



ASD-EUROSPACE

The Space group in ASD

Facts & Figures

24th edition, July 2020

The European space industry in 2019

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About Eurospace

Eurospace - a non-profit organisation founded in 1961 - fosters the development of space activities in Europe and promotes a better understanding of space industry stakes and challenges. Its members are the main space industry manufacturers and launch service providers. Eurospace members encompass the whole span of the space industrial chain, are present in most European countries and represent the core of the European space industry activity from both a turnover and employment point of view.

Since 2004, Eurospace is the Space Group of ASD (AeroSpace and Defence Industries Association of Europe) where it represents and defines the space viewpoint of the association. This new aggregated structure allows industry to address transversal stakes and challenges between aeronautics, defence and space industrial activities.

Since its creation, ESA (European Space Agency) has maintained formal links with Eurospace. The association provides an effective entry point for the industrial sector and is the preferred medium to discuss industry-wide topics. A frame contract between ESA and Eurospace was signed in 1987, which allows the association to perform advisory work for the Agency. In 2001, a Memorandum of Understanding (MoU) that officially recognised Eurospace as the representative body of the European space industry was signed. The MoU covered all aspects related to new programmes, competitiveness, research & technology, and administration. In 2012, the ESA Eurospace MoU was renewed.

Eurospace plays a key role in the European Space Technology Strategy process, officially presenting the whole European space manufacturing industry views on technology evolution and harmonisation.

Eurospace has established and maintained a comprehensive network of contacts with the relevant national ministries as well as with the main national space agencies in Europe. As policy evolution required, Eurospace extended its reach to new institutions, such as the EDA (European Defence Agency) or Defence agencies for security and defence matters.

Over the past 15 years, the European Union has developed a strong interest in space, from the research and development point of view (with dedicated space budgets being included in the 6th and 7th and 8th Framework Programmes for example), but also as a user and promoter of space infrastructures (as with the Galileo programme or the Copernicus infrastructure). Indeed, space services and applications are now recognised as efficient tools for policy implementation, environmental studies, situation assessments, etc. to support the European Commission and a number of EU Bodies and Agencies. Eurospace mandate covers the relevant EU bodies, including Commission Directorate Generals, the Council, the Parliament etc. Eurospace eventually established a dedicated office in Brussels in 2001.

Eurospace is a recognised interlocutor to the European Union, and an active participant to EU-led industry consultations on space, providing data, analysis and assessments on space industry related issues to relevant DGs as required.

Offices

In Paris	In Brussels
15 Av. De Ségur	10 Rue Montoyer
75007 Paris	B1000 Bruxelles

Key personnel

President: Mr André Hubert Roussel
 Secretary General: Mr Olivier Lemaitre
 Research and Managing Director: Mr Pierre Lionnet
 Office & Conference Manager: Ms Nathalie Aleccon
 Policy Analysts: Ms Zohra Mokadel & Mr Charles Galland
 Technology Strategy: Mr Jean-Charles Treuet & Mr Jérémy Hallakoun

www.eurospace.org

Contents

About Eurospace	3
Foreword	6
Overview	7
A specialised strategic sector.....	7
Markets and customers	8
Main indicators	11
Long series indicators	12
Sector Demographics	15
Industry employment - age and gender distribution	15
Industry employment - Qualification structure.....	15
Industry employment - distribution by country.....	16
Industry employment - distribution by company.....	18
<i>Employment in large groups</i>	18
<i>SMEs in the space sector</i>	19
Final Sales by Market Segment	21
Overview: European sales vs. Export	21
Overview - Public vs. Private customers.....	23
Customer details.....	24
<i>European public/institutional customers</i>	24
EU programmes contribution to industry Sales (estimate - M€).....	26
<i>The commercial market (private customers and exports)</i>	27
Overview: Historic series - customer segment.....	28
Final Sales by Product Segment	29
Overview: sales by main product segment	29
<i>Focus: Military systems and military customers</i>	31
Launcher systems sales	32
Satellite applications sales	36
Scientific programmes sales.....	39
Ground segment activities.....	42
Output of the European space industry in 2019	45
European spacecraft launched in 2019	45
<i>Correlation between spacecraft mass at launch and industry revenues</i>	48
Ariane and VEGA launches in 2019	48
Methodology	50
Introduction to the survey	50
Perimeter of the survey.....	50
Data Collection.....	50
Consolidation Model	51
<i>The need for consolidation</i>	51
Methodological update in 2010	51

Definitions	51
Space systems and related products considered in the survey	51
<i>Launcher systems</i>	52
<i>Spacecraft/satellite systems</i>	52
<i>Ground Segment (and related services)</i>	52
Sector concentration: employment in space units, employment by unit and cumulated %	52
Survey information	53
Eurospace economic model.....	53
2019 Survey statistics: questionnaire return rate in % of units, sales, and employment.....	53
Companies having supported the survey in 2020	54
Survey release notes	62
Long series information	62
Perimeter changes	62
Copyright policy	63
Survey/Report Credits	65

Foreword

by Pierre Lionnet : Research Director

This 24th edition of the Eurospace facts & figures annual report was produced in a difficult moment for our sector. Europe was struck by the Covid-19 pandemic, creating management and production disruption in all companies of the European space sector. This unique situation has affected Eurospace as an organisation as well as the companies participating in the survey. As a result our survey and report have been delayed and we have not been able to publish the results of our annual survey in June as we usually do. Furthermore, in order to avoid further delays in the publication we have issued the first version of the report as fast as humanly possible, cutting short all review, verification and professional editing steps we usually undertake. The published report may thus contain minor issues and inconsistencies, but the general figures and trends are considered reliable. We apologise for this in advance to our readers, and we will probably issue a revised version of the report after the summer.

Despite the difficulties of the period we are proud to announce that we have added 50 new companies (most of them start-ups and micro-enterprises) to our economic model, which now counts almost 350 European space units. We have also created data proxies and estimates for the most recent ESA member countries, based on information associated to their involvement in ESA programmes. Eurospace is also monitoring the emergence of new players in the *newspace* European ecosystem and is inviting the more significant ones to participate in the survey. In the meanwhile we have created appropriate proxies and estimates to reflect their contribution to the European space manufacturing ecosystem, in particular from the perspective of employment.

As with every year we have maintained our efforts to ensure that each data point we insert in our economic model is thoroughly verified to avoid methodological and data discontinuities. The consolidated data sets we publish this year exhibit our usual good confidence ratio (>70% for employment data and >90% for final sales data).

I must highlight, again this year, that without the unfailing commitment of the key players in the sector to support the survey we would not be able to achieve such high levels of confidence; I wish to warmly thank all participants for their dedication and trust.

This year's data shows a rather stable evolution profile compared to last year with a slight growth that brings industry revenues to the level of 2017. The outturn from European institutional programmes remains very satisfactory and in slight growth from the previous year, particularly within the remit of ESA managed programmes. This growth more than compensates the further reduction observed on revenues from commercial and export programmes where our survey unveils a receding trend since 2015.

I hope that our readers, in the private and institutional sector, will make the best use of the body of information that Eurospace provides to the community. Our goal is to support transparent and stable market metrics and analytics, enabling well-informed policy making and good sector benchmarking at international and European levels.

Overview

A specialised strategic sector

The European space manufacturing industry is a strategic sector, essential for the implementation of many public policies, and supporting all economic sectors. It is embedded in the wider European AeroSpace and Defence industrial complex.

The space manufacturing industry is an infrastructure supplier. The sector operates at the higher end of the space value chain, and supplies service providers and public institutions, spacecraft and launchers to meet their requirements.

The space industry designs, develops and manufactures spacecraft and launchers, along with the associated ground systems for satellite control and operations. The space manufacturing industry is organised vertically with large and medium system integrators (capable of delivering a complete launcher or spacecraft to the launch pad) providing business to a wide range of equipment and service suppliers (capable of delivering integration ready subsystem, equipment and components, or providing specialised services and tools supporting system design, integration and test). The industry is highly specialised and capital intensive. The sector is also rather concentrated; despite being distributed across all ESA member states.

Four large industrial groups (Airbus, Thales, Safran and Leonardo) are directly responsible for more than half of the total space industry employment via dedicated Business units (BUs) and/or Joint ventures (JVs). In 2019, the largest dedicated space business units and industrial capabilities are located mainly in Airbus Defence & Space, Thales Alenia Space and ArianeGroup. Smaller, but sizeable, space players such as GMV, RUAG and OHB provide additional employment and capabilities to the European space industry.

SMEs represent only a small fraction (less than 10%) of the total space industry manufacturing employment. Notwithstanding, small space units are very common in the space sector, but they are often part of, or owned by, a larger company, with the negative consequence of having to manage the usual difficulties of the SMEs while not being eligible to the dedicated support measures put in place by the public institutions.

Industry is distributed across all Europe, with the main industrial sites located in France, Germany, Italy, and, to a lesser extent, United Kingdom, Spain and Belgium.

- In 2019, the European space industry successfully delivered 89 spacecraft to the launch pad (of which 50 large satellites and 39 pico and nano satellites). It also delivered 6 launchers for operations in Kourou.
- In 2019, the European space industry posted sales worth 8756 Million € and employed a total of 47895 workers (FTE: Full Time Equivalents).

Main industry facts

Key figures employment (FTE) and sales (M€)	2017	2018	2019	Var.
Direct industry employment (FTE)	43910	44984	47895	6,5%
Other personnel working on site (FTE)	2658	2940	2256	-23,3%
Total space industry employment (FTE)	46568	47924	50151	4,6%
Final sales (M€ current e.c.)	8729	8525	8756	2,4%

Direct industry employment: personnel employed directly by the company (permanent staff, measured in FTE).

Other personnel working on site: personnel directly supporting company activities supplied by a third party (interim workers, engineering, etc. measured in FTE).

Final sales: sector sales to final customers (equal to consolidated sales).

Markets and customers

The European space industry has access to quite large, yet fragmented domestic markets; its core markets. It also exports its systems outside Europe. In both markets, space systems are sold to a variety of customers, mostly public entities such as space agencies in Europe and worldwide, but also private customers such as satellite or launch service operators.

Final sales by main customer segment (M€)

(M€)	2017	2018	2019	Var.
Final sales (M€)	8769	8525	8756	2,7%
European public customers	5059	5446	5509	1,2%
European private customers	1825	1520	1614	6,2%
Unknown European customers	90	99	109	10,6%
Public customers RoW	808	593	696	17,4%
Private customers RoW	906	810	777	-4,1%
Unknown customers RoW	80	57	50	-12,6%

The first business area of the space manufacturing sector lies in the design, development and manufacturing of satellites for operational applications, such as telecommunications systems and parts, Earth observation systems and parts, and navigation/localisation systems and parts.

The second area of business is launchers. Launcher activities include operational launch systems sales (mainly to Arianespace) and development and consolidation activities, mostly in support of the Ariane and Vega systems, but also for new systems (e.g. micro-launchers)

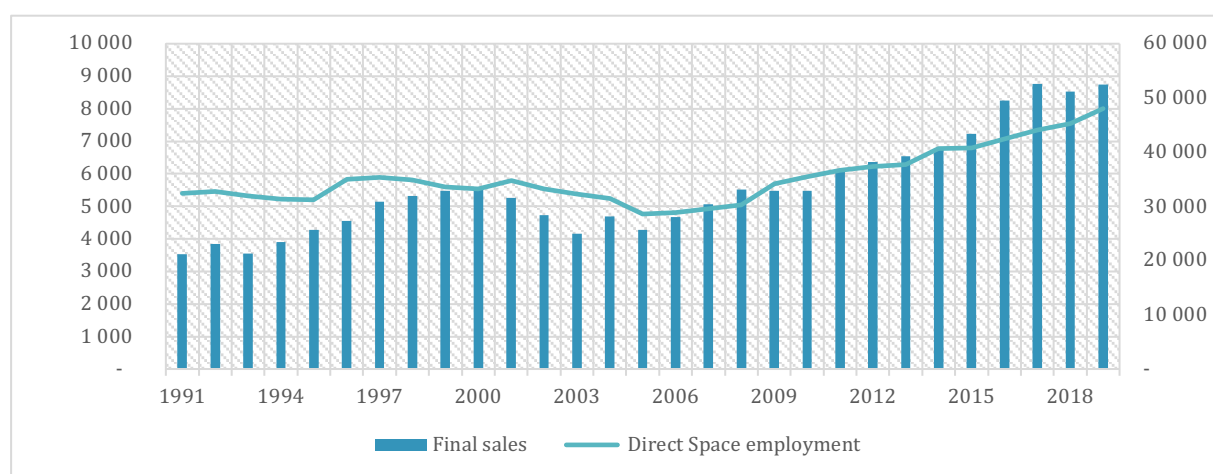
Scientific activities include a wide variety of systems and leading-edge technologies, with science systems and parts and human spaceflight (and related activities, such as crew and cargo systems for the ISS etc.) representing together the core of revenues in this area.

Ground systems and activities cover an array of diverse industrial activities, including engineering and consultancy services (provided to the manufacturing sector and in support to space agencies), the development and production of professional ground stations, and the industrial hardware required for the development, production and test activities (EGSE/MGSE).

Final sales by main product segment (M€)

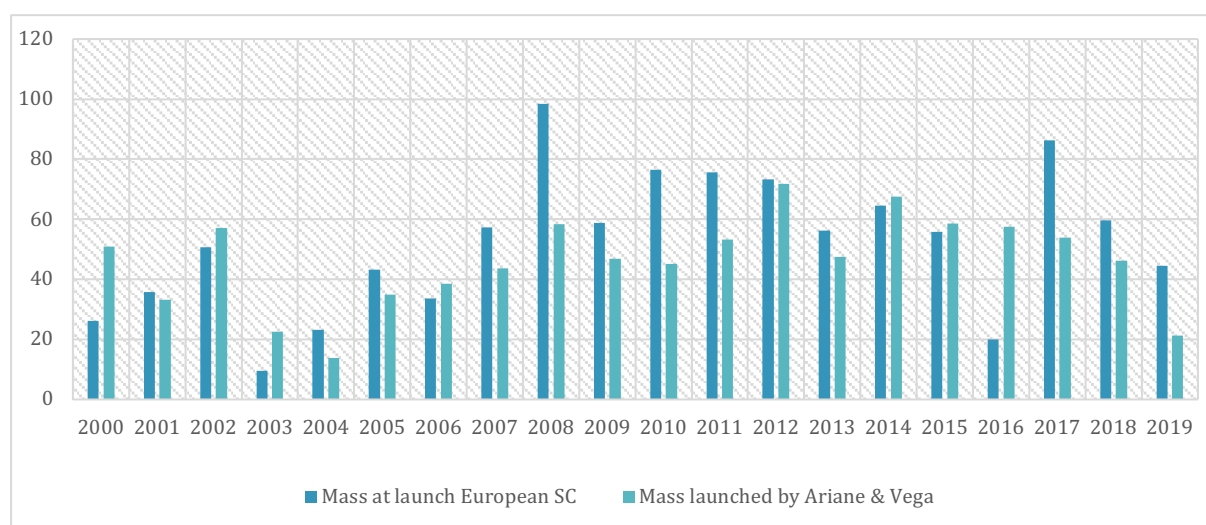
(M€)	2017	2018	2019	Var.
Final sales (M€)	8769	8525	8756	2,7%
Launcher systems	1709	1677	1712	2,1%
Satellite applications systems	4248	3813	4177	9,5%
Scientific systems	1117	1290	1006	-22,1%
Ground systems and services	1405	1509	1696	12,4%
Other & Unknown	290	236	166	-29,8%

European space industry sales and employment (M€, right & FTE, left)



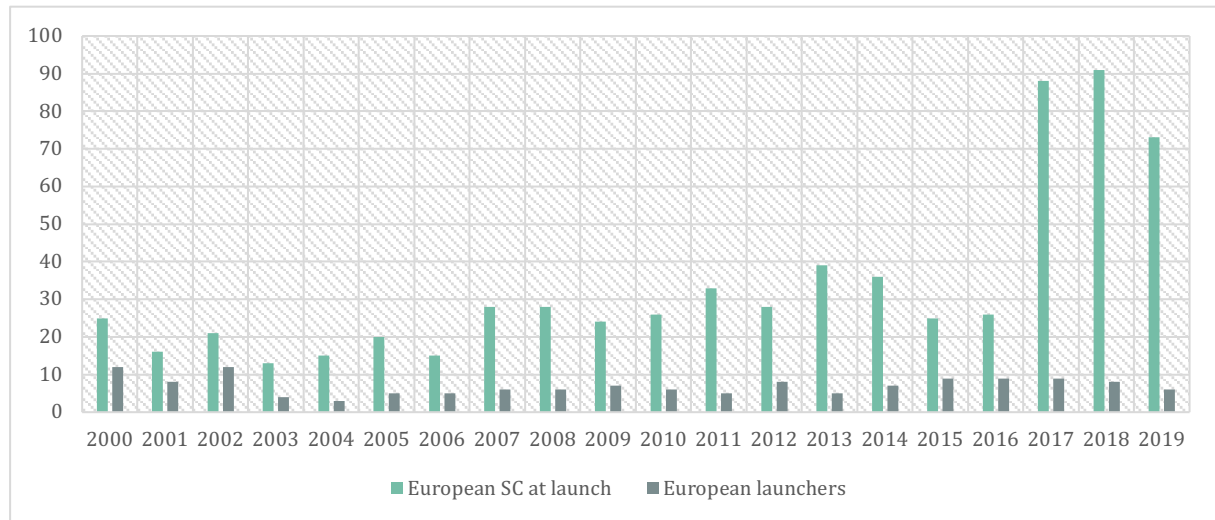
European space industry sales exhibit contrasted evolutions over time, mostly influenced by the evolution of sales to commercial customers. Industry employment figures follow the variation of sales, with a similar pattern.

