



**Securing the foundations of the UK's ambition for Science and Innovation Superpower
status -
*ensuring essential provision for the implementation of new Innovation Strategy***

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From:

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Ensuring provision for the implementation of the new Innovation Strategy to achieve the UK's ambition for Science and Innovation Superpower status

AIRTO sees the publication of the new [Innovation Strategy](#) as a progressive move by government to deliver on its stated goal for the UK to become a 'global hub for innovation' by 2035. AIRTO welcomes this fresh strategy, and recognises that in superseding the Industrial Strategy launched by the Department for Business, Energy and Industrial Strategy in 2017, it has the potential to provide the foundations of the UK's ambition for Science and Innovation Superpower status. By focussing on a Treasury-led plan for growth via [Build Back Better](#) and 'build back greener', we welcome the intention to make new Innovation Strategy an integral part of the plan for recovery, whilst recognising that the societal challenges and global market opportunities identified in 2017 remain. AIRTO contends that the fulfilment of the government's intention to place science and technology at the heart of both the UK's recovery from the pandemic and the race to Net Zero, requires swiftly deployed provision and investment in the UK's innovation capabilities. Without the assurance of the necessary resources, the new Innovation Strategy risks remaining an aspirational narrative that fails to materialise into a reality. **It is vital that investment in research and innovation is sustained across the three-year settlement covered by the Spending Review, in order to prevent the UK falling behind competitor nations rather than leading them. Therefore, we are calling on the government to use the Spending Review 2021 to bolster the Innovation Strategy. Spending Review 2021 represents that last major opportunity in the duration of this Parliament to build the foundations for the UK's bid for Science and Innovation Superpower status.**

Close-to-market innovation across the UK is central to the new Innovation Strategy

The new strategy aims to harness assets across the country, recognising the UK's geographically dispersed R&D and innovation ecosystem as a means of maximising the benefits of innovation for local economies and building on local strengths in places. The UK needs to bolster its capabilities for close-to-market R&D to successfully accelerate the pull-through to market of products and services. Much of these innovation assets reside in the UK's Innovation, Research and Technology (IRT) sector. With a combined turnover of £6.9 billion and more than 57,000 scientific and technical staff, the sector comprises some of the nation's most skilled scientists and innovative business leaders. Its members work at the interface between academia and industry. This sector plays a fundamental role in driving productivity providing centres of excellence for innovation operating across the UK in cities, such as the Met Office and National Physical Laboratory, and hubs of activity in non-urban areas, such as Orkney's European Marine Energy Centre. In considering priorities for the 2021 Spending Review, the government must **recognise that these hives of close-to-market innovation across the UK are central to the success of the new Innovation Strategy, and that continued investment is necessary to harness their capabilities.**

- **Applying pandemic lessons to pressing concerns**

The climate crisis and demographic (ageing population) crisis are, arguably the world's most pressing concerns. Globally we must cut emissions by 11.7% each year if future generations are to thrive. The market associated with goods and services for an ageing population is enormous, estimated at more than €3.2 trillion annually in the EU alone. Both crises offer global trade opportunities for the UK, with its world-class expertise and international reputation for innovation and entrepreneurship. The level of innovation required to tackle these big missions is colossal and needs nurturing if it is going to be successful. **A fresh commitment to and investment in the UK's innovation capabilities will be critical to underpin the successful implementation of this strategy.** By shaping the strategy around lessons from the Covid-19 pandemic, and understanding the weaknesses that it has exposed in national resilience, the government stands to harness the power that science and technology can play in tackling societal challenges and transforming lives, helping realise the ambition to 'Build Back Better'. In addition, there are some behaviours that, if instituted pervasively across government departments, would create confidence for industry and investors alike – as follows:

- Working with greater agility and speed in decision making and deployment of resources.
- Better retention of knowledge, and stability of know-how by attracting and retaining key personnel.
- Creating better clarity for business about the future direction of policies and strategies, thus providing a stronger basis for private investment in science and innovation.

