

## **Written evidence submitted by the Association of Innovation, Research and Technology Organisations (AIRTO) (GAP0077)**

### **Background to AIRTO**

This representation is from AIRTO (the Association of Innovation, Research and Technology Organisations). AIRTO's members comprise representatives from:

- Public Sector Research Establishments (PSREs).
- Non-profit distributing member and non-member based Research and Technology Organisations (RTOs, including Catapult Centres).
- Privately held research and technology companies (including Contract Research Organisations - CROs).
- Universities (Enterprise/Technology Transfer Departments).
- R&D departments of industrial companies.
- Business support (including Access to Finance) and early stage technology-based venture capital companies.

AIRTO's members undertake translation of ideas, research and technological advances into the commercial arena, for clients in both the private and public sectors. Collectively, these bodies connect fundamental research to business and commerce (and vice-versa) and are referred to as the Innovation, Research and Technology (IRT) sector. AIRTO members and the IRT sector turnover £8 billion per annum, employ 57,000 people and contribute £32 billion per annum to the UK economy. Exported services are significant, with more than twice as much going to the rest of the world as to the EU.

Some AIRTO members have made detailed submissions to the committee based on their particular activities in addressing the STEM skills gap.

### **Executive Summary**

- **AIRTO members utilise a very wide range of STEM skills, developing and recruiting these skills exposes a number of key issues**
- **AIRTO members participate in a wide range of activities to help reduce the STEM skills gap**
  - **Engaging with schools and higher education**
  - **Supporting apprenticeships and work experience**
  - **The 5% club**
- **Investing in skills development for innovation is seen as critical for the future of the UK economy by AIRTO**
- **Maintaining the interest of young people throughout their years in the education system is critically important. Providing practical 'hands-on' experiences helps to achieve this but cost and fears over health and safety have progressively squeezed such activities out of the curriculum and timetable.**

## Closing the STEM skills gap

1. STEM skills are vital in delivering large parts of the UK's economic activity. In the short and longer term these skills will be even more in demand, helping to deliver the challenges we face as the UK's position in the world evolves. STEM skilled individuals are both employed directly by science, technology and engineering companies and are also highly valued for their numerate and analytical capabilities, in particular by the financial, consulting and IT sectors. The UK is not alone in facing a STEM skills shortage<sup>[i]</sup>, which means there will be a continued international competition for STEM talent.

1.1. In delivering their contribution to the UK economy AIRTO members utilise a very wide range of STEM skills, at every level in the organisation. AIRTO members build their businesses around the application of innovative ideas and technologies for a broadly defined client base. They are therefore particularly dependent on being able to recruit versatile scientists and technologists. Potential recruits must have an interest in both science and technology and its application both in business and elsewhere in the economy and society. Some AIRTO members report that they cannot find sufficient recruits with the competence in fundamental literacy, numeracy and reasoning that is required for their businesses. Unless our education system successfully matches the demand for skills from the economy to supply from secondary and tertiary education, in terms of both quality and quantity, the UK will progressively fall further behind its global competition. The IRT sector which, as an independent research study by Oxford Economics<sup>[ii]</sup> highlights, contribute via their catalytic impact over £32Bn to the UK economy and generating £13Bn in tax revenue yet consuming just 0.3% of government spend - , and therefore skill shortages hold back this amplification of economic benefit to the economy.

1.2. Attracting talent, at all levels, into science and technology requires a combination of measures to:

- Instil ambition in up and coming generations of young people
- Generate enthusiasm for scientific and technological achievement
- Provide opportunities for engagement and career development in UK firms and universities
- Promote careers in science and technology as desirable, rewarding and 'cool'.

1.3. The skills gap can be seen as a systemic issue, encompassing the wider education sphere, the jobs market and society.

1.3.1. Education needs to be fully inclusive in its drive to instil enthusiasm for STEM subjects. That engagement works best started at Key stage 1&2<sup>[iii]</sup>. By Key stage 3&4 STEM are often seen as hard subjects, not well sold to pupils<sup>[iv]</sup>, and highly theoretical given the constraints that often exist on the practical aspects of STEM. Throughout primary, secondary and tertiary education there is a need to sustain interest in doing practical technical things. Practical work has been squeezed out for some time on grounds of lack of facilities, cost, health and safety etc. Motivational teachers need to be quality STEM graduates and motivated and rewarded themselves.

