

Brief

Call for ideas and evidence: help develop a new space strategy

The Government is working with industry and the science community to develop a new strategy to implement the 2015 National Space Policy.

Space is a fundamental part of Britain's future. From world-leading science in orbit to innovative satellite technology and services, space helps us grasp our place in the Universe, as well as tackling challenges here on Earth, such as supporting our growing population and understanding our changing planet.

The British space sector is built on partnership and a common vision for the way ahead. We want your ideas on the future of the UK in space so that we, as the UK Space Agency, can continue to grow our space sector, advance our world-leading science, and facilitate opportunities across the country.

In 2015 the Government published the [National Space Policy](#) which set out the principles that Government:

1. Recognises that space is of strategic importance to the UK because of the value that space programmes deliver back to public services, national security, science and innovation and the economy.
2. Commits to preserving and promoting the safety and security of the unique space operating environment, free from interference.
3. Supports the growth of a robust and competitive commercial space sector, underpinned by excellent academic research.
4. Commits to cooperating internationally to create the legal frameworks for the responsible use of space and to collaborating with other nations to deliver maximum benefit from UK investment in space.

What do you think needs to be done by Government, industry, academia, civil society or others to put the National Space Policy principles into practice? What actions should we take to ensure the UK can benefit from the growing opportunities in the space sector? How can we use space to meet the challenges of tomorrow?

We also want evidence on the opportunities and challenges we face, and your evidence for why your proposed actions are necessary and effective. Please include ideas on things which are already being done and should be continued, as well as ideas for completely new actions or things that should be stopped.

Please send your ideas and evidence to Natasha.Grant@ukspaceagency.bis.gsi.gov.uk by the end of Wednesday 11 January using this template with the title 'Strategy call for ideas and evidence' on your email.

We particularly welcome response from groups who have discussed the issues and are sending us a collective response.

Whitepaper Draft

The skills pipeline and the National Space Policy

Introduction

The UK Government's National Space Policy¹ recognises the potential benefits of space to society and the UK economy, and identifies that space is part of today's national critical infrastructure. It contains four major policy headings that should be supported by the a new national space strategy².

It is our opinion that these four policy headings are inherently and critically linked with the UK's ability to produce a skilled and experienced talent pool, which can be leveraged for growth and expansion by companies, and contribute to a vibrant [entrepreneurship] environment. Space is a global industry where competition is carried out on international scale. For the UK to achieve its growth targets of £40bn in 2030 in the space sector, the importance of education cannot be understated.

Previous strategies, such as the Space Innovation and Growth Strategy³ have stated the importance of ensuring that sufficient skilled employees are available in the space sector, and also included actions to address this. Similarly, the UK Space Agency publishes their own strategy specifically for Education, Skills and Outreach^{4,5}. It is our belief as representatives of students and early career people that these strategies do not fully address the skills problem that is currently faced by the space sector.

In this paper we have attempted to identify the major problems as young people see them, supported by evidence we have collected and have made some recommendations that could form part of the solution. These recommendations and the collected evidence will also be submitted to the UKSA *Call for ideas and evidence: help development a new space strategy*. *I am typing words, words tht might not be useful but stretch the number on the bottom, so kinda useful.*

¹ [National Space Policy, 2015](#)

² [Call for ideas and evidence: help develop a new space strategy](#)

³ [Space Innovation and Growth Strategy 2014 - 2030](#)

⁴ [UK Space Agency Education, Skills and Outreach Strategy 2016](#)

⁵ [UK Space Agency Education, Skills and Outreach Strategy 2011](#)

The Problem

The people who spend the most time looking for entry-level positions in any sector are student and recent graduates. They have come straight out of University, often with very little relevant experience and are seeking the first step on the career ladder. Many have only 3 years of education and the luckiest have 3 summers worth of internships or placements. Many jobs advertised look for students with 2 - 3 years worth of experience in a relevant field. How are graduates expected to compete in a job market where non-UK students have an edge because of the education they receive in their own countries.

