOMIC OPPORTUNITY AND THE PLACE AGENDA**

AIRTO member organisations are located throughout the UK, and many are operating world-class facilities based in the less economically developed regions. These entities provide innovation support to organisations across all parts of the UK and around the world., not only for their local regions. Therefore, support for the IRT sector will necessarily support the levelling-up agenda.

Many AIRTO member organisations are involved in 'Strength in Places Fund' projects, and it will be important to assess the effect of these projects on developing prosperity in deprived regions as they progress. This should influence the continuation of the programme and whether modifications to its aims and operation are necessary.

Some AIRTO member organisations have used EU Structural Funds to develop locally focused activities and SME support in different regions of the UK. With BREXIT, access to this funding will no longer be available in the UK. The government have announced that this will be replaced by the 'Shared Prosperity Fund' in the UK, but as yet no details have been confirmed. AIRTO advocated that it is essential for information on the Shared Prosperity Fund be released as soon as possible in order that applications can be developed in a timely manner to avoid a gap in investment occurring after the end of access to EU Structural Fund. It will be particularly important to understand if any of the planned new fund is 'ring-fenced' for supporting R&D, as was the case latterly for EU Structural Funds. AIRTO strongly recommends that this ring-fencing should continue in the UK programme and this provides an opportunity also to re-examine how such funding schemes work so that improvements on the EU's approach can be explored and, if helpful, adopted.

### **SKILLS**

The levelling of economic opportunity and realisation of the UK's ambition to be a Science *and* Innovation Superpower will require a skilled workforce to be in place, especially in key sectors of national strategic and economic importance such as space and aerospace, defence and security, automotive and transport, medicine, health care, life-sciences and pharmaceuticals, de-

carbonisation and digitalisation, as well as in some of the other technology-enabled sectors (creative industries. These R&D-intensive sectors also need cross-cutting skills such as advanced manufacturing and digital technologies. The skill sets required to underpin applied R&D and innovation are becoming more multidisciplinary in nature as well as demanding a number of increasingly advanced specialisations. Building up these skills in the workforce and provision for training/retraining at all stages of career development from beginning to end must be an important part of government strategy.

The IRT sector is a 'breeding ground' for people skilled in multiple technologies, their practical applications and the practical needs and operation of varied industry players. Investing in these world-class skilled people will continue to fuel the work and expansion of the IRT sector, and thereby support UK industry and attract international funding for R&D to the UK. This workforce is also a key source of talent for new/emerging high-tech and innovative industries and their outward movement into the business with whom they have collaborated contributes to mobility in this important part of the UK STEM workforce. This role of the IRT sector in nurturing and developing this valuable applied R&D and innovation skills base, needs government support to increase its size and scope.

AIRTO recommends that the government should invest in a programme to co-ordinate the activities of industry, Higher Education Institutions, Further Education Colleges and the IRT sector to create a package of measures for building an innovation-ready workforce and for promoting increased career mobility for the future, which will include:

- Access for public funding for Masters-level courses, much requested by industry.
- Increased support for PhDs undertaking industry led applied research in non-academic environments.
- Trialling of new schemes to boost translation of academic learning to the 'shop floor', including enhancements/expansion to the existing and successful Knowledge Transfer Partnership (KTP) scheme. This should encompass expanding the KTP scheme to include IRT sector organisations as well as universities to be the 'knowledge base' partner.
- Fellowships for early career STEM professionals to develop applied skills.
- Putting increased numbers of industry ready graduates through 'sandwich' and industry tailored degrees, including creating more opportunities for those in work to train and retrain and gain new qualifications. This should include innovation management and entrepreneurship, as well as applied technical subjects.
- Develop a national apprenticeship scheme for innovation, with a focus on management and leadership in innovation.

These measures will support the demand for more skilled people to work in applied R&D, innovation and entrepreneurial ventures, all of which are needed to exploit the UK's reservoir of research derived knowledge, introduce innovation to businesses, and bring new products and services to market.

### ***GOVERNMENT AS A CUSTOMER AND CATALYST FOR INNOVATION***

As well as being a direct funder of R&D, government can be a catalyst for driving innovation through harnessing public procurement. The government acting as an early adopter/intelligent customer for new technologies creates a confidence that gears in private sector investment to growing companies. This is relevant to all sizes of companies, but is particularly important for supporting innovation in ambitious SMEs.

Firms operating with the government on their list of customers, particularly those striving to push sales of newly introduced products, will be more likely to thrive and succeed in global export markets, where having the UK government as customer is highly respected by international businesses and gives a 'status' which can help in boosting export revenue.

Public procurement opportunities cover the full range of government departments and organisations, and involves services as well as tangible items. Although there have been some initiatives to introduce and support innovation through public procurement contracts, this has not been implemented government wide.