Output of the European space industry at date of launch (mass at launch - tons)



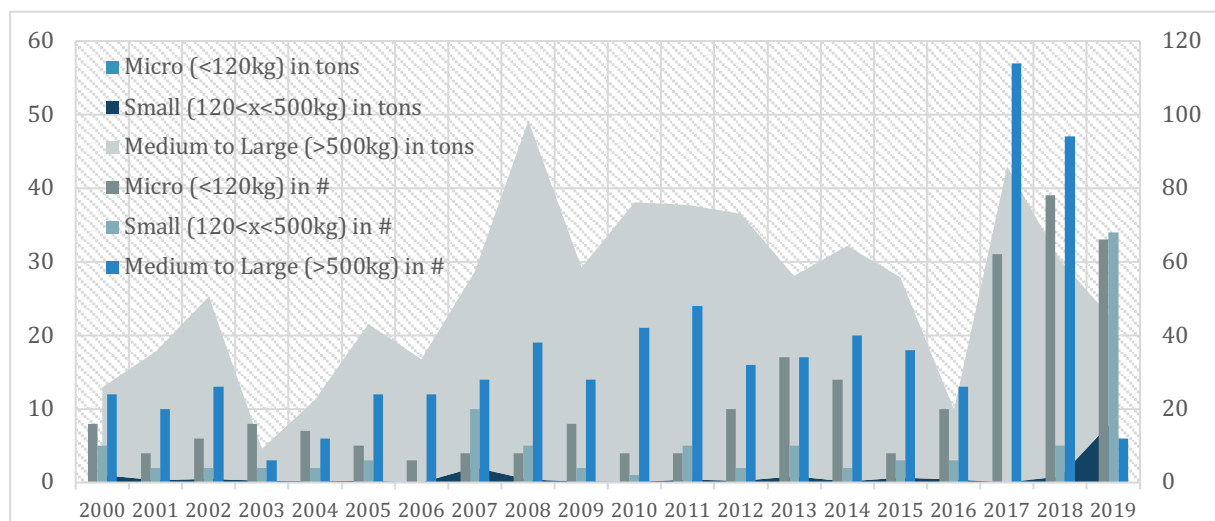
The output of the space industrial sector can be summarised every year with the measure of the mass of European spacecraft delivered for launch, and the measure of the mass launched by European-built launchers (Ariane and VEGA).

Output of the European space industry at date of launch (units: spacecraft and launchers)



The output of the Space industry can also be measured every year with the number of spacecraft delivered for launch and the number of European launchers operated the same year. A surge of spacecraft delivered for launch is visible in 2017, 2018 & 2019 due to the large numbers of very small satellites produced (many were produced within university labs, some by emerging European players specialising in very small satellite production). See the next chart for details. Disregarding such exceptional events, the European space industry has delivered a growing number of spacecraft over the years, from an average of 10-11 spacecraft/year in the 1990s up to 20 and more in the years 2000 and up to 30 in the years 2010. Regarding launcher deliveries, the situation is quite different with peak years with more than 10 launchers/year corresponding to the years between 1996 and 2002 when Ariane 5 and Ariane 4 were operational at the same time. With the Ariane 4 phase out (after 2002), the situation stabilised with less launchers produced.

Spacecraft Output - details by satellite mass class (left #, right tons)



In this chart, we present the evolution of the spacecraft delivered for launch, produced in Europe. The chart presents in bars the number of spacecraft delivered to launch, split between three classes of spacecraft: the Micro class (all less than 120kg at launch), the Small class (spacecraft between 120 and 500 kg at launch), and the Medium to Large class (all above 500kg). The chart presents: in bars,

the number of spacecraft delivered to launch by each mass class (left axis), and in areas, the cumulated mass at launch by class (right axis, in tons).

The chart exhibits the contrasted evolution of spacecraft market segments, with a particularly noticeable increase of deliveries in the Micro class in recent years and the seemingly cyclic evolution of deliveries in the Medium to Large class, with the visible impact of the Iridium NEXT deliveries in recent years. The mass distribution over time is mostly correlated with the evolution of deliveries of the largest spacecraft. The Micro class has no visible impact on the mass distribution.

Main indicators

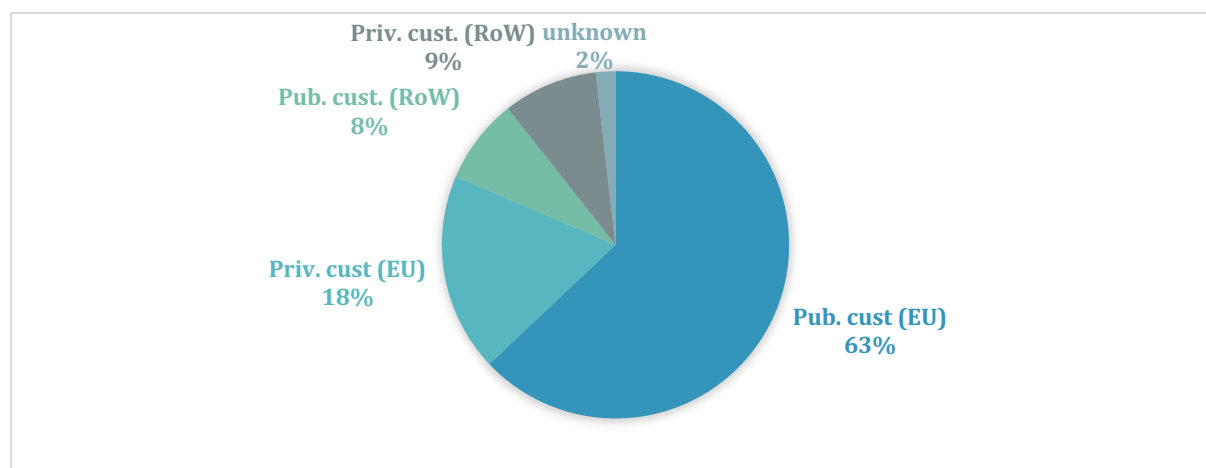
The European space industry designs, develops and manufactures spacecraft, launchers and the related ground segment for a variety of customers. Current market segmentations support the identification of the customer nature (public/governmental customers vs. private/commercial customers), and the identification of the customer's geographical location (customers located in Europe and customers outside Europe). Note that here the term 'Europe' covers all countries being ESA and/or EU members.

The core business of the European space industry is with European public customers (more than half of sales). As a whole, European customers (public and private) represent 83% of total sales.

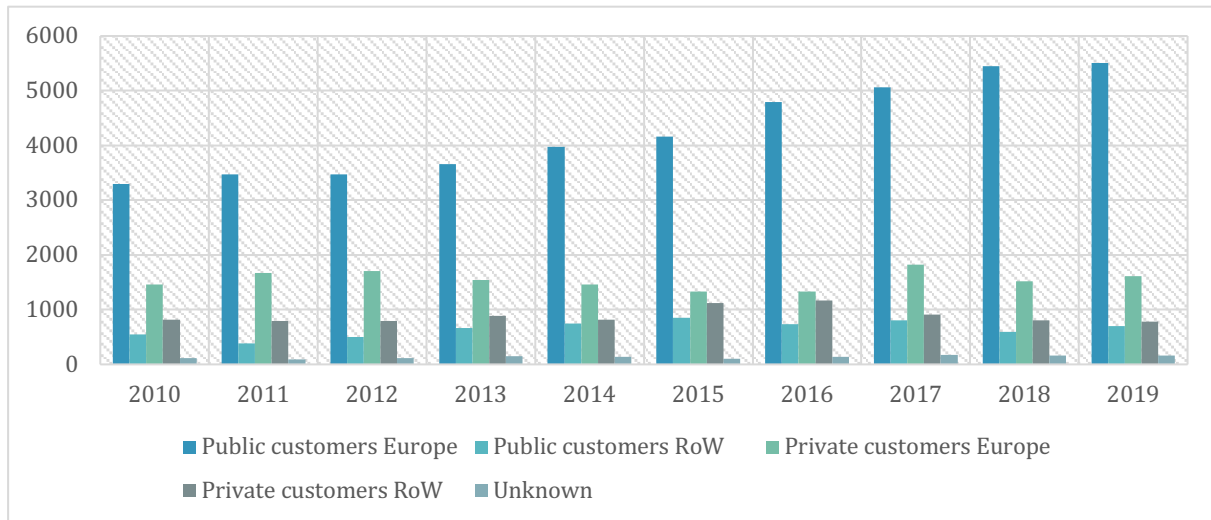
Sales by macro market segment (M€)

M€	EU customers	RoW customers	Total
Public customers	5509	696	6205
Private customers	1614	777	2391
Other / unknown	109	50	159
Total	7233	1523	8756

Distribution of sales by main market segment (%)



Distribution of sales by main market segment M€

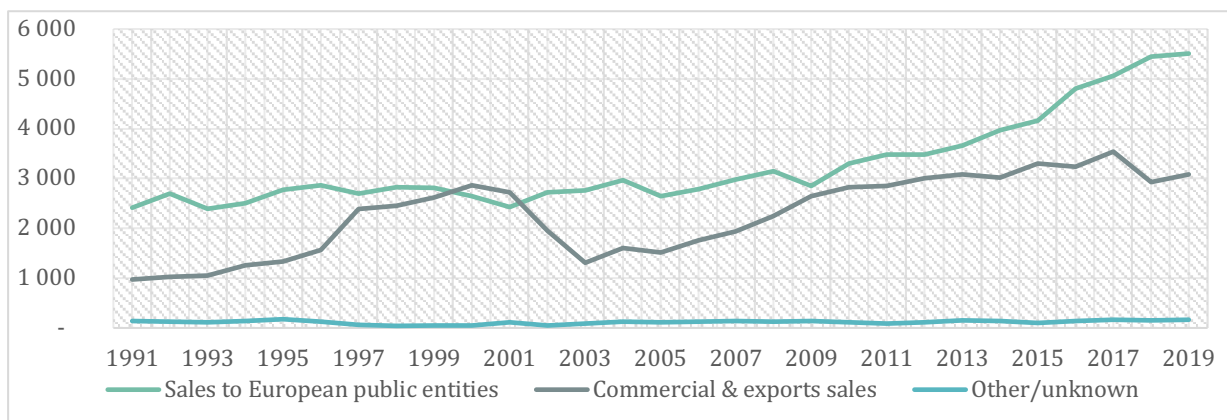


Long series indicators

IMPORTANT NOTE: Long series are built by aggregating data established over a long period of time using three different methodologies and data collection tools. Over time, new customers or product categories were introduced to increase the level of detail of the survey. In particular, the separate identification of ground systems (TT&C stations, ground control stations, EGSE/MGSE etc.) was introduced in 2009. Before, the value of relevant ground systems was associated to the relevant application (telecoms, observation etc.). To avoid statistical disruption, in long series by system, the value of ground systems is distributed proportionally in the satellite applications series. This is why the data points in the graphs have higher values than in the associated tables. In customer/market segment aggregate series, there is no statistical disruption.

European space industry sales are split amongst two main markets segments, according to the customer: an institutional domestic market, with a civil and a military component, where customers are European public entities, and a market for commercial and export customers.

Sales by main market segment - European public entities vs Commercial and exports (M€)

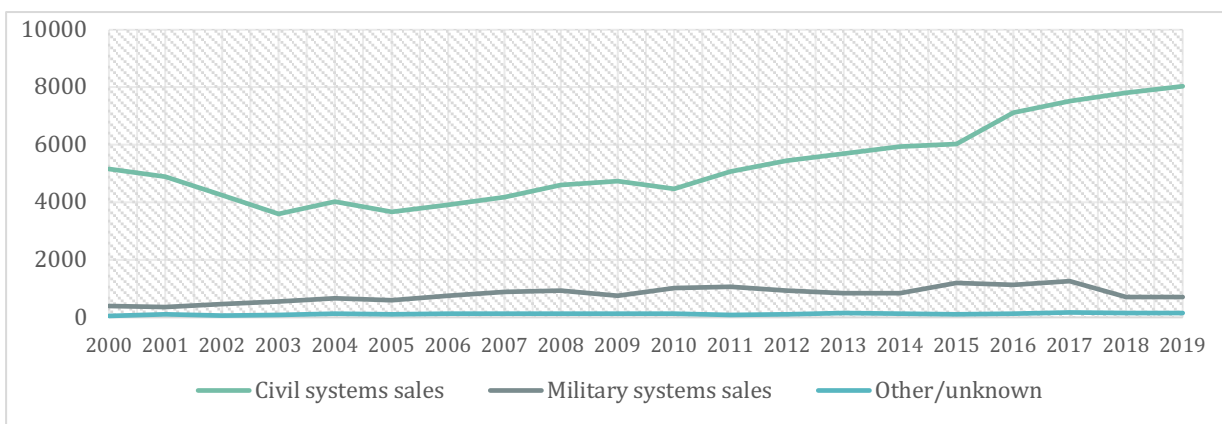


Commercial and export sales include the sales to: Privately owned satellite operators worldwide (e.g. Eutelsat, Intelsat), public satellite operators outside Europe (e.g. Arabsat, RSCC, Chinasat), privately owned launch services operators worldwide (e.g. Arianespace), public space agencies outside Europe

(e.g. NASA, KARI), military institutions outside Europe, space manufacturing companies outside Europe.

European space industry sales can also be split according to the civil or military nature of the system. This specific analysis is required to assess correctly the value of the defence/military component of European space industry's business. Indeed, due to innovative procurement schemes (such as PPPs) and due to the complex nature of space programmes, there are situations where military systems are procured by civil entities. For example, the French military observation system Essaim was procured by CNES (a civil agency), similarly the military communications system Skynet is owned and managed by Airbus (through a PPP scheme). Contrary to other space powers (the USA, Russia, China), Europe has modest investment in military space activities. As a result, military space systems sales represent only a small fraction of European space industry revenues.

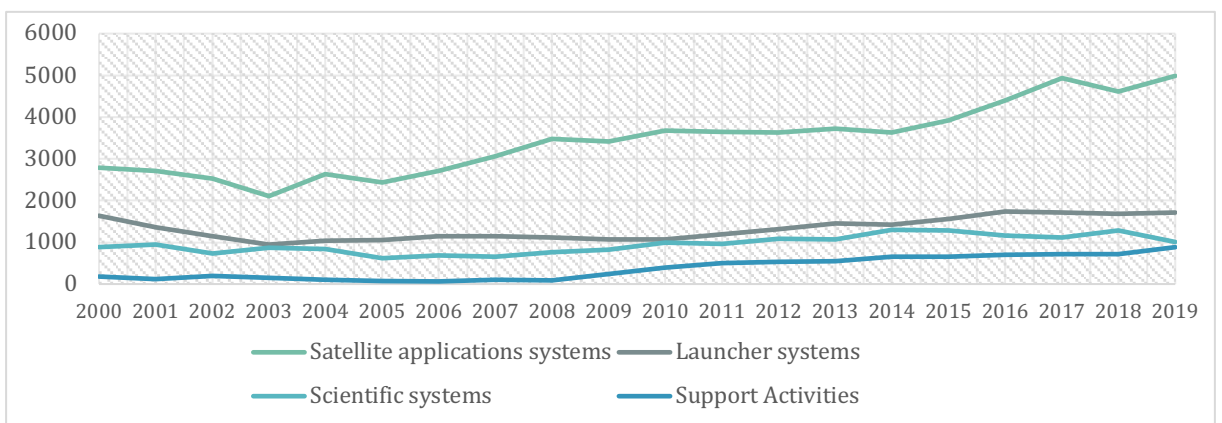
Sales by main market segment - Civil vs. Military systems sales (M€)



Military systems are defined as systems procured by a military entity (such as the French DGA) and systems designed for a military mission (such as the Skynet system for military communications or the Helios system for military observation). All other systems are identified as civil.

The European space industry is involved with four main lines of products, with different characteristics and customers: satellite applications systems (including the related ground segment), launcher systems, scientific systems (including human space infrastructure) and ground support activities. Satellite applications systems sales contribute the most to European space industry revenue. Their evolution is marked by a rather high variability over time.

Sales by main market segment - type of system (M€)



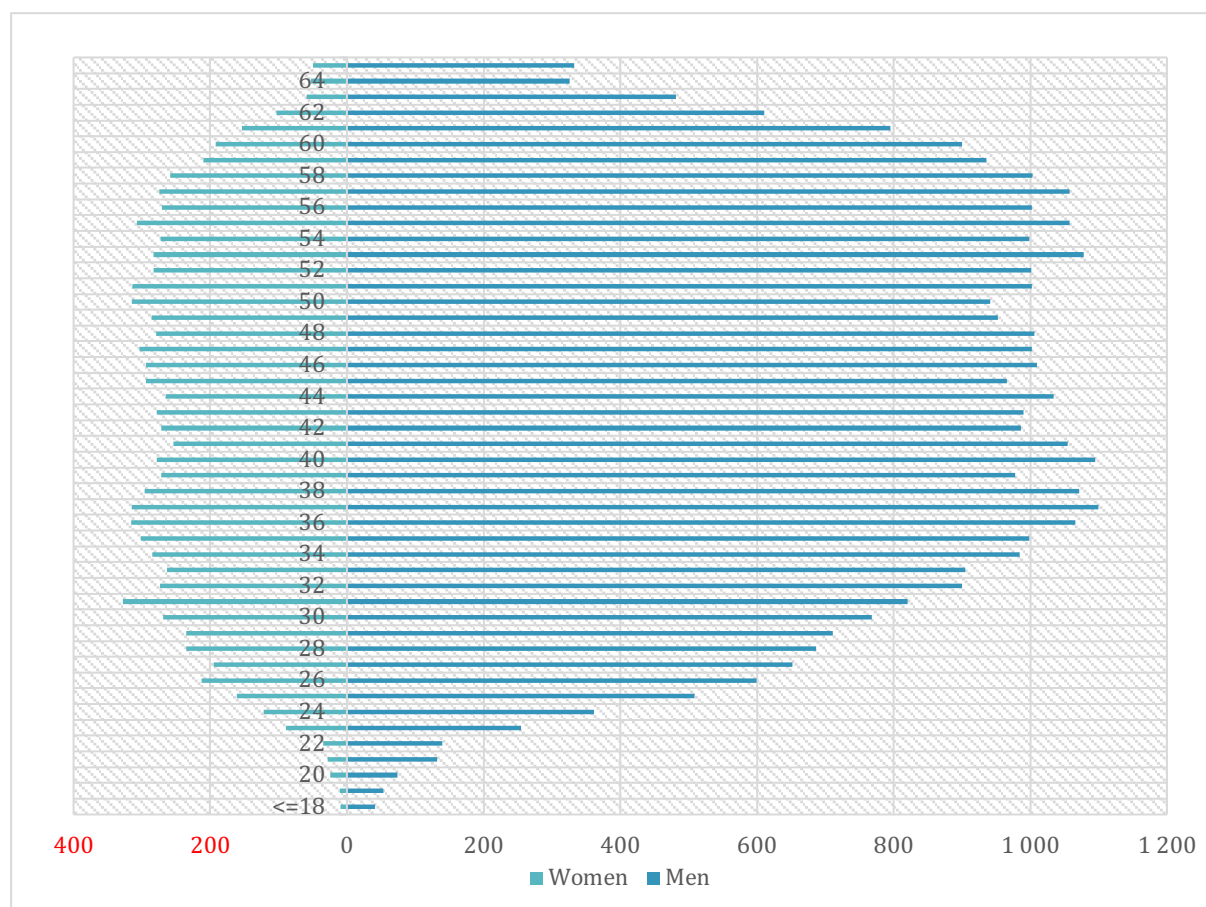
- *Satellite applications include all sales related to the development and production of systems for future and actual missions in telecommunications, Earth observation and navigation/positioning. Most of the revenues are drawn from the production of operational systems, while a smaller share is associated to technology and system development activities. In the specific frame of long series, satellite applications also include the value of ground systems (control centres, ground antennas etc.). These figures do not include the revenues drawn from satellite operations.*
- *Launcher systems include all sales relevant to the design, development and production of launcher systems. European launcher systems include the large Ariane system, in operations since 1996, and the smaller VEGA system, in operations since 2012. A small fraction of these revenues is associated to the exports of launcher equipment (e.g. thrusters, fairings) used on non-European launchers. These figures do not include the revenues drawn from launch operations.*
- *Scientific systems sales include all sales relevant to the design, development and production of scientific spacecraft systems. These spacecraft address missions such as: human spaceflight, planetary exploration, Earth science, astronomy, etc. Almost all of these revenues are associated to government programmes.*
- *Support activities include all activities required to support the design, development and production of space systems. This category includes a share of hardware and a share of services sales. Hardware sales are associated to the production of electric and mechanical ground segment equipment (EGSE & MGSE) i.e. dedicated equipment required for the test and integration activities of equipment, subsystems and complete systems. Services sales are associated to the delivery of engineering, test and other specialised services to the space manufacturing industry and space systems customers. These services sometimes include also ground control centre operations, in particular for space agencies.*

Sector Demographics

Industry employment - age and gender distribution

The European space industry is quite specific in terms of age and qualification structures. The industry maintains a rather stable age structure. The employment distribution by age exhibits a larger proportion of employees in the 49-58 age range, with an average age of employees around 44, with a slight difference between women and men. About a fifth of space industry employees are women.

