



Space Sector Skills Survey 2023

Report for  UK SPACE
AGENCY

In partnership with
know.space

September 2023

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Foreword from UKSA Director of Championing Space

As the new Director for Championing Space with strategic responsibility for the UK Space Agency's space education and future workforce programmes, I am delighted to introduce the 2023 Space Sector Skills Survey report. Its findings and recommendations, garnered from hundreds of space sector organisations from across the UK and of all scales, are sobering and constitute a sector-wide clarion call for greater focus and co-ordinated intervention.

The fundamental issues the sector is facing around skills haven't changed, but the scale and significance of the problems have increased, with significant numbers of sector companies reporting skills gaps in their workforce, difficulties with recruitment, and retention issues inhibiting company growth, productivity, and quality.

Pure inspiration alone is not enough – we need differentiated programmes with focused interventions that engage with the widest possible audience, from young people of all ages, teachers, academics, and professionals at each career stage of the future and current space workforce. All of which must be developed in pro-active partnership with academia and the sector organisations for which, as the survey highlights, skills issues are major factors in determining future growth, prosperity, and impact.

Accordingly, through its Inspiration Programme, the UK Space Agency is investing £15 million to deliver education, skills, and outreach interventions over the next two years as part of its commitment to delivering a skilled, diverse, and sustainable space sector workforce now and in the future.

Addressing the skills challenges the sector faces will require government, academia, and industry to deliver a coordinated effort at pace, with ambition, and with a step change in resourcing and strategic prioritisation. Quite simply, education and future workforce programmes with ambition, focus and adequate resourcing are no longer a nice to have – they are a must-have if the UK's space sector is to fulfil its potential.

Professor Anu Ohja OBE

Director of Championing Space, UK Space Agency

Foreword from Space Skills Advisory Panel Chair

The UK space sector is not achieving its potential. The sector's ability to innovate, scale-up, and deliver next generation solutions to today's problems is being throttled by access to the diverse skill sets it needs to face these challenges. Unlocking this growth in the UK space sector requires a skilled workforce fuelled by a pipeline of talent and world-leading training provision. Addressing skills gaps and recruitment challenges are therefore a key priority for both government and industry.

The Space Sector Skills Survey is a vital source of information about the recruitment and retention challenges that our industry faces. Key findings in this report include the growing scale and impact of space skills gaps, and the growing importance of new skills and technologies such as AI and machine learning, which bring both exciting opportunities for innovation and new recruitment challenges. These results will be the primary source of evidence to support the government's space skills policy-making, and to determine how the UK Space Agency allocates more than £4 million of investment in training initiatives specifically targeting the early and mid-career stages.

I am hugely grateful to my colleagues across the sector for taking the time to share their challenges and ideas with us. The survey received more than twice as many responses as the 2020 edition and gives us an unprecedented insight into where the problems are and what needs to be done to tackle them. A notable piece of feedback was a desire for more clarity from government on how it plans to address these challenges, so I am delighted that early next year the UK Space Agency, the Department for Science, Innovation and Technology, and the Space Partnership will be jointly co-developing the Space Workforce Action Plan detailing the concrete next steps we will take in this area.

The evidence shows that once we bring people in and imbue them with a sense of pride and excitement in what our sector does, they want to stay and build a career here. This is encouraging and reflects many of our personal experiences, but we cannot solely rely on the inspiration inherent in our sector to attract and retain. We have many difficult challenges ahead of us both in terms of bringing talented people into space at an unprecedented rate and also in ensuring that retaining our best people is hard-wired into the sector. This work will be 'in progress' for many years to come and I am delighted to work with the exceptional people in the cross-sector Space Skills Advisory Panel to find creative and new ways to address these challenges and prepare the sector for another ten years of exceptional growth.

Doug Liddle
Chair, Space Skills Advisory Panel
Vice Chair, UKspace
CEO, In-Space Missions

Summary

- **The Space Sector Skills Survey (S4) 2023** was commissioned by the UK Space Agency (UKSA) and the Department for Science, Innovation and Technology (DSIT) to be the **primary source of evidence to support the UK Government's understanding of skills gaps and workforce challenges in the space sector.**

Methodology & sample profile

- The survey was conducted via an **online form open for 6 weeks from 24th April to 2nd June 2023**. It comprised **51 questions** covering recruitment, retention, skills needs and gaps, training provision, and engagement with education. **21 in-depth structured interviews** were also conducted to gather qualitative data.
- Responses were received from **218 organisations**, including companies, government bodies, universities, and third sector organisations. This is **more than twice as many responses as the 2020 survey**, which received 97 responses. The responses represent about **12% of space companies** employing about 12,000 people or **35% of the space workforce**.
- Individual respondents were primarily **senior representatives of their organisations**. 82% responded on behalf of their whole organisation, while the remaining 18% were on behalf of a specific site or team within the organisation.
- **Responses were overwhelmingly from industry (86%)**. Academic bodies (9%), government (3%), and third sector (2%) organisations also responded. **Two thirds (66%) of respondents were from micro or small organisations.**
- **The regional distribution of respondents aligns closely with the distribution of space companies recorded in the Size & Health of the UK Space Industry report 2022.** The South West and Scotland are slightly overrepresented, while the West Midlands and North West are slightly underrepresented.
- See [Appendix A](#) and [Appendix B](#) for more information about the methodology and sample.

Results

Skills gaps and impacts

- **52% of organisations reported skills gaps in their current workforce**, unchanged from 51% in 2020, but significantly lower than the wider economy (73%)¹. This problem is **acute for large organisations**, where 65% report a skills gap in their current workforce.
- Of those reporting a skills gap in their current workforce, **72% have a gap in software & data skills**, significantly higher than any other technical area. This is partly driven by a need for skills in **AI & machine learning (41%)** and **data analysis & modelling (36%)**.
- These gaps are a result of **struggling to hire new staff (48%)**, **new staff not having the right skills (45%)**, and **existing staff leaving (34%)**. This has barely changed since 2020.
- **97% of organisations with skills gaps said the gaps had some impact** on business performance and growth, with 71% describing impacts as major or moderate.
- The greatest **impacts of skills gaps are an increased workload for the existing workforce (72%)**, and **delays in product development (65%)**, largely unchanged from 2020.
- **Half (50%) of organisations expect that their space skills needs will be different in three years' time**. 81% of these organisations expect that they will need **software & data skills**, and 70% highlight **AI & machine learning in particular**.

Scale of recruitment

- **62% of organisations had recruited in the past 12 months, down from 70% in 2020**; 48% recruited primarily to expand, while 15% were primarily replacing leavers. 38% did not recruit in the past 12 months; 29% did not need to hire, and 9% had a hiring freeze in place.
- **The organisations completing the survey had a combined space workforce of about 12,000, and recruited for a total of around 1,500 roles over 12 months**. This gives a **total hiring rate of approximately 12%**.
- **Large organisations hire more people but find it harder to recruit**. The median time to hire for larger organisations was 12 weeks, compared to 4 weeks for micro organisations.

¹ The Open University (2023). [Business Barometer June 2023: An analysis of the UK skills landscape](#) (p6).

Recruitment by skills and experience

- **61% reported skills gaps in job applicants.** This issue is **most acute for large organisations**, where 84% report a skills gap in job applicants.
- Respondents provided a list of roles they recruited for recently, and scored how difficult it was to fill them. Information was provided for **834 vacancies across 366 roles**.
- Roles within **software & data and systems engineering have the most vacancies**, together making up half (49%) of all vacancies.
- The most **difficult roles to recruit for are electronics, systems engineering, and spacecraft operations**. Of these, **systems engineering is the most challenging area**, where demand is high and it is also very difficult to recruit.
- **More senior roles are harder to recruit for** and take longer to fill.

Recruiting difficulties

- Of those who had recruited, **80% had faced recruitment difficulties**. This is significantly higher than the 2020 survey's result of 61%.
- **About two thirds (72%) of roles were difficult or very difficult to recruit for**, and only 10% were easy or very easy. The average role took a **median of 10 weeks to hire for**.
- The two most commonly cited reasons for recruitment difficulties were that **applicants lacked the required specialist skills, knowledge, or qualifications** (76%), or that there simply **were not enough applicants** in the first place (67%).
- **The main cause cited for difficulty recruiting is competition**: with other sectors (68%) and with other space companies (45%). While the competition from other space companies has remained largely constant since the 2020 survey, **competition with other sectors has increased significantly**, particularly engineering (39%) and tech/IT (20%).
- **Uncompetitive pay is the second biggest issue in recruitment**, cited by 39% of respondents.

Recruiting from abroad

- **Over a third (36%) of companies tried to hire from outside of the UK**, more commonly large (58%) and medium organisations (56%) than small (38%) or micro (16%) ones.
- Among organisations who tried to recruit from abroad, **83% faced difficulties** including **high costs and the complexity of the visa process**, and **21% were not successful**.

Training provision

- Almost **three quarters (72%) of organisations provide training**. Most large organisations have provided training (87%) compared to **half of micro organisations (50%)**.
- **On-the-job training is very common**, both formal (92%) and informal (84%). **External training is used much less often (54%)**. 30% of organisations offer sponsorship for further study such as an apprenticeship or degree, and 14% offer secondments.
- **Organisations primarily get training from their own staff (88%)** and from **private training companies (53%)**. Professional bodies (39%) and universities (38%), and sometimes further education colleges (11%) are also used.
- **Of respondents who provided training, 88% said that they faced a barrier**, including **lack of time (65%)** and **lack of budget (36%)**. Lack of availability of training was only cited by 25% of respondents.

Engagement with education

- **86% of respondents have engaged with education providers**, with larger organisations being the most likely to engage.
- The most common form of engagement is via outreach, by **giving talks (65%)** or **attending or hosting events** like careers fairs (49%).
- Just under a **third (30%) of organisations offer apprenticeships**. **Two thirds (63%) of large organisations** offer apprenticeships compared to just **8% of micro organisations**.

Retention

- **45% of organisations reported having difficulties retaining their space staff in the past 12 months**. Retention is a bigger problem for larger organisations than for micro ones.
- The two most commonly cited causes of poor retention are **poaching of staff** by other space companies (57%), and **low salaries (48%)**. The main impact of poor retention is to **increase the workload for remaining staff (72%)**.
- Of those that faced retention challenges, **16% said that their staff wanted to leave the space sector for another sector**.

Overall

- **Nearly every (95%) organisation experienced skills-related challenges, a large increase from 67% in 2020**. In particular, **retention challenges are now significantly greater**.

Introduction

Background

- 1 As set out in the National Space Strategy in Action², the space sector can only grow if it has a strong pipeline of skilled people, but the supply of experienced professionals has not kept up with demand. To address these challenges, it is important to understand the skills gaps and recruitment and retention issues that employers in the sector face.
- 2 The Space Sector Skills Survey (S4) 2023 was commissioned by the UK Space Agency (UKSA) and the Department for Science, Innovation and Technology (DSIT) to be the main source of evidence to support the UK Government's understanding of skills gaps and workforce challenges in the space sector. It was conducted by Space Skills Alliance, supported by know.space.
- 3 The results will feed into the Space Workforce Action Plan which will be co-developed by government, industry, and academia, and will be published in 2024 with the aim of identifying where intervention is most needed and by whom.
- 4 This is the second edition of the survey, which was first conducted in 2020. Where possible, the results of the two editions have been compared, and these are referred to as S4 2020 and S4 2023, and data from 2020 is generally coloured in grey.

About the UK Space Agency

- 5 The UK Space Agency is an executive agency of the Department for Science, Innovation and Technology responsible for the UK's civil space programme.

About Space Skills Alliance

- 6 [Space Skills Alliance](#) is a think tank and consultancy providing data, tools, and advice on space skills, training, and recruitment for employers and policy makers.

About know.space

- 7 [know.space](#) is a specialist space economics and strategy consultancy, with a mission to be the authoritative source of economic knowledge for the space sector.

² Department for Science, Innovation and Technology & Ministry of Defence (2023). [National Space Strategy in Action](#) (p12).

Skills gaps

- 8 Respondents were surveyed on a wide range of space sector skills. These are detailed below and grouped into nine themes (detailed in [Appendix A](#)) adapted from the SpaceCRAFT competencies framework³.
1. Aero/mechanical design
 2. Systems engineering
 3. Electronics design
 4. Spacecraft operations
 5. Maintenance, manufacturing & materials
 6. Software & data
 7. Sector support (e.g. regulation, training, economic analysis)
 8. Commercial operations (e.g. business development, finance, project management)
 9. Transferable skills (e.g. team work, time management, communication)

Skills gaps in the current space workforce

- 9 Half (52%) of organisations reported skills gaps in their current space workforce, almost unchanged from 51% in 2020. This problem is particularly acute for large organisations, where 65% report a skills gap in their current workforce, as shown in Figure 1.
- 10 The number of reported skills gaps is considerably lower across the space sector than for the UK economy as a whole. The Business Barometer found that across all sectors 73% of organisations report facing skills shortages, rising to 86% of large organisations⁴.

³ Space Skills Alliance (2023). [The SpaceCRAFT Framework](#).

⁴ The Open University (2023). [Business Barometer June 2023: An analysis of the UK skills landscape](#) (p6).

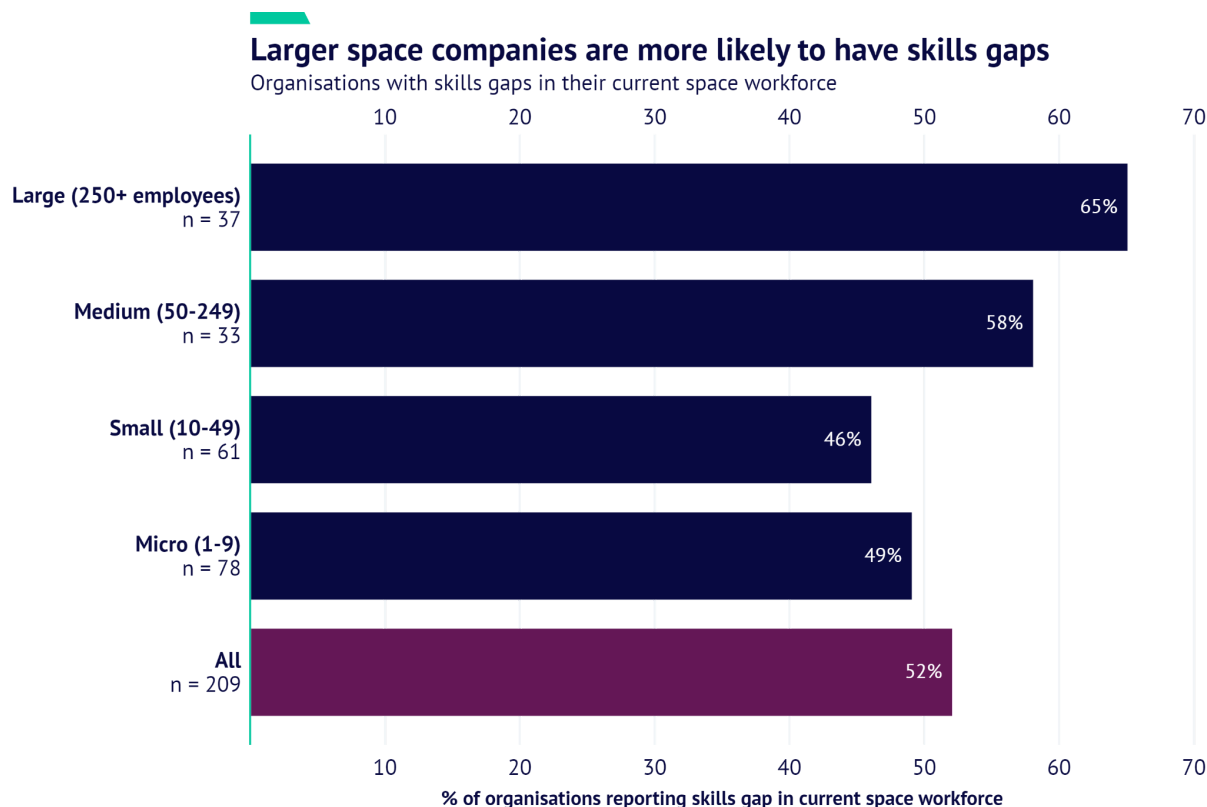


Figure 1: Proportion of respondents reporting a skills gap in their current workforce. Data comes from Q26.

- 11 Of those reporting a skills gap in their current workforce, 72% have a gap in software & data skills, significantly higher than any other technical area, as shown in Figure 2.
- 12 This is partly driven by a need for skills in AI & machine learning (41%) and data analysis & modelling (36%). Many respondents highlighted how important AI and machine learning are becoming in their day-to-day operations.

13 *“Many of our clients won’t award a project unless it contains machine learning and artificial intelligence, so we’ll always really need that skill.”*

– Jonathan Hendry, Chief Technology Officer, 4EI

14 *“AI is not a fad. It’s so profound, and it’s the definitive, ultimate technology in many respects.”*

– Graham Harrison, Special Projects Director, NCC

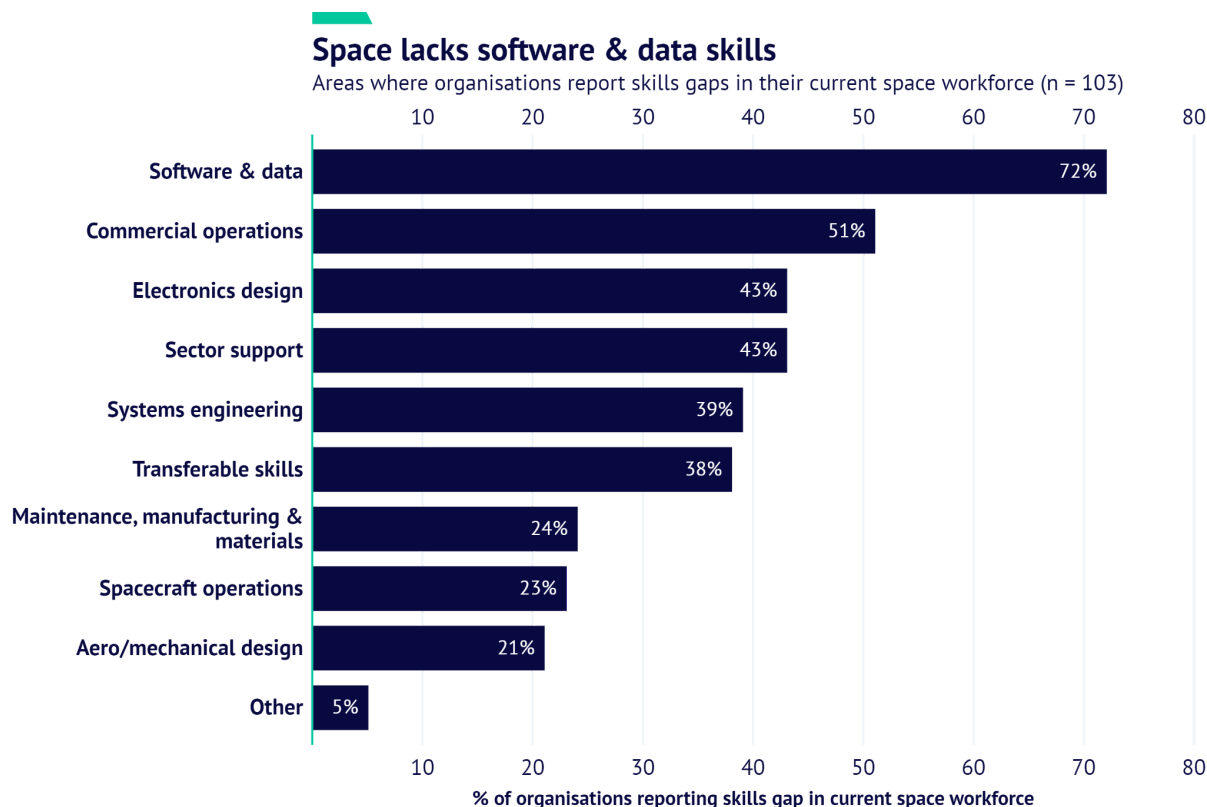


Figure 2: Skills gaps in current workforces grouped by theme, among organisations with a skills gap in their current workforce. Data comes from Q27.

15 There are several notable changes from 2020. Gaps in AI & machine learning (+8 percentage points) and data analysis (+14) have increased, while gaps in software engineering (-14) and radio frequency & telecoms engineering (-13) have decreased, as shown in Table 1. These changes may indicate changes in priorities within organisations, or may reflect the impact of recruitment or upskilling over the past 3 years.

16 *“The big skills gap for us is data scientists and machine learning engineers who understand geospatial. It’s not just about understanding the data, it’s also the interpretation. We’ll never get one person that can do all the hard stuff, but the key thing is that we always put these people with different skills in teams.”*

– Jonathan Hendry, Chief Technology Officer, 4EI

17 *“RF engineering and software are the most challenging gaps in the projects we are involved in. Many people have basic software skills through short courses, but no experience or knowledge of how to manage or deliver a software project.”*

– Director, systems engineering consultancy

Skill	% reporting skills gap in current workforce		
	2020 n = 49	2023 n = 103	Change (pp)
Artificial intelligence and machine learning	33	41	+8
Systems engineering	39	39	0
Data analysis & modelling (2023) / data analytics (2020)	22	36	+14
Strategy & leadership (2023) / Leadership or motivational skills (2020)	18	32	+14
Data processing & manipulation	-	30	-
Software engineering	45	29	-14
Radio frequency & telecoms engineering (2023) / radio frequency engineering (2020)	41	28	-13
Technical leadership	-	25	-
Project management	29	24	-5
Analogue and digital systems	-	23	-
Education and training	-	22	-
Sales & commercial	-	22	-
Regulation	-	19	-
Data visualisation	-	17	-
Assembly, integration, and testing	-	17	-

Table 1: Top 15 skills gaps in the current workforce, full list in [Table 27](#) in [Appendix C](#). Data comes from Q27. Data from 2020 comes from Figures 14 and 15 of that report, scaled to an n of 49.