AIRTO advocates that there is a need for a wide-ranging review of public procurement in order to introduce a systematic approach to harnessing opportunities to drive positive and beneficial innovation. Such a review should include procurement rules, types of contracts and concerns about State Aid, with the aim of implementing recommendations and associated initiatives/changes on a government-wide basis. AIRTO will play its part in such a review, if appropriate.

### ***IMPACT OF RECOMMENDATIONS MADE IN AIRTO'S REPRESENTATION***

AIRTO's proposals for the CSR will play an important part in the UK's economic and societal recovery from the COVID-19 crisis and the continuing development of the UK as a Science *and Innovation* Superpower. Combined with implementation of the recommendations of the recent AIRTO Position Statement on '[More D!](#)', they will result in the UK having a better balanced and more effective science and technology infrastructure and ecosystem with enduring system-wide benefits.

The proposals also facilitate a substantial increase in the size of the IRT sector as it steps up to meet the demands created by efforts to reach and benefit from the government's target of increasing R&D expenditure to 2.4% of GDP by 2027. The increased percentage expenditure and increasing GDP will result in the need to double R&D resources in the UK. Pro Rata, for the IRT sector, this will mean an increase in turnover of the organisations comprising the sector from around £7bn per annum to £14bn and, more importantly, and increased wide economic contribution of the sector to the UK economy from £34bn to £68bn per annum (GVA), based on figures from an [Oxford Economics analysis](#).

The impact of some individual parts of the recommendation can be assessed from an analysis of previous government supported activities, including:

- Previous programmes giving technical support to SMEs, run by RTOs, that have created significant numbers of jobs and increased turnover in the target companies. For example, analysis of the performance of the HVM Catapult in previous years has shown that £1 of core funding returned £15 benefit to UK industry (<https://hvm.catapult.org.uk/news/high-flying-results-for-high-value-manufacturing-catapult/>)
- Various economic surveys have assessed the direct effect of funding applied R&D to be between x7 and x14 of the funding provided. Taking the lower figure, the economic benefit of the underpinning applied R&D programme can be estimated as £3.5bn, although the benefit is likely to be higher because of the proposed widened dissemination of the results.

### ***SUMMARY***

AIRTO is fully committed to supporting the UK government in the economic recovery from the COVID-19 crisis, and the development of the UK as a Science *and Innovation* Superpower. Continued

commitment to the ambition of reaching 2.4% of GDP for investment in R&D by 2027, and the government's associated financial support, are both crucial if the UK is to fully exploit the knowledge reservoir resulting from its world-leading science base, for the economic and societal benefit of the country.

A key action for government will be to balance the public investment in applied R&D and innovation, with the support already given to the academic early-stage and discovery research sector. The increased levels of public funding which have been announced will allow this investment to happen without reducing resource allocation of the UK's world-leading universities. The target for this scaling-up of funding must be organisations that exploit and apply knowledge and innovation in practice to ensure that overall UK returns and value for public money can be obtained. The class of organisations referred to that are really very effective in translating, exploiting and applying research knowledge widely across industry sectors, does include some academic centres but those universities operating in this sphere (i.e. at the mid- and higher- Technology Readiness Levels) are limited in number. The vast majority of the newly available investment must be deployed to benefit industry itself, e.g. via investing in organisations which support industry from the IRT sector.

AIRTO is also proposing a number of specific initiatives for incorporation into the CSR aimed at building capacity and extended capabilities within the IRT sector as an integral part of the actions needed to reach the '2.4%' R&D target and to reap maximum value from the expenditure of public money, including:

- technical support for SMEs,
- capitalisation of the IRT sector,
- expanded generic applied research programmes,
- new innovation skills development.

These initiatives will support the economic recovery from the COVID-19 crisis in the short- and medium-term, and the longer-term development of the UK as a *Science and Innovation Superpower*, with the ensuing benefits for the country's productivity and prosperity.

**The total investment into the above proposals for the CSR is £1.06-1.16bn over five years, and will support an expansion in the IRT sector, such that it can build capacity to meet the needs of existing and new business and move towards growth, doubling its total annual turnover from around £7bn to £14bn and its contribution to the UK economy from £34bn to £68bn. The IRT sector will then be able to play its full role in the Science and Innovation Superpower. AIRTO is ready to support the government in the planning and co-ordination of the any or all of the initiatives it is proposing in this representation.**

## ***ABOUT AIRTO***

AIRTO is the Association of Innovation, Research and Technology Organisations. Its membership comprises approximately sixty of the principal organisations operating in the UK's Innovation, Research and Technology (IRT) sector. The IRT sector has a combined turnover of £6.9Bn per annum, employing over 57,000 scientific and technical staff (equivalent to the academic staffing of the Russell Group of universities) and, for comparison, it is significantly larger than the network of Fraunhofer Institutes in Germany both in size and its scope of activities. The sector contributes £34Bn to UK GDP annually. AIRTO's members work at the interface between academia and industry, for both private and public sector clients.



Members include independent Research and Technology Organisations, Catapult Centres, Public Sector Research Establishments, National Laboratories and some privately held innovation companies.

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