Towards a space competencies taxonomy

Joseph Dudley & Heidi Thiemann

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Space Skills Alliance

Space Skills Alliance

The Space Skills Alliance is the think-tank and backbone organisation addressing the skills shortage in the space sector. We work to ensure that the growth of the UK space sector is not constrained by a lack of access to talent.

We:

- Collect and publish data and analysis on the state of the sector's skills pipeline to identify issues in current approaches and policy, and inform decision making across the sector.
- Promote and advise on best practice in recruitment, retention, and training, and provide a consultancy service to our members.
- Bring together organisations and stakeholders from across the sector to network and learn from each other at events and through specialist working groups.

Authors
Joseph Dudley & Heidi Thiemann

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Photos
Covers: The Moon, Gregory H. Revera
Page 3: Crab Nebula, NASA/ESA/J. Hester and A. Loll (Arizona State University)
Page 5: James Webb Space Telescope, NASA Goddard/C. Gunn
Page 7: Terra Cimmeria (Mars), ESA/DLR/FU Berlin
Pages 9, 11, 13: Tokyo at night, NASA/Karen Nyberg
Page 15: ExoFiT rover, Airbus
Page 17: Europa's surface, NASA/JPL-Caltech/SETI Institute

Introduction & Summary

The UK's space sector is growing at a rate of more than 3% per annum, creating hundreds of new jobs each year[1b], and has set the goal that it should have a global market share of 10% by 2030[2].

However, UK space companies are facing a skills shortage. 68% predict that they will be hiring over the next 3 years, but already more than half of large organisations report being worried about having access to skilled workers, and nearly 40% of all organisations say staff recruitment is a major barrier to their growth[1c].

A taxonomy of competencies supports the process of recruitment, and facilitates upskilling and reskilling. It provides a common vocabulary for alignment between education providers, employers, and employees, and a common frame of reference against which we can measure demand for competencies, what competencies the space workforce already has, and the impact that new training courses might have.

With this in mind, we have developed an initial space competencies taxonomy. It is based on analysis of job adverts and builds on previous work including the draft Space Engineering Technician standards. As is to be expected, it has strong crossovers with other skills taxonomies, both general and specific. This taxonomy is based on the language used by employers, an important factor because it allows us to identify and measure the demand for skills.

It is the first taxonomy to be developed specifically for the space sector. This is important because the space sector is unusual in many ways, including having the most highly qualified workforce of any sector, with 75% of workers holding at least a first degree[1a] and having a segmented structure of upstream and downstream. A specialised taxonomy helps ensure that the specific workforce needs of the sector can be properly addressed.

- This is the **first competencies taxonomy to be developed specifically for the space sector**.
- It comprises about **250 competencies across five categories**: traits, knowledge, technical skills, transferable skills, and qualifications.
- It was **constructed through analysis of 812 early career UK space job adverts** from SpaceCareers.uk.
- It is a work in progress and is **not yet comprehensive**. We will continue to develop it as we conduct further research into the workforce needs of the sector.

1. UK Space Agency (2018), *Size & Health of the UK Space Industry 2018*, a: pp16-17, b: pp17-18, c: p19
2. Space IGS (2010), *A UK Space Innovation and Growth Strategy 2010 to 2030*, p10

Taxonomy structure

Hierarchy

The taxonomy has a hierarchical structure with up to five levels.

First level: competency types

At the top level are five categories. These are comparable with other definitions such as Engineering UK's five 'components of employability'[3]and the CBI's definition of employability[4] and similar to the Civil Service Success Profiles Framework[5]:

1. Traits

We define traits as features of a person's character or personality, embodied by certain behaviours. They encompass what is typically described as 'character' in education contexts[6,7], as well as interests (such as interest in space) and personal preference (such as willingness to travel).

While they are distinct from transferable skills as they are about mindset and temperament, they should not be considered as innate or unlearnable. They can, in most cases, be learned, but are typically developed over a longer time period and at an earlier stage of development than transferable skills.

In conversation they would typically be prefixed with 'You are'. Examples include: 'responsible', 'hardworking', and 'willing to travel'.