Causes of skills gaps

- 18 Among the 52% of respondents with skills gaps, the main causes cited for them were new staff not having the right skills (45%), struggling to hire new staff (48%), and existing staff leaving (34%).
- 19 This suggests that even when organisations have been able to hire, the successful candidates still do not have all the skills required. These issues have barely changed since 2020, as shown in Table 2.
- 20 *“Generally, we have to train more senior hires just as much as we do fresh graduates due to the common skills gaps.”*

– CEO, remote sensing company

Causes of skills gaps	% of responses		
	2020 n = 49	2023 n = 106	Change (pp)
Unable to recruit staff with the necessary skills (2020)	76	75*	-1
Unable to hire new staff (2023)	-	48	-
New staff did not have the right skills when they were hired (2023)	-	45	-
Staff with the necessary skills have left	39	34	-5
Existing staff have not received appropriate training	31	28	-3
Other	18	15	-3

Table 2: Causes of skills gaps reported by respondents who faced recruitment difficulties. Data comes from Q28. Results for 2020 come from figure 16 of that report. * Denotes that the respondent ticked either ‘Unable to hire new staff’ or ‘new staff did not have the right skills when they were hired’.

Impact of skills gaps

- 21 Almost all (97%) of organisations with skills gaps said the gaps had some impact on business performance and growth, with 71% describing impacts as major or moderate.
- 22 The proportion of organisations describing skills gaps as having a major impact has increased significantly from 9% in 2020 to 29% in 2023, shown in Figure 3.

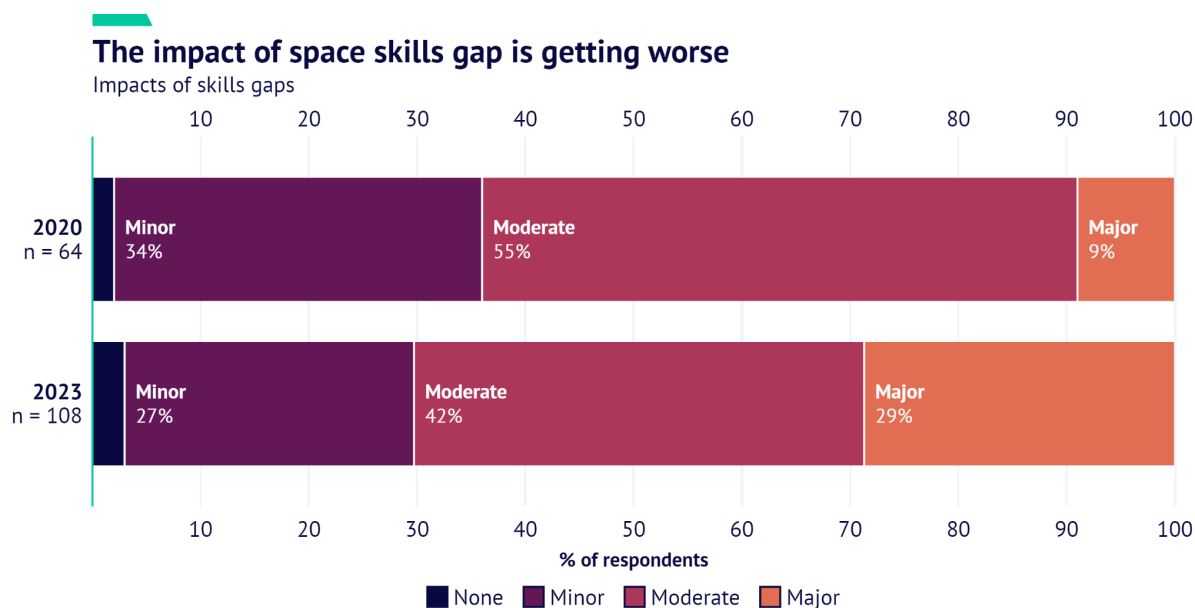


Figure 3: Severity of impact on business performance and growth of skills gaps on respondents with gaps. Data comes from Q29. Data from 2020 comes from Figure 20 of that report and are for any skills issue rather than skills gap specifically.

- 23 Figure 4 shows that the greatest impacts of skills gaps are an increased workload for the existing workforce (72%), and delays in product development (65%). These results are largely unchanged from the 2020 survey, but there has been a significant increase in the number of organisations reporting that skills gaps have reduced their productivity (+20 percentage points), made it difficult to keep deliver quality products and services (+18), stay competitive (+15), and introduce new technologies (+11).
- 24 These results also align with the economy as a whole. Across all sectors in the UK economy, 72% of organisations said that skills shortages increased workload for their existing staff⁵.
 - 25 “Timescales of identifying talent present significant ongoing operational challenges and puts pressure on businesses with respect to time, finance, quality, etc.”

– HR Director, spacecraft design company

⁵ The Open University (2023). [Business Barometer June 2023: An analysis of the UK skills landscape](#) (p6).

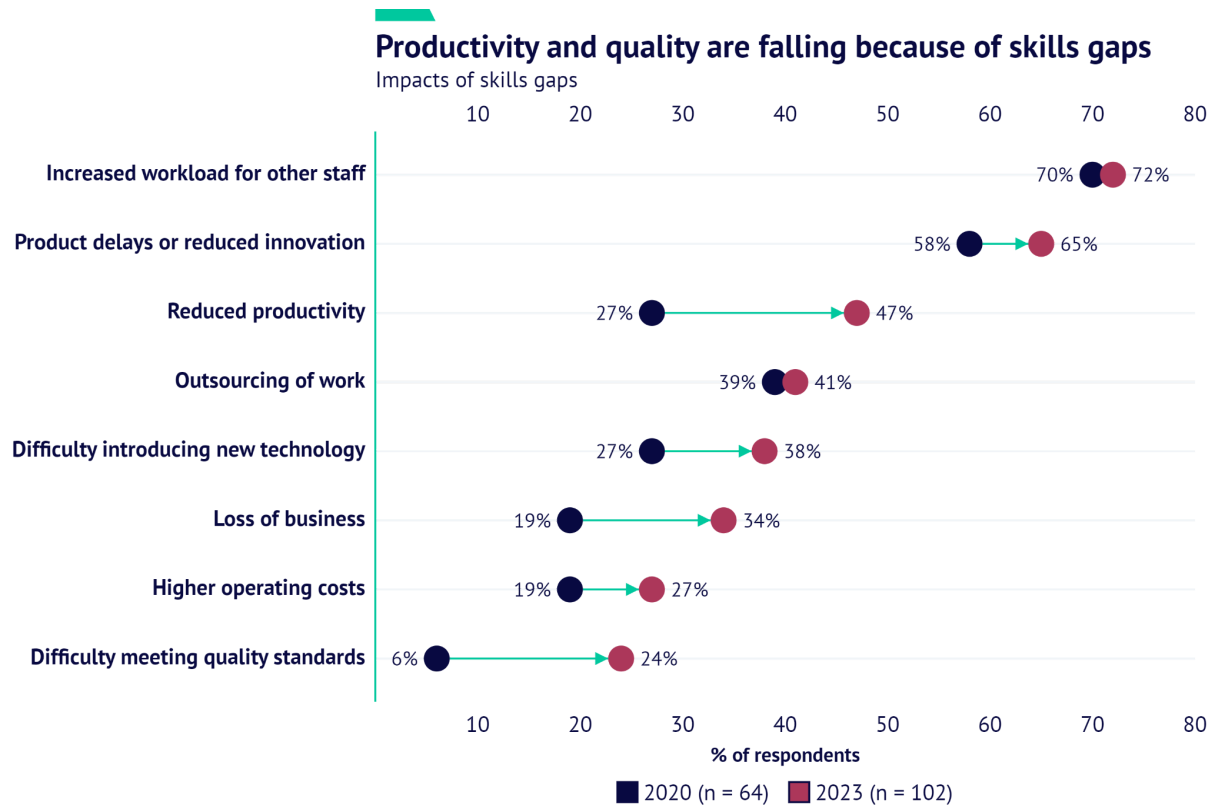


Figure 4: Types of impacts of skills gaps on respondents with gaps. Data comes from Q30. Data from 2020 comes from Figure 19 of that report and is for any skills issue rather than skills gap specifically.

Recruitment

- 26 62% of organisations had recruited in the past 12 months; 48% recruited primarily to expand, while 15% primarily replaced leavers, shown in Table 3. This is down from 70% in 2020, but the phrasing of the question was different⁶.
- 27 38% of organisations had not recruited in the past 12 months; 29% did not need to hire, and 9% had a hiring freeze in place.
- 28 Respondents reported the number of roles they recruited for in the past 12 months. This data was used alongside the size of their space workforce (see [Table 16](#) in Appendix B) to calculate an approximate hiring rate. For example, a company with 10 space employees hiring 5 people would have a hiring rate of 50%.

Hiring type	% of respondents who are recruiting	Median hires	Median hiring rate
Expanding	77%	4	25%
Maintaining	23%	3	16%

Table 3: Median proportion and number of hires per organisation. Data comes from Q15 and Q16.

- 29 The organisations who completed the survey had a combined space workforce of approximately 12,000, and recruited for a total of around 1,500 roles in the past 12 months. This gives an overall approximate hiring rate for the sector of around 12%.

Recruitment by skills theme

- 30 Respondents provided a list of roles they had recruited for in the past 12 months, further details about each role, and stated how difficult it was to hire. In total, information was provided for 834 vacancies across 366 roles.
- 31 The software & data and systems engineering themes had the most vacancies, together making up half (49%) of all vacancies, shown in Figure 5.

⁶ In 2020, two questions were asked: ‘... how many people with specialist knowledge did you try to recruit?’ and ‘... how many people with relevant knowledge did you try to recruit?’. 70% is the number of respondents who said they recruited in either or both categories. In 2023 the question (Q15) was ‘... was your organisation recruiting for space-related roles?’.

Software and systems make up more than half of space vacancies

Reported vacancies in each skill theme (n = 826)

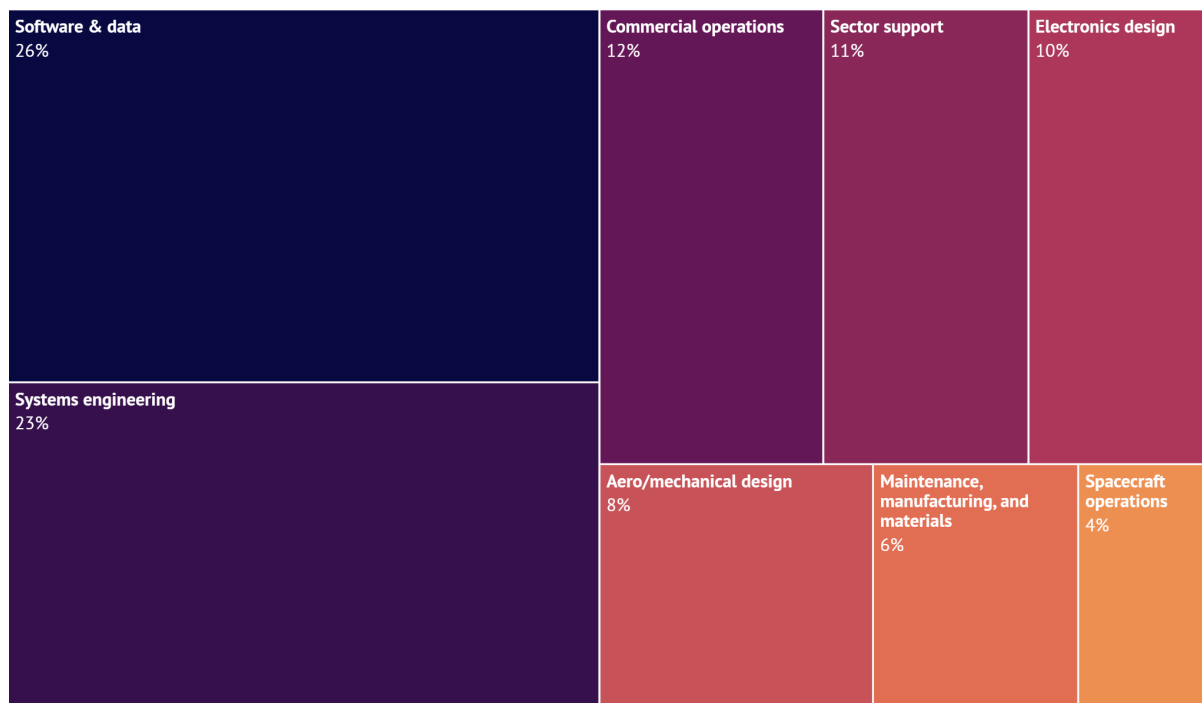


Figure 5: Number of reported vacancies in each theme. Data comes from Q17.

- 32 Respondents rated each role they recruited for on a 1-5 scale of ‘very easy’ (1) to ‘very difficult’ (5), and recorded the time in weeks taken to hire for the role, from publishing the advert to having a candidate accept an offer (not including time taken to complete tasks such as agreeing the advert wording, the candidate serving their notice period, or onboarding).
- 33 About two thirds (72%) of vacancies were difficult or very difficult to recruit for. Using the scale above, roles scored on average 3.8 out of 5, and took a median of 10 weeks to hire for, shown in Figure 6.
- 34 *“It varies a lot, sometimes almost nobody applies and after advertising again we have a reasonable amount of replies but all useless. It is hard to find anyone in general, it takes patience.”*

– Head of Research Group, major university

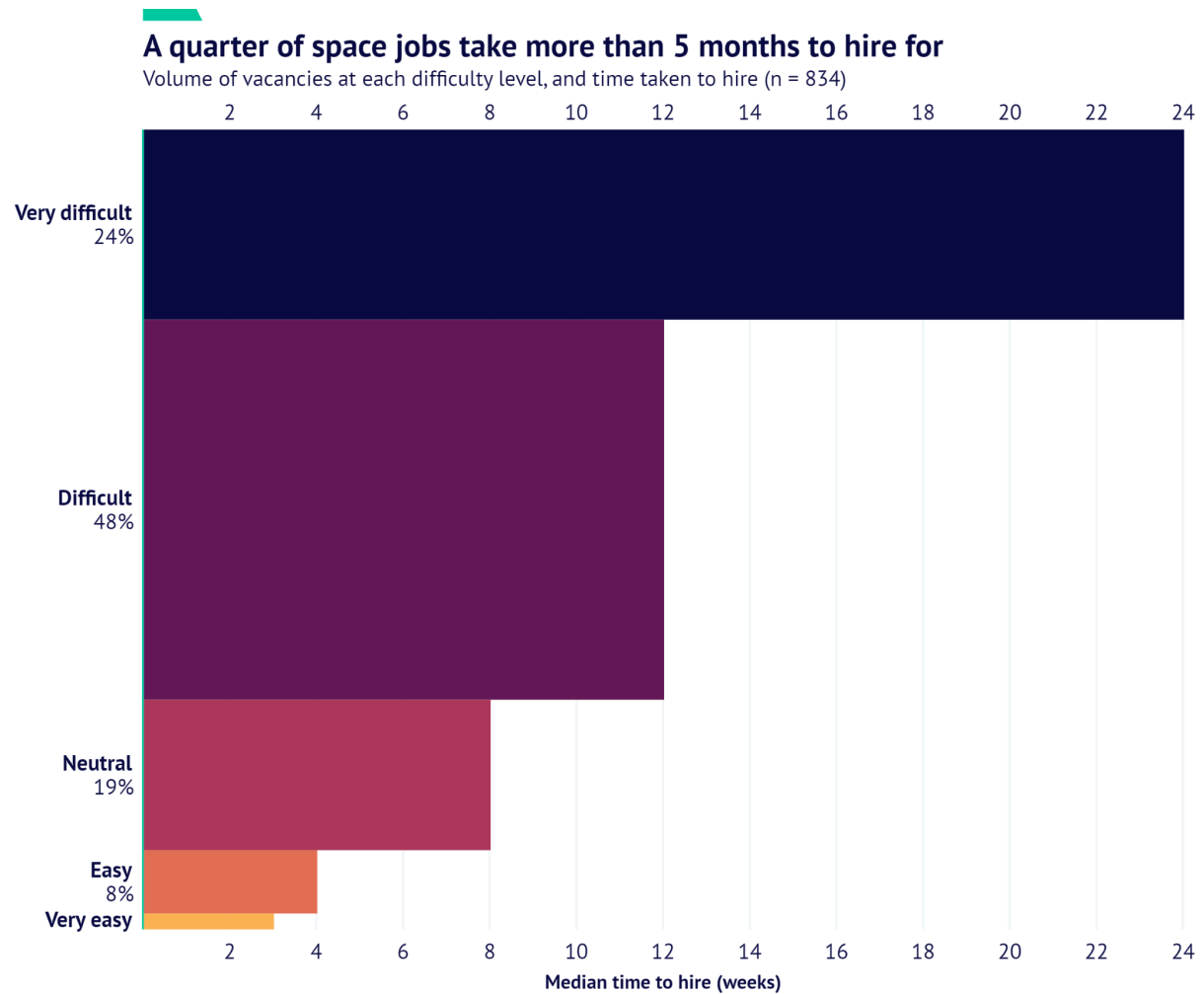


Figure 6: Proportion of vacancies by difficulty and median time to hire. Data comes from Q17.

35 The most difficult areas to recruit for were electronics (with a mean score 4.2 out of 5), systems engineering (4.1), and spacecraft operations (4.0), shown in Table 4. Figure 7 shows that systems engineering was the most challenging area, where both demand is high and it is also very difficult to recruit.

36 *“In the UK, we’ve got very good systems engineers, people who can design a spacecraft bus or payloads - we’ve got some of the best in the world in this country. But if we’re looking at an end-to-end picture, from research and development through to design, testing, and then launch, we’ve got some major skills gaps.”*

– Anonymous interviewee

Role theme	n	Median time to hire (weeks)	Mean recruitment difficulty score (1-5)
Electronics design	83	12	4.2
Systems engineering	186	13	4.1
Spacecraft operations	33	26	4.0
Software & data	216	10	3.7
Maintenance, manuf. etc.	49	12	3.6
Aero/mechanical design	66	10	3.5
Sector support	92	7	3.5
Commercial operations	101	6	3.3

Table 4: Recruitment difficulty for each role theme. Data comes from Q17.

Systems and software are the most challenging areas to recruit for

Demand and difficulty in each role theme



Figure 7: Summary of demand and difficulty for each role theme.

- 37 Time to hire is particularly long for spacecraft operations roles, but it should be noted that the sample size is smaller than for other roles. The 2020 survey also noted that businesses working in satellite operations reported the most skills gaps.
- 38 Of the technical roles, those in aero/mechanical design are reported as the easiest to fill, taking an average of 10 weeks. These roles are typically filled by people with aerospace engineering degrees, and this pathway into the sector has grown in popularity. The 2020 Space Census found that aerospace engineering has become a much more common route into space, with 21% of under 35s in the sector having studied it, up from 8% of over 35s. By contrast, electronic engineering has become less popular, dropping from 12% of over 35s to 6% of under 35s⁷.
- 39 Commercial operations and sector support roles are the easiest to hire for, taking just 7 weeks to fill on average. While these roles often require knowledge of the space sector, the skills they require are typically more transferable between sectors, giving employers access to a larger pool of candidates.
- 40 Overall, these results align with previous findings. The 2020 survey highlighted a shortage of software, radio frequency, electronics, and systems engineers, and another report on skills demand for early career space jobs found that the most sought-after technical skill was software development, required by almost half of all jobs⁸.

Recruitment by seniority level

- 41 In the past 12 months, demand has been highest for mid-level roles (60% of those reported), with demand for junior (22%) and senior positions (18%) about equal.
- 42 There are some notable differences between the breakdown of demand by seniority in different skills areas. Demand for junior roles appears to be very low in spacecraft operations (9% vs 22% average) and systems engineering (13%); demand for senior roles appears to be very low in maintenance & manufacturing (4% vs 18% average) and sector support (9%); aero/mechanical and commercial roles are split between senior and junior roles, with lower demand for the mid-level roles (50% vs 60% average).

⁷ Dudley, J. & Thiemann, H. (2023). [How and why people join the UK space sector](#) (para. 63). Space Skills Alliance.

⁸ Thiemann, H. & Dudley, J. (2020). [Skills demand for early career space jobs](#) (para. 26). Space Skills Alliance.

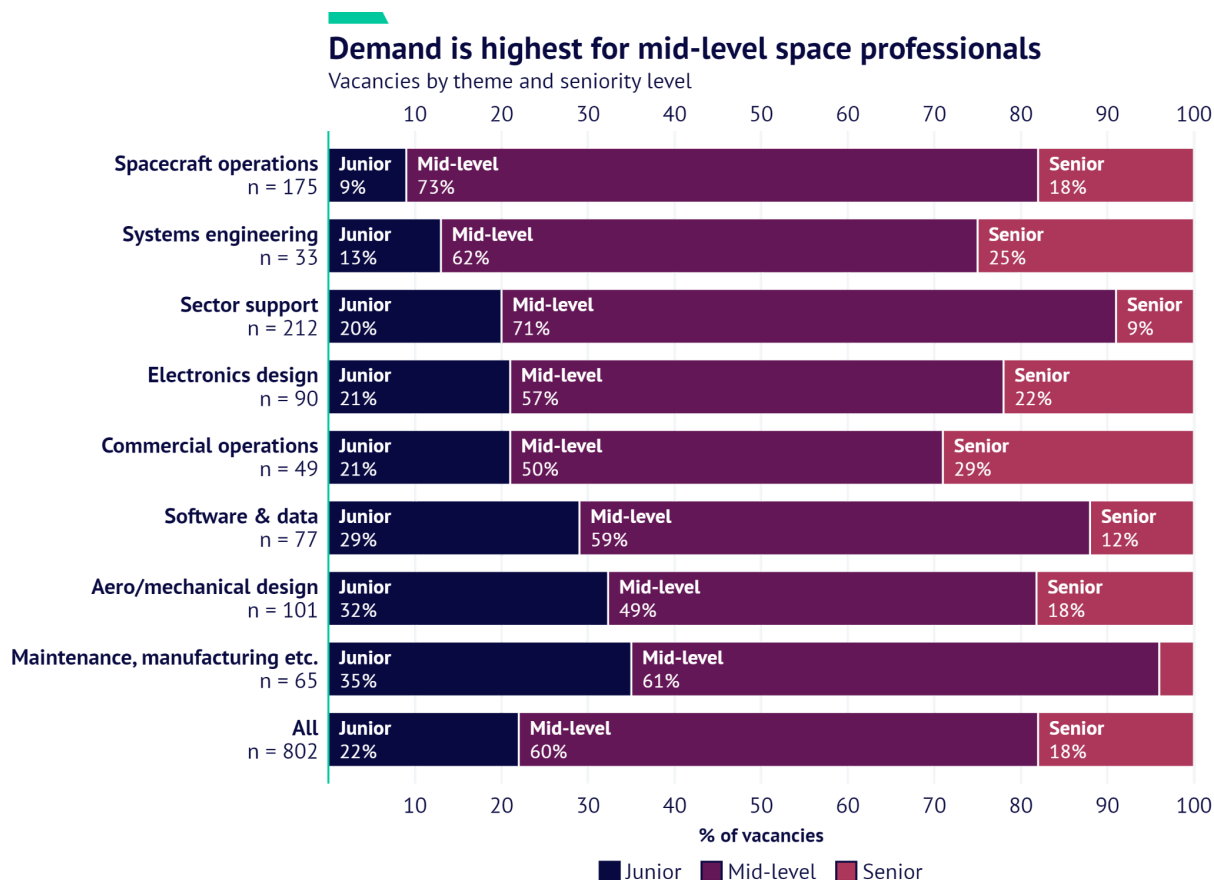


Figure 8: Demand for roles by seniority and theme in the past 12 months. This table excludes apprenticeships, internships, and roles without a theme classification. Data comes from Q17.