Building on our world-class existing capabilities

If the Innovation Strategy is to stimulate a post-pandemic economic boost, it needs to build on the best of our existing capabilities to fully exploit the innovation and development assets spread across the UK, recognising the considerable investments made over the past 30 years. This will enable the UK to build back better in a strategic manner and maximise impact for the UK economy and society as quickly as possible. **We are therefore calling on the government to use the Spending Review 2021 to go further in strengthening some particular areas of the Strategy:**

- Creating more support mechanisms for boosting international collaborations – and in particular, taking steps to ensure that established and renowned UK entities continue to play their pivotal part in programmes like Horizon Europe. The UK's international standing as a 'Science and Technology Superpower' will be hampered if we lose ground in our relationships with key collaborators in EU member states.
- Boost investment in the innovation ecosystem during the forthcoming Spending Review cycle. Some of the UK's non-profit distributing organisations that lie at the innovation ecosystem's foundations, offering living labs, test-beds and demonstrators, remain undercapitalised. For the UK's innovation ecosystem to be truly world-leading by 2035, this under investment must be addressed.
- In parallel with these actions, a comprehensive 'register' of the UK's IRT sector assets (government owned, not for profit and private) must be drawn up, in order that they can be promoted as a UK vital and unique asset by government and others, both nationally and internationally.

Adopting a fresh emphasis and systems approach to innovation is the way forward, but must be back-up with financial commitment: Overall, the strategy's commitments to increased public investment in science and innovation are welcome. These areas of fresh emphasis are particularly positive but must be followed through with matching, continuing financial commitment in the Spending Review.

Nurturing talent: recognising government needs to put people at the heart of its plans by investing in skills and improving opportunities for the brightest and best to come to work in the UK.

Nurturing the role of the innovation ecosystem: capitalising on the extensive network of innovation assets which lies in the UK's Public Sector Research Establishments (PSREs), Research & Technology Organisations (RTOs), Catapult Centres, Science Parks and Innovation Campuses to harness their capabilities, expertise and infrastructure to invigorate future economic growth across all parts of the UK.

Nurturing the global dimension: Leverage the international growth of the IRT sector to export innovation and world-firsts by building new collaborations and promoting British Standards around the globe.

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 Spending Review 2021.

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, manifested in the recently published [Innovation Strategy](#). It is vital that this public investment is used to maximum effect, both to address the economic recovery from COVID-19, to tackle the climate crisis 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.

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 and the private, industrial funding that can be attracted to support science and innovation in the UK.

In considering what needs to be done to deliver industrially inspired innovation, it is an inescapable fact that the level of innovation required to tackle big missions such as achieving Net Zero Carbon Emissions is enormous, and needs nurturing and investment if it is going to make the right impact. In particular, we are calling for a focus on bolstering three aspects of the new innovation strategy, adopting forward-thinking investment based on tried and tested approaches which are already in play across the breadth of the IRT sector, but which we believe could be considerably scaled-up with enhanced commitment from government to greatly advance UK innovation:

Talent: Prioritise skills for the future to power the fourth industrial revolution:

This requires the new strategy to make better use of the IRT sector as a “breeding and training ground” for people skilled both in technology and in the needs and operations of industry, Leveraging the IRT sector as a catalyst to deploy a package of measures to accelerate the expansion of the UK’s innovation-ready workforce by:

- *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).*
- *Building on successful models of collaboration between the IRT sector, industry and academia to establish the critical mass of the skills to tackle real-world technology problems.*
- *Mitigate the demographic crisis by harnessing the ageing workforce for retaining innovation skills.*

See detailed proposals in Appendix 1

Global: Leveraging the international growth of the IRT sector to export innovation and world-firsts by building new collaborations and shipping British standards around the globe:

This requires the new strategy to commit to an aligned sector-focused international plan to leverage partnerships and customer relationships to create new initiatives that will enhance strategic national missions.

- *Focusing on export of British Standards and related expertise, services and products.*
- *Exporting British Innovation by leveraging the IRT sector’s valuable global networks to mount an international ‘collaboration drive’ – this require government to create more investment mechanisms for boosting international collaborations and, in particular, taking steps to ensure that UK entities play their part in programmes like Horizon Europe to achieve UK’s international standing as a ‘Science and Technology Superpower’.*

See detailed proposals in Appendix 2

Innovation Ecosystem: Utilise the IRT sector to capitalise on the extensive network of innovation assets and their convening power across the UK to invigorate future economic growth:

This requires the new strategy to change the ‘mix’ to spread the risk, delineating between the ‘R’ and the ‘D’ of ‘R&D’ to invest in more DEVELOPMENT infrastructure and capabilities, balancing it appropriately against the UK’s substantial investment in early-stage RESEARCH.