The Solution

Companies in other parts of the world are capitalising on the benefit that practical experience in technical projects can have on a graduate's education. For example, SpaceX (apart from degree programme) filter applications based upon⁶⁷:

- Hands on hardware/software development exp - i.e. What problems have you actually encountered and solved?
- Experience with engineering competitions, and placement in top positions/ brackets at those competitions
- GPA/ SAT - other hard scores
- Drive/ Grit

SpaceX sends a recruiting mission to the Formula Student competition each year, competing with the automotive industry for the top performers. Finding the best talent for your company should be critically important, and the strategy should therefore be proactive and practical.

The National Space Policy should make an effort to encourage companies to improve their recruiting & education practices.

Key Recommendations

Conclusions

References

[Importance and Challenges of Hands-On Experience in Astronautical Education](#)

[UK Space Innovation and Growth Strategy: 2015 Update Report](#)

[Employer Engagement - enhancing HEI engagement with the Satellite Industry for workforce upskilling and informing policy makers](#) [Kathie Bowden]

[Space Innovation and Growth Strategy 2014-2030 - Space Growth Action Plan](#)

⁶ [Can I get a job at SpaceX after graduating from a low-ranked engineering program?](#)

⁷ [Space News: Op ed | 3 things to know if you want to work for SpaceX](#)

[UK Space Agency Education, Skills and Outreach Strategy 2016](#)

[UK Space Agency Education, Skills and Outreach Strategy 2011](#)

[National Space Policy, 2015](#)

Preamble

Industry & government needs to engage with this problem now - when 100,000 skilled employees are needed it will be too late

Key Points

Issues

- Advertisements for 'entry-level' positions require a minimum of 2-3 years experience (exceptions are the few graduate schemes available). This puts recent graduates off from applying, and encourages them to enter other industries (especially tech and finance) where requirements are lower.
- There is very poor industry presence on university campuses as compared to tech and finance. Most students have not had a 'space company' (their interpretation) exhibit at their university. [evidence: straw poll at NSSC16, and pre-NSSC17 survey]. Where there is industry engagement, it is typically only with Aerospace Engineering students.
- Industry not promoting to students beyond engineering/physics, so students are unaware of opportunities and end up at Google/Goldman Sachs
- Reluctance by industry/government to support initiatives like UKSEDS NSSC, SpaceCareers.uk, SPIN
- Much of the growth in the sector is predicted to be in the downstream sector - many students who have the skills for this part of the industry are not traditionally interested in the space sector (demographic is not currently reached).

Proposed actions:

- UKSA establishes HR working group with representatives from industry and the student that publishes recommendations about how to advertise and the best strategies for targeting groups
- Public UKSA support for student initiatives such as SC

Young professionals have told us that there is lack of space-specific CPD opportunities

- Support for young professionals, social community and CPD - lots of people leave the space industry for a better paid job
 - The Aerosoc doesn't fill this niche because of the lack of exclusivity

The space sector draws on the same pool of graduates as other similar sectors, but generally offers lower salaries. The industry does not do enough to highlight the unique perks of the space sector and

Lack of awareness about the differences between different graduate roles

Nothing is space specific

Early careers don't have enough oversight of different jobs they could go into

Like, there's so many different jobs and different routes to get there but it's hard to map your own

Also we don't get paid enough so we only do it because we are super keen space nerds

So you lose out on all the semi keen space nerds

1. Reluctance by industry/government to support initiatives like UKSEDS NSSC, SpaceCareers.uk, SPIN

Skill

- UK graduates are typically inexperienced relative to their European and American peers, who complete placements as part of their courses [evidence: university course requirements w.r.t. Industry placements, relative amount of free time]
- There are relatively few industry-supported opportunities for students to gain experience and develop skills compared to other sectors. This makes them less able/confident in applying for jobs and founding startups, and means they are less exposed to the sector.
 - Formula 1 teams support Formula Student, other sectors run challenges like Barclays Launchpad Business Challenge, Shell Ideas360, Babcock Telegraph STEM Awards 2017, IMechE Formula Student and Unmanned Aerospace challenges for Mechanical and EE students
 - Relatively few grad scheme and internship positions (~100/year)
- Few opportunities to develop experience and skills companies are looking for
 - Lack of "spare" time on degree courses
 - Few internships available
- Support for young professionals, social community and CPD - lots of people leave the space industry for a better paid job
 - The Aerosoc doesn't fill this niche because of the lack of exclusivity