43 “So far we’ve mostly only recruited at fresh grad level. No problems there. It starts to get more difficult (and expensive) when looking at 3+ years’ experience.”

– Director, space consultancy

44 “We generally try later hires because we want people with the experience. Grads come in with good brains, but you need to train them and they need to build experience, but I believe seasoned hires bring a combination of both.”

– Andy Butt, Head of Business Development and Commercial, Reliance Precision

45 “We have had 5 open vacancies for mid-level electronics design engineers for more than 2 years, and have only managed to fill 1 post in that time. Similarly, we have had 2 graduate posts open for the same time and have only managed to fill 1.”

– Head of Operations, research facility

Role seniority level	% of vacancies n = 833	Median time to hire (weeks)	Mean recruitment difficulty score (1-5)
Senior	17%	13	4.2
Mid level	58%	10	3.8
Junior	22%	8	3.4
Internship	1%	6	2.8
Apprenticeship	1%	4	2.7
All	100%	10	3.8

Table 5: Proportion of vacancies, time to hire, and difficulty by seniority level. Data comes from Q17.

46 More senior roles are harder to recruit for and take longer to fill than junior roles, as shown in Table 5. These results mirror those of the 2020 survey, which found that “entry-level positions receive a lot of applications, allowing employers the luxury of choice within the graduate market”, and suggests a bottleneck in retaining graduates to reach these mid-level positions.

47 Many graduate schemes also report being oversubscribed⁹. In 2021, the Space Placements in Industry (SPIN) scheme, which provides students and graduates with industry experience, received approximately 3,500 applicants for around 60 placements, an average of 58 applications per internship¹⁰.

48 “Applications for these positions [interns and graduates] have been extensive with upwards of 200 applicants per position.”

– Project Manager, prime

49 “With the expansion of space companies in the UK, the pool of experienced candidates with full life cycle of a mission is incredibly rare. We are able to attract graduates and less experienced engineers but the lack of experienced resource has hampered recruitment.”

– Head of HR, satellite manufacturer

⁹ House of Commons Science and Technology Committee (2022). [UK space strategy and UK satellite infrastructure](#) (para. 136). UK Parliament.

¹⁰ know.space (2022). [Returns and Benefits from Public Space Investments 2021](#) (p81). UK Space Agency.

Recruitment by location

- 50 Recruitment can be broken down by location, but only for organisations that have a single site, since data was not collected on where the recruitment took place. These results are displayed in Table 6.
- 51 Organisations that have more than one site are typically large, so are growing fastest in absolute terms despite having a relatively low hiring rate.

Region	n of orgs	% of region's orgs recruiting	Median hiring rate (%)	Median time to hire (weeks)	Mean recruitment difficulty score (1-5)
Wales	5	100%	18%	8	2.6
Yorkshire and The Humber	8	88%	16%	9	3.8
Multiple regions	44	84%	6%	12	4.0
East Midlands	10	80%	14%	12	3.4
East of England	10	80%	15%	9	4.0
North East	7	71%	17%	16	3.9
Scotland	17	65%	27%	12	3.5
Northern Ireland	9	56%	4%	4	3.0
South West	28	54%	10%	6	3.2
London	38	53%	18%	6	3.5
South East	34	44%	17%	16	4.0
West Midlands	5	40%	30%	4	2.8
North West	3	-	-	-	-
All	218	64%	15%	10	3.8

Table 6: Scale and difficulty of space recruitment in the past 12 months by region. An alternative breakdown by cluster is provided in [Table 30](#) in [Appendix C](#). Note, however, that many regions and space clusters have small sample sizes, so the results should be viewed with caution. Data for the North West has been suppressed to avoid being identifying.

Recruitment by organisation size

- 52 Hiring rates vary significantly based on space workforce size, since adding just a couple of people to a very small team results in a very high hiring rate. The median hiring rate for micro space workforces is 41%, while for larger workforces it is 8%.
- 53 Smaller organisations, especially micro ones, report finding it less difficult to recruit than larger ones. The median time to hire for large and medium sized organisations was 12 weeks, compared to just 4 weeks for micro organisations, as shown in Table 7.

Organisation size	% of orgs n = 136	Median hires	Median hiring rate	% of roles n = 834	Median time to hire (weeks)	Mean recruitment difficulty score (1-5)
Large (250+)	5%	40	8%	31%	12	4.1
Medium (50-249)	14%	10	11%	40%	12	3.7
Small (10-49)	28%	4	18%	20%	9	4.0
Micro (1-9)	52%	2	41%	9%	4	3.0
All	100%	3	25%	100%	10	3.8

Table 7: Scale and difficulty of space recruitment in the past 12 months by organisation size, where hiring.

Recruitment by segment

- 54 Responding organisations are typically active across more than one segment of the space sector, shown in Table 8. Those engaging in space applications are hiring slightly more people on average (median of 5 hires, vs 3 for the whole sector), while the rate of hiring is slightly higher for organisations working in space operations (18%, vs 14% for the whole sector).

Segment	n	Median hires	Median hiring rate (%)
Manufacturing	150	4	14%
Operations	84	4	18%
Applications	97	5	13%
Ancillary	101	4	16%
All	218	3	14%

Table 8: Hiring rate by segment. All of the segment medians being higher than the overall median is an example of Simpson's paradox.

Recruitment difficulties

- 55 Of the 62% of respondents who recruited in the last 12 months, 80% faced recruitment difficulties. This is significantly higher than the 2020 survey's result of 61%.
- 56 The two most commonly cited reasons were that applicants lacked the required specialist skills, knowledge, or qualifications (76%) for the role, or that there simply were not enough applicants in the first place (67%). These results, displayed in Table 9, are extremely similar to the 2020 survey, but worse than in other sectors of the UK economy. A study across all sectors found that 42% of organisations had a lack of applicants for their roles¹¹.

57 *"We've had to accept that we're never going to find somebody with the precise skills that we need. It's a case of looking for someone with a broad education who possesses basic engineering skills and some knowledge in our specific field of interest."*

– Dr Martin Heywood, Director, Newton Launch Systems

¹¹ The Open University (2023). [Business Barometer June 2023: An analysis of the UK skills landscape](#) (p6).

Specific recruitment difficulty	% of respondents		
	2020 n = 41	2023 n = 105	Change (pp)
Applicants lacked the required specialist skills, knowledge, or qualifications	73	76	+3
There weren't enough applicants	-	67	-
Applicants lacked the required behaviours, attitude, motivation or personality	27	24	-3
Other	15	19	+4

Table 9: Specific challenges faced by respondents who had difficulties hiring in the past 12 months. Data comes from Q18. Data from 2020 comes from Figure 12 of that report.

Reasons for recruitment difficulties

58 Respondents who had recruited and experienced difficulties gave reasons for their difficulties, as shown in Figure 9.

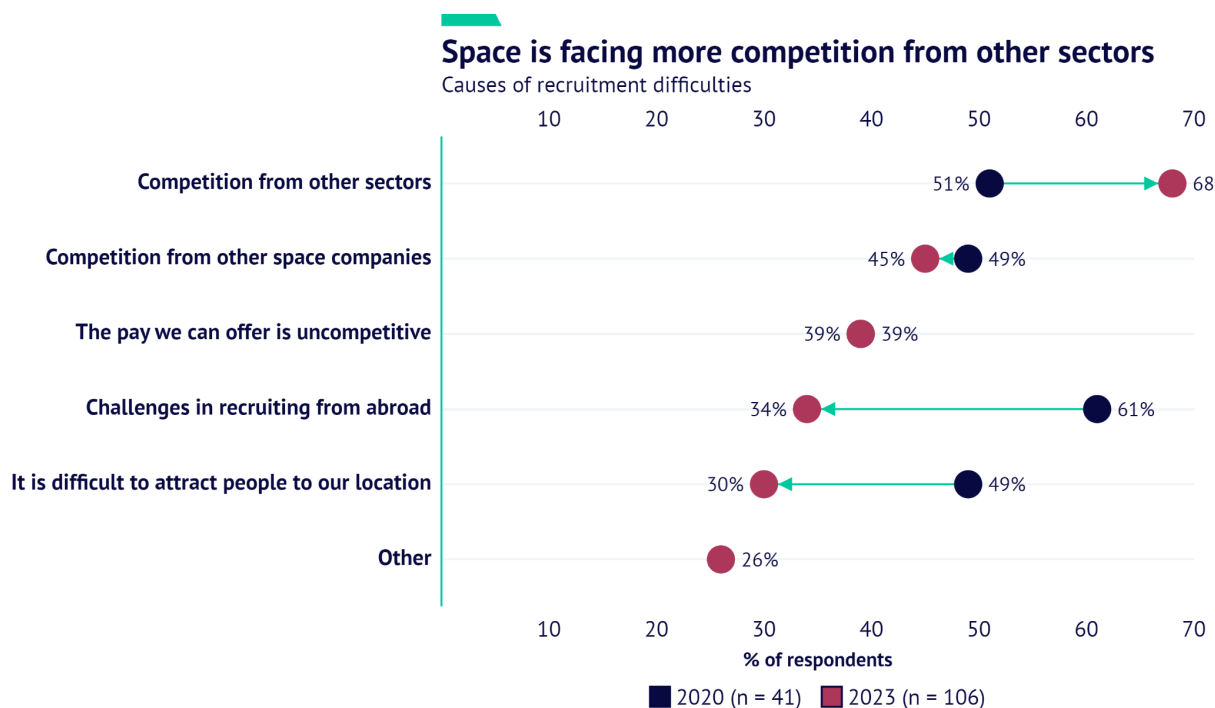


Figure 9: Reasons for recruitment difficulties faced by respondents who were hiring in the past 12 months. Data comes from Q19. Results for 2020 come from figure 12 of that report. Note that the wording related to recruiting from abroad differed between the 2020 and 2023 surveys ([see below](#)).

Competition with other employers

59 The main cause cited for difficulty recruiting was competition, both with other sectors (68%) and with other space companies (45%).

60 *“When it comes to getting people like RF engineers a lot will get pulled straight to large organisations [...], because they've got a higher budget than what we can afford to pay at the moment.”*

– Derek Harris, Business Operations Manager, Skyrora

61 While competition from other space companies has remained largely constant since the 2020 survey, competition with other sectors has increased significantly. Table 10 shows that respondents reported that those leaving the space sector tended to go into engineering (39%), tech/IT (20%), and government/defence (12%), however more research is needed to identify exactly which parts of these sectors are attracting space-qualified people.

62 *“I think it will be a challenge to attract people from other sectors. If you're someone working in manufacturing looking at, for example, factory efficiencies, you'll never think that you can work in space. It's not just it's not going to occur to you to even look. So how do you find those people? That's the problem.”*

– Portia Bowman, CEO, Growbotics

63 *“I'm not sure that the space sector is doing a good job of selling its career pathways. We need to provide a compelling reason why they should join this industry.”*

– Anonymous interviewee

64 *“We have many people that want to come and work with us because they see us as trying to address challenges that really matter to people. There is not a single application of space technology and Earth observation that doesn't have a sustainability lens to it.”*

– Anonymous interviewee

65 High competition with the tech sector is unsurprising given the similar demand for software skills, and the disparities in pay. The 2020 Space Census found that tech sector pays on average £10,000 more than space¹², and the public sector often faces similar pay-related challenges.

66 *“Data scientists are a key part of our delivery plan, but it's difficult to recruit and retain them, because we are competing with the likes of Google, and their higher salaries they can pay compared to a public sector organisation like OS.”*

– Dr Jason Hopkins, Senior Innovation & Research Scientist, OS

¹² Dudley, J. & Thiemann, H. (2021). [Pay in the UK space sector](#) (para. 68). Space Skills Alliance.

Sector	% of respondents n = 47
All engineering (general engineering, energy, aviation and automotive)	39
Tech/IT	20
General engineering	18
Government/defence	12
Consultancy	8
Aviation/aerospace	8
Other (incl. recruitment, hospitality, disaster management, health)	8
Energy	7
Automotive/Formula 1	7
Finance	7
Education/academia	7

*Table 10: Sectors respondents say their employees have left the space sector for.
Data comes from Q46.*

Uncompetitive pay

- 67 Uncompetitive pay is the second biggest issue in recruitment, cited by 39% of respondents. This remains almost unchanged since 2020 and is similar to findings for most sectors, where 31% of organisations report that offering competitive salaries is a challenge for recruitment¹³. Uncompetitive pay is marginally more of a challenge for recruitment for large companies (34%) than for SMEs (28%).
- 68 Previous research has shown that while very few (<1%) people, especially in their early career, were originally motivated by pay to join the space sector¹⁴, it is an important factor in hiring more experienced professionals with skills sought after by other sectors.

69 “We no longer receive applications from candidates from EU countries or the US. Pay levels are too low.”

– Physics lecturer, major university

¹³ The Open University (2023). [Business Barometer June 2023: An analysis of the UK skills landscape](#) (p17).

¹⁴ Dudley, J. & Thiemann, H. (2023). [How and why people join the UK space sector](#) (para. 41). Space Skills Alliance.

70 *“We can recruit graduates quite readily in most disciplines (with the exception of electronics). However when we lose staff with 10+ years experience we are generally unable to recruit replacements with equivalent experience as our pay is uncompetitive.”*

– Head of Operations, research facility

71 *“Start-up space companies are offering very high salaries to attract experienced engineers which has created unsustainable salary expectations when recruiting.”*

– Head of HR, satellite manufacturer

Location

72 Difficulty in attracting people to the organisation’s location was cited by 30% of respondents, down from 49% in 2020.

73 *“Anyone trying to come into Cornwall really struggles due to the housing crisis down here. We’ve tried so much to help. We’ve house hunted on their behalf, we’ve got in touch with estate agents & landlords, just so employees could find somewhere to live to be able to work for us.”*

– Felicity Searle, HR & Finance Manager, Piran Advanced Composites

74 *“There’s a dearth of RF capability in the north. Whilst there is RF talent in the UK, there’s a lot of competition, because geographically it seems that everyone who has RF experience is based in the south.”*

– Anonymous interviewee

75 This significant drop is likely related to the shift towards remote work following the COVID-19 pandemic, which occurred immediately following the 2020 survey. 21% of organisations report being fully or primarily remote (see section on [remote working](#) in [Appendix B](#)) and for many, this has allowed them to recruit from a much broader pool of talent, although it is not without its challenges.

76 *“We can recruit nationally now, so that has opened up a new talent pool for us.”*

– Dr Jason Hopkins, Senior Innovation & Research Scientist, OS

77 *“On one side there’s the togetherness and team spirit that comes from being in the same office every day, and then you have the flexibility and the ability to recruit from anywhere in the UK.”*

– Chris Spedding, Programme Manager, BASIC

Recruiting from abroad

- 78 Challenges in recruiting from abroad were cited by 34% of respondents, down from 61% in 2020. This significant drop is likely to be related to a change in wording of the question. In 2020 the option was 'Brexit reducing ability to attract people from Europe'. The UK left the EU in January 2020, and the survey was conducted in autumn 2020, reflecting on late 2019 and early 2020.
- 79 Just over a third (36%) of companies have tried to hire from outside of the UK. Overseas recruitment is more common among large (58%) and medium organisations (56%) than small (38%) or micro (16%) ones, shown in Figure 10.
- 80 Among employers that said they had not received enough applications, 61% had tried to recruit from overseas, compared to 25% of those who said they received enough applications. Respondents were not surveyed on why they tried to recruit from overseas, but some respondents commented that they had difficulty in finding enough skilled people in the UK.

81 *“We don't try to recruit software developers in the UK anymore, because they're in such high demand. So I go to Pakistan, I go to India, because they're ready to go, they're fantastically skilled, and there's many more applicants.”*

– Jonathan Hendry, Chief Technology Officer, 4EI

82 *“[There are] not enough UK candidates and we have to consider sponsorship for roles”*

– Chief of Staff, test facility provider

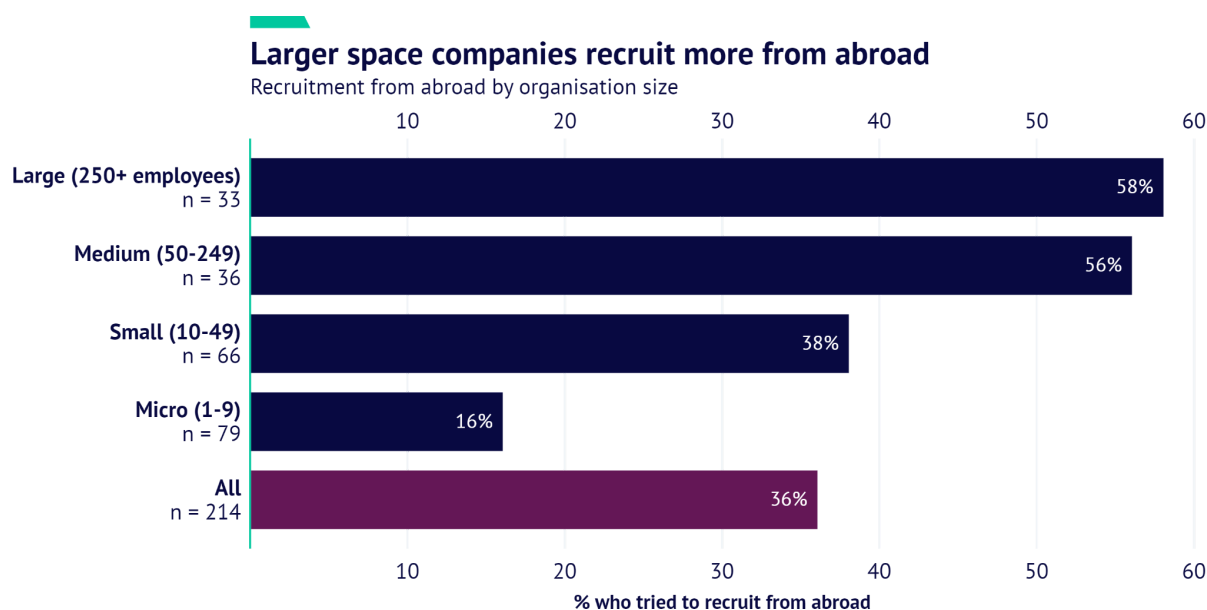


Figure 10: Proportion of respondents who tried to recruit from abroad in the last 12 months. Data comes from Q20.

Barriers to overseas recruitment

83 Among the 36% of organisations who tried to recruit from abroad, 21% were not successful, and 83% faced some type of barrier to recruitment, such as high costs, lengthy lead times, and the complexity of the visa application process, shown in Figure 11.

84 *“What I have seen recently is that as soon as international candidates look into the costs and what they have to do to get through the visa process, they’ve rejected offers and decided not to come to the UK.”*

– Rhiannon Owen, Talent Acquisition Partner, Satellite Applications Catapult

85 *“Getting the sponsorship licence wasn’t that difficult, but it was time consuming and cost about £2,000-3,000 per head. Before Brexit, any European person could just come and work and all they needed was a contract. Now we have to balance out that cost with how long they are going to stay here; or if they get the experience here and then move to a prime.”*

– Derek Harris, Business Operations Manager, Skyrora

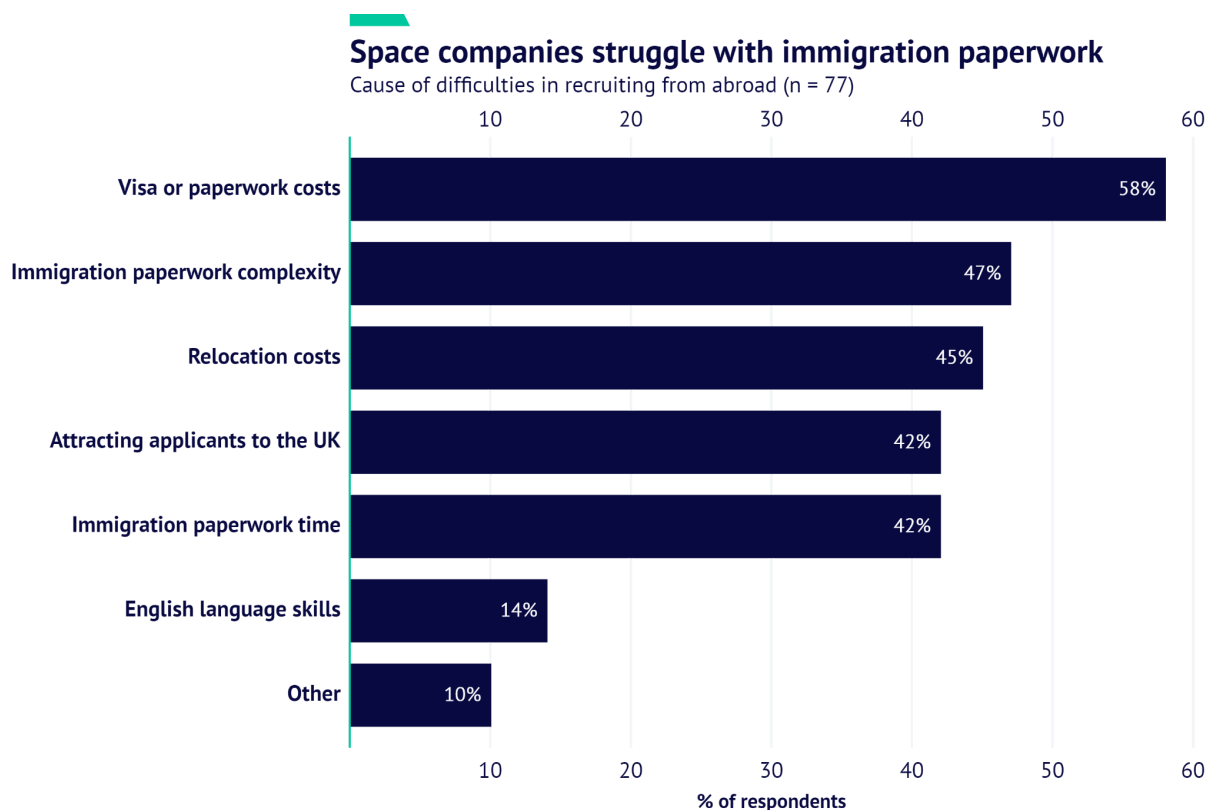


Figure 11: Reasons for recruitment difficulties faced by respondents who tried to hire from abroad in the past 12 months. Data comes from Q22.