- *Exploiting the IRT sector by creating a re-capitalisation 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.*
- *Leveraging the convening power of the IRT sector to syndicate innovation capabilities that will bolster the ecosystem to drive collaboration in mission-led initiatives.*
- *Forming a National Innovation Council backed by a cross-cutting ‘sector deal’ for innovation to provide foresight and deliver national co-ordination of innovation activities to support the needs of UK business, working in partnership with UKRI, Innovate UK and ARIA.*

See detailed proposals in Appendix 3

If the government can optimise investment in these three areas, it will benefit from boosting the skills of the 57,000 people employed in innovation workforce and increasing their number and resources, to fulfil its ambition to be a ‘Science & Technology Superpower’. This builds on the previous and existing, public and private, investment in the IRT sector ecosystem – which already turns over ~£7bn per annum to strengthen global competitiveness.

Each of these proposals is discussed in appendices 1-3 below and form a part of the argument for increasing funding in applied R&D, thereby balancing the existing levels of investment in

fundamental research. This support for innovation will dramatically increase 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'](#).

DETAILED PROPOSALS

Appendix 1: Talent: Prioritise skills for the future to power the fourth industrial revolution.

This requires the government to make better use of the IRT sector as a “breeding and training ground” for people skilled both in technology and in the needs and operations of industry. To realise its ambition of being a ‘Science and Technology Superpower’, the UK needs the people with the skills to match it. Skills are a critical enabler for innovation, with there being an inextricable link between skills and technology development. Ensuring people have the right skills is also fundamental to supporting employment and job creation. Rebuilding UK industry and stimulating investor confidence to drive Foreign Direct Investment (FDI) depends on having the ability to build a strong workforce with the right skills, especially in key sectors such as high value manufacturing and R&D intensive sectors such as aerospace, pharmaceuticals, & automotive. These skills are becoming more advanced, and are creating opportunities for people to evolve their skills and elect to retrain. They should be an important part of the new innovation strategy. The IRT sector is a ‘breeding ground’ for people skilled in technology and in the needs and operation of industry – both those with vocational skills and key innovation workers. These skilled staff may continue to work in the IRT sector, supporting UK industry and attracting international business to the UK. They are also a key source of talent for high-tech and innovative industries. Support for training by and within the IRT sector will provide upskilling of UK plc for the future. The new innovation strategy (and associated emerging [Research and Development \(R&D\) People and Culture Strategy](#)⁵) should aim to make better use of the IRT sector as a training ground. Those graduating from secondary, further and higher education since 2020 are facing a generational challenge of securing employment and initiating careers. The UK has large numbers of science, technology, engineering and mathematics (STEM) graduates in the wake of the pandemic. Existing training schemes from apprenticeships, future leader fellowships, and graduate level programmes are going to be swamped with applicants. There is an opportunity to expand existing schemes to get more young people with STEM qualifications upskilled for the UK’s workforce ensuring they are ‘innovation ready’, whilst levelling up access to opportunities for careers in research and innovation for young people from BAME communities and disadvantaged backgrounds. **How could things work better in the new innovation strategy?**

The government could build on its flagship [Institutes of technology programme](#)⁶ to boost technical and STEM skills by working with the IRT sector to create a package of measures for accelerating its work to build an innovation-ready workforce for the future, which will include:



FORWARD THINKING SOLUTIONS - No 1: #TALENT- Leverage the IRT sector as a catalyst to deploy a package of measures to accelerate the expansion of the UK’s innovation-ready workforce

The new innovation strategy should aim to build on its flagship [Institutes of technology programme](#)⁶ to boost technical and STEM skills by working with the IRT sector to create a package of measures for accelerating its work to build an innovation-ready workforce for the future. AIRTO recommends that the government invests 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, with industry driven content, which is 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.



FORWARD THINKING SOLUTIONS - No 2: #TALENT - Build on successful models of collaboration between the IRT sector, industry and academia to establish the critical mass of the skills to tackle real-world technology problems

Successful programmes which could be replicated include:

- [Flood and Coastal Engineering](#)⁷ - HR Wallingford's partnership with Brunel University and the Environment Agency designed to equip people with skills at undergraduate and post-graduate level with the knowledge and understanding needed for a successful career in flood risk management.