Space industry employees age pyramid



Space industry employees age and gender characteristics

Total employment	47906
Average age (women)	42,96
Average age (men)	44,19
Average (all)	43,92
Women in % of total	21,87%
Men in % of total	78,13%

Industry employment - Qualification structure

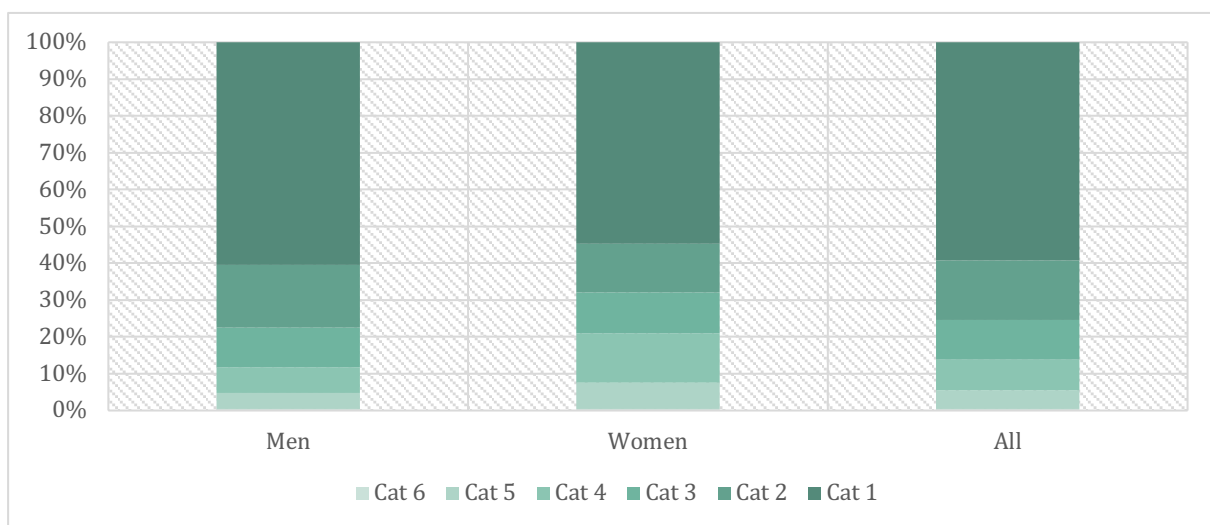
Due to the engineering complexity of space programmes, the space sector attracts a larger than average share of highly skilled workers. The majority of space industry workers have a scientific and/or engineering background

and hold high-level degrees (PhD, master). The qualification structure of women is quite similar to that of men; women in the space industry are not limited to clerical and -low-level positions.

Space industry employees' qualification and gender characteristics (Table)

Qualification profile	All	Men	Women
1. University (4-5 years and up)	57%	59%	53%
2. University (up to 3 years)	16%	17%	13%
3. Higher Vocational School	10%	10%	11%
4. Vocational School	8%	7%	13%
5. General School Only	5%	4%	7%
6. Apprenticeship	0%	0%	0%
Not available	3%	3%	3%

Space industry employees' qualification and gender characteristics (Graph)



NOTE: detailed age distribution and qualification structure is not available for all companies in the model. The data compiled here is based on 76% of total employment.

Industry employment - distribution by country

The European space industry is distributed across all Europe, resulting in an important fragmentation, particularly in the smallest contributors to ESA. Yet, the 6 major ESA member states (France, Germany, Italy, United Kingdom, Spain and Belgium) provide about 90 % of European space industry employment. In principle, personnel are allocated to the country of activity. This is particularly relevant to companies who provide engineering and other specialised services to space agencies and industry throughout Europe (e.g. Serco, Vega, RHEA, HE Space).

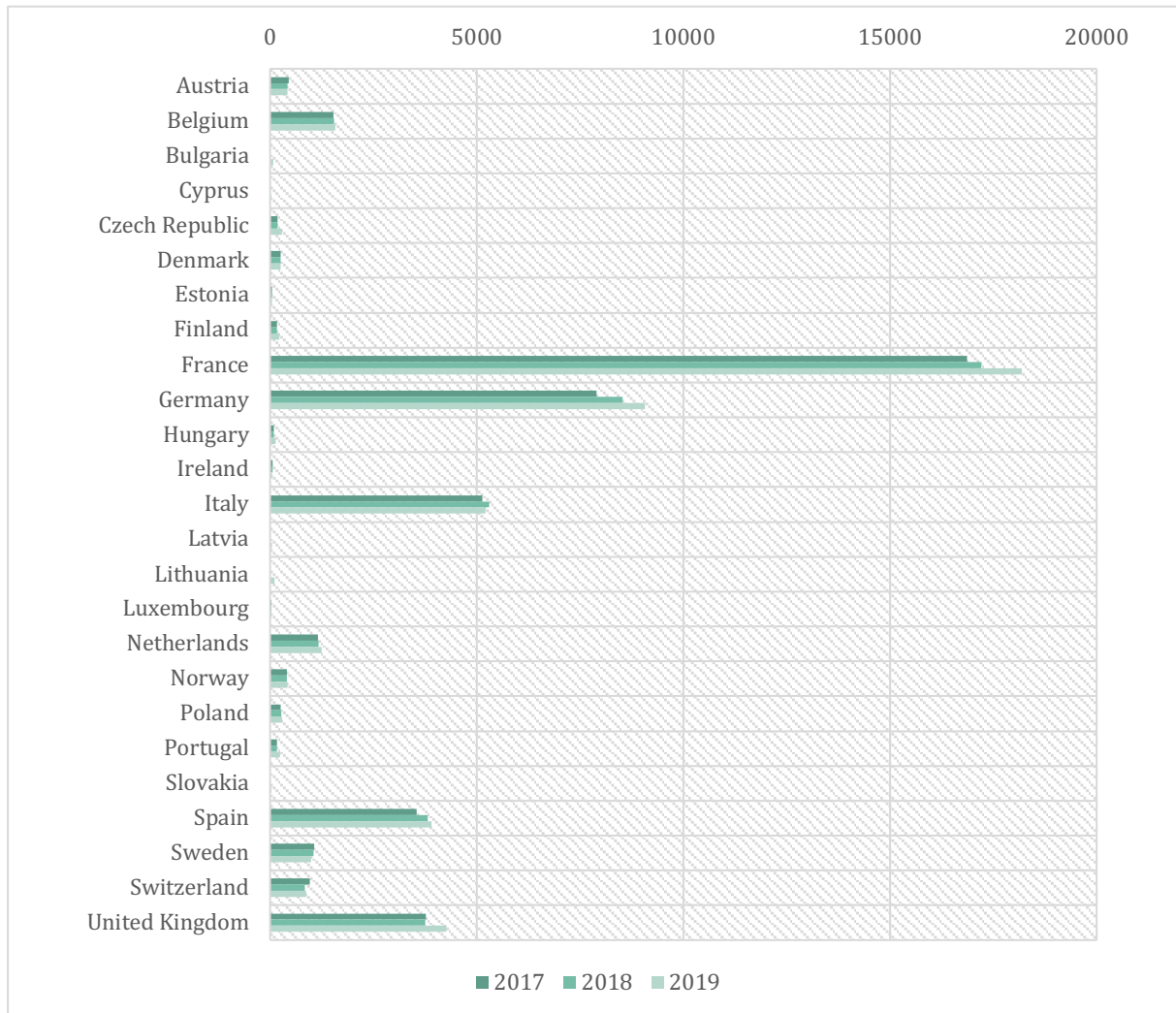
Industry employment distribution by country (FTE)

Country	2017	2018	2019	Level of confidence
Austria	420	420	416	68%
Belgium	1533	1554	1576	63%
Bulgaria	na	na	76	0%
Cyprus	na	na	25	0%
Czech Republic	187	187	292	93%
Denmark	258	257	257	0%
Estonia	39	39	51	24%
Finland	160	168	227	57%
France	16994	17128	18186	85%
Germany	7901	8526	9071	86%
Hungary	97	97	130	25%
Ireland	61	61	46	43%
Italy	5140	5076	5215	75%
Latvia	na	na	41	0%
Lithuania	na	na	99	0%
Luxembourg	34	36	24	0%
Netherlands	1155	1166	1240	32%
Norway	405	412	418	24%
Poland	250	266	290	27%
Portugal	161	165	239	46%
Slovakia	na	na	31	0%
Spain	3551	3811	3803	70%
Sweden	995	1057	996	57%
Switzerland	805	806	842	80%
United Kingdom	3969	3973	4263	61%
Europe	44115	45207	47854	76%

Note that the level of confidence is the ratio between actual data collected in 2019 by questionnaire and the total employment (including the estimates) by country. Country information displayed in the employment by country graphs is only for countries where three years of data are available.

Please read our "Release Notes" to better understand national evolutions: perimeter changes (i.e. the inclusion of a new company in the economic model) may affect significantly national employment figures.

Employment distribution by country: 3-year evolution



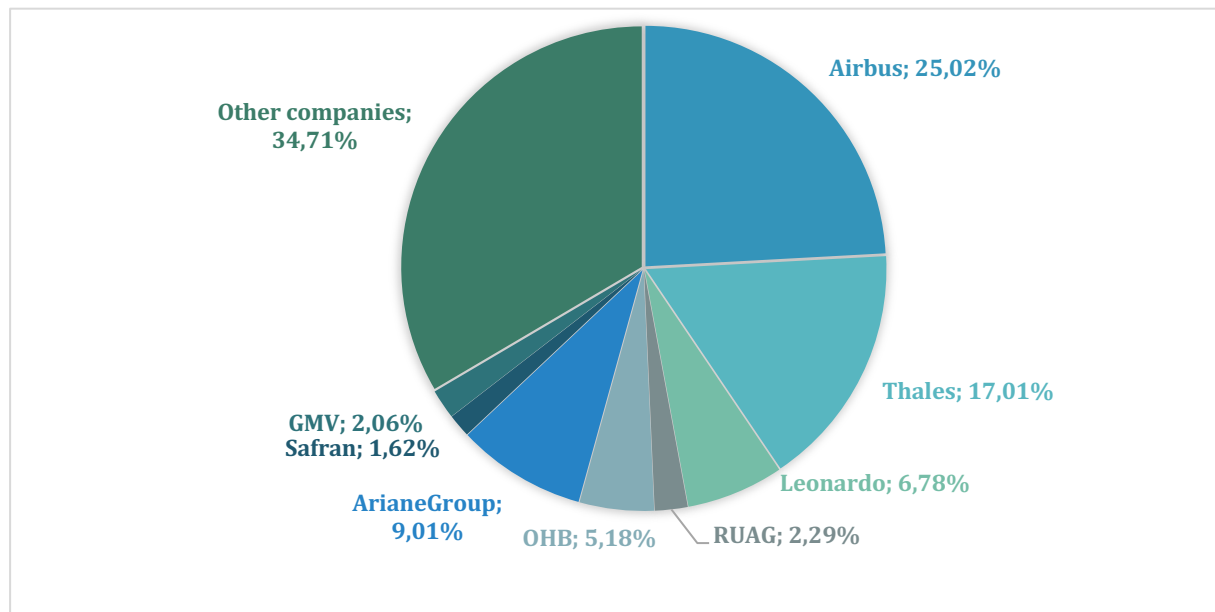
Industry employment - distribution by company

Employment in large groups

The space industrial sector is embedded in the larger aerospace and defence industrial landscape. Approximately half of the companies in the survey have corporate ties with the main industrial conglomerates, such as Airbus, Thales, Safran and Leonardo. As a result, the vast majority of space industry employees are working in large aerospace and defence groups. These groups may also create dedicated joint-ventures to undertake specific industrial tasks (e.g. Europropulsion, Cryospace, UMS, and more recently ArianeGroup...).

With a view to securing the supply of critical equipment, large groups also tend to extend their control in the space supply chain with the absorption of suppliers (and competitors). Thus, the space sector counts a large number of small space units, but a rather limited number of independent SMEs.

Space industry employment by corporate affiliation



Note: for the sake of representation we have associated all Thales Alenia Space employees to Thales (67% control share) and all of the Telespazio group employees to Leonardo (67% control share). Avio personnel is attributed to Leonardo in full despite Leonardo only owning a minority share in the company. UMS space personnel were instead evenly split between Thales and Airbus (50/50 JV). ArianeGroup is a 50/50 JV between Safran and Airbus created in 2015 and identified in Eurospace employment survey since 2016, its employees are identified separately than Airbus and Safran.

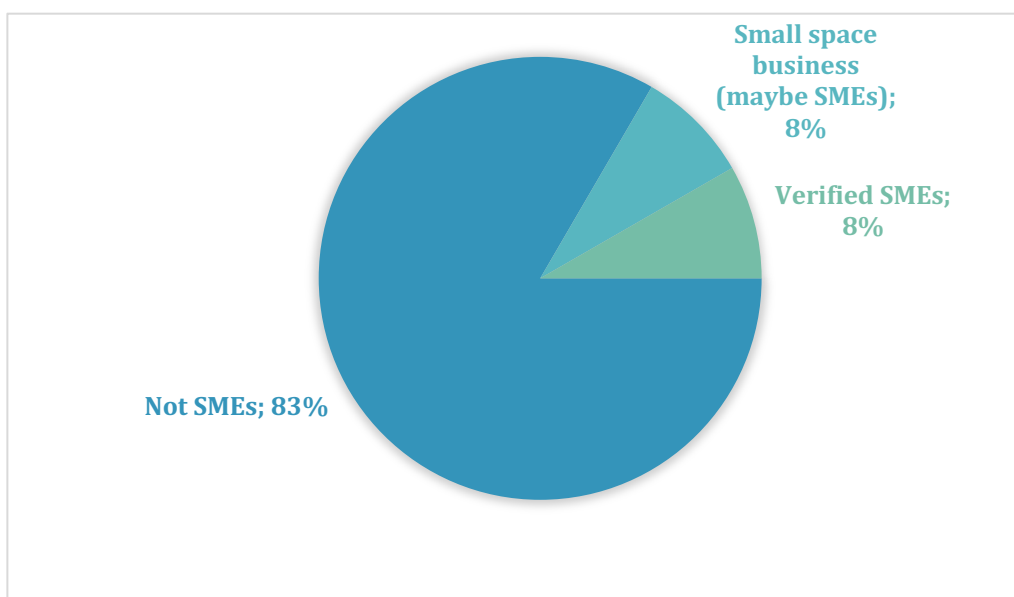
SMEs in the space sector

The Eurospace economic model considers 341 space units in Europe. Of these, only a fraction are SMEs (according to the EC definition), despite the fact that the vast majority of space units in Europe are quite modest in size, from both the employment and the revenues point of view.

In this year's survey, 109 companies formally qualified as SMEs (representing a total of 3984 employees), out of a total of 260 small space businesses. For the other small space units in the model, the status is unknown, some may be SMEs, some may not. The number of small space units (and relative employment) is growing fast in recent years stimulated by company creation (the 'newspace' trend) since most start-ups qualify as SMEs. The European space start-up "ecosystem" has often benefited from institutional support such as the ESABIC incubator programme and/or from the EU EASME and H2020 instruments.

Considering the uncertainties described above, it is ascertained that within the sector of space systems manufacturing and development in Europe, the proportion of SMEs is comprised between 8% and 16% of total employment.