Skill gaps in job applicants

- 86 61% of organisations reported seeing skills gaps in job applicants, slightly higher than for the [current workforce](#) (52%).
- 87 This issue is again most acute for large organisations, where 84% report a skills gap in job applicants, shown in Figure 12.

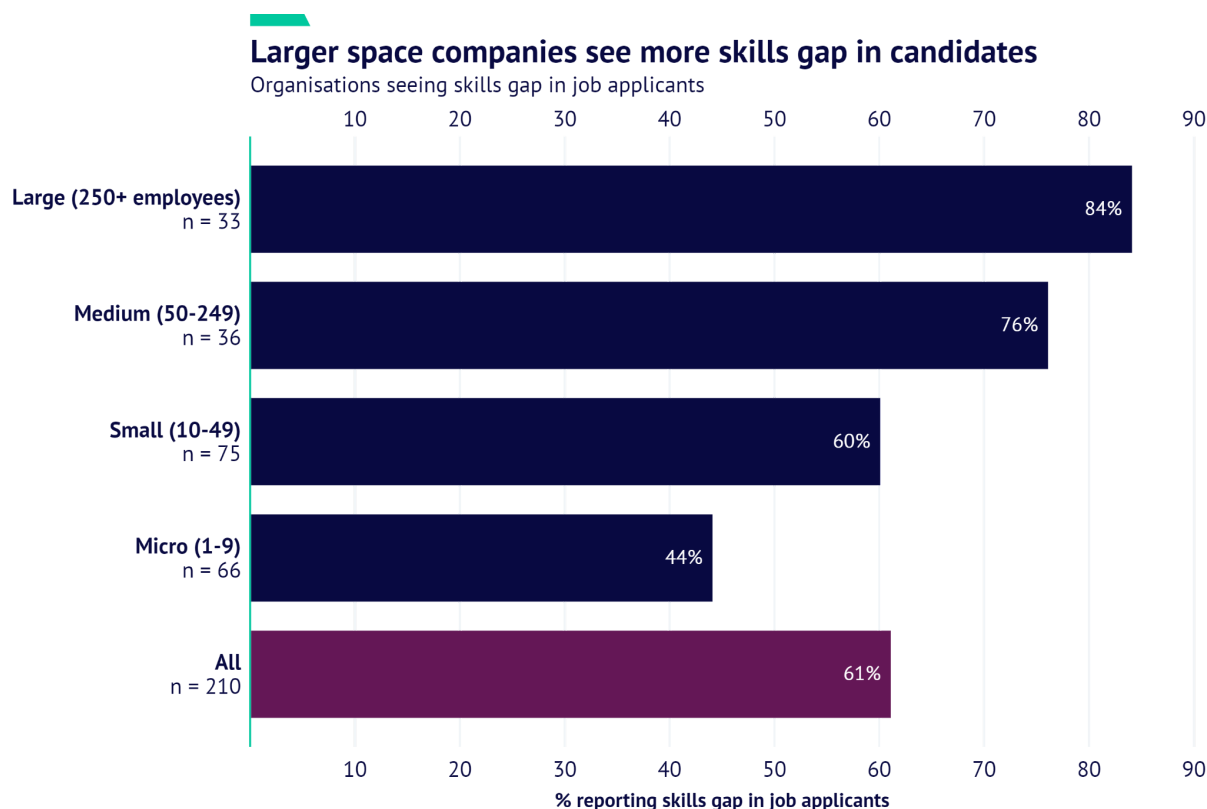


Figure 12: Proportion of respondents reporting skills gaps in job applicants by company size.
Data comes from Q24.

- 88 Of those reporting a skills gap in job applicants, 69% have a gap in software & data skills, again driven by a need for skills in AI & machine learning (52%), software engineering (37%) and data analysis & modelling (31%), shown in Table 11. There also are significant gaps in job applicants in systems engineering (42%), strategy & leadership (40%), and radio frequency & telecoms engineering (37%).
- 89 *“We talk to large defence companies, and they’re always saying the same thing: we can’t find FPGA engineers, we can’t find power engineers, we can’t find RF engineers, we can’t find electronic engineers.”*

– Adam Taylor, Founder & Lead Engineer, Adiuvo Engineering & Training

Skill	Theme	% reporting skills gap in job applicants n = 131
Artificial intelligence and machine learning	Software & data	52
Systems engineering	Systems engineering	42
Strategy & leadership	Commercial operations	40
Software engineering	Software & data	37
Radio frequency & telecoms engineering	Electronics design	34
Project management	Transferable skills	32
Data analysis & modelling	Software & data	31
Technical leadership	Transferable skills	31
Data processing & manipulation	Software & data	29
Analogue and digital systems	Electronics design	26
Assembly, integration, and testing	Maintenance, manufacturing & materials	25
Education and training	Sector support	25
Communication	Transferable skills	24
Funding & incubation	Sector support	22
Problem solving	Transferable skills	21

*Table 11: Top 15 skills gaps in job applicants, full list in [Table 28](#) in [Appendix C](#).
Data comes from Q27.*

90 The breakdown of these skills gaps is very similar to that of gaps in the current workforce, shown in Figure 13. However there are three notable exceptions: transferable skills (+14 percentage points in job applicants), maintenance & manufacturing (+12), and aero/mechanical design (+12). It is unclear why this is the case, but it may point to these skills being easier to learn on the job, or to changes in the supply of people with these skills.

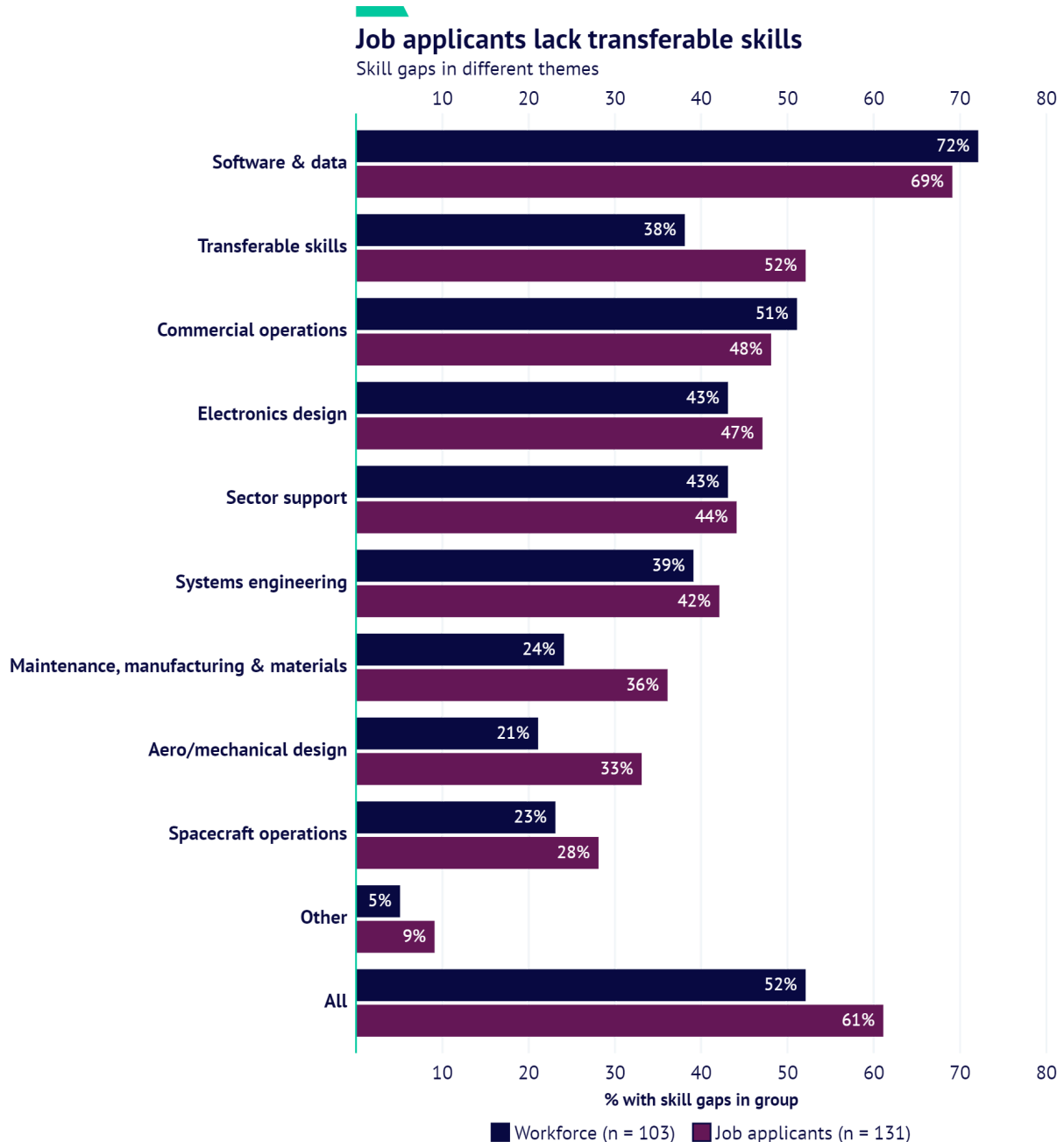


Figure 13: Proportion of respondents reporting a skills gap in their current workforce and job applicants. Data comes from Q27.

Skills in the future workforce

91 Half (50%) of organisations expect that their skills needs will be different in three years’ time. The demand for different skills is higher across the board than for the current workforce or job applicants, suggesting that skills problems will get worse without intervention.

92 Software & data skills are again most in demand, cited by 81% of those expecting their skills needs to change, with AI & machine learning in particular at 70%¹⁵. The other skills needed in the future workforce are shown in Figure 14 and Table 12.

93 *“It’s a little unclear where and how we’re going to utilise AI, but I think it’s unavoidable that we will. We’re looking at AI and machine learning capability to improve productivity, to maximise what can be done with available resources, and to achieve outcomes that might not otherwise be possible.”*

– Prof. Simon Evetts, R&D Director Blue Abyss & Visiting Prof. Northumbria University

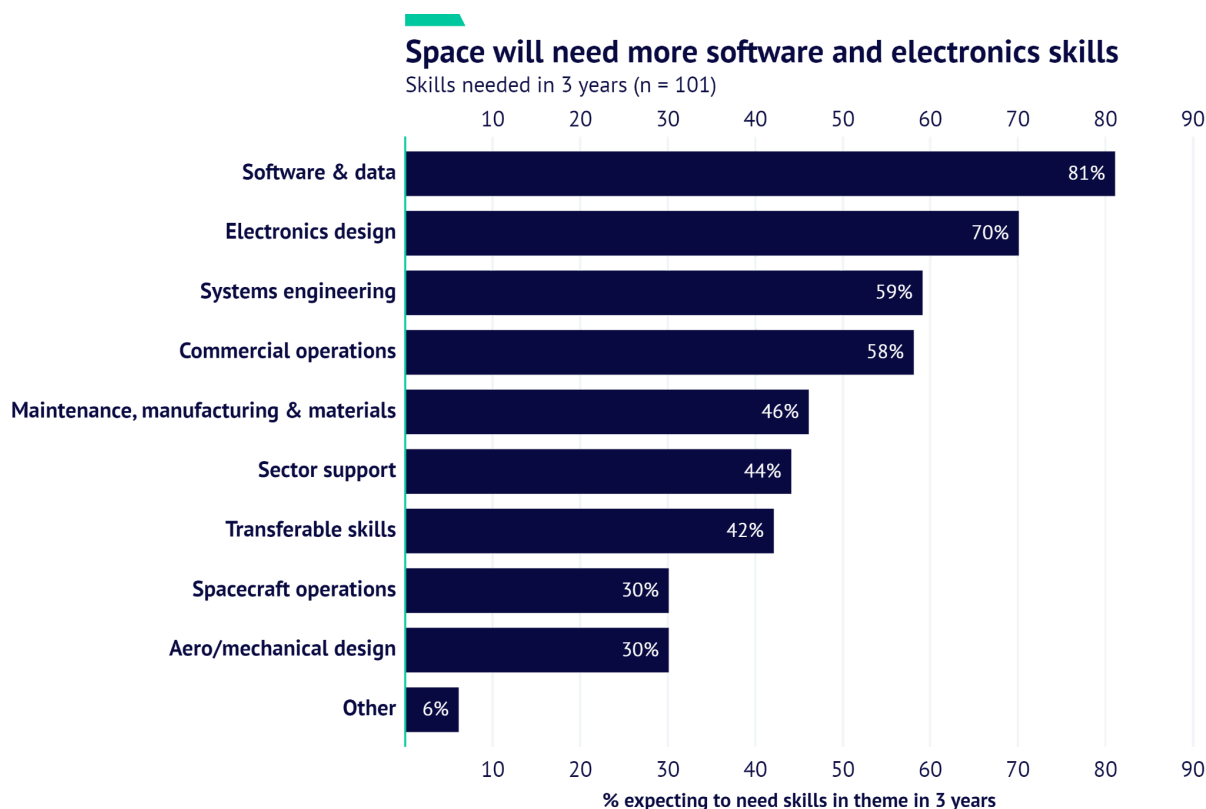


Figure 14: Skills respondents expect to need in three years’ time grouped by theme.

Data comes from Q32.

¹⁵ It should be noted that this survey was run not long after the widespread coverage of ChatGPT and other new AI tools.

Skill	Theme	% expecting to need skill in 3 years n = 101
Artificial intelligence & machine learning	Software & data	70
Strategy & leadership	Commercial operations	58
Project management	Transferable skills	49
Technical leadership	Transferable skills	47
Data analysis & modelling	Software & data	44
Software engineering	Software & data	44
Systems engineering	Systems engineering	42
Problem solving	Transferable skills	40
Data processing & manipulation	Software & data	38
Sales & commercial	Commercial operations	37
Team work	Transferable skills	36
Data visualisation	Software & data	35
Assembly, integration, and testing	Maintenance, manufacturing & materials	35
Communication	Transferable skills	34
Manufacturing and materials	Maintenance, manufacturing & materials	33

Table 12: Top 15 skills respondents expect to need in three years' time, full list in [Table 29](#) in [Appendix C. Skills](#). Data comes from Q32.

Training provision

Scale of provision of training

- 94 Almost three quarters (72%) of organisations have provided training in the last 12 months, down slightly from 80% in 2020.
- 95 Almost all organisations larger than micro have provided training (87% of large, 89% medium, and 83% small), compared to only half of micro organisations (50%). This is a similar pattern to 2020.
- 96 Organisations in the space sector appear to provide more training than other sectors in the UK economy. Across all sectors only 48% of organisations provided training in 2021¹⁶, although the impact of COVID-19 at this time did slightly reduce the amount of training provided by employers. However, it is interesting to note that there are still major skills gaps in the current space workforce despite the high level of training provision.
- 97 *“We put all our junior employees through the Prince II foundation course. And as they were then applying that to projects they were working on, we then advance them into the next level.”*
- Ralph Dinsley, Founder/Managing Director, 3S Northumbria Ltd
- 98 *“[I] firmly believe we need to invest in hands-on training in the workplace [...] to remain competitive.”*
- Managing Director, spacecraft manufacturing company
- 99 Among the 28% of organisations who did not provide training, 58% said their staff did not require it, and 30% said there was a barrier to provision.

¹⁶ Winterbotham, M., Kik, G., Selner, S., Gooding, O., Jackson, R., Cojocaru, M. (2022). [Employer Pulse Survey 2021 Report](#) (p4). Department for Education.

Types of training provided

- 100 On-the-job training, both formal (92%) and informal (84%), is very common among respondents. This is an increase on the 2020 survey, where 73% of respondents reported doing informal on the job training.
- 101 External training is much less popular (54%), but aligns with national figures across all sectors of the UK economy (54%)¹⁷.
- 102 In the 2020 survey, 54% of organisations reported doing formal external training. The breakdown for all types of training are displayed in Table 13.

¹⁰³ “Space technical formal training is very limited, which is why we self train”

– Head of Space, services company

Type of training	% of respondents) n = 154
Formal training on the job training (e.g. structured training programme)	92
Informal on the job training (e.g. shadowing more experienced staff)	84
<i>Any on the job training</i>	92
External accredited training (e.g. CPD course)	39
External unaccredited training (e.g. a webinar)	37
<i>Any external training</i>	54
Sponsoring further study such as an apprenticeship or degree	30
Secondments	14
Other	7

Table 13: Types of training provided by respondents in the last 12 months. Data comes from Q35.

¹⁷ Winterbotham, M., Kik, G., Selner, S., Gooding, O., Jackson, R., Cojocaru, M. (2022). [Employer Pulse Survey 2021 Report](#) (p4). Department for Education.

Training providers

104 Respondents primarily get training from their own staff (88%), private training companies (53%), and professional bodies (39%).

105 Organisations in the space sector are more likely to use a university for training than organisations in the wider UK economy, with 38% of space sector organisations using them compared to the average across all sectors of 7%. Further education colleges are used by 11% of space sector organisations compared to 15% across all sectors¹⁸.

106 *“We have trained and teamed up with the local college. We are the accredited training provider, and can provide an engineering degree, so within four years, we get exactly what we want back out of it.”*

– Andy Butt, Head of Business Development and Commercial, Reliance Precision

107 The proportion of training provided internally has increased significantly (+19 percentage points) since 2020, while the use of Further Education colleges has decreased (-8), as shown in Figure 15.

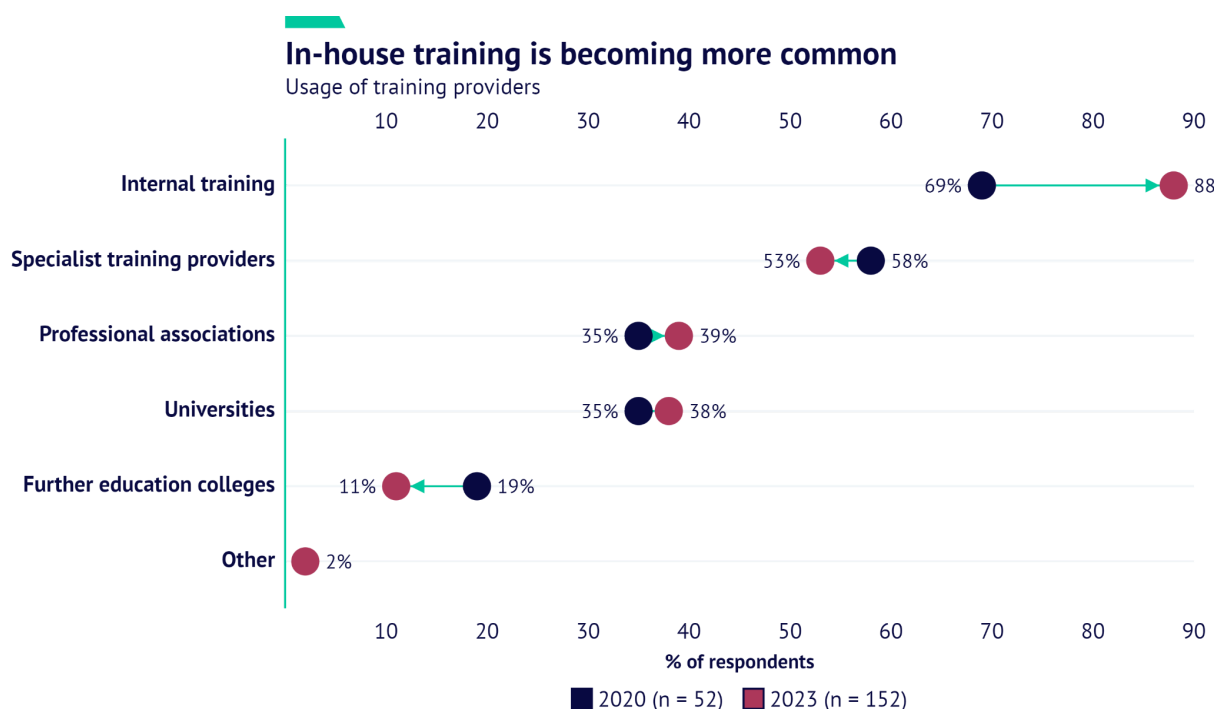


Figure 15: Training providers used by respondents. Data comes from Q36. Data from 2020 comes from Figure 22 of that report.

