The current structure of the European space manufacturing sector

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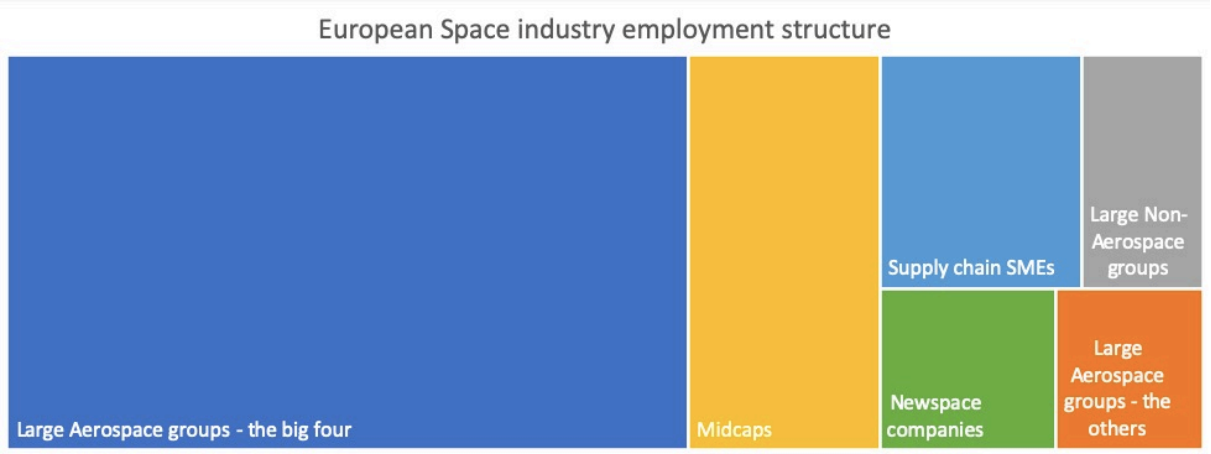
Main data sources: Eurospace facts and figures survey - Eurospace Newspace List - Eurospace survey of SMEs in the supply chain - all data proprietary, reproduction forbidden.

Corporate organisation

The European space industrial supply chain[1] (about 50000 employees) is embedded in the wider Aerospace and Defence sector, with four very large[2] conglomerates (Airbus, Thales, Leonardo, Safran) and a few big, but lesser, groups[3] (e.g. Kongsberg, Dassault, RUAG, ...). Together, these large aerospace corporations control directly and via their subsidiaries more than 30000 employees (i.e. more than 60% of total employment).



Most of the space industry employment is located in the four very **large aerospace groups - The big four**:

- The Airbus group, with its Defence and Space division, its subsidiaries and participations, and with its 50% share of the ArianeGroup JV, is clearly the largest player in the European space supply chain with more than 14000 direct employees in the space sector[4].
- The Thales group, with its own space activities, and its majority and minority shares in the Thales Alenia Space and Telespazio JVs is the second largest player, worth close to 7000 space employees[5].

[1] *By Space industrial supply chain we consider the industrial structures that are involved in the design, development and manufacturing of space systems. By Space systems we consider spacecraft and launch systems, plus the professional ground segment required for their test, assembly and operations. We do not include in this analysis the downstream sector (i.e. the sector in charge of operating the space systems, satellite and launch operators, telecoms operators, GIS providers etc.), nor the one producing consumer terminals (GPS receivers, DTH antennas etc.).*

[2] *i.e. counting more than a few tens of thousands employees worldwide, or more*

[3] *i.e. counting 10 to 20 thousand employees worldwide*

[4] *Including the prorata of ArianeGroup*

[5] *including the prorata of Thales Alenia Space and Telespazio*

- The Leonardo group, on top of its own space activities, also co-owns Thales Alenia Space and Telespazio with Thales (and is also a strategic investor in Avio); it is ranking third in Europe, with more than 4500 space employees[6].
- The Safran group, like Leonardo, has its own space related units and products, it is also the co-owner of the ArianeGroup JV with Airbus. This puts it in the fourth seat with close to 3000 employees[7].