Space industry employment - SME situation (%)

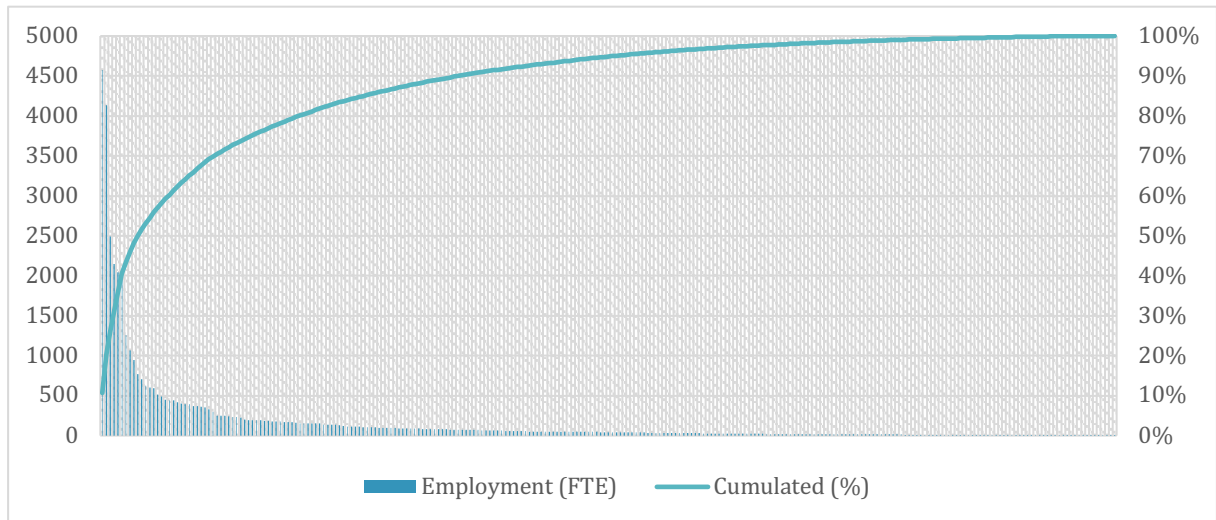


Space industry employment - SME situation (employment & sales)

SME Situation	Empl. Space (direct)	Total space sales (M€)	Final space sales (M€)	Numb. of units
Not SMEs	39848	7228	5115	80
Small space business (maybe SMEs)	4022	5162	3382	150
Verified SMEs	3984	507	224	109
TOTAL	47854	12897	8721	339

- SMEs are defined by the European Commission as companies with employment below 250 and total sales below 50 M€ (or balance sheet inferior to 43 M€) and with their capital not controlled by a large company.
- This very limitative EC definition excludes most space units from the strict SME definition, despite the small size of the majority of space units in Eurospace model. Indeed, most space units are subsidiaries of larger groups.
- Eurospace defines a space unit as a corporate entity or business unit or department involved in the design development and production of space systems. Space units are organised by country. Each space unit provides a separate entry in the Eurospace economic model.
- Note that total sales include inter-sector sales, they are higher than final sales. Please refer to methodological notes for details.

Employment distribution by space unit - concentration in the space sector



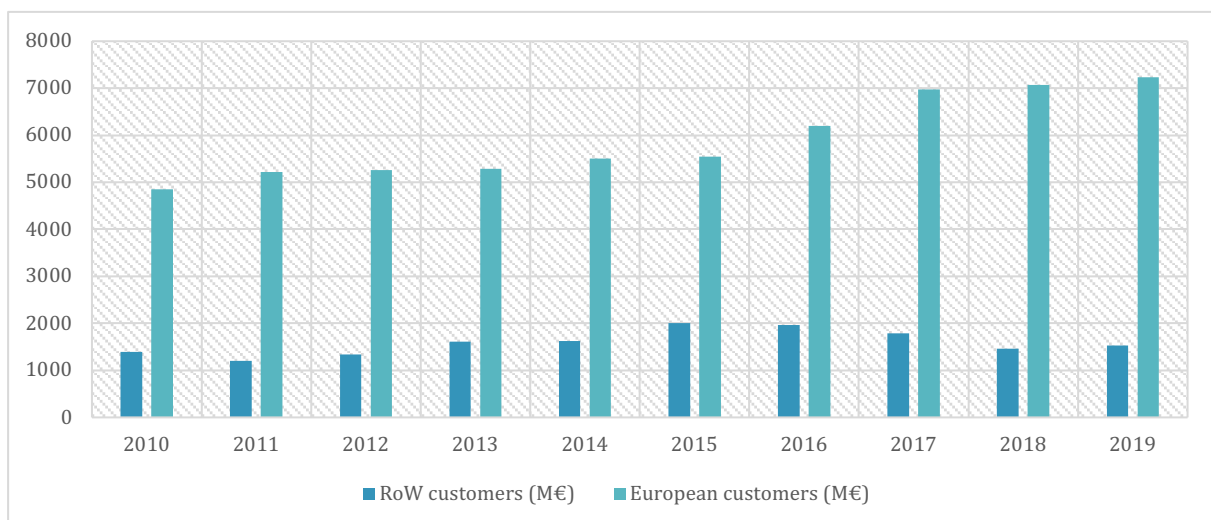
The graph above demonstrates the high level of concentration in the space industry in Europe, where only a few space units concentrate most of the employment whilst the majority of space units have very low employment figures (the smaller ones having less than 10 employees).

Final Sales by Market Segment

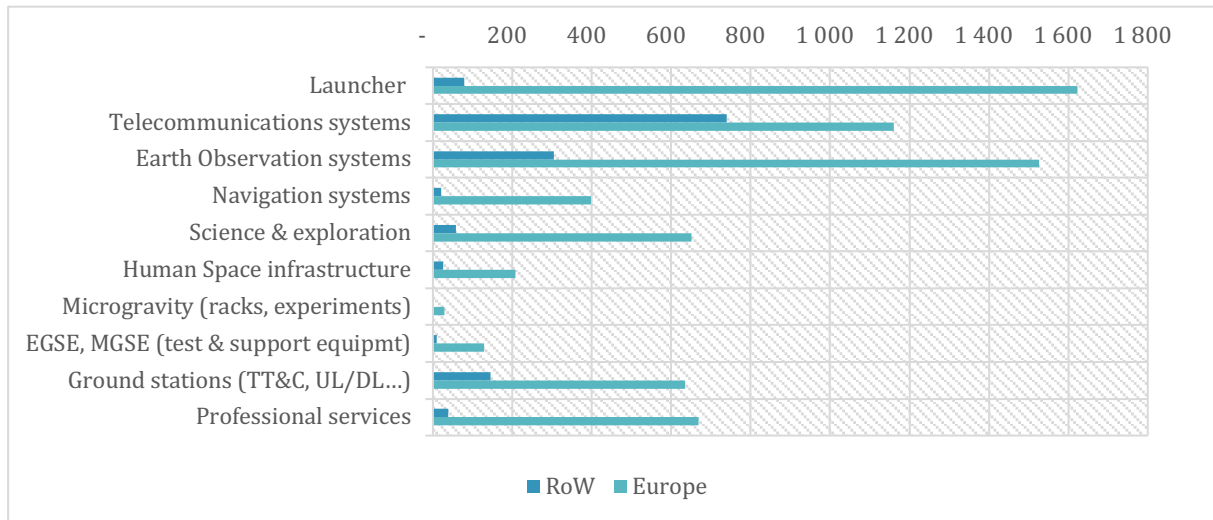
Overview: European sales vs. Export

The sales of the European space industry are located mainly in Europe (83% of final sales). Exports represent a smaller, but significant share (17%).

European sales vs. Exports (M€)

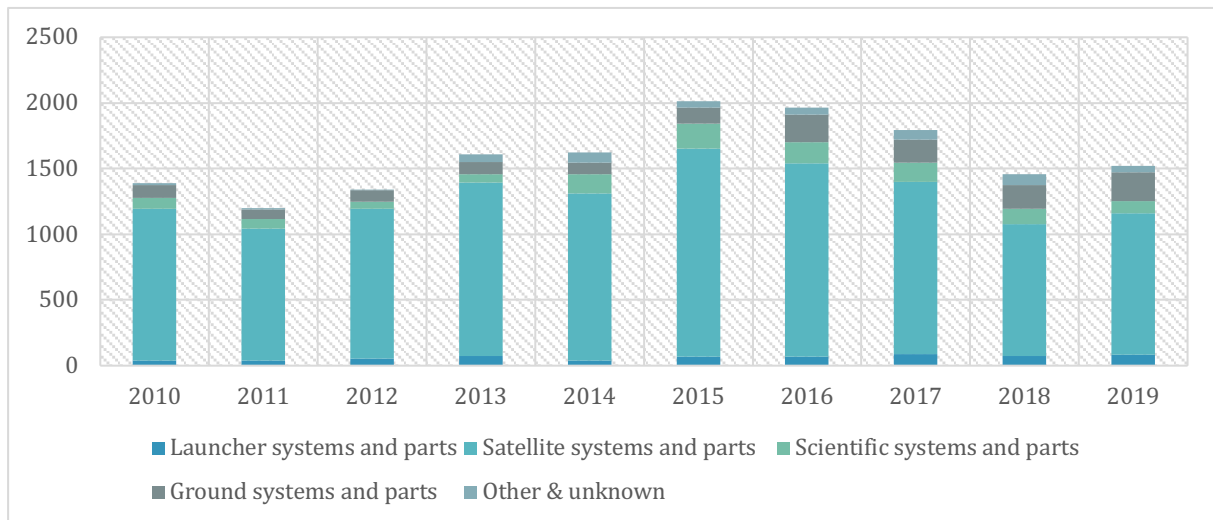


Sales by system - European customers vs. Exports in 2019 (M€)



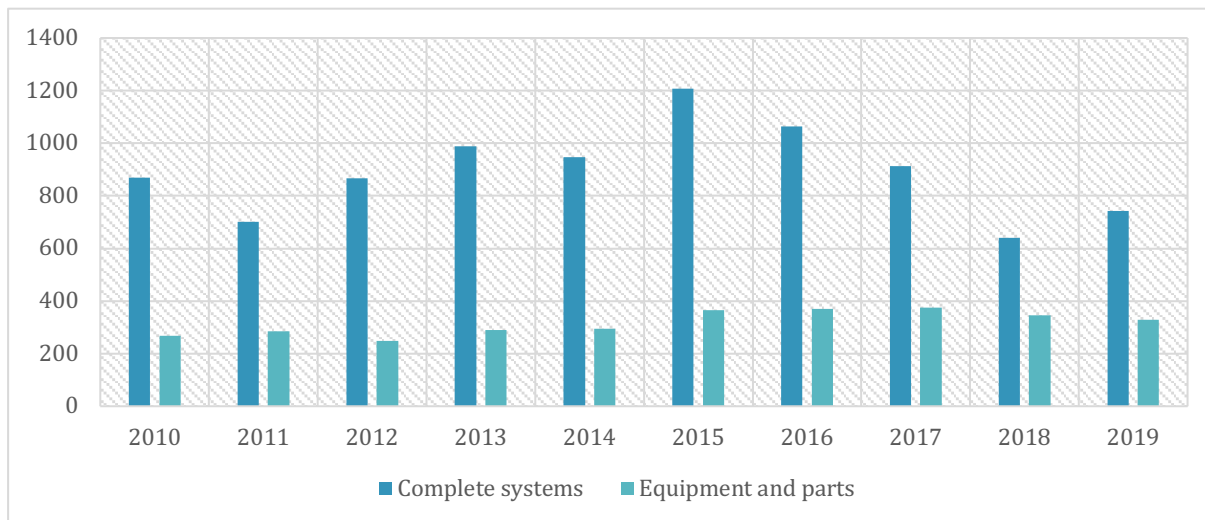
European sales involve a variety of customers, including of course the main space agencies in Europe (ESA procurement alone representing more than one third of industry revenues). Consequently, European sales concern a broad range of systems, from scientific spacecraft to satellite applications and launcher systems. Differently, customers outside Europe are almost exclusively commercial satellite operators, and their focus is on the procurement of telecommunications satellite systems. The exports of European telecommunications systems sales are even more important than the value of domestic sales for similar systems.

Export sales by system segment (M€)



Satellite systems and parts (mostly telecommunications) are the main segment for exports. Launcher systems are not prone to exports due to strict limitations on international trade in launcher technology. Exports for scientific systems are usually associated to bilateral inter-governmental agreements but, in recent years, they have regained opportunities for export. Ground segment exports are often associated to satellite export contracts, but not systematically.

Export sales, spacecraft systems - complete systems vs equipment and parts (M€)

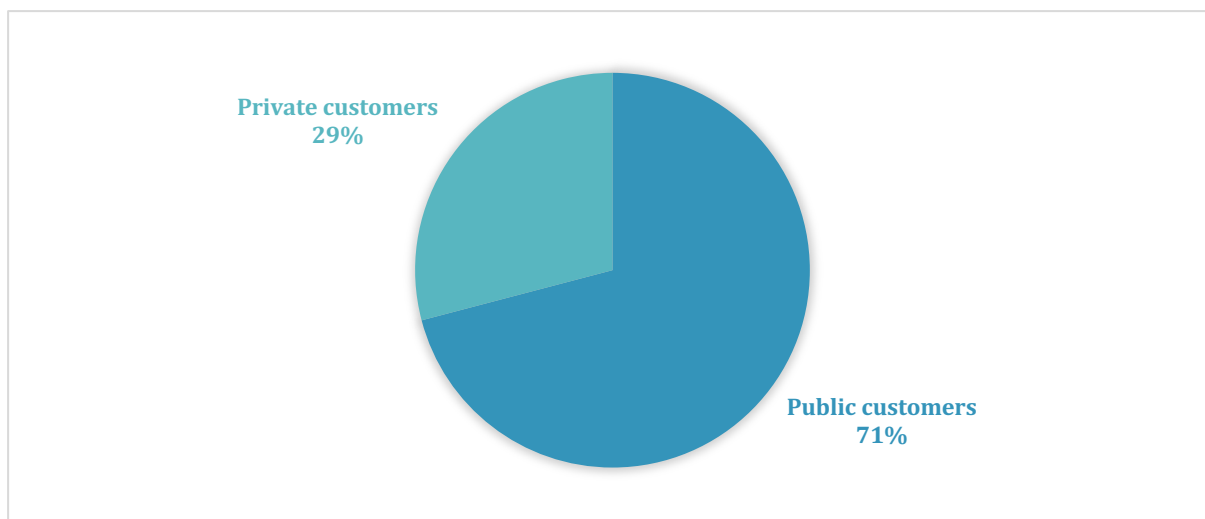


The majority of European space systems are exported as complete systems directly to the launch pad. Nevertheless, the European industry has developed a market for space equipment and parts that are exported for further integration onto spacecraft produced outside Europe. These deliveries range from complete payloads for telecommunications (for Russian customers e.g.) to dedicated components and specialised equipment (such as amplifiers e.g.).

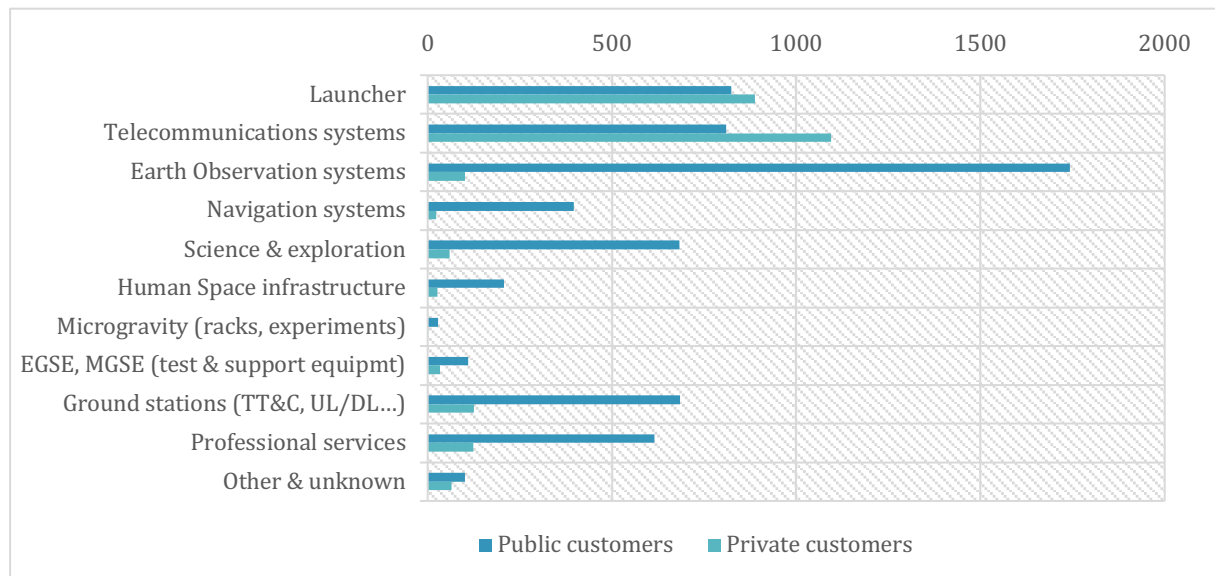
Overview - Public vs. Private customers

The sales of the European space industry are mostly associated to public customers (i.e. state-controlled/owned entities). They represent 71% of final industry sales. Private customers represent a significant, though lesser, share of European space industry sales, worth 29% of final industry sales.

Sales to Public vs. Private customers (%) in 2019



Sales by system segment - Public vs. Private customers (M€) in 2019



Historically, public entities have been the sole customers for space systems in Europe (and worldwide). Today, public/governmental programmes are still the largest contributors to space industry activity worldwide, and Europe is no exception to this rule. Public customers (i.e. government-controlled entities) are mostly composed of space agencies in Europe and abroad, as well as public satellite operators (such as Eumetsat in Europe, or Arabsat, Chinasat, RSCC worldwide). The gradual privatisation of a few specific areas of space activity has favoured the development of private customers for space systems. The first in line was Arianespace, the European private launch services operator. This development was accelerated at the turn of the millennium with the privatisation of all main telecommunications satellite operators (Eutelsat, Inmarsat, Intelsat).

As a consequence of the structure and nature of commercial markets in space, European space industry sales to private customers are concentrated upon two main product lines: large geostationary telecommunications satellite and operational launch systems for operations at Kourou. Since the late nineties, two secondary commercial markets have emerged; the market for low Earth orbit mobile communications satellites (in constellations) and the market for commercial Earth observations systems. We now see an emerging commercial/export market in the areas of Science and (more importantly) in the segment of human spaceflight.

Customer details

European public/institutional customers

European public institutions, including ESA, national agencies, Eumetsat, and later the military and the EC, are the core historic customers of the European space industry. Today, they represent 63% of space industry sales.

Space agencies have been established in Europe progressively from the sixties to nowadays. They have progressively acquired an extended technical competence that allows them to manage the complexity of space programmes, a unique competence that is put to the service of other institutions. Space agencies (ESA and CNES in particular) not only manage and procure programmes serving their own purpose, but also provide technical management and procurement services to other entities. The most notable cases involve complete programme delegation, where full budgets are delegated to the space agency for implementation on behalf of a third party. This is the case of the Copernicus satellites, managed and procured by ESA on behalf of the European Commission. This is also the case of the Galileo programme, where ESA ensures all procurement on behalf of the

Commission. Similarly, ESA has consistently developed and procured the European meteorological satellites on behalf of Eumetsat.