¹⁸ Winterbotham, M., Kik, G., Selner, S., Gooding, O., Jackson, R., Cojocaru, M. (2022). [Employer Pulse Survey 2021 Report](#) (p4). Department for Education.

Barriers to training

108 Barriers to providing training included lack of time (65%) and lack of budget (36%), as shown in Figure 16. Lack of any available training was only cited by 25% of respondents.

109 *“We are interested in hearing from more mid-career professionals rather than graduates with no experience, where the burden of training is on the employer.”*

– Managing Director, space situational awareness company

110 *“Scaling a company means there is a sudden need for internal training which is expensive to prepare quickly”*

– CEO, space software company

111 *“Why isn’t there an organisation in the UK offering vocational training to the space sector in the same way that other industry sectors have (e.g. CITB for construction)? Ideally it would be an organisation where new graduates are trained to bring them up to industry standards and apprentices could learn basic skills.”*

– Dr Martin Heywood, Director, Newton Launch Systems

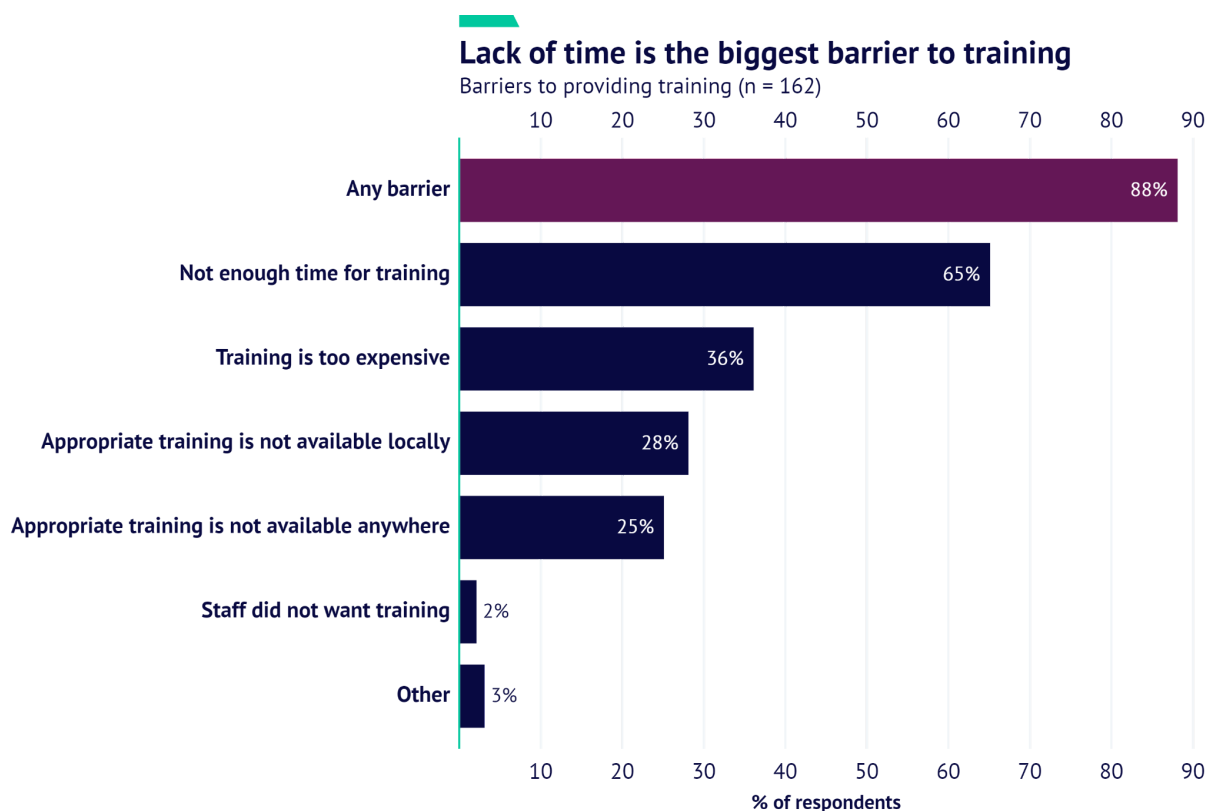


Figure 16: Types of barriers to providing training. Data comes from Q38.

Engagement with education providers

Scale of engagement with education providers

112 86% of respondents have engaged with education providers such as schools, colleges, and universities, with largest organisations being the most likely to have some engagement.

113 *“We have a great working relationship with our local education providers, but what we do lack is the capacity to fit more or anything in at present due to lack of skilled staff & management having to be more hands on.”*

– Managing Director, space systems company

114 All (100%) large organisations have had some engagement with education providers, compared to 95% of medium, 88% of small, and 74% of micro organisations. This is unsurprising, as larger organisations tend to have dedicated outreach personnel, while smaller organisations typically have less capacity to engage.

115 *“It is not clear how an SME can contact educators – the system seems designed for the very large companies. For example, there is no clear way to contact universities via single contact point to send messages to students graduating this year describing our open positions”*

– Director, RF engineering company

116 *“We fall into the position, like many other universities, where we are training for big businesses, and not small ones or start-ups. This lack of provision fuels part of the skills gap to the sector. Universities might not want to admit to this or adapt their courses to account for this or might not have yet recognised this as an issue and potentially overlooked the issue.”*

– Dr Peter Shaw, Senior Lecturer in Astronautics, Kingston University

Types of education engaged with

117 The most common form of engagement is doing outreach (71%), by giving talks (65%) or attending events (49%), shown in Figure 17. Previous research has found that events are a major influence on people’s decision to join the space sector, cited by more than 40% of the current workforce¹⁹.

¹⁹ Dudley, J. & Thiemann, H. (2023). [How and why people join the UK space sector](#) (para. 17). Space Skills Alliance.

118 Work experience/internships are provided by 56% of space sector organisations. This is comparable to the wider engineering sectors, with 57% of companies surveyed by the IET providing work experience for school-aged students²⁰.

119 “We work directly with schools and students to encourage them towards STEM and space. We also work with colleges and universities on course development and to make sure that there is a talent pipeline of students coming through with the right skills in the future”

– Dave Pollard, Education and Outreach Manager, Spaceport Cornwall

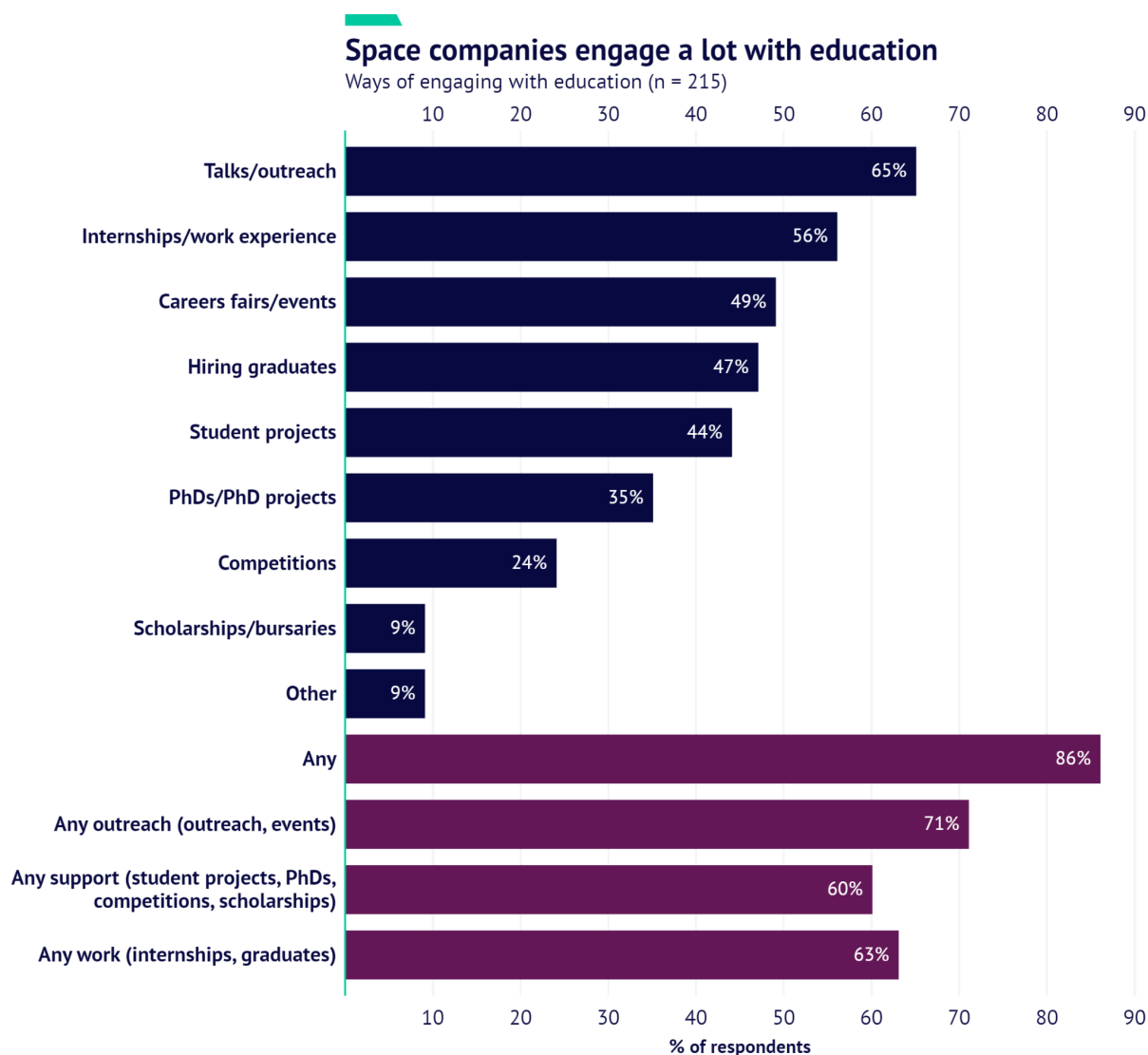


Figure 17: Proportion of organisations who engaged with education in different ways. Data comes from Q40.

²⁰ Institution for Engineering and Technology (2021). [IET skills and demand in industry 2021 survey](#) (p44). Institution for Engineering and Technology.

Provision of apprenticeships

120 Just under a third (30%) of organisations provide apprenticeships, up 10 percentage points from 2020. This aligns with an increase in the number of apprentices of 9 percentage points across all sectors since 2020/21²¹, and is driven by a 19 percentage point increase in the number of small businesses taking on apprentices. Previous research has found that 20% of those working in the space sector hold a vocational qualification such as an apprenticeship²².

121 The provision of apprenticeships varies significantly with organisation size, from 63% of large organisations to just 8% of micro organisations, shown in Table 14.

122 “Apprenticeships are impossible to access for small companies like ours.”

– CEO, testing provider

Organisation size	% providing apprenticeships		
	2020 n = 96	2023 n = 214	Change (pp)
Large (250+ employees)		63	+5
Medium (50-249)	58	46	-8
Small (10-49)	11	30	+19
Micro (1-9)	9	8	-1
All	20	30	+10

Table 14: Proportion of respondents who provided apprenticeship programmes. Data comes from Q41. Data from 2020 comes from Table 3 of that report.

123 Apprenticeships are provided at all levels with roughly the same frequency, shown in Table 15.

Apprenticeship type	% of respondents (n = 64)
Intermediate (Level 2)	45
Advanced (Level 3)	47
Higher (Level 4-5)	42
Degree-level (Level 6-7)	48

Table 15: Proportion of respondents who provided apprenticeships. Data comes from Q42.

²¹ UCAS (2023). [Where next: what influences the choices of would-be apprentices?](#) (p16). The Sutton Trust.

²² Dudley, J. & Thiemann, H. (2021). [Demographics of the UK space sector](#) (para. 54). Space Skills Alliance.

Retention

Scale of retention problems

124 Nearly half (45%) of organisations reported having difficulties retaining their space staff in the past 12 months. Retention is a bigger problem for established organisations than for micro ones, as shown in Figure 18.

125 Retention is also more of a challenge in 2023 than it was in 2020, but it should be noted that the 2020 survey asked about “staff in scientific, engineering, or technical roles”, while this survey simply asked about “space-related staff” to consider the whole space workforce.

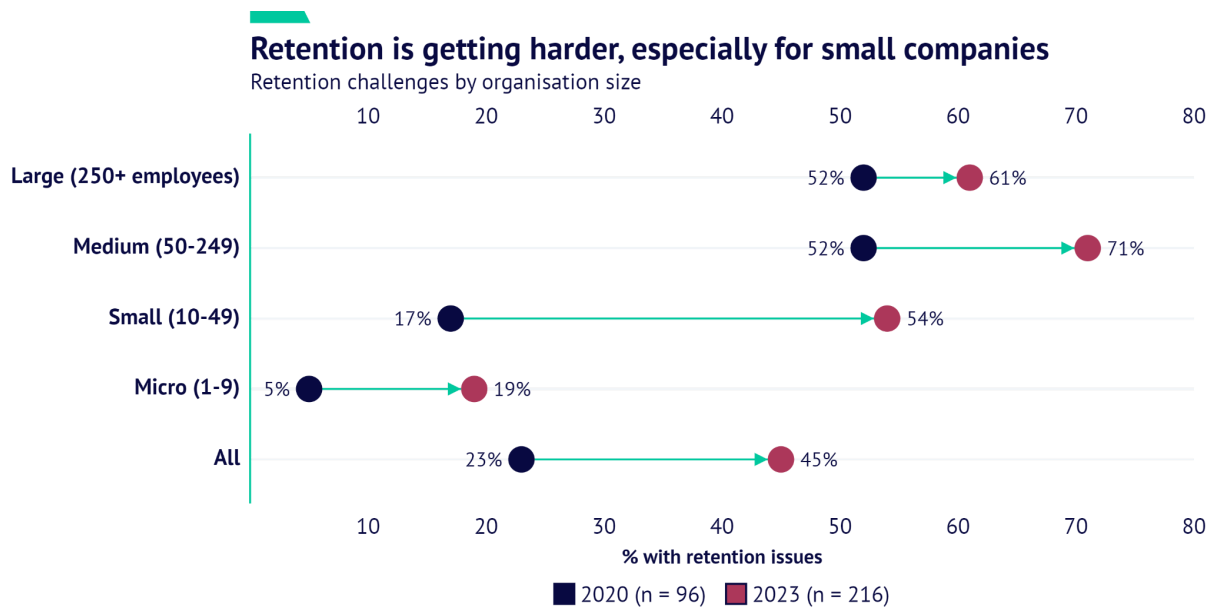


Figure 18: Proportion of organisations with retention issues by size. Data comes from Q44. Data from 2020 comes from Figure 17 of that report (with different question wording).

Reasons for poor retention

126 As shown in Figure 19, the two most commonly cited causes of poor retention are poaching of staff by other space companies (57%), and low salaries (48%), and these issues are likely linked.

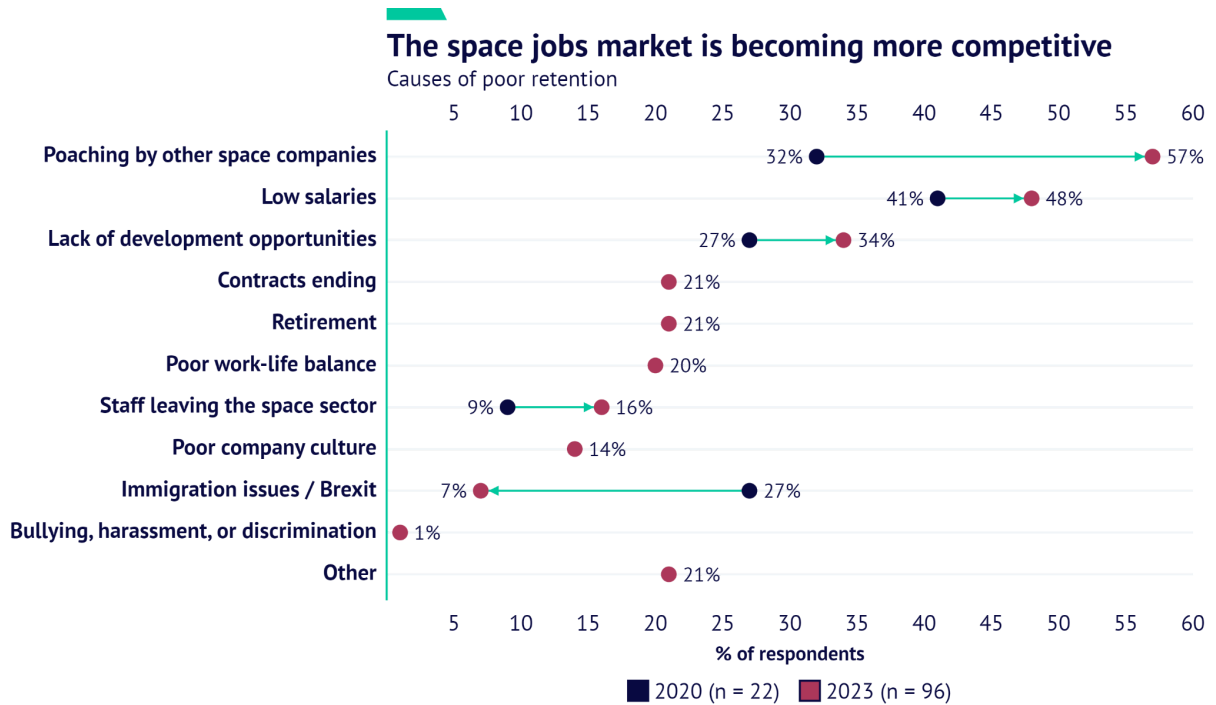


Figure 19: Causes of poor retention. Data comes from Q45. Data from 2020 comes from Figure 18 of that report.

127 Similar issues cause problems for both recruitment and retention, shown in Figure 20.

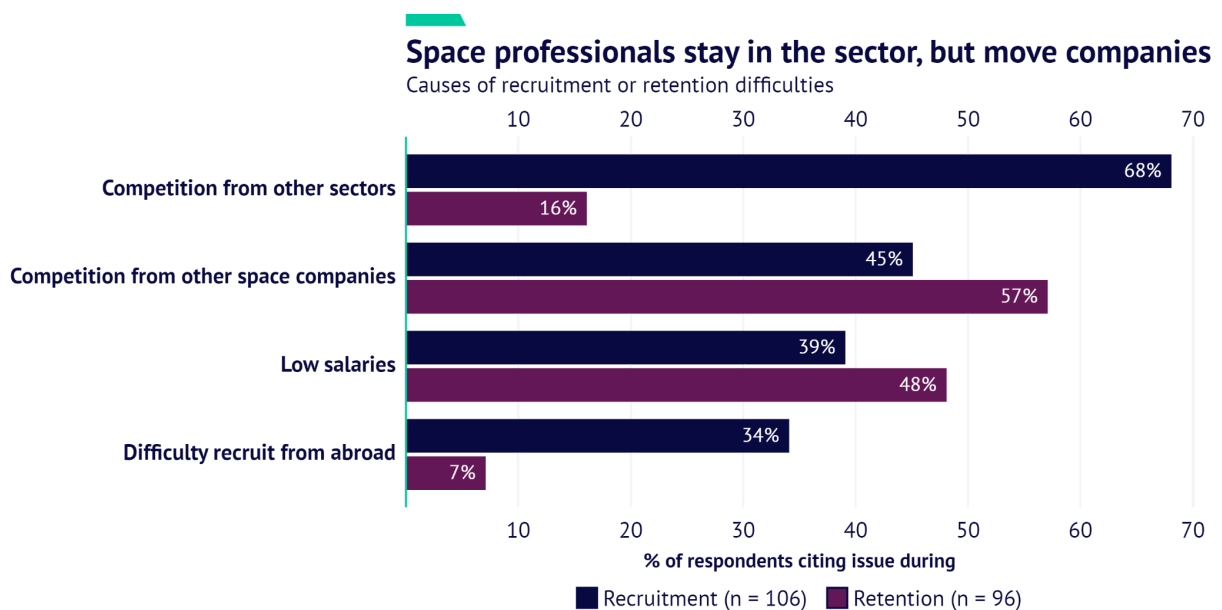


Figure 20: Comparison of how particular issues affect retention and recruitment differently.

Competition with other employers

128 Competition with other space companies when trying to retain staff was cited by 32% of respondents in 2020 and has increased significantly to 57% in 2023. This suggests that demand for experienced space professionals is increasing faster than supply.

129 An important difference in the challenges faced in recruiting and retaining is that when recruiting, the main challenge is competing against other sectors (68% other sectors vs 45% space), and when retaining, the main challenge is competing against other space companies (57% space companies vs 16% other sectors). This suggests that once staff enter the space sector they are likely to stay, even if they move to other space companies.

130 *“Competition within the space industry and over eager recruiters [make it] difficult to retain staff.”*

– Senior Systems Engineer, systems engineering company

131 *“It is extremely difficult to find people in the UK with the right skills. Maintaining staff is the best thing you can do - but there is competition from startups.”*

– Professor of Earth Observation, major university

Pay

132 Low salaries are a cause of both recruitment (39%) and retention (48%) challenges. This remains almost unchanged since 2020. Uncompetitive pay and conditions is more of a challenge for retention for large companies (57%) than for SMEs (45%).

133 The 2020 Space Census found that pay was one of the important factors in why people would choose to leave their current role and found that those who were looking to change jobs were, on average, paid £8,000 less than those who were staying put²³. The 2022 Size & Health of the UK Space Industry report also found that 76% of respondents identified the cost of living crisis as a negative impact on their employees²⁴, and this was also raised by many respondents. Many respondents also noted challenges in being able to decide on where to invest in new staff and training, due to the lack of long-term clarity and direction from government, which the government intends to address as set out in the National Space Strategy in Action²⁵.

134 *“Staff retention is generally very good >90%, but cost of living and keeping salaries up particularly when waiting on long term opportunities to come to fruition [...] has been a challenge.”*

– Managing Director, spacecraft design company

²³ Dudley, J. & Thiemann, H. (2021). [Pay in the UK space sector](#) (para. 70). Space Skills Alliance.

²⁴ know.space (2023). [Size and Health of the UK Space Industry 2022](#) (p6). UK Space Agency.