These four very large groups are providing almost 60% of the European space industrial capabilities and workforce (but space activities represent a small fraction of their global business: 10% and less).

The **other large aerospace groups** (e.g. Kongsberg, Dassault, RUAG, ...) contribute a much smaller fraction of employment to the sector, in the order of 2500-3000, about 5 to 6% of the total employment.

The remaining employment of the sector is distributed between four categories:

- Smaller space business units incorporated in **large non aerospace groups,** i.e. operating outside the aerospace and defence sector (such as Altran, Serco, Cap Gemini, Air Liquide, CGI...). These are usually rather small units (only a handful have more than a 100 space employees), for a total workforce in the order of 3000, i.e. about 6% of the total sector employment[8].
- Medium size independent[9] companies, usually active in aerospace and/or defence markets (OHB, SABCA, NAMMO, APCO, TERMA, Avio etc.). These companies, that could be labelled as **Midcaps**, accumulate more than 8000 space employees, with the largest one being the OHB group, followed by GMV and Avio. Many have very small space units, despite being quite large (e.g. QinetiQ).
- **The supply chain SMEs**: about 400-500 SMEs contribute to the European space supply chain. Only a few are 'pure' space players, while the most is composed of aerospace businesses, often micro-enterprises, where the space workforce may represent less than 10 employees. Their workforce may represent as much as 4000 to 6000[10] of the total. The majority of SMEs in the space supply chain are located in France, Germany and Italy, in close proximity to the large players.
- And last, but not least, the emerging **newspace companies**. In the past decade, fuelled by market expectations on micro-launchers, micro-satellites and cubesats, a few tens of companies have emerged in Europe. Some are turnkey and fully integrated system suppliers, other are equipment/subsystem suppliers addressing this specific segment of small and micro systems. A few have grown to respectable size (up to, or more than a 100 employees, such as GOM Space, ISIS, Mynaric, IceEye, Nanoavionics, Isar, RFA, ...), this segment of the industry may now represent 1500 employees or more in Europe. The majority of these recent companies are independent SMEs.

Geographical distribution

The European space sector is very unevenly distributed in Europe, with only a few countries providing most of industrial capacities. It is also interesting to note that the 'big four' are present in a growing number of European countries. SMEs (including newspace players) have developed more in the countries with a large

[6] including the prorata of Thales Alenia Space and Telespazio, Avio not included

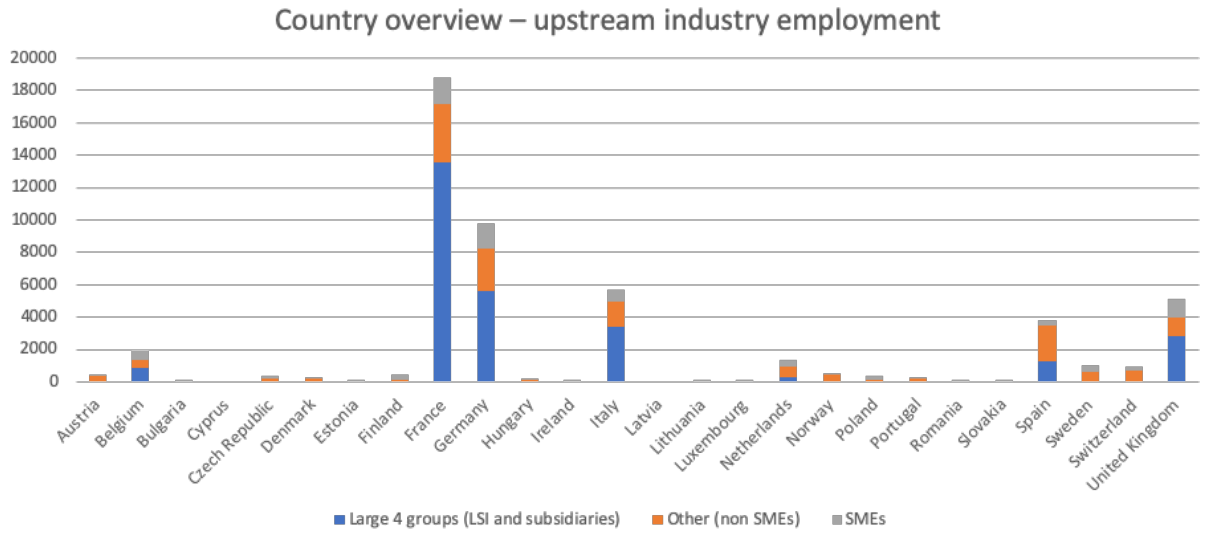
[7] Including the prorata of ArianeGroup