1.3.2. As the world gets more complex we need to develop multi-skilled people, rather than a traditional single subject focus, in particular creative, soft and managerial skills are needed<sup>[v]</sup>. A particular area of interest for AIRTO members is the skill set needed to work successfully on the

commercialisation of research. This is an area where there is a clear shortage of people with the multiple skills, including the vitally important 'soft/people skills', needed to deal with this critically important challenge for the UK. The IRT sector needs practical, technical people who can combine those interests with scientific and theoretical approaches as well, particularly those who also like to stretch their capabilities and who are stimulated by variety in what they do; for them the IRT sector offers a stimulating multidisciplinary environment to develop their careers.

1.3.3. The education system through to postgraduate level needs the capacity, at each level, to deliver sufficient job seekers for both the science, technology and engineering companies and also the needs of the financial, consulting and IT sectors.

1.3.4. Young people's career expectations have changed and the job market needs to reflect this, in particular they look for Interesting projects to develop skills and enhance their CV; A good cultural and team fit; and Flexible and remote working[vi]. The financial, consulting and IT sectors have traditionally been better at supplying these career features. Some employer's conservative approach to recruitment can be an issue also[vii].

1.3.5. UK society does not respect STEM players in the way that some of our key competitors do, making careers potentially less attractive[viii].

2. AIRTO members participate in a wide range of activities to help reduce the STEM skills gap:

2.1. Engaging with schools and higher education

2.1.1. A recent survey of our members has indicated two-thirds of AIRTO members are involved in schools outreach and most AIRTO members offer work experience opportunities to young people, with over two-thirds offering internships. About half of AIRTO members work with higher education institutions to deliver training, for example TWI, who are working with universities to explore ways of providing students with the mix of skills and experience from their degree courses to enable them to 'hit the ground running'. AIRTO's members' interactions with a very broad client base, which includes businesses from diverse sectors, industries of widely differing types and public sector organisations of various kinds, supported by extensive contacts with academia, financiers and funding bodies, provide an unrivalled environment within which to develop a rounded skill set; only really large corporations are able to offer anything comparable, and then generally only in the context of tightly channelled commercial interests.

2.2. Supporting apprenticeships and work experience.

2.2.1. To develop a pipeline of potential talent, about half of AIRTO's Members, including BMT, BRE, NPL QinetiQ, already operate apprenticeship, graduate or postgraduate development schemes. These schemes cover STEM roles as well as management and support activities. Apprenticeships, internships and work experience have traditionally provided entry points through which people starting out on a career can accumulate broader business experience as well as pursuing further formal qualifications where appropriate. The working environment also provides a very suitable context for mentoring and coaching.

2.3. The 5% club: <http://www.5percentclub.org.uk/>. A number of AIRTO members support this initiative. The club is making a separate submission to the committee.

3. The cost of the measures and how they have been funded.

### 3.1. Engaging with schools and higher education

3.1.1. This is undertaken on a voluntary basis and any cost is borne as an overhead by the companies involved. This model works for large companies and individuals who wish to volunteer. SMEs find it difficult on a corporate basis, which does deprive students of visibility of small company opportunities and culture and is maybe a lost opportunity to instil enthusiasm for entrepreneurial career paths.

### 3.2. Supporting apprenticeships and work experience.

3.2.1. Providing such opportunities requires a commitment from the companies involved and a degree of risk that their investment may not be recovered if recruits don't live up to expectations. They are also exposed to the risk that, having trained raw recruits, those recruits may expect to be able to move on immediately, possibly to other companies, to satisfy possibly unrealistic expectations that a degree is a fast track to well-paid management positions. There is a job to be done here therefore as people progress through secondary and tertiary education in setting realistic career expectations while also stimulating interest and ambition. While large organisations can bear these risks, many smaller enterprises cannot afford a sufficient portfolio of trainees to offset the risk. In such instances some assistance is required to offset part of the cost involved. Knowledge Transfer Partnerships provide a good example of a scheme widely supported by both the public sector and the private sector, in this case offering significant benefit to both the companies and the universities involved as well as experience to the students, who at the same time as gaining experience are being placed with potential future employers.