2. Knowledge

We define knowledge as facts or information about a given topic. It is often difficult to separate knowledge from skills, and in these cases we usually err towards classifying things as skills.

In conversation knowledge would typically be prefixed with 'You know about' or 'You have experience of'. Examples include: 'Engineering standards' and 'STEM Principles'. Foreign languages are also classified as knowledge, separate from communication skills.

3. Technical skills

We define technical skills as skills which are specific to a sector or job.

In conversation they would typically be prefixed with 'You can' or 'You have'. Examples include: 'Use CAD software' and 'Contribute to technical reviews'.

3. Engineering UK (2018), *Engineering UK 2018: The state of engineering*, p225
4. CBI (2014), *Time well spent: embedding employability in work experience*
5. Cabinet Office (2019), *Success Profiles*
6. The Jubilee Centre for Character and Virtues (2017), *A Framework for Character Education in Schools*
7. Department for Education (2019), *Character Education: Framework Guidance*

4. Transferable skills

We define transferable skills as skills which can be applied in a similar way to most jobs, regardless of sector. Elsewhere they may be referred to as 'essential skills', 'soft skills', or 'transversal skills'.

In conversation they would typically be prefixed with 'You can' or 'You have'. Examples include: 'Work in a team' and 'Attention to detail'.

5. Qualifications

We define qualifications as formal recognitions of certain knowledge or skills following an assessment process by a relevant body such as a college, university, or professional development organisation.

In conversation they would typically be prefixed with 'You have'. Examples include: 'Driving license' and 'PhD'.

Second level: thematic areas

At the second level are broad thematic areas such as 'Science & Engineering', 'Programming & Computer Science', and 'Marketing & PR'.

Third level: competencies

At the third level are the specific competencies. For knowledge competencies, these are topics like 'Orbital mechanics'; for skills competencies these are specific skills like 'Perform spectroscopy'.

Each item in the taxonomy has a specific code representing the hierarchical levels. For example, the code '3.2.1.1.1' represents the following:

```
3.2.1.1.1
3 - Technical skills
  2 - Programming & Computer Science
    1 - Process and analyse data
      1 - Geospatial data
        1 - GNSS data
```

Fourth level and below: subcompetencies

The fourth and lower levels are for adding specificity to the competency definition. For example: Process and analyse data (L3 competency) > Geospatial data (L4 subcompetency) > GNSS data (L5 subcompetency). Many competencies do not have subcompetencies at present, but might do in future iterations of the taxonomy. They are particularly useful for specifying software packages (eg. IT skills > MS Office > Excel).

Methodology

Datasource

To develop our taxonomy, we analysed job adverts posted on SpaceCareers.uk between December 2015 and December 2019. SpaceCareers.uk is a British space jobs board operated by UKSEDS, the UK's national student space society, which focuses on internships, graduate schemes, PhDs, postdoctoral fellowships, and other early careers opportunities. The cutoff criterion is that positions should ask for no more than three years of experience.

The initial dataset contained just under 1300 adverts. We cleaned this dataset by removing duplicate adverts, and excluding all adverts which were not for internships, graduate positions, or direct entry jobs. This left us with 812 adverts. The limitations of this dataset are discussed in the Limitations section.

Taxonomy development

We reviewed 104 adverts (~13% of total) by hand and tagged mentions of competencies such as 'Python' or 'problem solving', linking them to a taxonomy entry for the competency. For example, 'communication and presentation skills' and 'written and verbal communication' might both be linked to the taxonomic entry of 'communication skills'. In this way we built up a library of natural language examples of competencies in our taxonomy.

We then compared this library to the entire dataset, identifying which competencies were mentioned in each job advert.

Where no competencies were identified within a job advert, we reviewed the advert manually and added any missing competencies.

Accuracy

We assessed the accuracy of our algorithm by manually checking an additional randomly selected 50 job adverts and identifying any tags that had been missed or added incorrectly by the tagging algorithm.