²⁵ Department for Science, Innovation and Technology & Ministry of Defence (2023). [National Space Strategy in Action](#) (p6).

Lack of development opportunities

135 Companies that provide training are slightly less likely to report retention difficulties due to lack of development opportunities than those who do not (34% vs 40%).

136 *“Training is a huge commitment and essential. What happens if we train people and they leave? What happens if we don’t train people and they stay?”*

– CEO, testing provider

Retirement

137 Retirement was cited by 21% of respondents with retention challenges. While there is no detailed data about retirement figures for the UK space workforce, in 2021 the European Space Agency (ESA) reported that they expect 20% of their workforce to retire by 2025²⁶.

138 There is also some evidence to suggest that the UK space sector is a relatively young sector; a 2015 survey of the international space sector found that 42% of workers were over 55 years-old²⁷, but a survey of the UK space sector in 2020 found the equivalent figure for the UK was just 17%²⁸.

139 *“Everybody’s in their mid-50s or older, and I could count on three fingers how many people we have under 30 with RF skill sets. That’s a big problem for the continuity of the business. It’s also a big problem for the UK.”*

– Anonymous interviewee

Bullying and harassment

140 Only 1% of respondents identified bullying and harassment as a reason for poor retention. While they are under no obligation to report on bullying and harassment statistics in a government survey, this is despite the 2020 Space Census finding that 41% of women and 10% of men report experiencing some form of discrimination or harassment in the sector²⁹.

141 *“Providing these inclusive environments where people can see themselves reflected, that is far more important than just hiring the diversity hire. And what you’ve not done is create an environment to make them want to stay to breed innovation in order to get them the benefit from diversity within an organisation versus a look in house.”*

– Adele Fox, Marketing Director, EVONA

²⁶ European Space Agency (2021). [ESA Agenda 2025](#) (p13). European Space Agency.

²⁷ Space & Satellite Professionals International (2015). [Are we winning the war for talent?: The 2015 International Satellite Industry Workforce Study](#) (p16). Space & Satellite Professionals International.

²⁸ Dudley, J. & Thiemann, H. (2021). [Demographics of the UK space sector](#) (para. 76). Space Skills Alliance.

²⁹ Dudley, J. & Thiemann, H. (2021). [Women in the UK space sector](#) (para. 65). Space Skills Alliance.

Immigration-related issues

- 142 Immigration-related issues are a problem when recruiting (34%) but not when retaining (7%). Note that the option on the 2020 survey related to immigration issues was ‘Brexit has led to staff moving out of the UK’. The UK left the EU in January 2020, and the 2020 survey was conducted in autumn 2020 reflecting on late 2019 and early 2020.

Impact of poor retention

- 143 The main impact of poor retention is to increase the workload for remaining staff (72%). This increased pressure can itself fuel a cycle of poor retention. All impacts are shown in Figure 21.

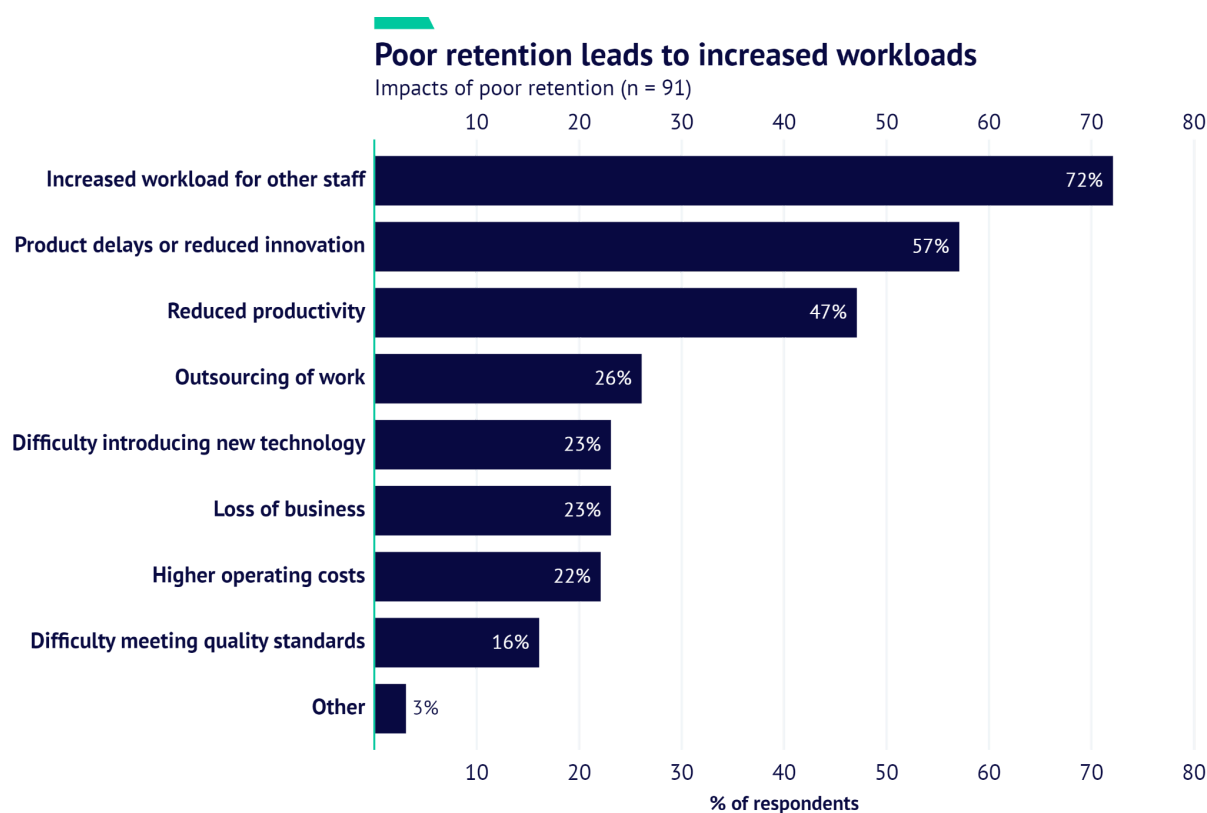


Figure 21: Types of impacts of poor retention on respondents with retention issues. Data comes from Q47.

Conclusions

The core issues have not changed

- 144 Skills gaps are a perennial problem within the space industry, as they are in many similar high-tech sectors³⁰.
- 145 Employers have skills gaps in their current workforces that hold back their growth and ability to innovate. They struggle to recruit and have to leave adverts up for a long time, because they face fierce competition from other STEM sectors that pay more, especially for software and data skills that are in very high demand. In particular, hiring for senior roles is a challenge due to a lack of availability of experienced professionals and a bottleneck in upskilling junior and mid-level workers. When employers do hire successfully, their new staff do not have all the skills required, and training is required. Once trained, these staff are often poached by other space companies and the cycle repeats.
- 146 This new survey has not revealed any significant new challenges, but instead gives more detail and data on the nature of the problem and an update on its scale since 2020.
- 147 The biggest changes in substance from 2020 relate to two seismic shifts that have happened outside of the space sector: The UK leaving the EU and COVID-19. Recruiting from abroad, whilst still a challenge, is less of an issue than it was immediately after leaving the EU, and a related difficulty in attracting people to a specific location has reduced now that COVID-19 has made remote working more practical and more commonplace.

The scale and significance of the problem has increased

- 148 While the core issues remain unchanged, their scale and significance have increased. In 2020, 67% of respondents reported some kind of skills-related challenge – skills gaps in their workforce, difficulties in recruitment, or challenges in retention. In 2023, that number has increased to 95%. In particular, retention issues have become more severe, shown in Figure 22.
- 149 Three years ago 9% of respondents described the impact of those challenges on their business as ‘major’, today that number is 29%. This has reduced productivity, reduced quality, and held back innovation.

³⁰ Ipsos and Warwick Institute for Employment Research (2023). [Insights from the UK-wide survey of the Research and Innovation Workforce 2022](#). Department for Science, Innovation and Technology.

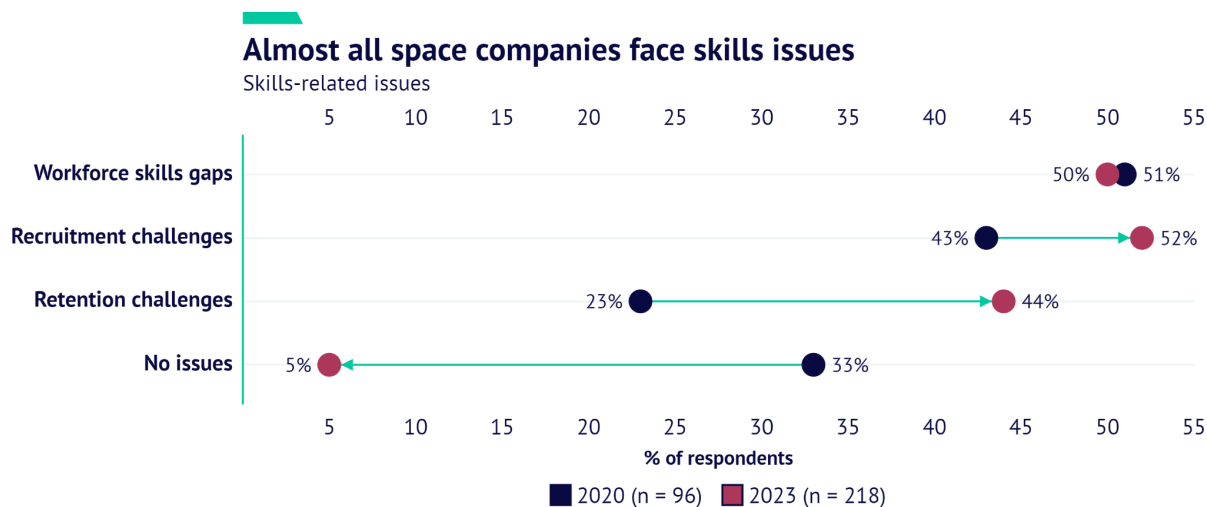


Figure 22: Proportion of organisations facing any skills-related issues. This chart summarises data presented earlier in the report. Data from 2020 comes from Table 2 of that report.

Software, systems, and RF are particular pain points

150 Three key areas of skills shortages stand out: software & data, systems engineering, and electronics engineering. In particularly high demand within these areas are skills in AI & machine learning, software engineering, and radio frequency & telecoms engineering. This is evident in the data on current and expected future skills needs, in recruitment difficulty, and in the number of roles being hired for.

151 These are not, however, the areas most commonly associated with space or emphasised by the sector. Space is most closely associated by students and the public with aerospace engineering, and the sector often chooses to emphasise this part of its work by displaying rockets and astronauts, engaging primarily with aerospace students, and providing training related to spacecraft and launch. Whilst this means that filling gaps in aero/mechanical engineering is relatively easy, it comes at the cost of being able to find qualified software, systems, and electronics engineers who are also in high demand elsewhere.

152 *“There’s so many different areas of space that you can work in and have an impact. We need to make people aware that it’s not just building and launching rockets and becoming an astronaut.”*

– Anonymous interviewee

153 *“The UK Space Agency and the wider space community needs to work harder so that the perception from schools isn’t ‘astronaut or nothing.’”*

– Rhiannon Owen, Talent Acquisition Partner, Satellite Applications Catapult

The workforce is skilled but space struggles to hire

- 154 Skills gaps in the current workforce are not uncommon in the space sector, with 52% of organisations reporting a gap, almost unchanged from 51% in 2020. However, this number is considerably lower than the 73% reported for the economy as a whole³¹. The same study found that 42% of organisations in the wider economy faced a lack of applicants for their roles, but 67% of organisations responding to the Space Sector Skills Survey reported the same issue.
- 155 This suggests that although the current UK space sector workforce is highly skilled, organisations are struggling to recruit new people to the sector. However, this issue is not the same across all seniority levels, with graduate-level and junior roles appearing to be oversubscribed and highly competitive. The real challenge for the space sector lies in attracting mid-level and senior personnel to join the workforce, and this may require the space sector to look at recruiting from adjacent sectors to fill the gaps, or quickly upskill junior staff.

Salaries need to be competitive

- 156 The high-tech sectors that space competes with also tend to pay more. Pay is not a reason why people join the space sector, but it is a reason they leave or fail to join in the first place. Retention at a sector level is much less of a problem than recruitment; once people join the space industry they tend to stay, though they may move between space companies.
- 157 Recruitment is something that the sector can tackle. It is possible to make the sector more attractive, changing perceptions of space from rockets to data, to make recruitment from overseas easier, and to pay more to attract those from outside the sector. The sector can also provide training for those from other tech and engineering sectors to join, filling the gap at mid-career level.

Towards a space workforce action plan

- 158 Though the scale and significance of the space skills gap has increased since 2020, the challenges are not insurmountable. Many respondents to the survey identified a need for a plan from the UK Space Agency.
- 159 The July 2023 National Space Strategy in Action³² set out the commitment to publish a Space Workforce Action Plan in 2024, based on the results of this report. The publication will be co-developed by government, industry, and academia, and is expected to set out a direction for the sector, and coordinate the actions that need to be taken.

³¹ The Open University (2023). [Business Barometer June 2023: An analysis of the UK skills landscape](#) (p6).

³² Department for Science, Innovation and Technology & Ministry of Defence (2023). [National Space Strategy in Action](#) (p12).

Acknowledgements

- 160 We would like to thank all those who took the time to respond to the survey, especially those people who gave up their time to be interviewed (listed in [Appendix F](#)), as well as those who wished to remain anonymous.
- 161 We would also like to thank the Education and Future Workforce team at the UK Space Agency, the Space Directorate at the Department for Science, Innovation and Technology, and members of the Space Skills Advisory Panel for their support in designing the survey and preparing this report.
- 162 Finally, thank you to ADS, Astroverse, Cornwall Space Cluster, Farnborough Aerospace Consortium, GVF, Harwell Space Cluster, The Institution of Engineering and Technology (IET), the North East Satellite Applications Centre of Excellence, Northern Ireland Space Office, the Royal Aeronautical Society, the Royal Institute of Navigation, the Satellite Applications Catapult, Space East, Space Hub Yorkshire, Space Park Leicester, the Space Partnership, Space Scotland, Space South Central, the Space Universities Network, SpaceCareers.uk, SSPI UK, and UKspace for promoting the survey on social media, through newsletters, and by word of mouth.

Appendices

Appendix A: Methodology

- 163 The Space Sector Skills Survey 2023 was conducted via an online form open for 6 weeks from 24th April to 2nd June 2023.
- 164 It comprised 51 questions covering recruitment, retention, skills needs and gaps, training provision, and engagement with education providers. The exact questions shown to each respondent depended on their answers to earlier questions. A version of the survey in Microsoft Word was also provided to help respondents prepare their responses.
- 165 In addition to the online survey, in-depth structured interviews were conducted with 21 respondents to gather qualitative data and more detailed answers. Quotes are included from both interviews and free text responses.

Audience

- 166 There are many different definitions of the 'space sector'. The wording used in promoting the survey was:
- 167 All organisations employing space professionals or using space as part of their day-to-day operations. This includes companies that build and launch satellites, use Earth observation data, and build software for the space sector.*
- 168 A target list of approximately 1,600 space organisations was compiled based on:
- the KTN Space Sector Landscape Map³³
 - the Satellite Applications Catapult Capabilities Catalogue³⁴
 - the Space Enterprise Community³⁵
 - lists provided by regional space clusters
 - proprietary datasets
- 169 While the survey was promoted to all space sector organisations, it was advertised as a survey seeking to understand recruitment and skills challenges, and organisations self-selected to respond. Organisations who recently recruited or who have faced skills challenges may have been more likely to respond and therefore may be overrepresented in the sample.

³³ Innovate UK KTN (2023). [UK Space Sector Landscape Map](#).

³⁴ Satellite Applications Catapult (2023). [UK Space Capabilities Catalogue](#).

³⁵ Satellite Applications Catapult and UK Space Agency (2023). [Space Enterprise Community](#).

Question design

- 170 A copy of all the survey questions is provided in [Appendix D](#).
- 171 The questions were co-designed by Space Skills Alliance, know.space, UK Space Agency, and the Department of Science, Innovation and Technology, with the goal of collecting actionable data about the skills issues within the UK space industry and addressing key policy questions.
- 172 All questions were optional. The majority were closed questions, but there were also free-form text boxes for respondents to provide additional information if they wanted to.
- 173 The wording was chosen where possible to align with the previous edition of the survey and with other space sector data sources such as the Size & Health of the UK Space Industry³⁶ report and the SpaceCRAFT competencies framework³⁷.

Promotion

- 174 The survey was shared by direct email with the list of target organisations. It was also included in email newsletters and social media posts sent out by a number of partner organisations, at several space sector events, and on the Space Enterprise Community. A list of organisations that assisted with promotion can be found in the [acknowledgements](#).
- 175 Organisations received an initial email during the first week of the survey. If they had not responded, a follow up email was sent during the third week, fifth, and sixth (final) week of the survey. Where response rates were low for particular clusters or regions, localised follow up emails were also sent to encourage uptake.

Non-response rate

- 176 Overall the non-response rate was low, about 1% for questions that were relevant to all respondents. In most cases, non-responses were omitted, and the remaining responses were normalised to 100%. The exception is where the size of the non-response rate was comparable to the size of a valid response.

Interviews

- 177 In addition to the online survey, 21 in-depth structured interviews were conducted. The goal of the interviews was to provide qualitative detail and nuance on top of the quantitative survey data. Further detail is provided in [Appendix E](#).

³⁶ know.space (2023). [Size and Health of the UK Space Industry 2022](#). UK Space Agency.

³⁷ Space Skills Alliance (2023). [The SpaceCRAFT Framework](#).

Processing and analysis

Removal of invalid and duplicate responses

- 178 Of the 250 responses received, 5 responses were removed as invalid. These included responses from companies with no UK operations, blank, or spam responses.
- 179 16 organisations provided multiple responses, totalling 43 responses between them. Each duplicate response was merged to provide a single response per organisation. Where sensible, responses were combined. Where responses differed, the most senior respondent's answer was chosen, or the respondent who gave the most complete answers were chosen.

Organisation type classification

- 180 Organisations were classified into industry, research (universities and research institutes), government (government agencies, funding bodies, defence and military), and third sector (charities and think tanks).

Location classification

- 181 Respondents were asked to answer where their organisation had operations. They could provide a postcode or a free text answer. These were reclassified into ITL/NUTS 1³⁸ regions as well as regional space clusters, based on clusters' own definitions.

Skill and job theme classification

- 182 The themes used for skill and job classification are adapted from the SpaceCRAFT framework³⁹, with the addition of spacecraft operations to meet the needs of this survey:
- 1. Aero/mechanical design**
Design and analysis of spacecraft, their subsystems, and components from an aerothermal and mechanical perspective.
 - 2. Systems engineering**
Designing, developing and verifying a space system as an integrated system able to fulfil the objectives of a mission within acceptable technical and programmatic frames.
 - 3. Electronics design**
Design and analysis of spacecraft electronic systems and telecommunications.

³⁸ ONS (2023). [UK International Territorial Levels \(ITLs\)](#).

³⁹ Space Skills Alliance (2021). [The SpaceCRAFT Framework](#).

4. **Spacecraft operations**

Operation of and mission planning for spacecraft in space.

5. **Maintenance, manufacturing & materials**

Production, assembly, and testing of components and subsystems for satellites, spacecraft, and ground stations.

6. **Software & data**

Design and development of software for satellite operations and for processing of data collected by satellites.

7. **Sector support**

Work that supports the space sector as a whole such as through funding, policy development, economic analysis, and provision of education and training.

8. **Commercial operations / support staff**

Work that supports the operations of a business, such as ensuring that projects run to time, people have the support they need, progress is communicated to clients, and finances and contracts are properly managed.

9. **Transferable skills** (*not used in classification of jobs*)

Competencies that are required for most roles in the sector, regardless of specialism.

Quality assurance

¹⁸³ Quality assurance (QA) is at the heart of all of our projects, with time set out in the project plan for internal assessments of report content and underpinning analysis in line with HM Treasury *Aqua Book* principles⁴⁰. Led by a team member otherwise uninvolved in the project, to ensure independence, QA activity focused on ensuring that survey data was correctly transposed, that there were no errors in spreadsheet calculations, and that conclusions for the report were evidence-based and with any caveats or limitations clearly communicated.

⁴⁰ HM Treasury (2015). [The Aqua Book: guidance on producing quality analysis for government](#).

Appendix B: Sample profile

Sample Size

Organisations

- 184 The target sample size was 200 organisations. 250 responses from 218 organisations were received, including companies, government bodies, universities, and third sector organisations.
- 185 The total number of space companies in the UK is estimated to be 1,590, so this sample of 188 companies represents about 12% of the total. However, many space companies are very small, with only 162 organisations generating space income of more than £5m, accounting for 94% of the sector's income⁴¹.

Workforce

- 186 The total space workforce is estimated to be 48,800. However, this figure includes about 22,000 people working in direct-to-home (DTH) broadcasting, which is generally considered separate from the rest of the sector⁴¹.
- 187 The non-DTH space industry workforce is estimated to be about 26,800. The 188 companies in this sample report employing about 9,300 people in space-related roles, about 35% of the total non-DTH employment.
- 188 While the overall sample size is large enough to give us a high level of confidence in the accuracy of the findings, when looking at intersections of certain characteristics (for example company size and location), the sample sizes are considerably smaller. In these cases it is difficult to draw robust conclusions from the data, but it is useful in giving indications of trends and identifying areas for further research.
- 189 Though every effort was made to ensure that responses were collected from across the whole sector, there is likely to be some bias in this dataset.

⁴¹ know.space (2023). [Size and Health of the UK Space Industry 2022](#) (p5, p17). UK Space Agency.

Individual respondents

- 190 The individual survey respondents were primarily senior representatives of their organisations, managing a programme, division, or the whole organisation. Table 16
- 191 82% of responses were on behalf of a whole organisation, while the remaining 18% were on behalf of a specific site or team within the organisation, shown in .