Thus, it is no surprise that ESA is now the single most important customer of the European space industry, worth 3,7 B€ of revenues. In this total, the European Commission programmes delegated to ESA represent an estimated 680 M€ worth of revenues for the sector. Furthermore, programmes delegated by Eumetsat represent 160 M€ of revenues for industry.

After ESA, national space agencies in Europe represent the most sizeable share of revenues from European institutional programmes, worth 941 M€. These are the revenues generated by national space programmes. Most of these are associated to the activities of CNES (France), DLR (Germany) and ASI (Italy). It must be noted however that these three civil space agencies also occasionally manage programmes on behalf of the military. This was the case of Essaim (CNES/DGA), Satcom BW (DLR/Bundeswehr), Sicral (ASI/Forze Armate Italiane). In 2019, the estimated value of military systems procured by civil space agencies in Europe was 22M€.

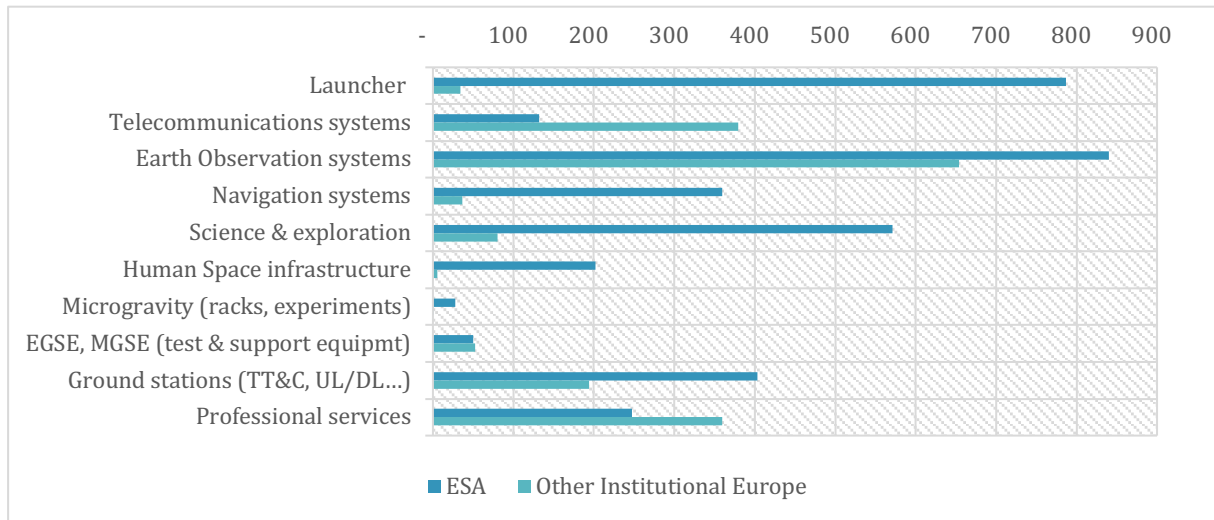
With regard to the sales to military institutions in Europe, they represent revenues worth 698 M€. Since not all military systems are procured directly by military entities, the total value of military systems sales is higher than the value of sales to military customers in Europe, worth 610 M€. This total includes the procurement of civil space agencies, worth 22 M€, the PPP approaches (e.g. Airbus/Skynet) worth 5 M€, and exports worth 107 M€ and a further 2 M€ worth of military systems whose customer could not be identified in the survey. In total, the sales of military systems represent 717 M€ in 2019.

Focus: Sales to European institutional customers by procuring entity (M€)



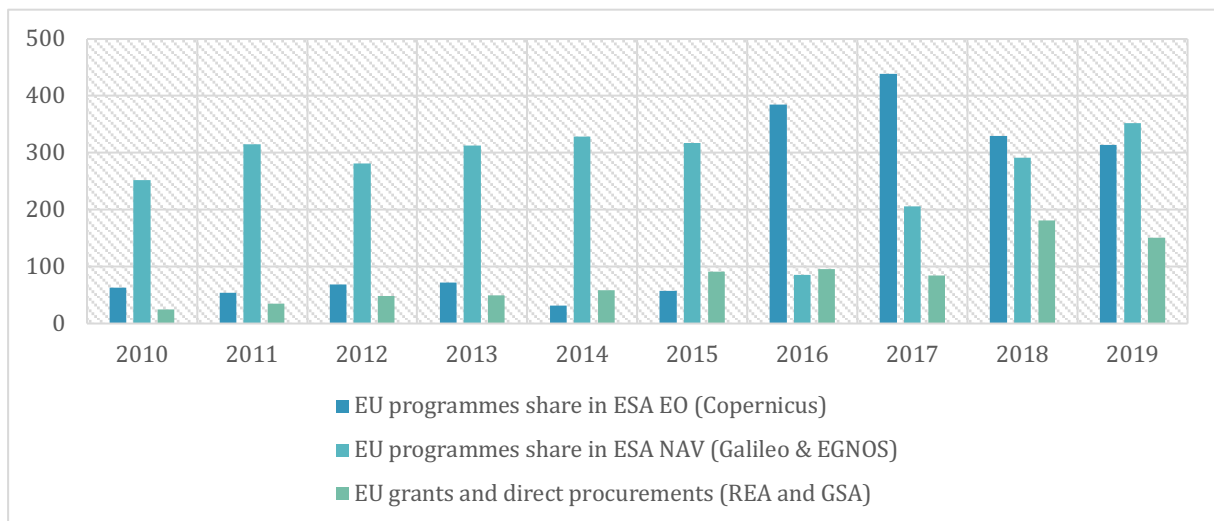
NOTE: In these two graphs all sales to ESA include also the programmes with budget delegation from the EU (GMES/Copernicus and Galileo/EGNOS) and from Eumetsat. The two EU programmes represent 680 M€ worth of industry sales to ESA. Eumetsat delegated procurement represents 160 M€ worth of industry sales. An estimate of the yearly impact of EU programmes on space industry revenues is provided further down. Sales to the EC include revenue from grants (H2020 e.g.) and direct procurement managed by the GSA.

Sales to European institutional customers by system (M€) in 2019



It is interesting to note that ESA and other institutional customers in Europe are not procuring the same types of systems. For Earth observation systems, the most important area of activity for institutional programmes, we note that ESA, supported by the /Copernicus and Meteosat delegated budget, generates revenues comparable than those of all national agencies. This clearly shows that Earth observation is still considered as a strategic activity for some member states (France, Germany and Italy mostly) that invest more on national programmes than what they provide to ESA. For telecommunications, we note an even more striking situation with industry revenues from ESA programmes being lower than those of national programmes. On the contrary, some branches of activity are almost completely organised in the ESA frame, this is the case of launch system development, human spaceflight (and ISS activities), and science.

EU programmes contribution to industry Sales (estimate - M€)



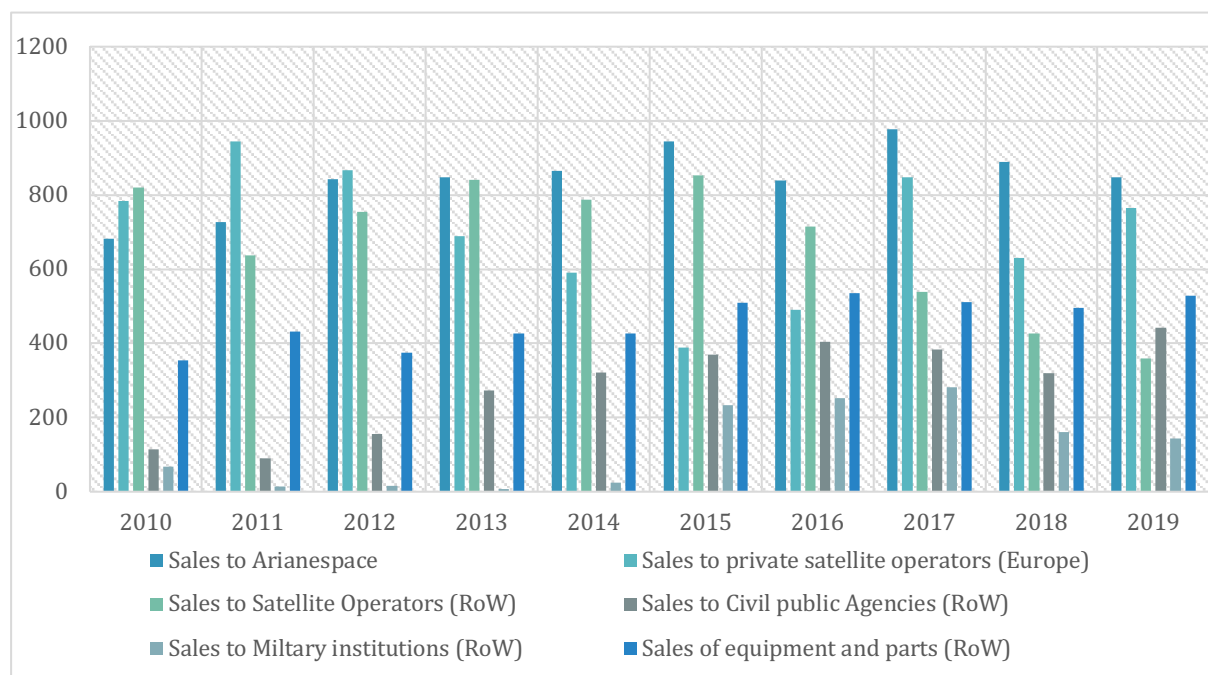
Note: the chart above estimates the annual contribution of EU programmes to space industry sales (inclusive of Galileo, EGNOS, Copernicus, and Research grants). European Union programmes' contribution to industry sales is increasing regularly since 2009.

The commercial market (private customers and exports)

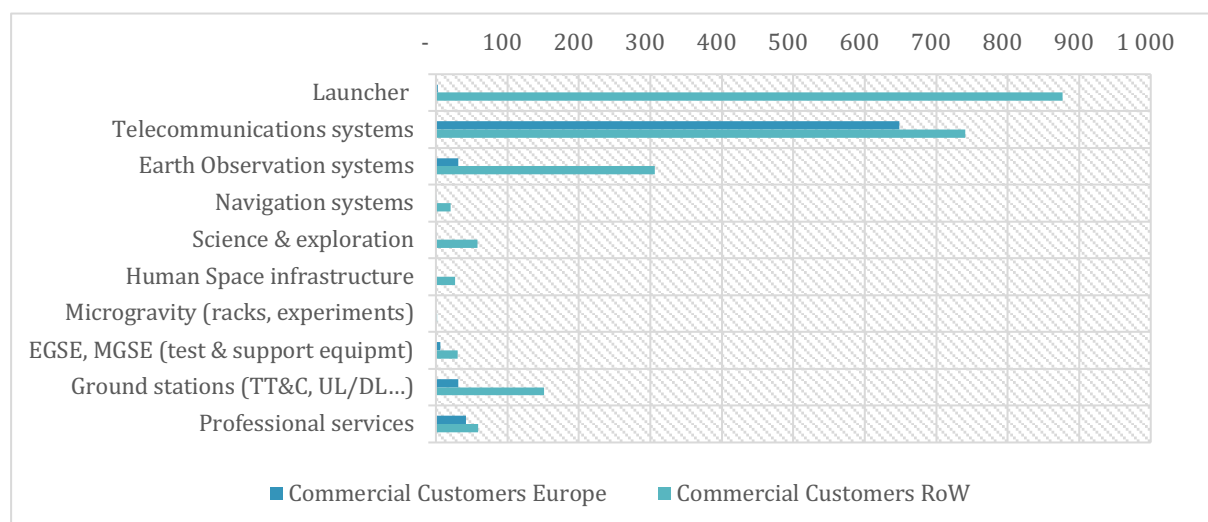
With the establishment of Arianespace, and later the advent of commercial satellite operators, the European space industry has added new customers on top of its core business with European institutional customers. These customers are commonly referred to as 'the commercial market', although not all of them are private entities.

The 'commercial market' is the market composed of private entities (e.g. satellite operators, Arianespace), and public entities located outside Europe. In other terms we define the commercial market as all sales to private entities, plus all exports (sales to customers outside Europe).

Sales on the commercial market by customer (M€)



Sales on the commercial market by system (M€) in 2019



Differently than the European institutional market, where sales are distributed among a wide variety of different systems, in the commercial market, the sales are concentrated on two main types of systems: launchers (29%) and telecommunications systems (45%).

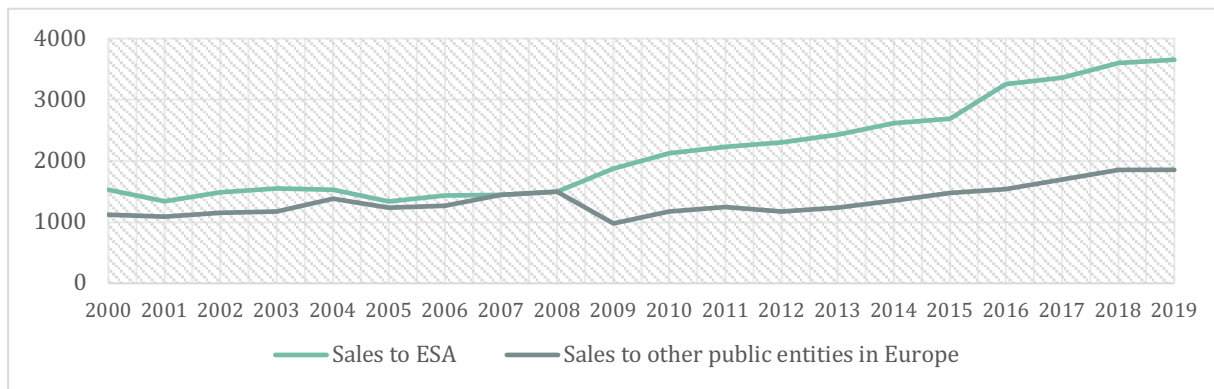
In telecommunications systems, the importance of exports is particularly worth noting. They represent alone 45% of the European space industry sales on the commercial market, and 50% of total exports.

The future of the commercial satellite communications business is very uncertain today. The broadcast business that was at the core of satellite operators' markets, based on GEO infrastructure, is now in a transition phase towards new business models (such as broadband offering, in GEO, LEO and MEO...).

In all other product segments, the commercial market is far from being similarly mature/sizeable, and European industry sales are altogether still limited.

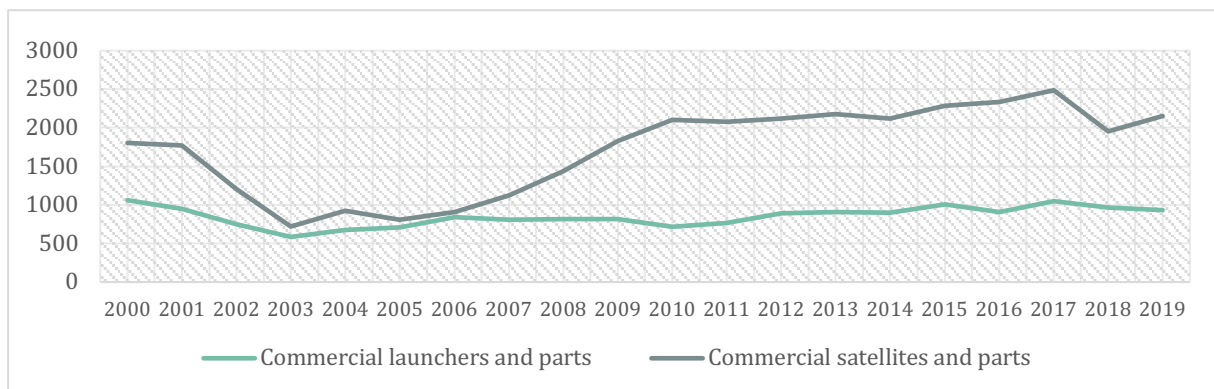
Overview: Historic series - customer segment

Historic series: Institutional Europe (M€)



Note: two EC programmes (Galileo and Copernicus/GMES) are managed by ESA on behalf of the EC. The sales associated to these programmes are thus included in the ESA values. The contribution of the EC to ESA probably explains most of the growth of sales to ESA observed after 2008. The series 'sales to other entities in Europe' is mostly relevant to the revenues generated by national programmes (civil and military).

Historic series: Commercial market & export (M€)



Note: for historic series, the value of exports alone is unknown. Eurospace started measuring exports separately only with the 2009 methodological update.

Final Sales by Product Segment

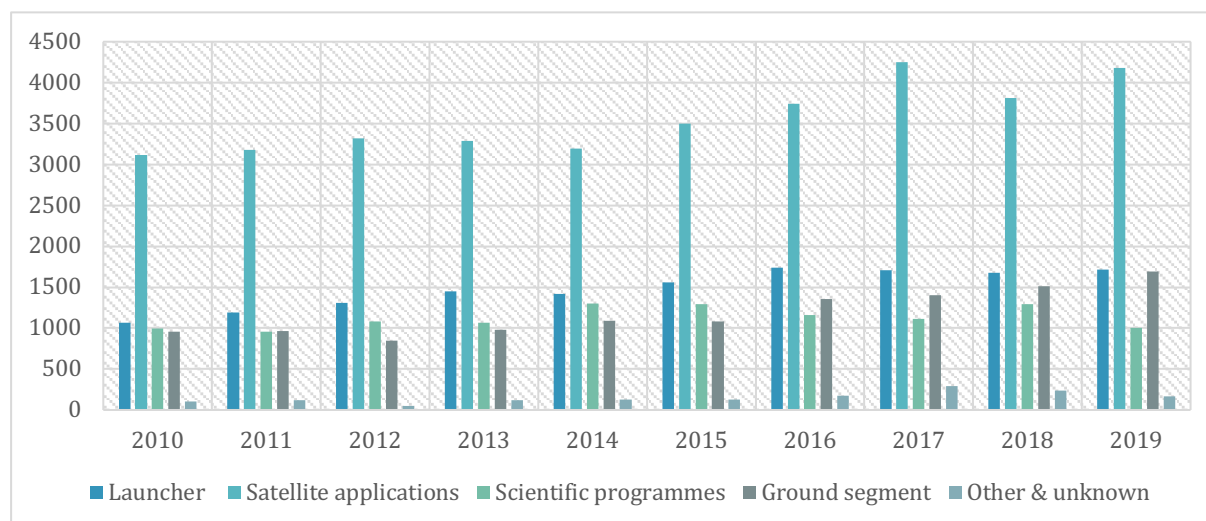
Overview: sales by main product segment

The Eurospace survey identifies 4 main product segments in European space industry sales, each lending itself to further categorisation: Launcher systems, Satellite applications, Scientific systems, and Ground systems/services.