Across the 50 jobs there were 468 tags in 383 categories. We found that 5 (1.3%) of these categories were incorrect – for example an advert for an administrative role described the employer as an 'electronics' company, and the job was incorrectly classified as requiring knowledge of electronics. We also found that there were 30 tags (6.4%) that we would have applied but had not been by the algorithm – for example we would have tagged 'autonomous and challenge-driven' as an example of the skill of working independently.

Future work

Building on this taxonomy

The taxonomy we present here is a work in progress and is not yet comprehensive. We will continue to develop it as we conduct further research into the workforce needs of the sector.

Most importantly, we want to improve its coverage. There are undoubtedly many skills that are missing because they did not appear in the jobs we analysed to produce the taxonomy. Analysing more jobs, particularly from other datasets will help to ensure that the taxonomy is a good representation of the skills needed across the sector.

We also intend to add definitions to each of the competencies identified in our taxonomy, creating a resource for the space sector which supports the process of recruitment, and facilitates upskilling and reskilling. Our goal is to have a common vocabulary for alignment between education providers, employers, and employees, and a common frame of reference against which we can measure demand for competencies, what competencies the space workforce already has, and the impact that new training courses might have.

We recognise that there are many other relevant taxonomies with which our work overlaps, and we want to identify and map these links so that the different taxonomies can be used together and do not needlessly duplicate each other.

Wider research

This report is the first step in our goal of building an evidence base to inform the development of a robust skills pipeline for the space sector. Our research areas include:

The space skills gap

Where are the skills shortages in the space sector?

Best practice

What is the best practice in recruitment, training, and inclusion within the space sector, and what can we learn from other sectors?

The future space workforce

What does the future space workforce look like, and how can we attract them to the sector?

Perceptions of the space sector

What do people think of the space sector, and is it a sector they want to join?

The Taxonomy

1: Traits

1.0: Traits

1.0.1: Creative / innovative
1.0.2: Enthusiastic
1.0.3: Flexible
1.0.4: Inquisitive / curious
1.0.5: Open-minded / willing to learn
1.0.6: Practical / hands on
1.0.7: Resilient
1.0.8: Resourceful / proactive
1.0.9: Responsible / trustworthy
1.0.10: Self-improving
1.0.11: Interested in space
1.0.12: Willing to travel
1.0.13: Self-motivated
1.0.14: Hardworking

2: Knowledge

2.1: Science & Engineering

2.1.1: Adhesives, bonding, soldering and fastening techniques required to meet space qualification standards.
2.1.2: Configuration and Document Management Control Processes including issue control, incorporation of change and End Item Data Pack.
2.1.3: CubeSats
2.1.4: Disciplines and handling in cleanliness and contamination-controlled environments.
2.1.5: Ground Support Equipment and Systems including electrical/electronic test equipment and mechanical handling equipment.
2.1.6: Imaging detectors
2.1.7: Launch vehicle design
2.1.8: Mechanical, Electrical and Electronic Analysis & Testing principles, including space industry-specific test standards.
2.1.9: RF/Microwave systems
2.1.10: Orbital Mechanics
2.1.11: Planetary science
2.1.12: Principles of Additive Manufacturing for application in space including powder quality and repeatability of build.
2.1.13: thermal-vacuum, electromagnetic compatibility, shock, vibration and acoustic testing.
2.1.14: Properties, handling and application of space qualified materials including Electrostatic Discharge (ESD) precautions.
2.1.15: Purpose of approved processes, components, parts and materials lists and verification control documentation.
2.1.16: Quality and Product Assurance principles
2.1.17: Radar
2.1.18: Space sector
2.1.18.1: Relationships between customers, partners & suppliers in the international space engineering and manufacturing sector.
2.1.19: Remote sensing
2.1.20: Robotics
2.1.21: Satellite communication systems
2.1.22: Software Defined Radio (SDR)
2.1.23: AIT such as vibration, thermal-vacuum, electromagnetic compatibility.
2.1.24: Spacecraft operations
2.1.25: Spacecraft Systems
2.1.26: STEM Principles
2.1.26.1: Precision and uncertainty in measurement systems, including limitations and appropriate use.
2.1.27: The space environment including thermal, vacuum, radiation, atomic oxygen and launch operations.
2.1.28: Vacuum and pressurised systems and measurement.
2.1.29: Engineering Standards
2.1.29.1: ECSS
2.1.29.2: GSWS
2.1.29.3: CCSDS
2.1.30: Concurrent design
2.1.31: Knowledge of control systems
2.1.32: Knowledge of electronics
2.1.33: Knowledge of ESA
2.1.34: Knowledge of mechanical design
2.1.35: Knowledge of optics
2.1.36: Knowledge of science
2.1.37: Knowledge of Synthetic Aperture Radar (SAR)
2.1.38: Knowledge of tribology
2.1.39: Design of experiments
2.1.40: Principles of thermodynamics