We want:

- More support for student projects
 - industry supported
 - properly accredited
 - relevant to industry
- Industry/government engaging with students
 - Involving students in panels/steering groups

- Providing students projects/support (eg clydespace/sstl providing hands on experience on cubesats. In the US it is expected that all aerospace graduates will have worked on a cubesat)
- Universities to update their courses & collaborate with industry

Evidence

Survey:

- Looking for careers
- Quality/clarity of careers information and jobs adverts/description
- Provision of projects at universities
- Graduates & experience [Tom, Adam, Portia, Alex, Dan W, Dan E, Jake Wood, Zoe V, Graeme Taylor]
- Lecturers
 - SUN
 - Adam Baker
 - Lucy Berthould
 - Chris Bridges
- Recruiters
 - HE Space
 - Sapienza
 - SSPI
- [Draft Form](#)

Summarise tertiary education systems in European and the USA - how this affects student experience & employability

Response to Call for ideas and evidence

Please put down your thoughts on what needs to be done by Government, industry, academia, civil society or others to put the National Space Policy principles (listed below, and at <https://www.gov.uk/government/publications/national-space-policy>) into practice. What actions should we take to ensure the UK can benefit from the growing opportunities in the space sector? How can we use space to meet the challenges of tomorrow?

We also want evidence on the opportunities and challenges we face, and your evidence for why your proposed actions are necessary and effective. Please include ideas on things which are already being done and should be continued, as well as ideas for completely new actions or things that should be stopped.

Please send your ideas and evidence to Natasha.Grant@ukspaceagency.bis.gsi.gov.uk by the end of Wednesday 11 January using the template below with the title 'Strategy call for ideas and evidence' on your email.

We particularly welcome response from groups who have discussed the issues and are sending us a collective response.

Confidentiality and data protection

Information provided in response to this call for evidence, including personal information, may be subject to publication or release to other parties or to disclosure in accordance with the access to information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA) and the Environmental Information Regulations 2004). There is also a statutory Code of Practice issued under section 45 of the FOIA with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

If you want information, including personal data, that you provide to be treated in confidence, please explain to us what information you would like to be treated as confidential and why you regard the information as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding.

Your information

Name: Robert Garner, Joseph Dudley, James Telfer

Email address: exec@ukseds.org

Organisation: UKSEDS (UK Students for the Exploration and Development of Space)

Your location (city or county within the UK): National Organisation

Is this response from an individual or a collective response from an organisation or group?

Collective response from our organisation.

If this is a collective response, from which organisation/group is it from?

UKSEDS

Your response

What do you think needs to be done by Government, industry, academia, civil society or others to put the National Space Policy principles into practice? What actions should we take to ensure the UK can benefit from the growing opportunities in the space sector? How can we use space to meet the challenges of tomorrow?

Principle: Supporting the growth of a robust and competitive commercial space sector, underpinned by excellent academic research.

Proposed actions:

1. Industry should establish a sector HR working group with industry, student, and graduate representatives to discuss sector-wide recruitment and skills issues and scope for collaboration, publishes best-practice recommendations for job advertisements aimed at students and recent graduates, and work to increase the availability and visibility of junior positions across the sector.
2. Industry should be more proactive in promoting the sector on university campuses in order to engage with talented students from non-traditional specialities who would otherwise end up in competing sectors such as finance and tech.
3. Industry should get involved in the wider skill-building environment, lending support and time to endeavours such as the UKSEDS Lunar Rover Competition and Satellite Design Competition, and offering more internships.
4. Industry should provide opportunities for students to get involved in the engineering process in the form of academic projects - benefiting both the company and the student.

Evidence:

1. Advertisements for 'entry-level' positions typically require a minimum of 2-3 years experience (exceptions are the few graduate schemes available). This puts recent graduates off from applying, and encourages them to enter other industries (especially tech and finance) where requirements are lower.