Sales by macro product segment

M€	2015	2016	2017	2018	2019
Launcher systems	1557	1738	1669	1677	1712
Satellite applications systems	3501	3744	4248	3813	4162
Scientific programmes	1291	1158	1116	1290	986
Ground systems and services	1087	1355	1408	1512	1696
Other & unknown	124	174	289	236	165

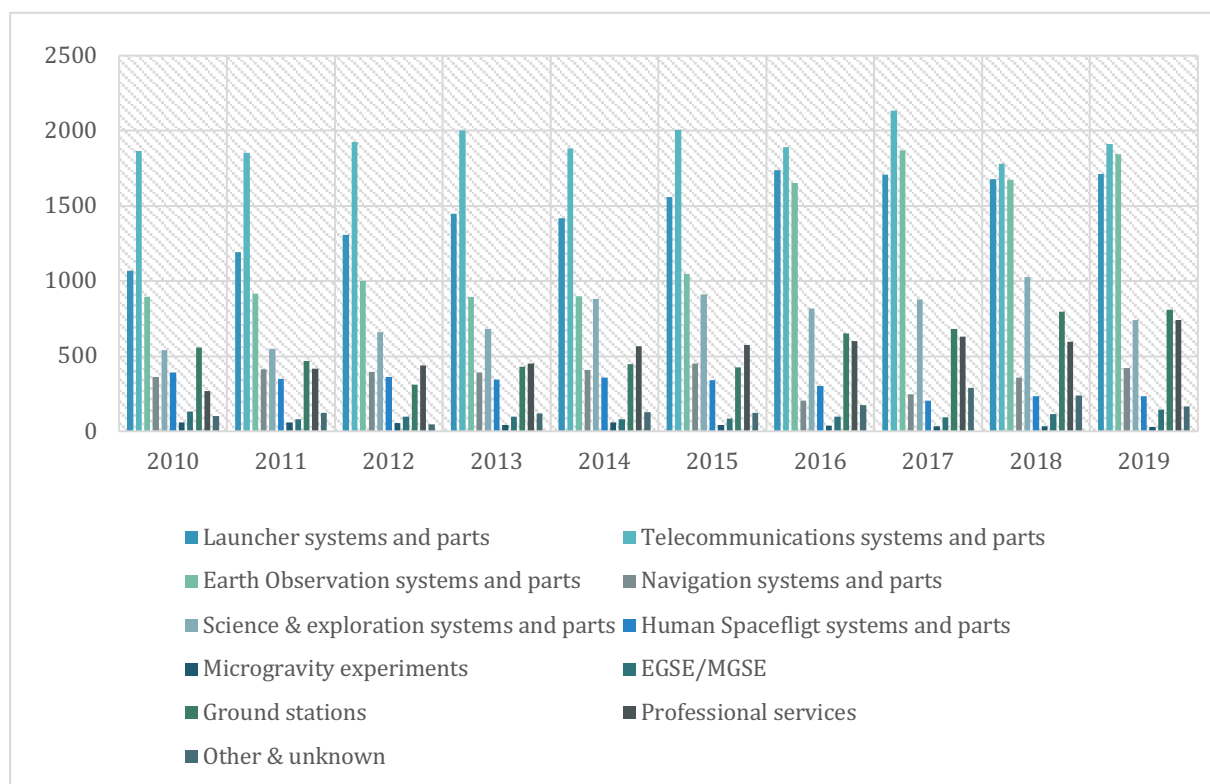
Sales by macro product segment - recent evolution - (M€)



- *Launcher systems: The category only encompasses space launchers; all missile activity is excluded from the perimeter of the survey. Launcher systems are further split between operational launcher systems and parts (sold to launcher integrators and to launch services operators) and launcher development activities (funded by space agencies, so far).*
- *Satellite applications: this category considers satellite systems, i.e. autonomous systems destined to be operated in Earth orbit to perform an operational mission. Satellite systems category thus includes all systems (and parts) for telecommunications, Earth observation (including meteorology), and navigation/localisation/positioning.*

- *Scientific systems: this category encompasses all spacecraft with a scientific purpose. This includes all scientific satellites (i.e. for astronomy or Earth science purposes) as well as all human related structural components (cargo spacecraft, habitable modules etc.) and microgravity equipment (racks and modules for operations in the space station, or in artificial microgravity environment such as drop towers/parabolic flights).*
- *Ground systems/services: this category considers hardware and services closely associated to space systems development, production and operations. The category includes: professional ground stations (uplink/downlink stations) and ground control centres (for telemetry, tracking, and command - TT&C), Electric and mechanical ground support equipment (EGSE/MGSE - specialised equipment used to test and integrate space systems), services (only professional services, including test and engineering services associated to development and manufacturing), and ground control centre and operations services associated to spacecraft or launcher operations.*

Sales by product segments, details (M€)



Sales by macro segment and by customer (M€)

M€	Launcher systems	Satellite applications	Scientific programmes	Ground systems & services	Other / Unknown systems	Total
Sales to ESA (incl. delegated EC programmes - GMES & Galileo)	787	1332	784	701	33	3636
Sales to other European institutions (public)	34	1070	86	608	58	1856
Sales to Public institutions RoW	2	548	32	104	10	696
Other/unknown European customers	4	15	26	45	20	109
Sales to European private operators	3	681	1	79	3	766
Sales to Arianespace	799	3	0	47	0	849
Sales Private satellite operators RoW	0	193	2	45	7	248
Sales of equipment and parts RoW	76	320	50	44	28	518
Other/unknown RoW customers	7	7	7	23	6	50
Total	1712	4168	986	1696	166	8728

Looking at the matrix of sales (the distribution by macro segment and by customer/procuring entity) we note that all product segments are not associated to the same customer categories.

ESA procurement addresses all product segments in the sector, but maintains a marked focus on scientific programmes (worth 22% of total sales to ESA, and 80% of total sales in scientific systems). This is consistent with the historic mandate of European cooperation in space established in the 60s with ESRO (European Space Research Organisation).

Launcher sales are very much focused on two main customers, ESA (46% of launcher sales) and Arianespace (47% of launcher sales). This is consistent with the organisation of launcher development and procurement activities in Europe where Arianespace is procuring operational launcher systems while ESA is financing launcher development and consolidation activities.

Satellite applications sales (sales of systems and equipment for telecommunications, Earth observation and navigation) are more evenly distributed across a variety of customers in Europe and outside Europe. Of course satellite operators worldwide (public and private) are the core customers for this segment of products worth 24% of total satellite applications sales. The exports of equipment and parts (complete payloads, specialised equipment etc.) represent a sizeable amount (8% of total satellite applications sales).

On the ground systems & services segment, the core business is located with European institutional customers (77% of total ground system/services sales). Within this segment, sales are mostly associated to ground control centre hardware and services, as well as engineering services provided in support of technical space agency activities.

Focus: Military systems and military customers

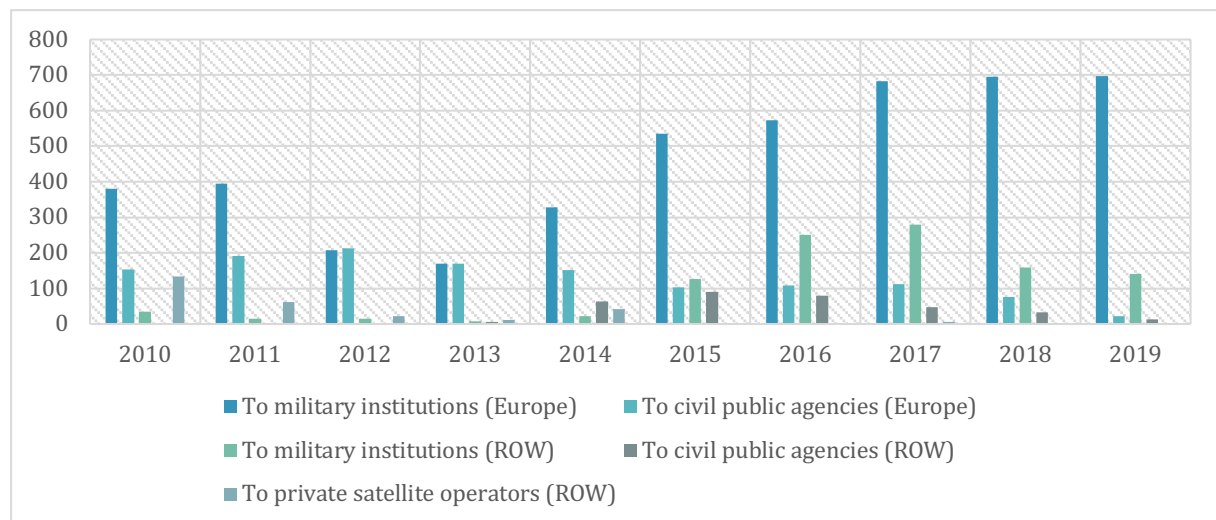
In Europe, differently than in the USA, Russia or even China, military applications of space are rather under-developed. Strategic considerations have not been a major driver of space systems development in the early years of European space programmes, and today European space military programmes are still organised at national level rather than at European level.

Military space programmes in Europe have almost exclusively developed in the areas of telecommunications (with the Syracuse, Skynet, Sicral, Satcom BW systems...) as well as in the area of remote sensing and electronic intelligence (Helios, Cosmo-Skymed-Pleiades, Essaim...).

The technical and financial management of military space programmes in Europe has been associated to a wide variety of solutions, from the direct procurement of military systems by defence procurement agencies (such as the French DGA) to budget delegation to national space agencies (such as the DGA/CNES agreement or the Bundeswehr/DLR scheme) as well as a variety of public-private partnerships (such as the Skynet/Paradigm scheme with the UK Ministry of Defence). As a result, the economic assessment of military systems sales cannot be limited to the assessment of industry sales to military entities.

The Eurospace methodology identifies all sales to military entities, but also the sales of military systems under procurement by civil public and private entities.

Focus on Military systems: military systems sales by customer segment (M€)



With regard to the sales to military institutions in Europe, they represent revenues worth 698 M€. Since not all military systems are procured directly by military entities, the total value of military systems sales is higher than the value of sales to military customers in Europe, worth 758 M€. This total includes the procurement of civil space agencies, worth 22 M€, the PPP approaches (e.g. Airbus/Skynet) worth 36 M€, and exports worth 162 M€ and a further 2 M€ worth of military systems whose customer could not be identified in the survey. In total, the sales of military systems represent 920 M€ in 2019.

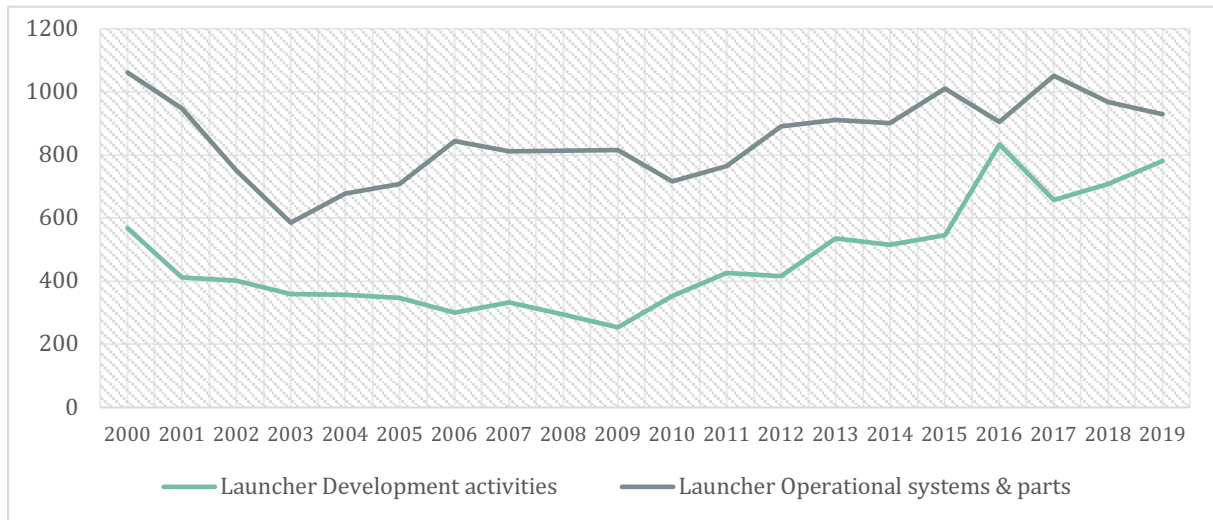
Due to their strategic nature, defence markets are still very much organised nationally worldwide. With military space systems, this situation is reflected in the sales figures for European military space systems, where exports are a growing fraction of military systems sales.

Launcher systems sales

Launcher system sales include sales of operational launch systems to Arianespace procurement, the exports of launcher equipment and parts, and all launcher development and consolidation activities funded mainly by ESA.

The European space industry currently manufactures two different launchers, the Ariane 5 system (heavy launcher), and the VEGA system (small/medium class launcher). Both are operated by Arianespace from the European spaceport in French Guyana, alongside the Russian Soyuz launcher. The Soyuz is produced in Russia and is not associated to any significant revenues for the European space manufacturing industry.

Long series: Launcher systems sales (M€)



Launcher programmes include two different and complementary market segments.

- A market for operational launcher systems: the space industry produces and integrates the Ariane and VEGA launch systems for Arianespace. This is strictly a domestic market, although Arianespace services are sold to customers worldwide. The level of business in this segment is driven mostly by Arianespace demand for launch system, itself being strongly linked to the global demand for launch services and by the competitiveness of Arianespace. Industry also exports launcher parts (e.g. fairings, nozzles) that are integrated to non-European launchers (e.g. Atlas in the USA, H2 in Japan).
- A market for launch system development activities: development programmes are funded almost exclusively through ESA, they aim at preparing the future (e.g. FLPP) or at consolidating and improving existing technology (e.g. ARTA, VERTA). The level of business associated to this market is driven by policy decisions. In 2014, European Ministers at the ESA Council decided to embark on the development of a new launcher system: Ariane 6. The impact of the Ariane 6 development programme on industry revenues is quite visible since 2016.

With the exception of launcher parts for exports (only 5% of launcher sales), the whole launcher system market is domestic, on both its operational and development market segments. Still, the customer base of Arianespace business is markedly international, since over past years Arianespace launched a majority of satellites for non-European entities.

Long series: All satellites (#) launched by Ariane and Vega launchers by customer region

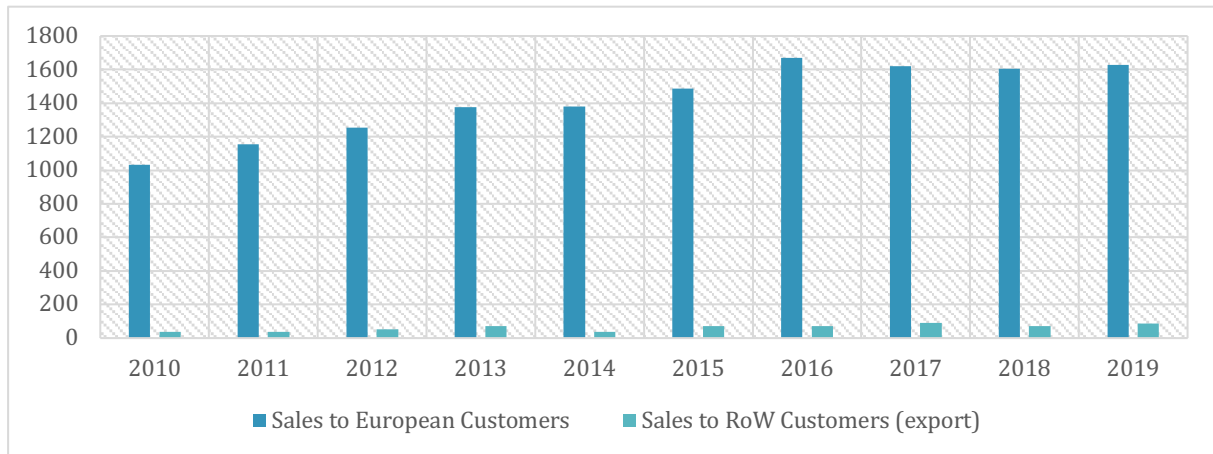


Note that in the graph above only the satellites launched with the Ariane 4, Ariane 5 and Vega systems are taken into account. Arianespace also operates Soyuz launchers, whose activity is not considered here.