2.2: Programming & Computer Science

2.2.1: Embedded programming
2.2.1.1: Arduino
2.2.1.2: FPGA
2.2.1.3: Microprocessors
2.2.2: Encryption/cryptography
2.2.3: Networking, Ethernet
2.2.4: Software Standards
2.2.4.1: DO178-B
2.2.4.2: IoT protocols and standards
2.2.4.3: MISRA
2.2.4.4: UML
2.2.5: Image processing
2.2.6: Machine learning

2.3: Languages

2.3.1: French
2.3.2: German
2.3.3: Italian
2.3.4: English
2.3.5: Mandarin

2.4: Education & Outreach

2.4.1: Outreach
2.4.2: Teaching experience
2.4.3: Knowledge of the national curriculum
2.4.4: Experience with children

2.5: Work Experience

2.5.1: Research environment experience

The Taxonomy (continued)

3: Technical Skill

3.1: Science & Engineering

- 3.1.1: Work in facilities such as cleanrooms, workshops and testing facilities
- 3.1.2: Assemble, integrate and test at equipment, subsystem and system level.
- 3.1.3: Electronics AIT
- 3.1.5: Contribute to technical reviews such as assembly, integration and test readiness, and non-conformance reviews.
- 3.1.6: Contribute to the definition of space engineering process improvement plans.
- 3.1.7: Design electronics
- 3.1.8: Do aerodynamic analysis (use CFD software)
- 3.1.9: Do flight analysis
- 3.1.10: Do structural analysis (use FEA software)
  - 3.1.10.1: Abaqus
- 3.1.11: Do thermal analysis
- 3.1.12: Inspect electrical, mechanical or electronic equipment for quality assurance purposes.
- 3.1.13: Interpret outputs from manufacturing software such as Computer Aided Design (CAD) / Computer Aided Manufacture (CAM) and Product Data Management / Product Lifecycle Management (PDM/PLM)
- 3.1.14: Measure, test and analyse, using instruments such as pressure gauges, micrometers, balances and non-contact approaches.
- 3.1.15: Perform appropriate joining techniques
- 3.1.16: Perform electrical and electronic measurement and testing
- 3.1.17: Perform spectroscopy
- 3.1.18: Prepare and complete documentation and specifications
- 3.1.19: Support and maintain ground support systems for spacecraft and subsystems.
- 3.1.20: Use and maintain cryogenic systems for space applications
- 3.1.21: Use and maintain vacuum and pressure systems for space applications (such as environmental test chambers, pressure-fed propulsion systems, and gas supply lines for manufacturing & testing) including associated processes and documentation such as Piping & Instrumentation Diagrams.
- 3.1.22: Use CAD software
  - 3.1.22.1: Solidworks
  - 3.1.22.2: Siemens NX
  - 3.1.22.3: CATIA
  - 3.1.22.4: ProEngineer
  - 3.1.22.5: Autodesk Inventor
  - 3.1.22.6: SolidEdge
  - 3.1.22.7: EagleCAD
  - 3.1.22.8: CREO
  - 3.1.22.9: KiCad
  - 3.1.22.10: LTspice
- 3.1.23: Use GIS software
- 3.1.23.1: SaVoir
- 3.1.23.2: PCI Geomatica
- 3.1.23.3: ENVI
- 3.1.23.4: ArcGIS
- 3.1.24: Use internal and external Quality Management Systems
- 3.1.25: Use CAE software
- 3.1.26: Conduct practical engineering activities safely
- 3.1.27: Laboratory skills
- 3.1.28: Perform research
- 3.1.29: Design mechanical parts
- 3.1.30: Interpret specifications