[8] In total, the very large corporations (with global employment above 10000) provide almost 70% of total employment of the European space industry.

[9] Independent refers to public listed companies or private equity, with no majority shareholder that is a large group, and/or family owned businesses. The level of independence of any company is sometimes difficult to assess lacking complete information on capital ownership. This information is not always public.

[10] There are no dedicated statistics on the space supply chain SMEs, The information is derived form a Eurospace soft assessment of the SMEs involved in the supply chain of its members and the few larger ones participating in the Eurospace facts and figures survey.

established industrial base than in smaller countries. In fact, the presence of large and mid size groups seems to provide the most solid foundation for industrial development in the smaller European countries (as shown by the industrial structures in such countries as AT, CZ, DK, NO, PL, PT, SE and CH).



Supply chain organisation

Space programmes are usually capital and workforce intensive, characterised by the contribution of a wide array of industrial capabilities and the integration of an even wider range of technologies. Thus, the space supply chain is very diverse. Consequently, space programmes are organised with a multi-layer contractual structure where one top level contractor (the prime, or industrial architect) manages the complexity of the programme for the customer, ensuring the procurement and integration of all system parts and sub-assemblies (AIT: assembly integration & test).

The prime contractor is thus at the upper end of a complex procurement chain, where numerous intermediate deliveries are provided by lower tier companies (subcontractors): from materials, components and building blocks, to equipment and subsystems. Subcontractors may also provide specific expertise in the form of specialised services, such as engineering, testing, project management, market research, legal etc. Subcontractors will also provide specific hardware to be used during integration and test (Electrical/Mechanical ground support equipment).

It is difficult to assess with precision the contribution to the overall system value of each industrial layer, and in particular the value of AIT activities. Elements gathered in the Eurospace facts & figures survey suggest that the AIT function may represent between 15 and 30% of the value of space contracts. This value would be at the lowest for recurrent systems, and would increase for new designs - the value would also increase with the growing complexity of the supply chain involved, indeed the prime also manages the contracts and subcontracts, the planning, and the numerous programme reviews[11]. Intermediate deliveries and support functions and products would then represent 70 to 85% of the programme value. Still, the distribution of revenues between corporate entities in the Eurospace survey shows that subcontracted work represents only 30 to 40% of the total sector turnover, this would mean that integrated supply chains contribute for about half

[11] *Preliminary Design Review - Review Item Discrepancies - Flight Readiness Review - Hold Qualification Review - Flight Acceptance Review (FRR) - Manufacturing Readiness Review - Launch Readiness Review - Commissioning and Commissioning Result Review - End of Life Review - Mission Close-out Review... the ECSS management process for ESA programmes is very thorough.*

of the intermediate deliveries. This is consistent with the high vertical integration of the European space industry where a handful of large corporations have absorbed the majority of industrial assets (as described in the previous section).

Indeed, with the wave of industrial restructuring that have swept the European Aerospace industrial landscape in the past decades, the space sector has increased its concentration through horizontal and vertical integration. With an Herfindahl–Hirschman Index of 16% the European space industry exhibits moderate concentration, notwithstanding, the 3 largest companies absorb 63% of the total turnover, the figure reaches 85% for the 10 largest, and as high as 95% when considering the 50 largest players.

Furthermore, only a handful of industrial architects (or primes) have remained, and the largest ones are now located in the main industrial groups and have thus integrated the capability to produce many subsystems and equipment internally.