Seniority level	% of respondents n =201
CEO/Director level (e.g. CEO, Managing Director)	50
Division director (e.g. Chief Technology Officer, Head of Skills and Workforce Transformation)	20
Programme manager (e.g. Project Manager, Space Analysis Lead)	16
Individual technical contributor (e.g. Airborne Systems Engineer, Research Scientist)	10
Administrator (eg. Executive Assistant, HR Administrator)	3

*Table 16: The seniority level of survey respondents, classified based on their job titles.
Data comes from Q4.*

Organisation type

- 192 Respondents were overwhelmingly from businesses (86%). A small number of research organisations and groups (9%) also responded, encompassing fields such as space instrumentation, cubesats, Earth observation, and meteorology. The remaining responses came from government (3%) and third sector (2%) organisations.

Organisation size (number of UK employees)

Total size

193 Over two thirds (68%) of respondents are from micro or small organisations. This is a very similar result to the 2020 survey, and aligns closely to the 2020 KTN Space Landscape and 2023 Space Capabilities Catalogue (SCC), as shown in Table 17.

Organisation size in the UK	% of organisations			S4 2023 n =218	Median number of UK employees (S4 2023)
	S4 2020 n =96	KTN 2020 n =828	SCC 2023 n =816		
Large (250+)	15	20	18	17	1756
Medium (50-249)	12	13	15	17	95
Small (10-49)	31	32	25	29	25
Micro (1-9)	39	35	42	37	4
Unknown	3	-	-	-	-

Table 17: Respondent organisations classified by size of UK workforce, using the OECD definitions of business size⁴². Data comes from Q10. Data from 2020 comes from Figure 1 of that report.

Proportion in space-related roles

194 Our definition of space-related roles is those that support space activities. This includes everyone from satellite engineers to software developers to administrative staff, where they support space activities.

195 The proportion of a respondent organisation’s workforce that is space-related falls as the organisation increases in size. For large organisations (250+ employees), the median size of their space workforce as a proportion of their total workforce was 3%, compared to 54% for medium-sized organisations, 90% for small, and 100% for micro. This is unsurprising; small organisations are focused exclusively on space, while larger ones have space as just one aspect of their business. The breakdown is shown in Table 18.

⁴² OECD (2005). [Small and Medium-Sized Enterprises \(SMEs\)](#).

Organisation size	Median total number of UK employees	Median number of UK space employees	Median size of UK space workforce as % of total UK workforce
Large (250+)	1756	65	3%
Medium (50-249)	95	59	54%
Small (10-49)	25	12	90%
Micro (1-9)	4	3	100%
All	21	8	73%

Table 18: Median number and proportions of employees and space employees in respondent organisations of different sizes. Data comes from Q10 and Q11.

196 Most space workforces are very small. The median is 8 people, 52% of teams are smaller than 10 people, and 81% are smaller than 50. The breakdown is shown in Table 19.

Organisation UK space workforce size	% of respondents n = 218	Median number of UK space employees
Large (250+)	5%	360
Medium (50-249)	14%	80
Small (10-49)	28%	19
Micro (1-9)	52%	3
All	-	8

Table 19: Respondent organisations classified by size of UK space workforce. Data comes from Q11.

197 Though an organisation may have a large total workforce, its space workforce may be very small. For example, 8% of large organisations have a space workforce equivalent to the size of a micro organisation (1-9 employees). The cross tabulation of size is shown in Table 20.

		Organisation total UK workforce size			
		Large	Medium	Small	Micro
Organisation UK space workforce size	Large (250+)	29%	-	-	-
	Medium (50-249)	26%	58%	-	-
	Small (10-49)	37%	22%	63%	-
	Micro (1-9)	8%	19%	38%	100%

Table 20: Cross tabulation of organisation total UK workforce size against UK space workforce size. 8% of large organisations have a micro-sized space workforce of fewer than 10 people.

Proportion in space technical specialist roles

198 Of the space-related workforce, 50-67% are in space technical specialist roles, as shown in Table 21. These are roles that require space-specific skills and knowledge (for example rocket engine design). The remaining 33-50% of the space-related workforce are in more generic roles that require an understanding of space but have significant skills overlaps with other sectors (such as general data processing).

Organisation size	Median number of UK space specialists	Median size of UK space specialist workforce as % of UK space workforce	Median size of UK space specialist workforce as % of total UK workforce
Large (250+)	21	50%	1%
Medium (50-249)	20	55%	17%
Small (10-49)	4	56%	19%
Micro (1-9)	1	67%	50%
All	4	59%	17%

Table 21: Median number and proportions of employees in space specialist roles in respondent organisations of different sizes. Data comes from Q10, Q11, and Q12.

199 In contrast to the space-related percentages in Table 17, the space specialist percentage is reasonably stable across different sizes of organisation as it relates more to the kinds of activities that an organisation engages in.

Location

Region

200 Respondents to the survey appear to well represent the regional distribution of the UK space sector, with the number of space sites in each region aligning closely with the results Size & Health of the UK Space Industry 2022 (S&H 2022) report. The breakdown is shown in Table 22.

Region	% of respondents' sites		
	S4 2020 n = 96	S&H 2022 n = 2202	S4 2023 n = 292
South East	47	23	24
London	12	18	17
South West	13	11	17
Scotland	9	8	12
East of England	7	9	6
East Midlands	5	5	5
Yorkshire and the Humber	2	4	5
North East	1	3	3
Northern Ireland	0	2	3
Wales	1	3	3
West Midlands	0	5	2
North West	3	6	2
Other	0	3	0

Table 22: Proportion of survey respondents' sites in each region. Data comes from Q14. Results from the 2020 report come from figure 6 of that report; results from Size & Health come from page 34.

201 In this survey, the South West and Scotland are slightly overrepresented relative to Size & Health, by approximately 6 and 4 percentage points respectively. The West Midlands and North West are slightly underrepresented relative to Size & Health, by approximately 3 percentage points each.

- 202 There were very few respondents from the West Midlands region in particular. It is unclear why, but one possible reason is that many of the organisations identified are not obviously space-related, lying more in the supply chain. This means that they may have self-selected not to respond to a space-branded survey.
- 203 The South East and South West had very good representation, in part due to the strength of the clusters in these regions. Cornwall in particular was very well represented, likely because one of the researchers on this project was based in the region and had close ties with the cluster.

Space clusters

- 204 Organisations were not asked to respond to a question about which cluster they were part of. Instead, it was determined which cluster a site was part of by analysing its location by looking at membership lists provided by the clusters and postcodes provided by the respondents. The breakdown is shown in Table 23, and is intended to provide an indicative breakdown only.
- 205 Where organisations' sites did not fit neatly into a cluster, they were grouped with their closest cluster. For example, sites in Plymouth (Devon, which does not have a space cluster) were grouped with the Cornwall Space Cluster, and organisations in Milton Keynes were grouped with Arc for Space.
- 206 There is not a London space cluster, but a significant number of space organisations are located there, so we include it as a pseudo-cluster. Additionally, Space Park Leicester and West Midlands are in the process of forming the Midlands Space Cluster so are included both individually and combined.
- 207 The cluster with the highest number of responses was London with 19% of the responses, followed by Space South Central (17%), and Space Scotland (12%).

Cluster	% of respondents' sites n = 292
London (a pseudo-cluster)	19%
Space South Central	17%
Space Scotland	12%
Cornwall Space Cluster	9%
Harwell Space Cluster	8%
Space West	7%
Midlands Space Cluster (East & West)	7%
Space Hub Yorkshire	5%
Space Park Leicester (East Midlands)	5%
North East Space Cluster	3%
Northern Ireland Space Office	3%
Space Wales	3%
Space East	3%
Arc for Space (Oxford-Cambridge)	2%
North West Space Cluster	2%
West Midlands Space Cluster	3%
Westcott Space Cluster	<1%

Table 23: Proportion of survey respondents' sites in each space cluster. Data comes from Q14.

Space-related activities & segments

- 208 The space sector is generally divided into several segments, often referred to as ‘upstream’ (manufacturing and in-space activities), and ‘downstream’ (use of space data). These segments can be further broken down into activities.
- 209 Respondents were asked to classify their organisation’s activities according to the standard categories used by the Size & Health of the UK Space Industry survey, the Satellite Applications Catapult, and others. In the 2020 survey different categories were used. Table 24 compares the categories.

S4 2020 category	S4 2023 / S&H category
Manufacture or research the manufacture of equipment or components which are used in space operations	Space Manufacturing: Design and/or manufacture of space equipment and subsystems
Develop or research the development of software for use in space operations	-
Research, manage or are involved in ground control, launch, or satellite operations	Space Operations: Launch and/or operation of satellites
Research or consultancy related to space activities or operations	Ancillary Services: Specialised support services
Research or operations are substantially or critically dependent on the capabilities or information supplied by satellites and related technologies	Space Applications: Applications of satellite signals and data

Table 24: Comparison of space sector categories used between surveys.

- 210 Organisations were typically engaged in multiple activities (median of 4 activities), across more than one segment (median of 2 segments). It is therefore difficult to neatly separate organisations into being ‘upstream’ or ‘downstream’, but Size & Health defines ‘upstream’ as space manufacturing plus space operations, and ‘downstream’ as space applications.
- 211 Over two thirds (71%) of organisations are doing some kind of manufacturing, 40% are involved in launch and spacecraft operations and 46% in satellite applications, and 48% are providing ancillary services, shown in Table 25. Responses are biased toward upstream segments of the space sector, such as space manufacturing. This may be because downstream organisations feel less connected to the space sector than other sectors like tech, and are therefore less likely to self-identify as the target audience of the Space Sector Skills Survey.

Segments (in bold) and activities	% of respondents	
	2020 n = 96	2023 n = 212
Space Manufacturing: Design and/or manufacture of space equipment and subsystems	47	71
Satellites/payloads/spacecraft and subsystems	-	39
Scientific and engineering support	-	36
Ground segment systems and equipment	-	31
Fundamental and applied research	-	28
Space test facilities	-	20
Scientific instruments	-	20
Suppliers of materials and components	-	20
Launch vehicles and subsystems	-	17
Space Operations: Launch and/or operation of satellites	38	40
Space surveillance & tracking (SST)	-	16
Ground station networks	-	15
Debris removal	-	13
Third-party ground segment operation	-	11
Proprietary satellite operation	-	11
Launch services	-	10
In-orbit servicing	-	10
Spaceports	-	9
In-space manufacturing	-	8
Launch brokerage services	-	2
Space tourism	-	2

Segments (in bold) and activities	% of respondents	
	2020 n = 96	2023 n = 212
Space Applications: Applications of satellite signals and data	50	46
Processors of satellite data	-	27
Applications leveraging satellite signals/data	-	26
Mobile satellite communication services	-	12
Fixed satellite communication services	-	10
Other (e.g. quantum key distribution)	-	9
Supply of user devices and equipment	-	8
Location-based signal service providers	-	6
Direct-To-Home (DTH) broadcasting	-	3
Ancillary Services: Specialised support services	54	48
Market research and consultancy services	-	25
Software and IT services	-	24
Business incubation and development	-	14
Policymaking, regulation and oversight	-	14
Legal and financial services	-	5
Launch and satellite insurance (inc. brokerage) services	-	3

Table 25: Proportion of organisations engaged with space sector activities across each segment. Data comes from Q8. Results for 2020 come from figure 2 of that report.

Space-related capabilities

- 212 Respondents also reported the high-level space capabilities their organisations support through their space activities, shown in Table 26. These are the categories used in the Size & Health of the UK Space Industry 2022 report, and are equivalent to ‘sectors’ in OECD terminology.
- 213 Responding organisations typically have multiple overlapping areas of capability (median of 3 capabilities). Half (49%) of respondents have capabilities in space technologies, 46% in defence/military and in Earth observation (excluding meteorology), and 41% in science.

Capability	% of responses n =217
Space technologies	49
Defence/military	46
Earth observation (excl. meteorology)	46
Science	41
Satellite communication (excl. broadcasting)	35
Positioning, navigation, timing (inc. GNSS)	33
Generic technologies/components (e.g. AI)	32
Space exploration	26
Space transportation (inc. launch)	21
Meteorology	21
Financial, legal or other services	16
Broadcasting	11
None of the above	7

Table 26: Proportion of organisations with specific space-related capabilities. Data comes from Q9.

Remote working

- 214 The COVID-19 pandemic led to a significant and sustained increase in the number of people working remotely. 61% of organisations offer a hybrid model of in-person and remote work. 21% of organisations are primarily or fully remote, and 18% are primarily or fully in-person.

Appendix C: Additional data tables

Skills gaps in the current space workforce (full table)

Skill	% reporting skills gap in current workforce		
	2020 n =49	2023 n =103	Change (pp)
Artificial intelligence and machine learning	33	41	+8
Systems engineering	39	39	0
Data analysis & modelling (2023) / data analytics (2020)	22	36	+14
Strategy & leadership (2023) / Leadership or motivational skills (2020)	18	32	+14
Data processing & manipulation	-	30	-
Software engineering	45	29	-14
Radio frequency & telecoms engineering (2023) / radio frequency engineering (2020)	41	28	-13
Technical leadership	-	25	-
Project management	29	24	-5
Analogue and digital systems	-	23	-
Education and training	-	22	-
Sales & commercial	-	22	-
Regulation	-	19	-
Data visualisation	-	17	-
Assembly, integration, and testing	-	17	-
Funding & incubation	-	17	-
Cyber security	-	15	-
Economics analysis	-	15	-

% reporting skills gap in current workforce

Skill	2020 n =49	2023 n =103	Change (pp)
Optoelectronic systems	-	15	-
Safety & regulation	-	15	-
Self-management	-	15	-
Legal & financial	-	14	-
Policy development	-	14	-
Procurement	8	14	+6
Problem solving	-	13	-
Spacecraft operations	-	12	-
Communication	-	12	-
Manufacturing and materials	-	12	-
Thermal	16	12	-4
Team work	20	11	-9
HR	-	10	-
Robotics (electronics)	12	10	-2
Structural	-	8	-
Launch	-	7	-
Robotics (mechanical)	12	7	-5
Maintenance	-	6	-
Propulsion	-	5	-
Other	-	5	-

Table 27: Skills gaps in the current workforce. Data comes from Q27. Data from 2020 comes from Figures 14 and 15 of that report, scaled to an n of 49.

Skills gaps in job applicants (full table)

Skill	Theme	% reporting skills gap in job applicants n =131
Artificial intelligence and machine learning	Software & data	52
Systems engineering	Systems engineering	42
Strategy & leadership	Commercial operations	40
Software engineering	Software & data	37
Radio frequency & telecoms engineering	Electronics design	34
Project management	Transferable skills	32
Data analysis & modelling	Software & data	31
Technical leadership	Transferable skills	31
Data processing & manipulation	Software & data	29
Analogue and digital systems	Electronics design	26
Assembly, integration, and testing	Maintenance, manufacturing & materials	25
Education and training	Sector support	25
Communication	Transferable skills	24
Funding & incubation	Sector support	22
Problem solving	Transferable skills	21
Self-management	Transferable skills	20
Sales & commercial	Commercial operations	19
Data visualisation	Software & data	18
Regulation	Sector support	18
Spacecraft operations	Spacecraft operations	18
Team work	Transferable skills	17

Skill	Theme	% reporting skills gap in job applicants n =131
Thermal	Aero/mechanical design	17
Manufacturing and materials	Maintenance, manufacturing & materials	16
Safety & regulation	Spacecraft operations	16
Optoelectronic systems	Electronics design	15
Policy development	Sector support	15
Structural	Aero/mechanical design	14
Cyber security	Software & data	13
Launch	Spacecraft operations	12
Legal & financial	Commercial operations	12
Procurement	Commercial operations	12
Propulsion	Aero/mechanical design	11
Robotics (electronics)	Electronics design	11
Robotics (mechanical)	Aero/mechanical design	11
HR	Commercial operations	11
Economics analysis	Sector support	8
Maintenance	Maintenance, manufacturing & materials	7
Other	-	9

Table 28: Skills gaps in job applicants. Data comes from Q27.

Skills in the future workforce (full table)

Skill	Theme	% expecting to need skill in 3 years n =101
Artificial intelligence and machine learning	Software & data	70
Strategy & leadership	Commercial operations	57
Project management	Transferable skills	49
Technical leadership	Transferable skills	47
Data analysis & modelling	Software & data	44
Software engineering	Software & data	44
Systems engineering	Systems engineering	42
Problem solving	Transferable skills	40
Data processing & manipulation	Software & data	38
Sales & commercial	Commercial operations	37
Team work	Transferable skills	36
Data visualisation	Software & data	35
Assembly, integration, and testing	Maintenance, manufacturing & materials	34
Communication	Transferable skills	34
Manufacturing and materials	Maintenance, manufacturing & materials	32
Funding & incubation	Sector support	32
Education and training	Sector support	31
Policy development	Sector support	31
Cyber security	Software & data	30
Legal & financial	Commercial operations	30

Skill	Theme	% expecting to need skill in 3 years n =101
Procurement	Commercial operations	30
Self-management	Transferable skills	29
Analogue and digital systems	Electronics design	29
Economics analysis	Sector support	25
Regulation	Sector support	24
Radio frequency & telecoms engineering	Electronics design	23
HR	Commercial operations	22
Spacecraft operations	Spacecraft operations	21
Safety & regulation	Spacecraft operations	20
Optoelectronic systems	Electronics design	18
Structural	Aero/mechanical design	18
Maintenance	Maintenance, manufacturing & materials	17
Propulsion	Aero/mechanical design	17
Robotics (mechanical)	Aero/mechanical design	17
Launch	Spacecraft operations	16
Robotics (electronics)	Electronics design	14
Thermal	Aero/mechanical design	13
Other	-	6

Table 29: Skills respondents expect to need in three years' time. Data comes from Q32.

Recruitment by cluster

Cluster	n of orgs	% of cluster's orgs recruiting	Median hire rate (%)	Median time to hire (weeks)	Mean recruitment difficulty score (1-5)
Space Wales	5	100%	18%	8	2.6
Space East	7	86%	11%	9	4.2
Multiple clusters	45	84%	6%	12	4.0
Space Hub Yorkshire	6	83%	16%	9	3.9
Space Park Leicester (East Midlands)	8	75%	14%	12	3.3
North East Space Cluster	7	71%	17%	16	3.9
Harwell Space Cluster	10	70%	29%	16	4.2
Space Scotland	17	65%	27%	12	3.5
Arc for Space	5	60%	29%	7	3.0
North West Space Cluster	5	60%	5%	4	3.7
Space West	10	60%	5%	6	3.6
West Midlands Space Cluster	7	57%	23%	4	3.1
Cornwall Space Cluster	17	53%	13%	4	2.9
London	39	51%	18%	6	3.5
Northern Ireland Space Office	8	50%	10%	3	3.3
Space South Central	21	33%	2%	14	3.8
Westcott Space Cluster	1	-	-	-	-
All	218	64%	14%	10	3.8

Table 30: Scale and difficulty of space recruitment in the past 12 months by space cluster.
Data for Westcott Space Cluster has been suppressed to avoid being identifying.

Appendix D: Survey questions

- 215 The survey was presented as a single-page form, designed following Government Digital Service best practice, and with a focus on accessibility and compatibility with a wide range of web browsers.
- 216 The entire question set, exactly as presented to respondents can be found at survey.spaceskills.org.

Space Sector Skills Survey 2023

This survey seeks to understand recruitment and skills challenges

It has been commissioned by the [UK Space Agency](#) as the primary source of evidence to support the UK Government's understanding of skills gaps and workforce challenges in the space sector. It is being conducted by [Space Skills Alliance](#) and [know.space](#).

This is your opportunity to influence DSIT and the UK Space Agency

Your answers to this survey will directly feed into policy-making decisions at the Department for Science, Innovation and Technology, and will be used by the UK Space Agency to inform funding of new and existing skills and training interventions to address skills gaps.

*“The **Space Sector Skills Survey** will help us to identify the skills gaps and shape policies that will support the growth of the industry. I urge all companies in the sector to respond and share their valuable insights.”*

–Dr Paul Bate, UK Space Agency CEO

It is open to all organisations employing space professionals

Any organisation that uses space as part of their day-to-day operations is encouraged to respond. This includes companies that build and launch satellites, use Earth observation data, and build software for the space sector.

It'll take you between 15 and 25 minutes

Almost all of the questions are closed questions that are quick and easy to answer. If you have some time to spare, there are opportunities to provide some more detail and to be involved in follow-up studies, which we would really appreciate.

Your answers will be kept confidential

We understand that some of the information we ask for is commercially sensitive. All your answers will be treated confidentially, and you can answer all, some, or none of the questions.

You can contact us at info@spaceskills.org

If you have any questions about this survey, you can get in touch with us at info@spaceskills.org.

Information you will need to provide

This survey is going to ask about:

- Your space-related hiring in the last 12 months
- Your skills needs
- Your training provision and needs
- Your engagement with education providers
- Your retention challenges

You might find it useful to have information about these topics to hand before you start. Your answers will be saved as you go, so you can pause and come back at any time.

Privacy

This survey mostly asks questions about your organisation, as well as a few questions about you.

We need your consent to store and process your personal information.

Your answers are not anonymous, but we will not share any data from this survey in a way that makes you or your company identifiable. We will be publishing reports based on the survey results that will contain aggregate and anonymous data.

You can [read our full privacy policy for this survey here](#), which explains how we store and process your data.

Q1: Do you consent to us processing your survey responses for research purposes?

- Yes – I consent
- No – I do not consent

Your details

This section is about who you are. We want to understand who is responding from each organisation, and we may get in touch if we need clarification about any of your answers.

Q2: What is your email address?

You won't be added to any mailing lists.

Q3: What is your name?

Q4: What is your job title?

Your organisation

Q5: Which organisation are you responding on behalf of?

Q6: Are you responding on behalf of your whole organisation?

- Yes – for my whole organisation
- No – just a part of my organisation

[Only if no to Q6]

Q7: Which part of your organisation are you responding on behalf of?

The site, team, or other subunit you are representing

For the rest of the survey, when we ask about 'your organisation', please respond only about your part of the organisation.

Q8: Which of the following space-related activities is your organisation engaged in?

Select all that apply. These are the same categories as are used in the annual survey of the [Size & Health of the UK Space Industry](#).