3.2: Programming & Computer Science

- 3.2.1: Process and analyse data
- 3.2.1.1: Geospatial data
- 3.2.1.1.1: GNSS data
- 3.2.1.1.2: Satellite imagery
- 3.2.3: Design, develop, and deploy software
  - 3.2.3.1: C/C++
  - 3.2.3.2: C#
  - 3.2.3.3: CSS
  - 3.2.3.4: Django
  - 3.2.3.5: FOTRAN
  - 3.2.3.6: HTML
  - 3.2.3.7: IDL
  - 3.2.3.8: Java
  - 3.2.3.9: JavaScript
  - 3.2.3.10: Linux
  - 3.2.3.11: Matlab
    - 3.2.3.11.1: Simulink
  - 3.2.3.12: Python
  - 3.2.3.13: Ruby
  - 3.2.3.14: VBA
  - 3.2.3.15: Visual Basic
  - 3.2.3.16: XML
  - 3.2.3.17: .NET
  - 3.2.3.18: Acceleo
  - 3.2.3.19: Ecore
  - 3.2.3.20: GoLang
  - 3.2.3.21: JSON
  - 3.2.3.22: Solidity
  - 3.2.3.23: STK
- 3.2.4: Use cloud computing platforms
  - 3.2.4.1: AWS
  - 3.2.4.2: Docker
- 3.2.5: Design and use databases
  - 3.2.5.1: SQL
  - 3.2.5.2: PostgresSQL
  - 3.2.5.3: Microsoft SQL Server
- 3.2.6: Use version control systems
  - 3.2.6.1: Git
- 3.2.7: Data collection
- 3.2.8: Front-end development

3.3: Creative design

- 3.3.1: GUI design
- 3.3.2: Use creative software
  - 3.3.2.1: Adobe CC
    - 3.3.2.1.1: Photoshop
    - 3.3.2.1.2: InDesign
    - 3.3.2.1.3: Premier
- 3.3.3: Multimedia
  - 3.3.3.1: Video
  - 3.3.3.2: Audio
- 3.3.4: Illustration skills

The Taxonomy (continued)

3.4: Marketing & PR

3.4.1: Social media
3.4.2: Media
3.4.2.1: Press releases

3.5: Sales
3.6: Education & Outreach

3.6.1: Deliver planetarium shows
3.6.2: Teaching and lecturing

3.7: Finance

3.7.1: Use accounting software
3.7.1.1: Netsuite

3.8: Astronomy photography
3.9: Business development

4: Transferable Skill

4.0: Transferable Skill

4.0.1: Analytical skills
4.0.2: Attention to detail
4.0.3: Communication skills
4.0.3.1: Communicate verbally
4.0.3.1.1: Presenting / Public speaking
4.0.3.2: Write
4.0.3.2.1: Technical report writing
4.0.3.3: Listen
4.0.4: Interpersonal skills
4.0.4.1: Be polite
4.0.4.2: Work in a team
4.0.4.3: Customer/partner relationships
4.0.4.4: Negotiate and influence
4.0.4.5: Lead a team
4.0.5: IT skills
4.0.5.1: Eclipse software
4.0.5.2: MS Office
4.0.5.2.1: Outlook
4.0.5.2.2: Excel
4.0.5.2.3: Word
4.0.5.2.4: PowerPoint
4.0.5.2.5: Project
4.0.5.2.6: Visio
4.0.5.2.7: Publisher
4.0.5.3: CRM system
4.0.5.3.1: SalesForce
4.0.5.4: ERP system
4.0.5.5: Operating systems
4.0.5.5.1: Windows
4.0.5.5.2: Linux
4.0.5.5.3: OS X
4.0.5.6: Using databases
4.0.5.7: Project management software
4.0.5.7.1: MS Project
4.0.6: Planning & organisation
4.0.6.1: Event planning
4.0.6.2: Process management
4.0.7: Problem solve
4.0.7.1: 8D
4.0.7.2: FMEA
4.0.7.4: PDCA
4.0.8: Time management skills
4.0.9: Work independently
4.0.10: Work under pressure
4.0.11: Administer First Aid
4.0.12: Conduct risk assessments
4.0.13: Coach/mentor someone
4.0.14: Keep records
4.0.15: Manual dexterity
4.0.16: Numerical skills
4.0.17: Calm in a crisis
4.0.18: Follow health and safety guidelines