- TWI's [Structural Integrity Research Foundation \(SIRF\)](#)⁸ was established in 2012 as a partnership between TWI, BP and the Lloyd's Register Foundation and several leading universities with the aim of developing world-leading structural integrity capabilities through people and skills at the post-graduate level. The economic impact of SIRF has been estimated as being worth £189 million to the UK economy (or £109 million without the capital impact of setting up the foundation). In addition to this direct impact, for every 10 jobs at SIRF, 12 more are supported elsewhere in the economy⁹.

- [MIRA Technology Institute \(MTI\)](#)¹⁰ is the result of a unique industry collaboration led by North Warwickshire and South Leicestershire College, and its partners, HORIBA MIRA, Coventry University, the University of Leicester, and Loughborough University. Built with £9.5m investment from the UK Government's Local Growth Fund via the Leicester and Leicestershire Enterprise Partnership Limited, the MTI is a specialist facility designed specifically to train the next generation of engineers (from Level 2 to Level 8) in the latest automotive technology, and specifically aims to deliver progress for the 'Future of Mobility', one of the four Grand Challenges of the government's 2017 Industrial Strategy by creating learning opportunities in the cutting-edge technologies required to develop innovative, inspiring solutions which create wealth and improve transport in all its forms. It has a particular focus on disruptive technologies, such as electrification and driverless cars, cultivating the skills necessary to operate at the cutting edge of automotive technology.

- [NPL's PostGraduate Institute for Measurement Science \(PGI\)](#)¹¹ is a pioneering initiative to equip the UK with an exceptionally skilled workforce ready to tackle real life industrial challenges. The vision of the PGI is to be the number one institute for postgraduate research and training in measurement science. Developed by a strategic collaboration between NPL and the University of Strathclyde and the University of Surrey, the PGI aims to create a step change in industrially relevant postgraduate research and training to create impact across advanced manufacturing, energy, environment, digital and life sciences and in doing so to equip the UK to lead the way in advancing and influencing worldwide measurement and industrial strategies.



FORWARD THINKING SOLUTIONS - No 3: #TALENT – Mitigate the demographic crisis by harnessing the ageing workforce for retaining innovation skills

A growing challenge for sectors reliant on Science, Technology, Engineering & Maths (STEM) skills, is the ageing workforce, generating a need to enable older generations to continue contributing their experience. What is the optimal retirement pattern? The IRT sector employs 57,000 people and contributes >£32Bn to the UK economy annually, generating £13Bn in tax revenue¹²; skill shortages could hold back this amplification of economic benefit. The IRT sector could be used as a 'living lab', partnering with the government and industry, to identify new approaches to employment practice, career development, and staff mobility in STEM to tackle:

- The shortfall in skilled staff: thousands of technicians and science/engineering roles will need replacing over the next decade as older people retire. EngineeringUK's analysis shows an annual shortfall of 29,000 people in engineering roles with Level 3 skills and 40,000 with Level 4+ skills¹³.

- Limited opportunities for promotion amongst early career staff as older people remain employees for longer, to deter young talent leaving STEM.

- A need for more flexible working patterns to retain the extensive capabilities of older, experienced people.

The IRT sector could be an ideal 'test-bed' for innovation in the STEM workforce, by piloting:

- Schemes for flexible/part-time working and retraining (apprenticeships), including phased retirement, flexible work patterns to accommodate caring responsibilities.

- Emeritus-style programmes, creating mechanisms for retirees to continue contributing skills/knowledge.

- Models and tools for intergenerational knowledge and knowhow exchange, e.g., mentoring between the oldest and youngest to capture the 'corporate knowledge base'.

- Age-friendly workplaces: developing solutions for people to continue working for longer in laboratories/workshops, e.g., use of exoskeletons, virtual reality and artificial intelligence based technical assistants.

Appendix 2: Global: Leverage the international growth of the IRT sector to export innovation and world-firsts by building new collaborations and promoting British Standards around the globe.

This requires the new strategy to commit to an aligned sector-focused international plan to leverage partnerships and customer relationships to create strategic initiatives that enhance strategic national missions.

IRT sector organisations compete on the international stage, with a large proportion of their international commercial activities being undertaken outside the EU¹² (approximately two-thirds). The international footprint of the UK-based sector is strong, and offers immense growth potential for the UK government to leverage upon to build international collaborations, offer overseas industry IRT services, and acts a channel for exporting British innovation in the sectors where the UK leads the world (e.g., healthcare and energy transition) and in the areas of emerging standards and regulation. As such, the IRT sector represents a significant leverage opportunity for UK in the post-Brexit world in years to come.