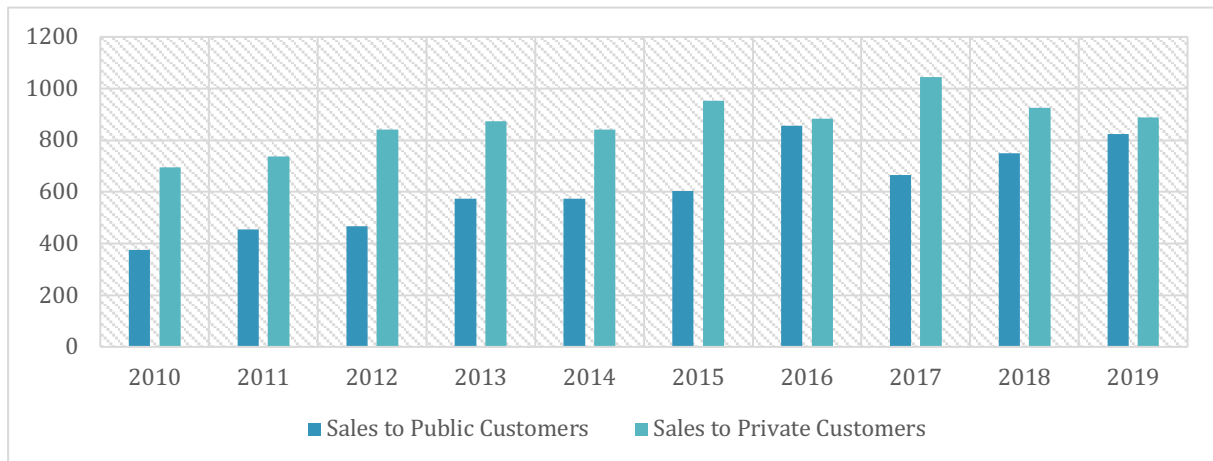
Launcher segment details, commercial vs. institutional customers sales (M€)



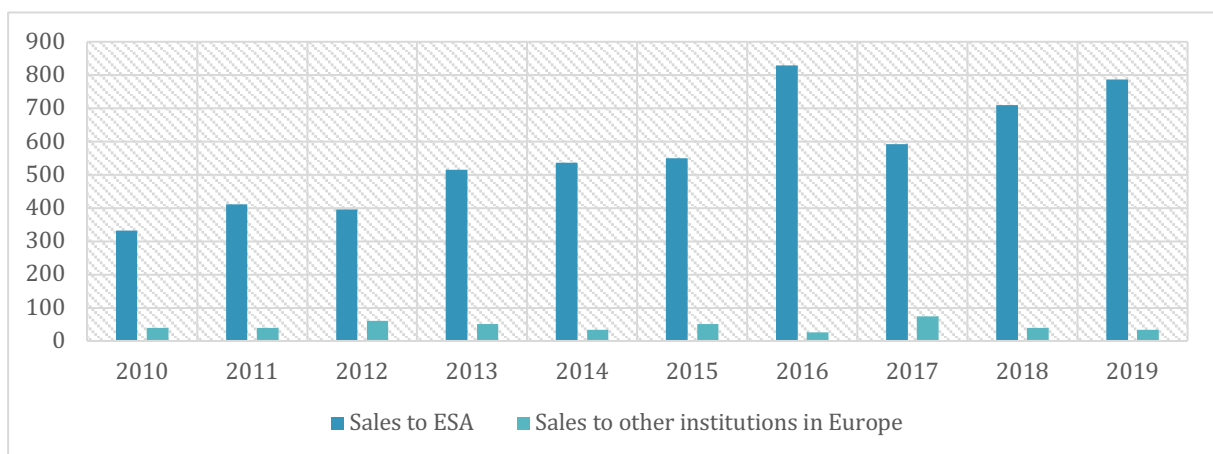
Launcher segment details: European vs Export customers (M€)



Launcher segment details: Private vs. public customers sales (M€)



Launcher segment details: Sales to public entities in Europe (M€)



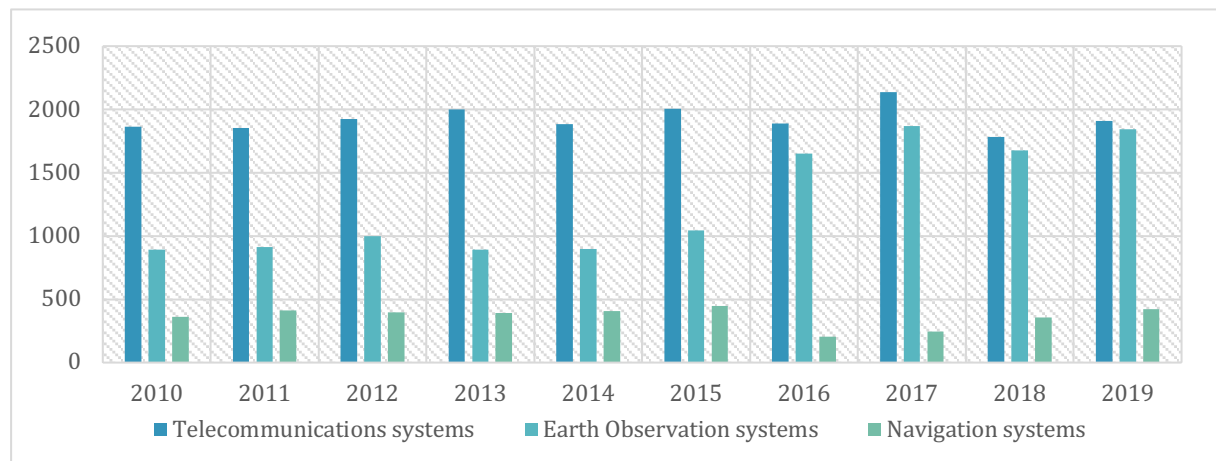
For launcher development programmes ESA manages the largest budget in Europe. National and EU programmes are comparatively very small in this domain.

Satellite applications sales

Satellite applications: this category considers satellite systems, i.e. autonomous systems destined to be operated in Earth orbit to perform an operational mission. Satellite systems category thus includes all systems (and parts) for telecommunications, Earth observation (including meteorology), and navigation/localisation/positioning.

Satellite applications, as a whole, represent the most important source of revenues for the European space industry, worth 48% of final sales. They are also the main export segment with 71% of exports.

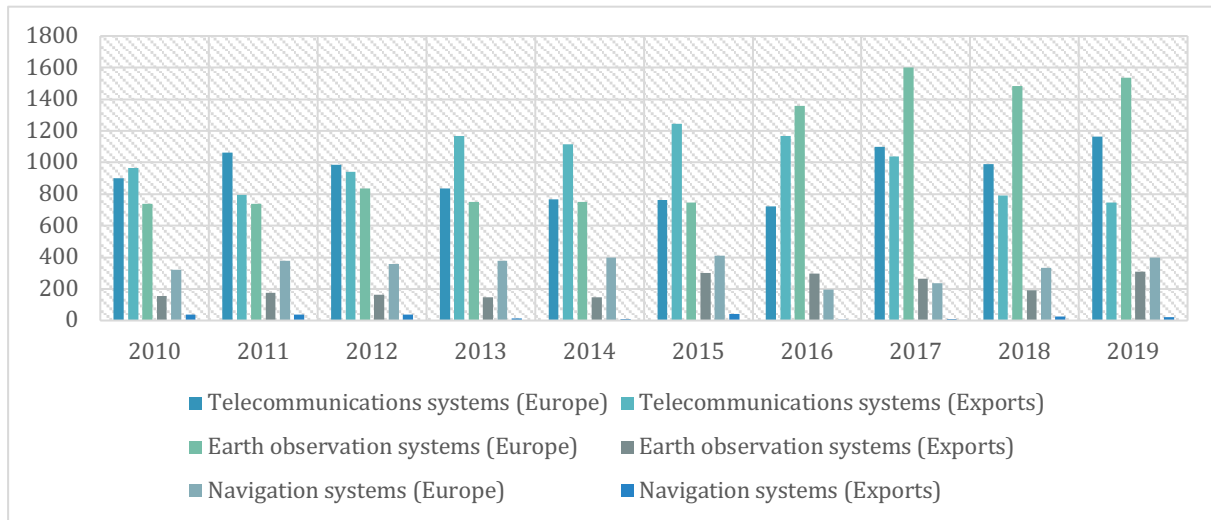
Satellite applications details: distribution by application - decadal evolution (M€)



The evolution over time of sales among the three segments of satellite applications is very different. Telecommunications systems sales exhibit a high variability with an evolution that may be driven by a cycle. Fluctuations in telecommunications systems sales are mostly linked to fluctuations in the commercial/global market for geostationary telecommunications systems. In Earth observation, the evolution is marked by rather stable sales over time. In navigation the situation is that of an emerging market segment, with no significant sales until the mid-nineties, and from there on a growth associated to the gradual commitment of European public institutions to the development and deployment of the European EGNOS, and Galileo systems.

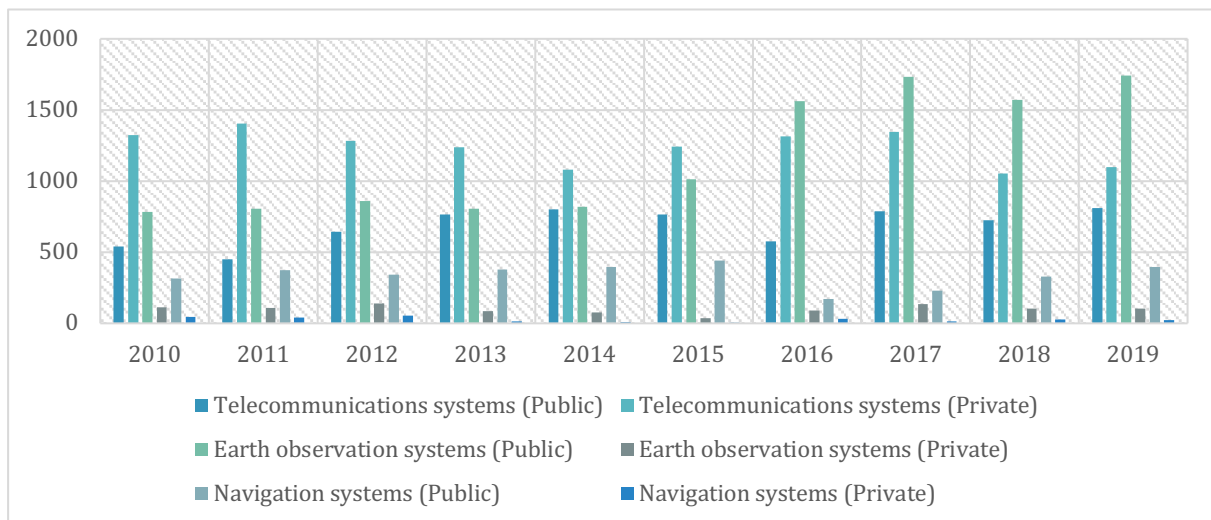
The sales of satellite applications systems are composed at 90% of complete systems sold to final customers such as space agencies (in Europe and abroad) and satellite operators. A small percentage of satellite applications sales (10%) is associated to the export of satellite parts and equipment, ranging from complete payloads for telecommunications system, to smaller parts and equipment such as amplifiers, TWTs, gyros, etc. These parts and equipment are sold for integration in satellite systems produced by non-European space companies (mainly in the USA and Russia). These not so marginal exports highlight the excellence of some specific European products.

Satellite applications sales: European sales vs. exports (M€)



Satellite applications represent the major segment of exports for the European space industry. These exports are not evenly distributed among the three sub-segments. In fact, most of satellite applications systems exports are associated to telecommunications systems (69% of all satellite applications exports). For the other two sub-segments, export markets have yet to develop significantly, although European Earth observation systems are facing a growing non domestic demand from emerging operators and aspiring space countries.

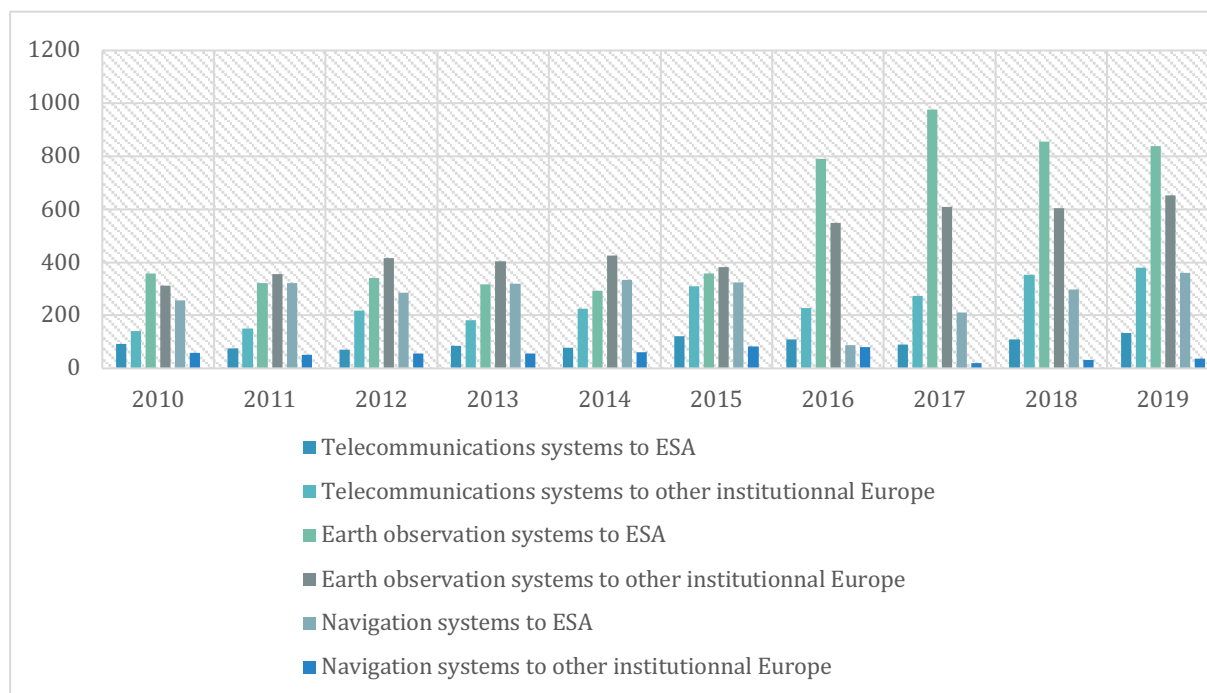
Satellite applications sales: Private vs. Public customers (M€)



The satellite applications market segment is composed at 71% by the demand expressed by public customers, mostly public agencies such as ESA (mostly acting on behalf of the EU in this segment), national space agencies and public satellite operators such as Arabsat. Private entities are found on the demand side mostly in telecommunications systems, where they represent the core demand (i.e. Eutelsat, Inmarsat, Paradigm etc.).

European institutional/public customers are core players in the satellite applications market, their demand is worth 58% of the total satellite applications sales, and worth 81% of the demand expressed by public customers worldwide in this market segment.

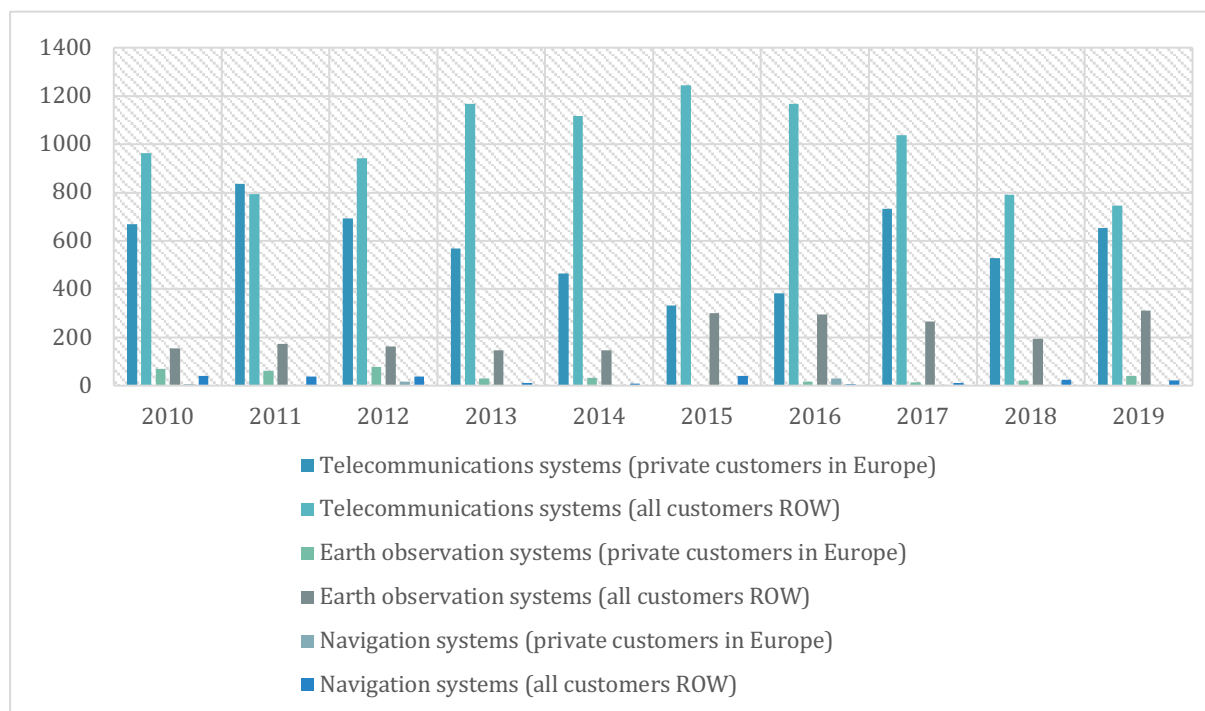
Satellite applications sales: focus on the European institutional market (M€)



Note: two EC programmes (Galileo and Copernicus/GMES) are managed by ESA on behalf of the EC. The sales associated to these programmes are thus included in the value of sales to ESA. It is estimated that GMES activities represented almost half of Earth observation sales to ESA and Galileo about 90% of the navigation-related sales to ESA.

Within the specific sub-segment of European institutional customers, a few peculiarities can be highlighted with regard to the split between sales to ESA and sales to other institutional entities (mostly national space agencies). In two sub segments, the activities performed under ESA procurement generate more business than those performed mainly in a national environment. This is the case for navigation and Earth observation. On the contrary, in telecommunications, the majority of sales occur outside the ESA procurement scheme (with national funding). Such a situation suggests that in telecommunications and Earth observation, ESA member states rather promote activities on a national scheme, supporting the development of their own industry.

Satellite applications sales: focus on the commercial and export market (M€)



The commercial and exports market for European satellite applications systems is mostly associated to the sales to telecommunications satellite operators to the point that sales to telecommunications satellite operators represent 24% of total sales of satellite applications, and are worth as much as 5454% of sales in the total commercial and export market segment. The smaller value of sales of Earth observation and navigation systems on the commercial and exports markets is due to the lower commercial maturity of these market segments, compared to telecommunications.