5: Qualifications

5.0: Qualifications

5.0.1: Other
5.0.1.1: Driving license
5.0.2: Project management
5.0.2.1: AgilePM
5.0.2.2: APM
5.0.2.3: ITIL
5.0.2.4: PRINCE2

5.1: Science & Engineering

5.1.1: Spacecraft Control
5.1.1.1: CAT2 Spacecraft Controller

Limitations

Taxonomy deficits

Omission of niche skills

Our approach to developing the taxonomy means that certain niche skills that are demanded for only a few jobs, but are nonetheless important to the sector, may have been omitted. We intend for the taxonomy to be a living database that is continuously improved upon, and hope to include any omitted skills in future iterations.

Dataset Limitations

Early careers bias

The SCUK dataset is made up of adverts for early career space jobs. The competencies demanded for early career jobs may be different from the demand across the sector more generally. In future work we will look at wider datasets to examine this in more detail.

Upstream bias

The SCUK dataset is significantly biased toward upstream companies compared to data from the UK Space Agency's Size and Health report[1b].

Segment	SCUK Dataset (% of jobs)	S&H 2018 (% of jobs)
Downstream	35	81
Upstream	65	19

As a result, where there is a significant variation between upstream and downstream demand for a competency (such as for data analysis skills), the 'all jobs' figure should not be considered an accurate picture of sector-wide demand, and instead demand should be looked at on a sector-specific basis.

Individual job bias

SpaceCareers.uk cautioned that some schemes with large numbers of openings – for example the ESA Young Graduate Trainee Programme – are represented by only a single advert per year.

Inclusion of non-UK jobs

Though we present our analysis as being an assessment of skills demand in the UK space sector, about 30% of the jobs in the SCUK dataset are based outside of the UK. Of these, most (28%) are based in Europe, primarily Germany (10%) and the Netherlands (4%).

SpaceCareers.uk advertised these roles as they were open to British nationals, and we include them as many relate to work in which the UK is closely involved, or to agencies such as ESA of which the UK is a member country.

There is no indication that the demands of the European space sector are significantly different from those of the UK's, and many of these roles may need to be duplicated in the UK after Brexit if the UK develops replacement for EU programmes such as Galileo[8].

UK regional bias

The SCUK dataset has a significant bias toward companies in the South East of England and Scotland at the expense of London, the South West, and the East of England compared to data from the UK Space Agency's Size and Health report[1d].

Region	SCUK Dataset (% of jobs)	S&H 2018 (% of employees)
Scotland	8.7	18.1
North East	0.2	2.2
North West	1.6	5.6
Yorkshire and the Humber	0.3	3.1
East Midlands	5.2	2.1
West Midlands	0.2	2.8
East of England	5.7	10.5
Wales	0.5	1.2
London	9.0	29.4
South East	53.9	21.6
South West	9.4	3.2
Northern Ireland	0	0.3
Other (includes jobs with no fixed location)	5.2	0

It is not clear why this is the case, but as a result care should be taken when considering our findings in a regional context. We have chosen not to segment our results by region because the sample size for some regions is too small to be a useful indication of demand in those regions.

8. Department for Business, Energy & Industrial Strategy (2019), *Satellites and space programmes from 1 January 2021*

Dataset characteristics

Country breakdown

Country	Number of jobs (count)	Number of jobs (%)
Austria	9	1.1
Belgium	9	1.1
Bulgaria	1	0.1
Canada	2	0.2
Chile	1	0.1
Czech Republic	2	0.2
Denmark	3	0.4
Europe Wide	2	0.2
Finland	7	0.9
France	20	2.5
French Guiana	2	0.2
Germany	79	9.7
Ireland	1	0.1
Italy	15	1.8
Japan	9	1.1
Luxembourg	7	0.9
Norway	1	0.1
Poland	2	0.2
Portugal	1	0.1
Spain	13	1.6
Sweden	4	0.5
Switzerland	2	0.2
The Netherlands	36	4.4
UK	573	70.6
USA	9	1.1
Worldwide	2	0.2