Design and/or manufacture of space equipment and subsystems

- Launch vehicles and subsystems
- Satellites/payloads/spacecraft and subsystems
- Scientific instruments
- Ground segment systems and equipment
- Suppliers of materials and components
- Scientific and engineering support
- Fundamental and applied research
- Space test facilities

Launch and/or operation of satellites

- Launch services
- Launch brokerage services
- Proprietary satellite operation
- Third-party ground segment operation
- Ground station networks
- In-orbit servicing
- Debris removal
- Space surveillance & tracking (SST)
- Space tourism
- In-space manufacturing
- Spaceports

Applications of satellite signals and data

- Direct-To-Home (DTH) broadcasting
- Fixed satellite communication services
- Mobile satellite communication services
- Location-based signal service providers
- Supply of user devices and equipment
- Processors of satellite data
- Applications leveraging satellite signals/data
- Other (e.g. quantum key distribution)

Specialised support services

- Launch and satellite insurance (inc. brokerage) services
- Legal and financial services
- Software and IT services
- Market research and consultancy services
- Business incubation and development
- Policymaking, regulation and oversight

Q9: Which of the following space-related capabilities does your organisation enable?

Select all that apply. These are the same categories as are used in the annual survey of the [Size & Health of the UK Space Industry](#).

- Broadcasting
- Satellite communication (excl. broadcasting)
- Positioning, navigation, timing (inc. GNSS)
- Earth observation (excl. meteorology)
- Meteorology

- Space technologies
- Space transportation (inc. launch)
- Space exploration
- Science
- Defence/military
- Generic technologies/components (e.g. AI)
- Financial, legal or other services (please specify)
- None of the above

What we mean by 'space-related role'

In this survey we will ask a lot about 'space-related roles', which are any roles that support space activities. This includes everyone from satellite engineers to software developers to administrative staff.

Q10: How many people work in your organisation in total in the UK?

Please provide headcount rather than FTE, and include everyone, not just those working in space-related roles. An estimate is fine.

Q11: What percentage of those people work in space-related roles?

See the definition of space-related role above. Include people working in non-technical roles such as admin and finance, where they support space activities. An estimate is fine.

Q12: What percentage of those people working in space-related roles are in space technical specialist roles?

By 'space technical specialist roles' we mean roles that require highly technical space-specific skills and knowledge (for example rocket engine design). We are excluding more generic roles that require an understanding of space but have significant skills overlaps with other sectors (such as general data processing). An estimate is fine.

Q13: Do people in your organisation work remotely?

- No – majority are fully in-person
- Yes – hybrid/partially remote
- Yes – majority are fully remote

[Only if No, or Yes - hybrid/partially remote to Q13]

Q14: Please provide the location and the space-related headcount for each of your organisation's offices.

If no space activities take place at a particular office then there's no need to include it.

Location or postcode	Space-related headcount

Your recent recruitment

Q15: At any point in the last 12 months, was your organisation recruiting for space-related roles?

- Yes – Expanding by recruiting for new roles
- Yes – Recruiting to replace staff who have left
- No – Not recruiting at all, in a hiring freeze
- No – Not recruiting at all, haven't needed to hire

[Only if Yes to Q15]

Q16: How many space-related vacancies were you recruiting for in total?

An estimate is fine

[Only if Yes to Q15]

Q17: Roles you've recruited for

For each space-related role that you've advertised for in the last 12 months, please provide the following information:

1. **Job title** – This can be generic or specific, and you can use the same job title more than once if you have recruited for it at different seniority levels
2. **Functional area** – Select from:
 - Aero/mechanical design
 - Systems engineering
 - Electronics design
 - Spacecraft operations

- Maintenance, manufacturing & materials
- Software & data
- Commercial operations / support staff
- Sector support (e.g. regulation, training, economic analysis)

3. **Seniority** – Select from:

- Senior
- Mid-level
- Entry-level or graduate
- Internship
- Apprenticeship

4. **Number** – The number of vacancies you wanted to fill for this role

5. **Recruitment difficulty** – Select from:

- Very easy
- Easy
- Neither difficult nor easy
- Difficult
- Very difficult

6. **Time to hire** – The time in weeks that it took to hire for this role, from publishing the advert to having a candidate accept an offer. Don't include time taken internally to do things like agree the advert wording or to onboard the successful candidate.

You can provide information about a maximum of 10 jobs. If you've hired more than that, please provide a representative sample of areas and seniorities. We are particularly interested in areas where you are persistently struggling to recruit.

If you are finding it difficult to complete this section because you have hired for a large number of roles, get in touch with us and we can help collect the information from you in a different way.

Job title	Functional area	Seniority level	Number	Recruitment difficulty	Time to hire (weeks)

[Only if Yes to Q15]

Q18: If it was difficult to recruit for these roles, why?

Select all that apply

- There weren't enough applicants
- Applicants lacked the required specialist skills, knowledge, or qualifications
- Applicants lacked the required behaviours, attitude, motivation or personality
- Other (please specify)
- Did not find it difficult to recruit

[Only if Yes to Q15]

Q19: What, if any, do you think were the underlying causes of your recruitment difficulties?

Select all that apply

- Competition from other space companies
- Competition from other sectors
- The pay we can offer is uncompetitive
- It is difficult to attract people to our location
- Challenges in recruiting from abroad
- Did not find it difficult to recruit
- Other (please specify)

Q20: Have you tried to hire from outside the UK?

- Yes
- No

[Only if Yes to Q20]

Q21: What percentage of your hires were from outside the UK?

An estimate is fine

[Only if Yes to Q20]

Q22: What barriers, if any, have you faced in recruiting from outside the UK?

Select all that apply

- Visa or paperwork costs
- Relocation costs
- Immigration paperwork complexity
- Immigration paperwork time
- English language skills
- Attracting applicants to the UK
- No barriers
- Other (please specify)

Q23: Is there anything else you would like to share about your recruitment challenges?

Extra information helps us better understand and address problems.

Your skills needs

Q24: Do you see skills gaps in space job applicants?

- Yes
- No

[Only if Yes to Q24]

Q25: For which skill areas do you see gaps?

Select all that apply. These categories are based on the [SpaceCRAFT Competencies Framework](#).

Aero/mechanical design

Design and analysis of spacecraft, their subsystems, and components from an aerothermal and mechanical perspective.

- Structural
- Thermal
- Propulsion
- Robotics (mechanical)

Systems engineering

Designing, developing and verifying integrated spacecraft systems.

- Systems engineering

Electronics design

Design and analysis of electronic systems and telecommunications equipment.

- Radio frequency & telecoms engineering
- Analogue and digital systems
- Optoelectronic systems
- Robotics (electronics)

Spacecraft operations

Launching, controlling, and maintaining spacecraft.

- Spacecraft operations
- Safety & regulation
- Launch

Maintenance, manufacturing & materials

Production, assembly, and testing of components and subsystems for satellites, spacecraft, and ground equipment.

- Maintenance
- Assembly, integration, and testing
- Manufacturing and materials

Software & data

Design and development of software and processing of data.

- Software engineering
- Data processing & manipulation
- Data analysis & modelling
- Data visualisation
- Artificial intelligence and machine learning
- Cyber security

Commercial operations

Work that supports the operations of a business, such as ensuring that projects run to time, people have the support they need, progress is communicated to clients, and finances and contracts are properly managed.

- Procurement
- HR
- Legal & financial
- Strategy & leadership
- Sales & commercial

Sector support

Work that supports the space sector as a whole.

- Funding & incubation
- Policy development
- Economics analysis
- Education and training
- Regulation

Transferable skills

Competencies that are required for most roles in the sector, regardless of specialism.

- Project management
- Team work

- Technical leadership
- Communication
- Problem solving
- Self-management

Other skills

- Other (please specify)

Q26: Do you have skills gaps in your current space workforce?

- Yes
- No

[Only if Yes to Q26]

Q27: For which skill areas do you see gaps?

Select all that apply. These categories are based on the [SpaceCRAFT Competencies Framework](#).

Aero/mechanical design

Design and analysis of spacecraft, their subsystems, and components from an aerothermal and mechanical perspective.

- Structural
- Thermal
- Propulsion
- Robotics (mechanical)

Systems engineering

Designing, developing and verifying integrated spacecraft systems.

- Systems engineering

Electronics design

Design and analysis of electronic systems and telecommunications equipment.

- Radio frequency & telecoms engineering
- Analogue and digital systems
- Optoelectronic systems
- Robotics (electronics)

Spacecraft operations

Launching, controlling, and maintaining spacecraft.

- Spacecraft operations
- Safety & regulation

- Launch

Maintenance, manufacturing & materials

Production, assembly, and testing of components and subsystems for satellites, spacecraft, and ground equipment.

- Maintenance
- Assembly, integration, and testing
- Manufacturing and materials

Software & data

Design and development of software and processing of data.

- Software engineering
- Data processing & manipulation
- Data analysis & modelling
- Data visualisation
- Artificial intelligence and machine learning
- Cyber security

Commercial operations

Work that supports the operations of a business, such as ensuring that projects run to time, people have the support they need, progress is communicated to clients, and finances and contracts are properly managed.

- Procurement
- HR
- Legal & financial
- Strategy & leadership
- Sales & commercial

Sector support

Work that supports the space sector as a whole.

- Funding & incubation
- Policy development
- Economics analysis
- Education and training
- Regulation

Transferable skills

Competencies that are required for most roles in the sector, regardless of specialism.

- Project management
- Team work
- Technical leadership
- Communication
- Problem solving
- Self-management

Other skills

- Other (please specify)

[Only if Yes to Q24 or Q26]

Q28: What, if any, do you think are the main causes of your skills gaps?

Select all that apply

- Unable to hire new staff
- New staff did not have the right skills when they were hired
- Existing staff have not received appropriate training
- Staff with the necessary skills have left
- Other (please specify)

[Only if Yes to Q24 or Q26]

Q29: What impact have skills gaps had on your business performance and growth in the last 12 months?

- Major impact
- Moderate impact
- Minor impact
- No impact

[Only if Yes to Q24 or Q26]

Q30: Have skills gaps had any of the following impacts on your organisation in the last 12 months?

Select all that apply

- Loss of business to competitors
- Delay in service or product development or reduced level of innovation
- Difficulty in meeting quality standards
- Higher operating costs
- Reduced productivity

- Difficulty in introducing new working practices, processes or technology
- Increased workload for other staff
- Outsourcing or subcontracting of work which might have been done in-house
- Other (please specify)

Q31: Do you expect your organisation's space skills needs to be the same in 3 years' time?

- Yes
- No

[Only if Yes to Q31]

Q32: What new/different skills do you think your organisation will need in 3 years' time?

Select all that apply. These categories are based on the [SpaceCRAFT Competencies Framework](#).

Aero/mechanical design

Design and analysis of spacecraft, their subsystems, and components from an aerothermal and mechanical perspective.

- Structural
- Thermal
- Propulsion
- Robotics (mechanical)

Systems engineering

Designing, developing and verifying integrated spacecraft systems.

- Systems engineering

Electronics design

Design and analysis of electronic systems and telecommunications equipment.

- Radio frequency & telecoms engineering
- Analogue and digital systems
- Optoelectronic systems
- Robotics (electronics)

Spacecraft operations

Launching, controlling, and maintaining spacecraft.

- Spacecraft operations
- Safety & regulation
- Launch

Maintenance, manufacturing & materials

Production, assembly, and testing of components and subsystems for satellites, spacecraft, and ground equipment.

- Maintenance
- Assembly, integration, and testing
- Manufacturing and materials

Software & data

Design and development of software and processing of data.

- Software engineering
- Data processing & manipulation
- Data analysis & modelling
- Data visualisation
- Artificial intelligence and machine learning
- Cyber security

Commercial operations

Work that supports the operations of a business, such as ensuring that projects run to time, people have the support they need, progress is communicated to clients, and finances and contracts are properly managed.

- Procurement
- HR
- Legal & financial
- Strategy & leadership
- Sales & commercial

Sector support

Work that supports the space sector as a whole.

- Funding & incubation
- Policy development
- Economics analysis
- Education and training
- Regulation

Transferable skills

Competencies that are required for most roles in the sector, regardless of specialism.

- Project management
- Team work

- Technical leadership
- Communication
- Problem solving
- Self-management

Other skills

- Other (please specify)

Q33: Is there anything else you would like to share about your skills needs?

Extra information helps us better understand and address problems.

Your training needs & provision

Q34: Did you provide training to your space workforce in the last 12 months?

- Yes
- No

[Only if Yes to Q34]

Q35: What type of training opportunities do you support or provide?

Select all that apply

- Formal training on the job training (e.g. structured training programme)
- Informal on the job training (e.g. shadowing more experienced staff)
- External accredited training (e.g. CPD course)
- External unaccredited training (e.g. a webinar)
- Secondments
- Sponsoring further study such as an apprenticeship or degree
- Other (please specify)

[Only if Yes to Q34]

Q36: Who provided your training?

Select all that apply

- Internal training by other members of staff
- External specialist training providers
- Professional associations, learned societies, or sector bodies
- Universities
- Further education colleges
- Other (please specify)

[Only if No to Q34]

Q37: Why haven't you provided training?

- Staff didn't require training
- We faced a barrier to providing training
- Other (please specify)

[Only if Yes to Q34 or faced a barrier in Q37]

Q38: What, if anything, is a barrier to providing training?

Select all that apply

- Staff do not want training
- Training is too expensive
- Not enough time for training
- Appropriate training is not available anywhere
- Appropriate training is not available locally
- Other (please specify)
- No barriers

Q39: Do you think there are gaps in training provision, and if so what provision would address this?

Your engagement with education

Q40: What type of engagement has your organisation had with schools, colleges, and universities in the last 12 months?

- Giving talks or doing outreach
- Providing internships/work experience
- Hiring graduates directly
- Providing scholarships or bursaries
- Supporting student projects
- Supporting/sponsoring PhDs or PhD projects
- Attending, hosting, or sponsoring careers fairs or events
- Attending, hosting, or sponsoring competitions
- Other (please specify)
- No engagement with schools, colleges, or universities

Q41: Do you provide apprenticeships?

- Yes
- No

[Only if Yes to Q41]

Q42: What kind of apprenticeships do you provide?

Select all that apply. If you are unsure, check this [government guidance about apprenticeship levels](#).

- Apprenticeship (Intermediate)
- Apprenticeship (Advanced)
- Apprenticeship (Higher)
- Apprenticeship (Degree-level)

Q43: Is there anything else you would like to share about how you engage with education providers?

Extra information helps us better understand and address problems.

Your retention challenges

Q44: Has your organisation experienced any difficulties in retaining space-related staff in the last 12 months?

- Yes – some difficulties
- No – no difficulties

[Only if Yes to Q44]

Q45: What are the main causes of your difficulties in retaining space-related staff?

Select all that apply

- Lack of development opportunities
- Poor company culture
- Poor work-life balance
- Bullying, harassment, or discrimination
- Low salaries
- Staff wanting to leave the space sector
- Staff being poached by other space companies
- Contracts ending
- Retirement
- Visa or immigration-related issues
- Other (please specify)

Q46: If you've had staff leave to join other sectors, which sectors have they moved to?

List as many as are relevant.

Q47: What has been the impact of poor retention on your business in the last 12 months?

Select all that apply

- Loss of business to competitors
- Delay in service or product development or reduced level of innovation
- Difficulty in meeting quality standards
- Higher operating costs
- Reduced productivity
- Difficulty in introducing new working practices, processes or technology
- Increased workload for other staff
- Outsourcing or subcontracting of work which might have been done in-house
- Other (please specify)

Q48: Is there anything else you would like to share about your retention challenges?

Extra information helps us better understand and address problems.

Additional feedback

[Only if defence listed as a capability in Q9]

Q49: Are there any specific differences that you find in recruiting, training, and retaining staff for space-related defence work compared to other kinds of work?

Q50: Is there anything else you'd like to share with us?

Q51: We will be conducting further in-depth structured interviews to delve deeper into the skills issues the sector faces. Would you be open to being interviewed in the next few weeks?

- Yes – I'm open to being interviewed
- No – I would not like to be interviewed

Appendix E: Interview questions

213 The questions below are an indication of the kinds of questions asked to interviewees. The exact course of the interview was determined by their survey responses and where the conversation went.

Interview script

Hi I'm [name]. Thanks for agreeing to chat with us today.

I'm from [Space Skills Alliance/know.space]. The UK Space Agency (UKSA) and Department for Science, Innovation and Technology (DSIT) has commissioned the Space Skills Alliance and know.space to identify national skills needs through the Space Sector Skills Survey.

The answers you have provided through the survey and this interview will directly feed into policy-making decisions at DSIT, and will be used by UKSA to inform funding of skills and training interventions.

I'm going to ask a few questions about your skills and training needs. If there's anything you don't want to talk about, that's fine.

I'm going to be recording this call so that I don't miss any of your points and you don't have to just watch me writing things down. We won't share the recording with anyone and it will be deleted after I transcribe it.

Quotes transcribed from your interview may be used in a report which will be delivered to UKSA and DSIT, and will be published publicly on the GOV.UK website.

Before publication, we will confirm whether you are happy with the use of your quotes, and you will have the opportunity to approve, amend, or veto use of your quotes, and to choose whether the quotes should be attributed to you or kept anonymous.

Do you have any questions before we start? [Pause for questions]

I'm going to turn on the recording now. [Start recording]

Questions

These questions act as a guideline for the conversation, rather than a strict Q&A.

Skills

- You said that [specify] are skills you need in your organisation. Could you give some more detail and examples?
- Where have the people currently in your organisation gained their skills? E.g. *university, CPD, on the job, other sectors.*
- You said you've provided [specify] training. What does this look like in practice?
- Is there anything you'd like to be doing around skills but aren't? Why not? E.g. *want to create a graduate scheme but lack resources, want to hire interns but don't know how, want to partner with universities but don't have contacts.*
- Where do you think the issues are coming from in the skills pipeline? E.g. *academia, individual companies, a lack of support from sector bodies.* What needs to change?
- *[If ticked the 'defence' box and provided insight into differences in hiring and retaining defence space staff]* Could you tell us more about the challenges you're facing here? Is there much fluidity to move between civil and defence space work to resolve these, either within your company or within the wider sector?

Recruitment

- You said you're struggling to recruit for [specify] roles. Could you give some more details and examples? What seniority are these roles?
- You said you're recruiting for [specify] roles. Do you primarily recruit for highly specialised/experienced space employees for these roles, or are you open to broadly qualified applicants who may need some training?
- How important are specific qualifications to hiring? Do you think it is essential for potential hires to have a degree, masters, PhD? How does this affect hiring decisions?
- You have offices in [specify]. Do you find recruitment challenges are different in different parts of the country?
- How has remote working affected your organisation's ability to recruit? E.g. *competition, hiring from EU, internationally, expectations of potential hires.*
- You cited [specify] as reasons for your recruitment difficulties. How might these be addressed? E.g. *More interns, specific uni courses etc*
- You cited competition from other [specify] sectors as an underlying cause of your recruitment difficulties. Which sectors, and why do you feel applicants feel they are more attractive?
- In general, would you say your recruitment approach equally targets early or mid-career individuals, or favours one over the other? Are there many recruitment opportunities for late career individuals?

Retention

- You said you're struggling to retain [specify] roles. Could you give some more details and examples? What seniority are these roles?
- You said that employees are leaving to go to other sectors. Which sectors are these?
- Is poaching from other space sector companies or competition with other sectors a greater retention challenge?
- In general, would you say your retention challenges are concentrated in any specific career stages, i.e. early, mid or late career groups?

Hiring from abroad

- You've said that hiring from abroad is a challenge. Could you tell us some more about that? *E.g. forms are very complicated, too many, lots of different agencies*
- If yes, is there anything specific about the UK system which is a challenge?

Future

- How do you see your organisation changing in the future? How will this impact skills needs? On what timescales? *E.g. expansion, diversification of products, expansion overseas, automation/AI.*
- Are there any particular technical skills or subjects which you think will be more necessary in the future? *Specific technologies, not generic '21st century skills'.*
- What do you think the long-term impact of skills shortages will be on your organisation? Will it change your business or operating model?

Support

- Are you aware of current support offered by government (UKSA, Catapult, UKRI)?
- Is current government support working well? If not, what should be changed?
- Is there anything else you think that government could do to help ensure skills needs within the space sector are met in the future?
- Do you feel like the focus of skills discussion is right? Is the balance between grad/retention/mid career right?

Appendix F: Interviewees

- 214 125 respondents (57%) said they were willing to be contacted for a follow up interview. 91 were contacted, selected based on their survey answers and a range of key themes. As far as possible, interviewees represented a range of segments, organisation sizes, and locations.
- 215 25 respondents agreed to be interviewed, and 21 were interviewed, listed in Table 31. Interviews typically lasted 30 to 60 minutes.
- 216 Note that not all quotes in the report are from interviewees, some are from free text answers to survey questions.

Name	Position	Company
Adam Taylor	Founder and Lead Engineer	Adiuvo Engineering & Training
Adele Fox	Marketing Director	EVONA
Andy Butt	Head of Business Development and Commercial	Reliance Precision
Chris Spedding	Programme Manager	BASIC
Dave Pollard	Education and Outreach Manager	Spaceport Cornwall
Derek Harris	Business Operations Manager	Skyrora
Felicity Mayers	HR & Finance Manager	Piran Composites
Graham Harrison	Special Projects Director	National Composites Centre
Dr Jason Hopkins	Senior Innovation & Research Scientist	Ordnance Survey
Jonathan Hendry	Chief Technology Officer	4 Earth Intelligence
Dr Martin Heywood	Director	Newton Launch Systems
Dr Peter Shaw	Senior Lecturer in Astronautics	Kingston University
Portia Bowman	Chief Executive Officer	Growbotics
Ralph Dinsley	Founder/Managing Director	3S Northumbria
Rhiannon Owen	Talent Acquisition Partner	Satellite Applications Catapult
Prof. Simon Evetts	R&D Director	Blue Abyss
	Visiting Professor	Northumbria University

Table 31: List of interviewees who opted not to remain anonymous. 5 interviewees wished to remain anonymous.