By adopting a strategy of successfully investing in the IRT sector, the UK can become a favoured nation for overseas based entities (for trade, inward investment etc.). The government should be aiming for a co-ordinated and aligned national plan around specific sector strengths; where 'sector deals' already exist, there should be joined up plans with the Department for International Trade to drive collaborations with partners and networks around the globe. Continuing engagement in EU Framework Programmes must be a key priority for the UK, to enable continued leveraging of the partnerships, networks and customer relationships it provides. Use of Overseas Development Funds to promote collaborations is welcome, but care must be taken to ensure that such projects are of benefit to the UK and that key UK future commercial and security interests are not compromised. Formation of major, strategic collaborations between the UK and other countries requires government to take a lead.

These should enhance strategic national priorities and sector strengths for innovation such as Net Zero. Developing a better understanding of the players in the UK's IRT sector is critical if the government and agencies such as UKRI/Innovate UK is going to succeed in promoting the UK's innovation assets and infrastructure internationally.

How could things work better in the new innovation strategy?



FORWARD THINKING SOLUTIONS - No 4 #GLOBAL – Focus on export of British Standards and related expertise, services and products

[BREEAM](#) is the world's leading built environment sustainability assessment method, using standards developed by BRE. It recognises and reflects the value in higher performing assets across the built environment lifecycle, from new construction to in-use and refurbishment. There are now nearly 600,000 BREEAM certified buildings in 89 countries. BREEAM helps drive performance and innovation globally against scientifically rigorous requirements that go beyond current regulations and practice. It helps create a pull for expertise and innovation and supports the UK's reputation as a leader in this field. There are opportunities for the UK to take a lead on new standards in construction, for example in MMC and digital ways of working, as well as in other sectors that could be adopted globally to create a pull for UK expertise, services and products. The success of the UK's programme on Building Information Management (BIM) standards, helping lead to global ISO standardisation, is now creating opportunities globally for UK companies, demonstrating the benefits of such an approach.



FORWARD THINKING SOLUTIONS - No 5 #GLOBAL – Exporting British Innovation, leveraging the IRT sector’s valuable global networks to mount an international ‘*collaboration drive*’

The [Catapult Network](#) have built up a significant international programme to export British Innovation in a relatively short period of time. In key areas where the UK can lead the World, they are building significant affiliations around the Globe. For example, the ORE Catapult is partnering with European RTOs to form strong bi-lateral partnerships, supporting the UK Network to expand international renewables portfolio post BREXIT, embarking upon an International Joint Venture collaboration with Chinese Technology partners, and taking forward a USA collaboration programme for offshore wind development support. This programme is helping to enhance the UK’s reputation for innovation in offshore renewable energy through offering technical advisory services via consultancy on research infrastructure and coordinated R&D collaborations on offshore wind supply chain. Major projects underway and priorities in the near future include: EC research projects on offshore wind technology development, bi-lateral USA projects on O&M technologies and SE Asia commercial advisory services. The ORE Catapult is just one exemplar of international R&D collaboration. There are many more across the IRT sector.

The UK would stand to benefit from embarking on a strategically planned ‘*collaboration drive*’ in areas of key strengths, with government support for building up alliances across the R&D landscape in key territories identified as strategic importance by leveraging the existing networks which the IRT sector have already established. This will involve developing a concerted plan around specific sector strengths and where ‘sector deals’ already exist, there should be joined up plans with the Department for International Trade to drive collaborations with partners and networks around the globe. In addition to the obvious benefits to advancing technology that such a drive would bring, the role of science and technology as a tool for asserting ‘soft power’ should be prioritised. A comprehensive understanding of the breadth and depth of the entire UK IRT sector by government is essential if this initiative is to be successful.

Appendix 3: Ecosystem: Utilise the IRT sector to capitalise on the extensive network of innovation assets and their convening power across the UK to invigorate future economic growth.

This requires the new strategy to change the 'mix' to spread the risk: delineating between the 'R' and the 'D' to invest in more DEVELOPMENT (whilst retaining investment levels in early-stage RESEARCH).