UK region breakdown

Region	Number of jobs (count)	Number of jobs (%)
East Midlands	30	3.7
East of England	33	4.1
London	52	6.4
North East	1	0.1
North West	9	1.1
Scotland	50	6.2
South East	310	38.2
South West	54	6.7
Wales	3	0.4
West Midlands	1	0.1
Yorkshire and the Humber	2	0.2
Other	30	3.7
Non UK	237	29.2

Job type breakdown

Job Type	Number of jobs (count)	Number of jobs (%)
Apprenticeship	17	2.1
Direct Entry Job	410	50.5
Graduate Position	190	23.4
Internship	195	24

Business size breakdown

Size Classification	Number of jobs (count)	Number of jobs (%)
Micro	35	4
Small	94	12
Medium	207	25
Large	281	35
n/a	195	24

Job category and functional area breakdown

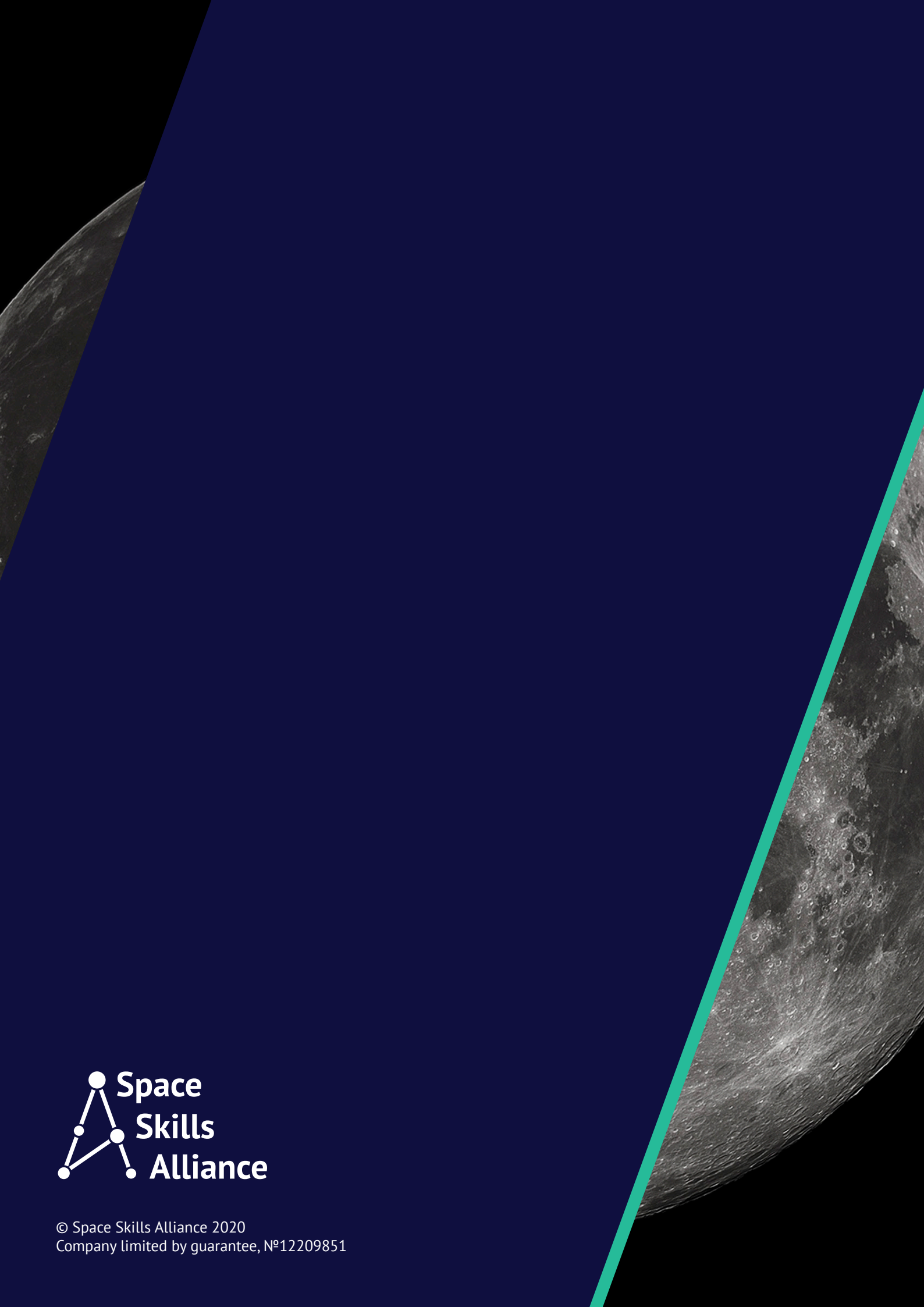
Category	Functional Area	Number of jobs (count)	Number of jobs (%)
-	Mixed	16	2
Administration	Administration	14	1.7
	IT	6	0.7
	Events	7	0.9
	Finance	10	1.2
	HR	2	0.2
	Management	2	0.2
	Project management	21	2.6
	Recruitment	3	0.4
Business	Business Analyst	7	0.9
	Business Development	18	2.2
	Communication	27	3.3
	Marketing	17	2.1
	Sales	14	1.7
Computing & Data Analysis	Architecture	6	0.7
	Artificial Intelligence and Machine Learning	3	0.4
	Data Analysis	16	2
	Data science	5	0.6
	Geospatial	1	0.1
	Software Engineering	124	15.3
	Remote sensing	49	6
	Web Development	3	0.4
Education & Outreach	Outreach	32	3.9
Engineering	Assembly, Integration and Test	12	1.5
	Astrodynamics	16	2
	Technician	12	1.5
	Telecommunication	14	1.7
	Control	12	1.5
	Design	1	0.1
	Electrical	11	1.4
	Electronics	75	9.2
	Systems & AIT	34	4.2
	Materials	2	0.2
	Mechanical	34	4.2
	General engineering	33	4.1
	Mission Planning	5	0.6
	Propulsion	7	0.9
	Quality	6	0.7
Engineering	Systems	33	4.1
	Space systems	5	0.6
	Spacecraft Operator	18	2.2
	Structural	3	0.4
	Thermal	7	0.9