Enquiries often reveal that jobs advertised at the 2-3 years experience level can be applied for by graduates or those with little to no experience but this is not effectively communicated.

For example, looking at Airbus' website (top graduate recruiter in the sector), the option of "no experience" yields only internships for undergraduates only. The next experience option asks for "2 to 3 years of experience".

Space-Careers.com (the top jobs board for the sector) has offered only one 'junior' UK-based job in the past 2 months. By comparison SpaceCareers.uk (operated by UKSEDS) is currently advertising 38 positions. This demonstrates that there is a large number of junior positions which are not being properly advertised by the sector, and there is a clear need for the service SpaceCareers.uk provides.

2. Students have a poor knowledge of the opportunities available in the space sector versus sectors such as tech and finance. This is a result of a lack of industry presence on university campuses. Where there is industry engagement, it is typically only with Aerospace Engineering students. A lack of engagement with the non-engineering community, particularly with disciplines required for the downstream sector, is leading to a significant loss of talent. Very few people consider space to be the realm of computer scientists, geographers, or lawyers.

Our experience at public outreach events shows that the pervasive myth ‘astronaut is the only space job’ is still held by students and the general public. This is supported by website analytics data that show a high volume of searches relating to becoming an astronaut.

Our surveys of university students attending our annual conference have found that most students can only name 3 or 4 ‘space companies’ (their interpretation), and have not had one exhibit at their university. A third have not heard of large companies such as Thales Alenia Space UK and Reaction Engines. These are students who already have a keen interest in space.

By comparison, these same students can easily name dozens of finance and tech companies (Facebook, Amazon, Google, Goldman Sachs, Barclays, EY etc.), who have strong presences on campuses in addition to being household names. These companies actively engage with students through careers fairs, talks, competitions, hackathons, scholarships, and placements.

3. UK graduates are typically inexperienced relative to their European and American peers. This is mostly because of the relative time taken for their degree courses – 3 to 4 years for UK students compared to 4 to 6 years in both Europe and US. During this time they generally complete several research placements or internships, and take part in technical projects, which are often extra-curricular. These are either student initiatives related to space, such as building cubesats and rockets, or part of industry-supported national engineering competitions, which are not specific to space (such as Formula Student or the SpaceX Hyperloop competition). Space-oriented competitions have the advantage of building skills and experience specific to space, making the onboarding process easier and increasing the likelihood of retaining participants in the sector when they graduate.

These give students practical experience working in teams to follow industry specifications and complete realistic engineering projects. The high quality of many of these projects demonstrates the benefit they have on students. Several companies recognise this, including [SpaceX](#), who filter during their recruitment process according to:

- “Hands on hardware/software development exp - i.e. What problems have you actually encountered and solved?”
- “Experience with engineering competitions, and placement in top positions/ brackets at those competitions”

Although these examples are US companies, the space sector is a globally competitive field, and UK companies should desire the best possible graduates to join them.

Additionally, there are relatively few industry-sponsored work experience opportunities, such as internships or placements. Although SPIN, and several university summer research programmes have made great strides to increase the number of these opportunities, particularly with small and medium enterprises, the opportunities to develop experience remain few. The total number of opportunities for graduate work within the space industry (estimated at 150) is comparable to the yearly intake for a single large finance company (HSBC take 150-250 across all roles each year).

4. The sector offers fewer academic opportunities to students than competing technical sectors. Offering final year and master's projects gives undergraduates insight into the engineering process, and academics the chance to network and create links between their research centres and the companies. These links are critical both to the development of an academic community that remains in touch with the changing needs of the sector, and the development of graduates with the skills the sector needs.

For example, of the over two hundred final year and masters projects offered by the Electronic Engineering department at the University of Surrey this year, the only space company offering projects is Surrey Satellite Technology Limited (a company with close ties to the university). As a course with a particular space focus, many of the available projects are related to satellite communications or radio frequency design. Without industrial links these projects build towards purely academic goals that risk becoming out of touch with the needs of the sector.

Similarly, at Imperial College London, there were no final year projects for Aeronautical Engineering put forward by space companies, but several for aviation, material science, and transportation. Many of the students who undertook these projects went on to work at the company who supported their project.