The government has access to a whole range of institutions to drive innovation: some of which it owns, and some are private bodies. AIRTO contends that the innovation strategy should aim to capitalise on the extensive network of established innovation assets across the UK to invigorate future economic growth. If the UK government is serious about ensuring the country becomes a 'Science and Technology Superpower', it needs to properly support all of these institutions, not just those that are currently government owned. Improved systems integration within the ecosystem will also be critical to improving co-ordination of existing assets to support a step change in levels of innovation. Establishing new entities is costly. Sometimes there is a strong business case for creating new infrastructures/technology organisations from scratch, but frequently the same objectives may be achievable by utilising and leveraging the extensive existing infrastructure to do more and extend its scope, often through creating collaboration. This provides a way for government to syndicate well-established innovation capabilities (both infrastructure and people with expertise) that will bolster the ecosystem to drive collaboration in mission-led initiatives. Where new infrastructures for research and innovation purposes are established, it is essential that they have a fully resourced operating budget (i.e., they have 'batteries included') rather than given attention only to the capital costs.

To boost economic growth in the wake of Covid-19, the government needs to take radical action to create attractive value propositions for industry to continue to invest in innovation. We urge the government to creatively consider how it can utilise the UK's IRT sector as part of its new innovation strategy. Do not allow it to become an underutilised asset! It is important to recognise that innovation is not a linear process that always commences in a laboratory. We are calling for something different, for change - for a 'market pull' approach. The new innovation strategy stands to benefit from focusing more on the DEVELOPMENT aspects of R&D and infrastructure for mid-Technology Readiness Level (TRL) capabilities such as test beds and demonstrators to gear in the private sector (with associated finance) and pull technologies through to market. This requires a deliberate and conscious move to stop 'putting all the eggs in one basket' by continuing to front load innovation policy towards early-stage research. The IRT sector has repeatedly demonstrated its ability to convene academic, industrial, government and IRT sectors together, with PACE, to deliver on national priority missions. The IRT sector acts as a catalyst to "MAKE THINGS HAPPEN". **How could things work better in the new innovation strategy?**



FORWARD THINKING SOLUTIONS - No 6: #ECOSYSTEM – Exploit the IRT sector by creating a re-capitalisation fund

The IRT sector to advance the deployment of its tremendous convening power to create expand the range and number of test beds, demonstrators and living laboratories available to businesses. This convening power was recently evident during the Covid-19 crisis, when the [VentilatorUK Consortium](#)¹⁴ was rapidly formed demonstrating the convening power of the IRT sector, expertly led by the High Value Manufacturing Catapult. In the final weeks of June 2020, the consortium was building an intensive care ventilator on average every 4 minutes, 24 hours a day, 7 days a week. A total of 13,437 ventilators were produced, ensuring availability for anyone who needed one for life-saving treatment and more than doubling the number of ventilators in the UK in just a matter of a few months! This exemplary best practice should be used as a model for the new innovation strategy concerning high profile projects and programmes by exploiting existing organisations. The new innovation strategy must support IRT sector organisations as a critical part of the innovation ecosystem involved in rebuilding the economy. Specifically, for IRT sector organisations, there is an immediate need for balanced funding to finance both equipment and facilities for R&D, and generic programmes of work, so that the IRT sector can give industry the support it needs in an innovation-led recovery.

The IRT sector (which turns over ~£7bn per annum and employs, 57,000 people) needs to increase in size to further equip the UK to deliver on the translational research and development activities created by the market pull from industry in the advancement of the fourth industrial revolution. To have the right infrastructure to attract foreign direct investment in UK R&D, it is important to understand that not all organisations within the sector will be able to achieve this growth by themselves, particularly those that are not-for-profit RTOs. The need to "shore up" some private research and technology institutions has been noted in recent years and for this to become a reality, a recapitalisation fund is required. This would need to be of the magnitude £50-70million/year. The provision of this fund would enable the whole sector to grow commensurate with the UK's ambitions to be a 'Science and Technology Superpower'.