For instance, Airbus and Thales Alenia Space are, at the same time, the largest European prime contractors for spacecraft systems, and among the largest equipment and subsystem suppliers of the European supply chain. In a similar guise, Avio and Arianegroup are both prime contractors respectively for Vega and Ariane and at the same time they are among the largest subsystem suppliers to one another.

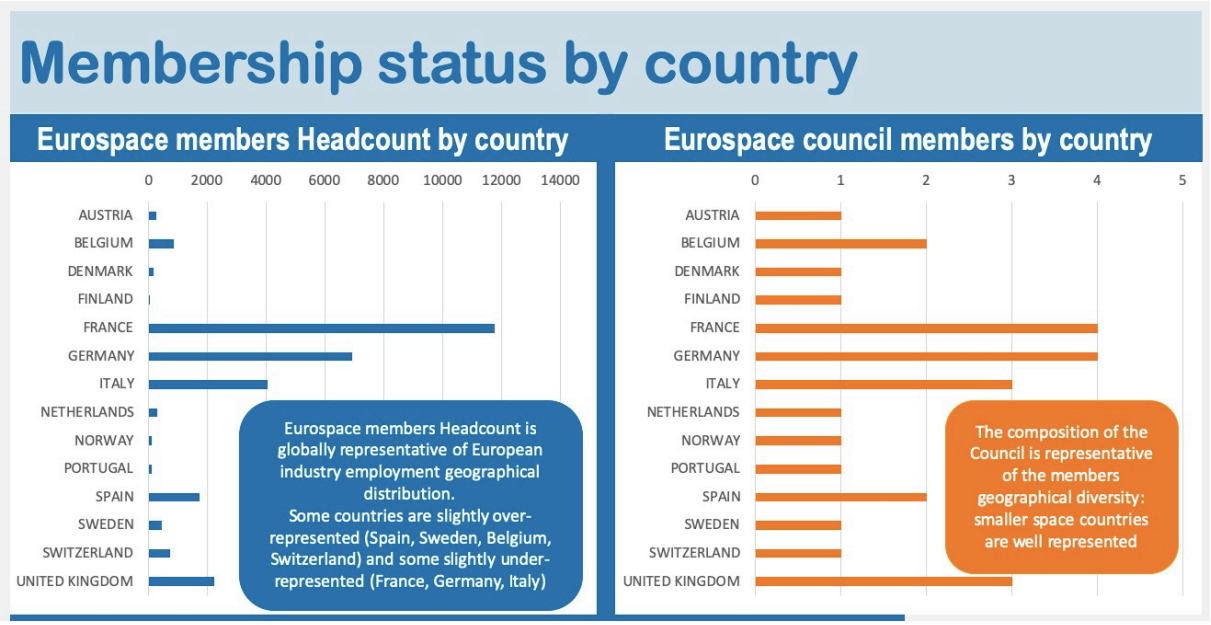
Conclusion

Today the Eurospace space sector is organised with only a handful of prime contractors. The largest of them are located in the major European aerospace groups, and are at the helm of a large verticalised supply chain that makes them also the largest equipment and subsystem suppliers in Europe. Not all primes are located in large groups: three important midcaps are also prominent prime contractors, respectively for satellite, launcher and ground systems. The rest of the supply chain is rich of a few hundred subcontractors of varied sizes, including space divisions of large (and very large) groups, midcaps and SMEs - most of them are micro enterprises or very small business units. A budding prospective market for very small satellites and launchers (the 'newspace') is supporting the emergence of a new industrial segment, composed mainly by independent small and very small companies.

The geographical distribution of the European industry is a direct consequence of decades of localised/domestic procurement for space institutional programmes in Europe, with the French leading the financial effort by far, resulting in the French industry now contributing to more than 35% of the total industrial employment. Other space nations of significance in Europe are Germany, Italy and the UK, and, to a lesser extent, Spain, Belgium and Switzerland. Together these 7 countries contribute 85% of European industrial capabilities, and the most of institutional budgets.