Job category & functional area breakdown (continued)

Category	Functional Area	Number of jobs (count)	Number of jobs (%)
Other	Education	3	0.4
	Journalism	4	0.5
Policy	Policy	18	2.2
Science research	Science research	41	5
	Earth Science	2	0.2
	Physiology	1	0.1

Employer segment and business area breakdown

Segment	Business Area	Number of jobs (count)	Number of jobs (%)
Ancillary	Non-profit	26	3.2
	Policy and regulation	5	0.6
	Space agency	48	5.9
	Other	55	6.8
	Research & development	50	6.2
	Consultancy	8	1
	Academia	92	11.3
	Marketing and communications	3	0.4
	Education & Outreach	22	2.7
	Market research and consulting	3	0.4
	Recruitment	21	2.6
Downstream	Downstream software and IT	1	0.1
	Satellite data user	1	0.1
Midstream	Ground segment equipment	5	0.6
	Satellite meteorological service provision	3	0.4
	Satellite operations	2	0.2
	Sat data processing	47	5.8
	Satellite communication service provision	24	3
	Satellite EO service provision	30	3.7
	Ground segment operator	22	2.7
	Midstream software and IT	29	3.6
	Midstream support services	27	3.3
	Satellite navigation service provision	9	1.1
Upstream	Upstream software and IT	1	0.1
	Prime/system integrator	62	7.6
	Launch services	7	0.9
	Launch vehicles and subsystems	22	2.7
	Component/materials supplier	36	4.4
	Testing services	2	0.2
	Upstream support services	4	0.5
	Subsystem supplier	46	5.7
	Robotics	4	0.5
	Satellite/payload manufacturing	95	11.7



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