## 4. Recommendations for action

### 4.1. Invest in skills development for innovation:

4.1.1. The government should invest in the skills base needed for innovation and commercialisation, where there is a clear shortage of the multi-skilled people needed to deal with the many critically important innovation challenges for the UK. Particular shortages are being experienced in sourcing innovation leaders with the vital 'soft/people' skills needed for good management, but also the sound capabilities in business planning, supply chain operation, finance and familiarity with relevant technologies and new product and service development. An apprenticeship programme to develop innovation leaders could be a solution to this challenge. Ideally, such a programme would comprise a series of secondments, each for a period of six to eighteen months, to academia, the finance sector, departments of government (such as BEIS) and commercial industry, much along the lines of a traditional fast-track graduate development scheme in a large enterprise. Such a scheme, or a suitable variation on the concept, would require financial support, but would quickly produce a younger generation of multi-skilled practitioners ready to take up the challenge of capitalising on the UK's strong research and innovation base. The IRT sector would be very well placed to host this kind of programme, working in conjunction with networks of commercial enterprises, universities and government departments. This would capitalise on the vital role that the IRT sector already plays in contributing to the development and retention of the UK's skills base by providing scientists, engineers and technologists with:

- Professional development of talented graduates and PhDs.
- Training through apprenticeships and internships.

- Defined career pathways.
- Job mobility.

4.1.2. Engaging the IRT sector as a training partner at apprenticeship level and recognising the role the sector plays in employability of the graduate workforce should be a central component of the government's strategy for better utilising the UK's assets for accelerating innovation and commercialisation.

*January 2017*

### **Declaration of interests**

This submission is made by the Association of Innovation, Research and Technology Organisations (AIRTO). The organisation represents research and technology organisations operating in the space between the academic research of universities and the commercial needs of industry. AIRTO members undertake research and development, and knowledge and technology transfer. This submission does not necessarily represent the views of individual member organisations. AIRTO currently comprises organisations employing more than 40,000 scientists and engineers<sup>1</sup>, with a combined annual turnover in excess of £5 billion (AIRTO Ltd. is a company limited by guarantee registered in England No. 1217006 Register office address: National Physical Laboratory, Hampton Road, Teddington, Middlesex, TW11 0LW. AIRTO is a not-for-profit organisation funded by membership subscriptions, and managed under contract by NPL). The members of AIRTO currently are:

Advanced Forming Research Centre

Advanced Manufacturing Research Centre (AMRC) with Boeing

Agrimetrix

APHA

Axillium Research

BCIS

BGS

BHR Group

BMT Group  
BRE Group  
BSRIA Ltd  
C-Tech Innovation Ltd  
Campden BRI  
CIRIA  
City University London  
CPI  
DG Cities Limited  
Digital Catapult  
Fera  
FloWave TT Ltd  
Fraunhofer UK Research Ltd  
Fripp Design and Research  
Future Cities Catapult  
Health & Safety Laboratory  
High Value Manufacturing Catapult  
HORIBA MIRA Ltd  
HR Wallingford Group Ltd  
Institute for Environmental Analytics  
LGC  
Lucideon Limited  
MTC  
NCC  
NIAB  
National Nuclear Laboratory  
National Physical Laboratory  
Northern Automotive Alliance  
NNFCC  
Nuclear AMRC  
Offshore Renewable Energy Catapult

Organic Research Centre  
PA Consulting  
Patent Seekers  
QinetiQ  
Rothamsted Ltd  
Satellite Applications Catapult  
SATRA Technology Centre  
Science and Technology Facilities Council  
Smith Institute  
Stockbridge Technology Centre  
Thatcham Research  
The European Marine Energy Centre  
The Scotch Whisky Research Institute  
Transport Systems Catapult  
TWI Ltd  
University of Greenwich  
University of Surrey  
WMG HVM Catapult

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**[i]References:**

<https://www.adeccousa.com/employers/resources/infographic-stem-skills-are-driving-innovation/>

[ii] The Impact of the Innovation, Research and Technology Sector on the UK Economy, Oxford Economics, 2014

[iii] <https://eic.rsc.org/section/opinion/addressing-the-stem-uk-skillsshortage/2000391.article>

[iv] <http://www.cityam.com/233916/uk-skills-shortage-misconception-about-stem-subjects-are-failing-young-people>

[v] <http://www.economist.com/news/britain/21648003-lack-skilled-workers-and-managers-drags-country-down-mind-gap>

[vi] <https://www.arm.co.uk/resources/stem-shortage-whitepaper/>

[vii] <https://www.theguardian.com/careers/work-blog/stem-skills-shortage>

[viii] See comments to footnote iv

at <http://www.economist.com/node/21648003/comments#comments>