FORWARD THINKING SOLUTIONS - No 7: #ECOSYSTEM – Leverage the convening power of the existing organisations in IRT sector to syndicate innovation capabilities that will bolster the **ecosystem** to drive collaboration in mission-led initiatives

[The UKRI funded Construction Innovation Hub](#) has brought together key players in the ecosystem to syndicate world-class expertise from the BRE, the Manufacturing Technology Centre (MTC) and the Centre for Digital Built Britain (CDBB) to transform the UK construction industry, supporting the ambitions of the Construction Sector Deal and UK Government's Construction Playbook, to deliver improved productivity, quality, environmental and social outcomes. This exemplary best practice should be used as a model for harnessing the existing ecosystem across other key industry sectors in the new innovation strategy to unleash innovation in areas of focal opportunity for national missions.

One such example of a forward-thinking solution would be to establish a Hydrogen Innovation Initiative (HII) to help facilitate the UK's energy transition from fossil fuels to reach the target of Net Zero is deployment of hydrogen technologies. There are a number of technical challenges to be tackled in realising the transition to hydrogen energy sources in the UK. The government could seek to create a new technology innovation centre to tackle these and exploit the market opportunity for R&D. However, a more effective approach could be to harness the existing ecosystem by bolstering existing organisations to work together to deliver a virtual centre to collaborate, leveraging the collective strengths of the Catapult Network, leading Technology Centres and key industrial stakeholders through collaboration and innovation into strategic technologies, critical for delivering an end-to-end UK hydrogen economy. Such an approach would advance key technologies to facilitate the transition to hydrogen gas, to achieve a cohesive approach and avoid patchy execution of the UK's mission-led goals.

The Hydrogen Innovation Initiative (HII) would be a virtual innovation centre comprising of the Catapult Network and Technology Centres as partners, including the Net Zero Technology Centre (formerly OGTC), the Aerospace Technology Institute (ATI), the Advanced Propulsion Centre (APC) and the National Physical Laboratory (NPL) to create a new connected innovation ecosystem to accelerate the hydrogen economy¹⁵. HII would act as a focal point for hydrogen innovation and the mechanism for implementation of the end-to-end UK Hydrogen Innovation roadmap.

HII is a key solution for delivering a UK Hydrogen economy and in enabling it to capitalise on the economic opportunities of emerging global hydrogen markets. HII would be unique in that it would focus on strategic technologies and cross-sectorial innovation priorities, and also bridge between academia and industry to avoid duplication, driving a consensus view on key UK strategic priorities. This co-ordinated intervention directly addresses the technical and non-technical challenges faced by a traditional 'sector-focused' innovation approach.

UNDERPINNING THE IMPLEMENTATION OF THE INNOVATION STRATEGY

Finally, on the matter of implementation of the strategy, AIRTO recommends that the government should consider:

- the formation of a National Innovation Council to ensure robust oversight of the Innovation Strategy, and funding allocations for innovation-related activities made in the Spending Review 2021, working with key stakeholders across government and the devolved administrations, business, academia and the IRT sector. Its role will be to ensure that the strategy is turned into a reality and is effective in achieving its stated long-term goals. Such a Council would play a key role ensuring that the elements of the strategy are considered collectively, taking a holistic approach rather than the eight pathways being delivered in isolation;
- the creation of an innovation 'sector deal' to provide the necessary resource and foresight to turn the strategy into a reality, such that it achieves a tangible step change in the UK's innovation output.



FORWARD THINKING SOLUTIONS - No 8: #ECOSYSTEM – Form a National Innovation Council backed by a cross-cutting 'sector deal' for innovation and provide national coordination of innovation activities

With representation from industry, government and academia, the core mission to the Council will be to coordinate innovation activities across the UK. Such a Council would act in partnership with UKRI, Innovate UK and ARIA to:

- Join up the entire innovation ecosystem to improve diffusion of innovation through collaboration along and across supply chains and between different sectors, including both high productivity and lower productivity areas of business.
- Foster the generation of innovative ideas, the development of suitably skilled innovation practitioners and the availability of appropriate finance from both public and private sources.
- Support the evolution of commercial and entrepreneurial culture amongst those engaged in the translation of developments towards market.

Such a Council could be backed by a cross-cutting 'sector deal' for innovation and provide national coordination of innovation activities delivered to support UK industry needs. Specific opportunities for IRT sector organisations to add value by playing their role in such a Council lie in the areas of:

- Innovation training and skills provision to industry.
- Commercialisation of inventive concepts on their journey to market.
- Leveraging UK regional footprints to support the levelling-up agenda of government.
- Leveraging international partnerships for growing UK export potential in areas of new innovation.

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