About Eurospace

Eurospace is the leading European association for the space manufacturing industry. With its members representing 70% of the total space industry employment Eurospace is the most representative space industry organisation in Europe. Eurospace members are highly representative of the European industrial landscape, matching very closely the European distribution by country.



The Eurospace membership includes all the large European prime contractors, as well as all the major midcaps, equipment and subsystem suppliers in Europe.

Eurospace members by corporate category

Company	Country	Size
AEDCP	**PORTUGAL**	Association
AIR LIQUIDE ADVANCED TECHNOLOGIES	**FRANCE**	Large group
AIRBUS DEFENCE & SPACE GmbH	**GERMANY**	Large group
AIRBUS DEFENCE & SPACE Ltd	**UNITED KINGDOM**	Large group
AIRBUS DEFENCE & SPACE NETHERLANDS B.V.	**NETHERLANDS**	Large group
AIRBUS DEFENCE & SPACE SAS	**FRANCE**	Large group
AIRBUS DEFENCE & SPACE SAU	**SPAIN**	Large group
ALTER TECHNOLOGY-TÜV NORD S.A.U.	**SPAIN**	Large group
APCO Technologies	**SWITZERLAND**	Midcap
ARIANE GROUP SAS	**FRANCE**	Large group
ARIANESPACE	**FRANCE**	Large group
AVIO SpA	**ITALY**	Midcap
AZUR SPACE	**GERMANY**	SME
CGI IT UK Ltd	**UNITED KINGDOM**	Large group
Dassault Aviation	**FRANCE**	Large group
DEIMOS	**SPAIN**	Large group
GMV Aerospace and Defence S.A.U.	**SPAIN**	Midcap
INDRA SISTEMAS SA	**SPAIN**	Large group
KONGSBERG DEFENCE & AEROSPACE	**NORWAY**	Midcap
OHB ITALIA	**ITALY**	Midcap
OHB SYSTEMS AG	**GERMANY**	Midcap
RUAG SCHWEIZ AG RUAG SPACE	**SWITZERLAND**	Midcap
RUAG SPACE AB	**SWEDEN**	Midcap

RUAG SPACE FINLAND OY AB	**FINLAND**	Midcap
RUAG SPACE GmbH	**AUSTRIA**	Midcap
SABCA	**BELGIUM**	Midcap
SAFRAN AIRCRAFT ENGINES	**FRANCE**	Large group
SENER Ingeniería y Sistemas, S.A.	**SPAIN**	Midcap
SITAEL S.p.A.	**ITALY**	Midcap
TECNALIA RESEARCH & INNOVATION	**SPAIN**	Midcap
TELESPAZIO SpA	**ITALY**	Large group
TELESPAZIO GmbH	**GERMANY**	Large Group
TERMA A/S	**DENMARK**	Midcap
TESAT Spacecom GmbH&Co. KG	**GERMANY**	Large group
THALES ALENIA SPACE BELGIUM	**BELGIUM**	Large group
THALES ALENIA SPACE FRANCE	**FRANCE**	Large group
THALES ALENIA SPACE ITALY	**ITALY**	Large group
THALES ALENIA SPACE SPAIN	**SPAIN**	Large group
TNO	**NETHERLANDS**	Midcap
VITROCISET	**ITALY**	Large group
TTTech Computertechnik GmbH	**AUSTRIA**	Midcap

Note that we have attributed the category **Large Group** to all members that are affiliated to groups having more than 10000 employees worldwide. The category **SME** is attributed according to EU definition. The category **Midcaps** thus incudes all companies that are larger than SMEs and not affiliated to any large group of more than 10000 employees worldwide. This is not an official definition of Eurospace (the Eurospace Midcaps Task Force will elaborate its own), but just a practical placeholder lacking a consistent EU-wide definition[12].

[12] Currently the EU has only set a 'recommendation' in 2003 (2003/613/EC) for midcaps to include companies up to 3000 employees. The French government has an the ETI category that goes up to 5000 employees, and up to 2b€ balance sheet. Financial markets usually define midcaps as companies with market capitalisation up to 10B€.