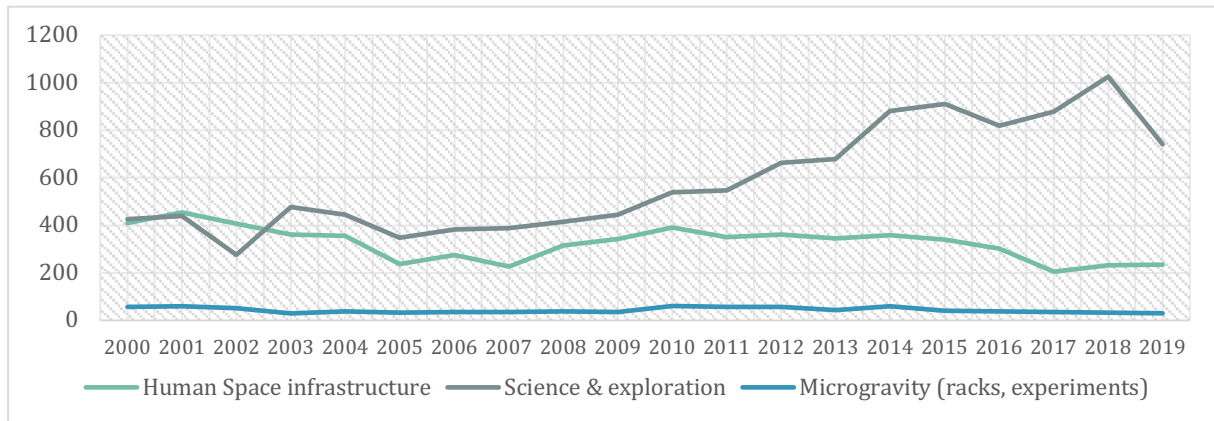
Satellite applications: sales matrix (M€) in 2019

M€	Private customers Europe	Public customers Europe	Private customers RoW	Public customers RoW	Total
Telecommunications systems	648	511	441	299	1899
Earth Observation systems	32	1493	50	249	1824
Navigation systems	1	396	17	0	414
Total	681	2400	508	548	4137

Scientific programmes sales

Scientific programmes cover activities exclusively related to governmental programmes. With the development of exploration missions and the interest of not missing the appropriate launch windows for such remote targets as Mars (Mars Express, Exomars) or Jupiter (Juice), a growth trend in exploration and science has been observed after a long decade of extreme stability of scientific programme revenues of the European industry.

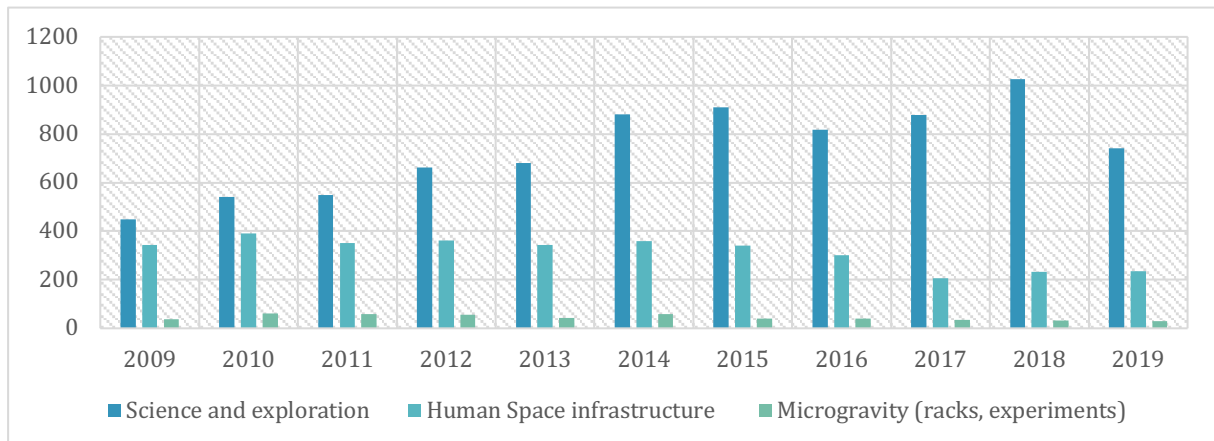
Long series: scientific programmes (M€)



Scientific programmes are a broad market segment that includes three very different sub-segments.

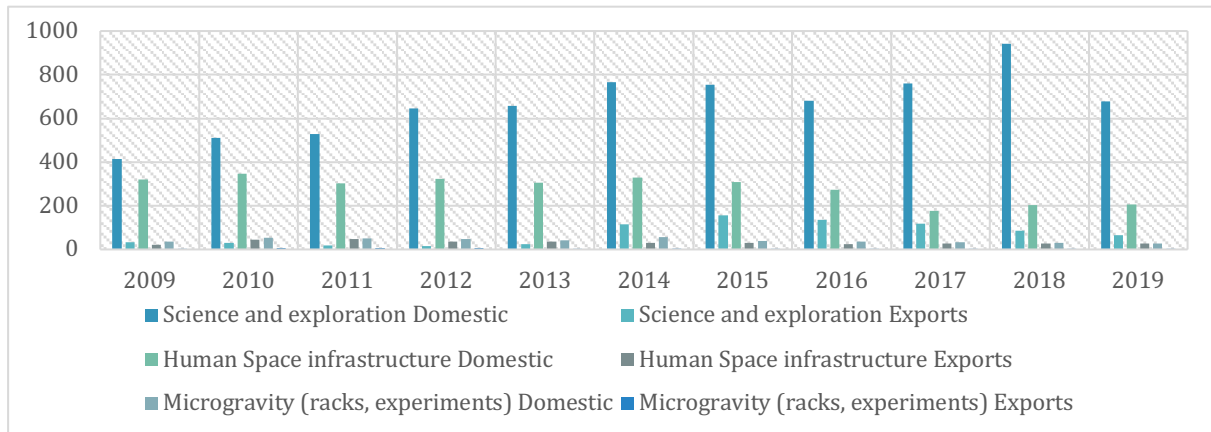
- *Science and exploration:* this category embraces all industry sales associated to the design, development and production of automated spacecraft systems in the frame of scientific programmes promoted by governmental organisations. These may cover a diversity of missions in the scientific domain, such as astronomy, oceanography, atmosphere science, magnetosphere studies, planetary exploration, etc.
- *ISS and human spaceflight programmes:* this segment covers all activities relevant to the European involvement in the European space station (cargo spacecraft, modules, habitats, specialised gear, etc.) with the exception of the experiments carried on board.
- *Microgravity:* this segment covers all sales related to the design, development and operations of experiments and tests performed in microgravity, mostly aboard the space station, but also on Earth-based microgravity infrastructures (Zero-G flights, drop towers).

Scientific programmes sales by product segment (M€)



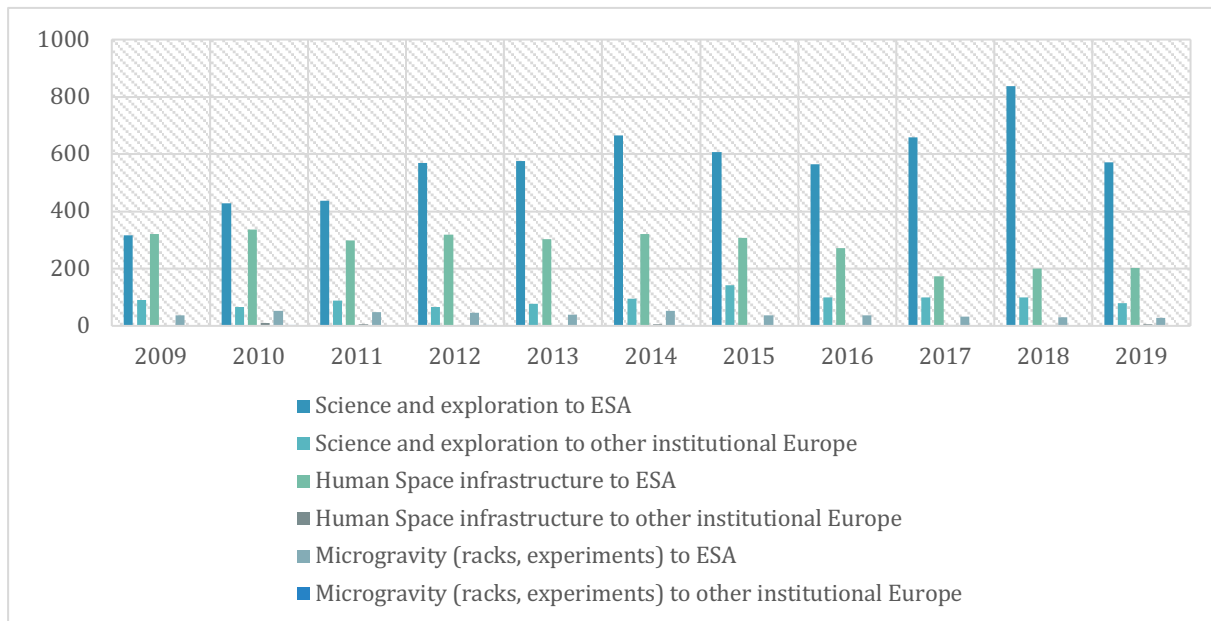
Science and exploration systems represent alone 74% of the sales of scientific programmes. The human space infrastructures related systems sales are worth 23% of scientific programmes while microgravity products (racks and experiments) are the smallest share of sales in this segment, only worth 3% of scientific programmes sales.

Scientific programmes sales: Domestic vs. Export (M€)



Due to the governmental nature of scientific programmes in space, there are only limited opportunities for exports in this specific segment. As a result, exports represent a mere 9% of all scientific programmes sales, and are mostly associated to activities performed in a multilateral framework (such as the ISS, or scientific programmes in collaboration with India, the USA or Russia). For human spaceflight, the situation has changed in 2014 with the delivery of European contributions to the US Cygnus cargo module. The European involvement in this programme may further generate growth opportunities for exports in this market segment.

Scientific programmes sales, focus on European institutional customers (M€)



In Europe, the majority of scientific programmes (differently than satellite applications) are promoted and funded in the frame of ESA (80% of all scientific programmes sales). This is completely in line with the original vision of the founding fathers of European space programmes willing to promote scientific research in space at European level.

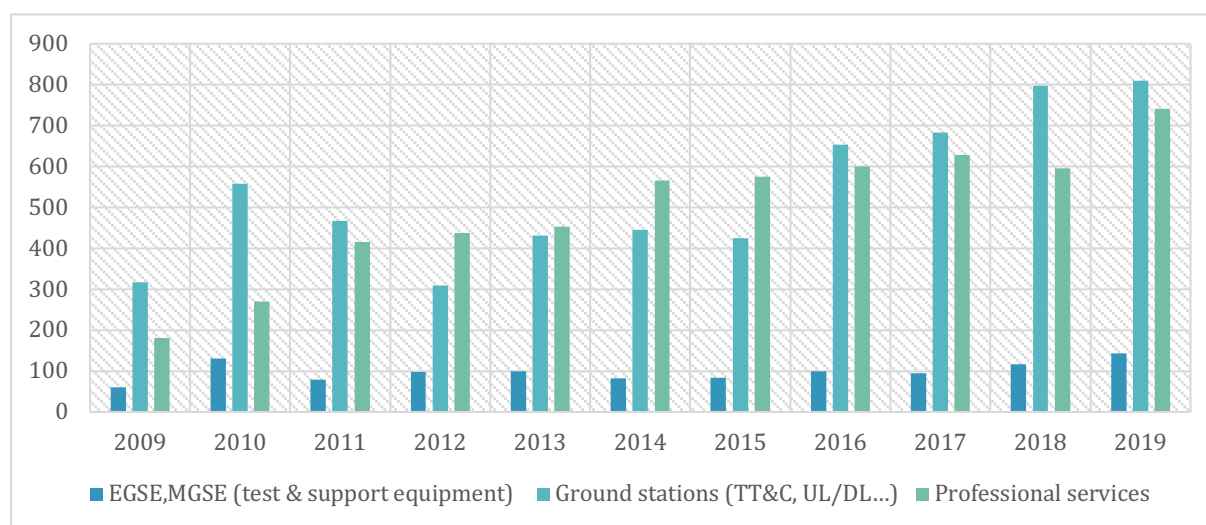
Scientific programmes, sales matrix (M€) in 2019

M€	Private customers Europe	Public customers Europe	Private customers RoW	Public customers RoW	Total
Science & exploration	1	634	24	20	679
Human Space infrastructure	0	207	26	0	233
Microgravity (racks, experiments)	0	28	2	0	30
Scientific programmes	1	869	52	20	942

Ground segment activities

This product category was introduced with the methodological change of 2009, there are no long series associated. The category was created to measure precisely the ground segment business directly associated to the design, development, manufacturing and operations of space systems. Since the measure was introduced, this market segment has represented an average of 19% of space industry sales, confirming the relevance of the measure and the importance of ground segment activities in the overall space system approach.

Ground segment sales by product segment (M€)

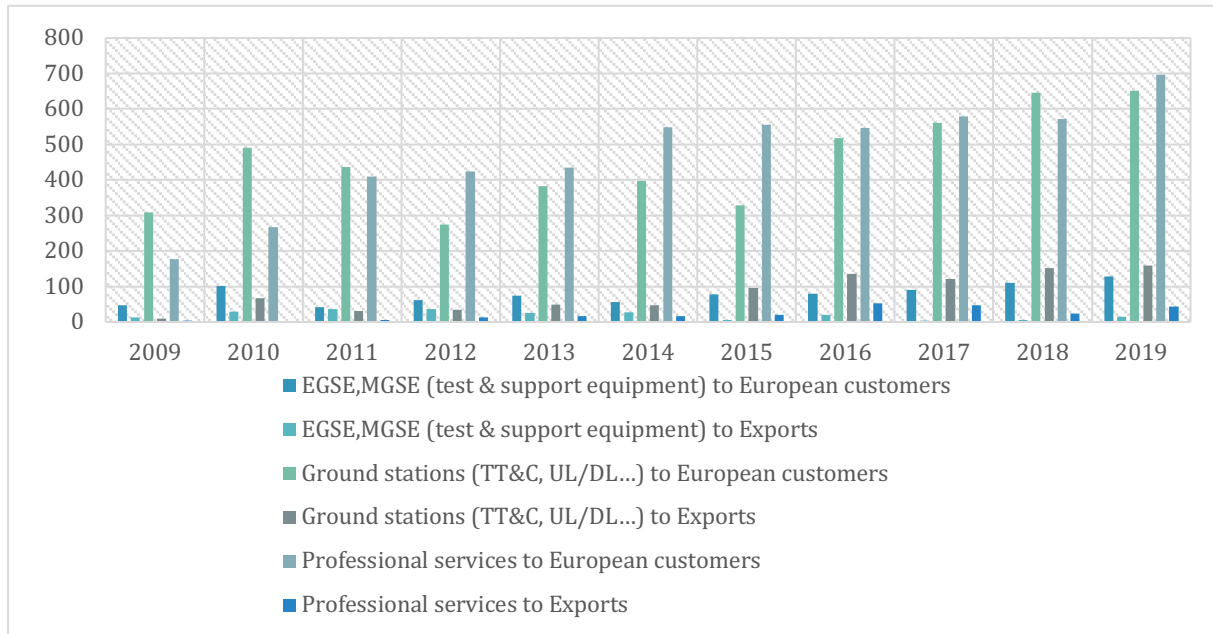


Ground segment activities include three categories.

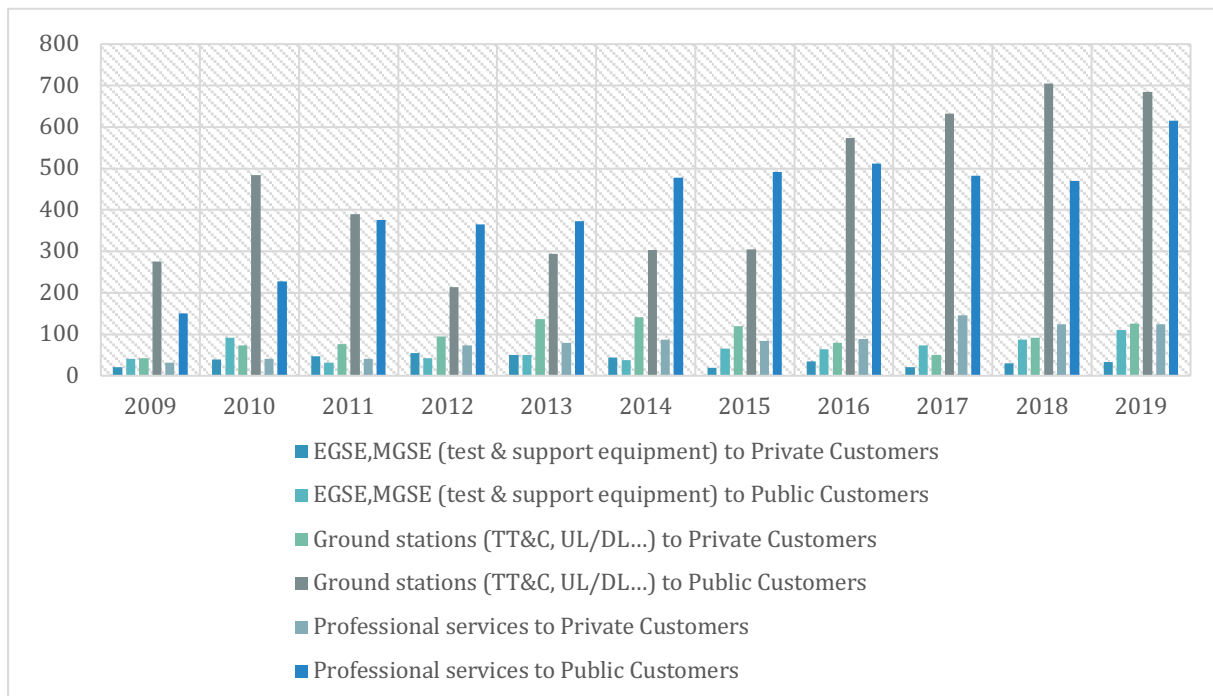
- First the manufacturing of EGSE/MGSE (electric/mechanical ground support equipment): the professional equipment used to perform calibration, integration and test activities on spacecraft systems, subsystems and instruments (worth 8 % of ground segment sales). Only specialised equipment designed and procured to support space programmes is included in this category. Generic manufacturing equipment is not included in the Eurospace survey.
- The sale of ground stations and ground control centres, i.e. the ground infrastructure required to operate space systems (launchers during launch, and spacecraft during operational lifetime) is worth 48% of ground segment activities sales. Ground segment services are not counted in this category.
- The last, but not least, category of sales in the ground segment is associated to services exclusively. In this category are bundled two different types of services. The services provided to the manufacturing industry in support of design, development, test and integration activities, and the services provided to space agencies for the technical and financial management of their programmes, including, sometimes, ground control centre operations.

This category represents 44% of the total ground segment activities sales. In this category the vast majority of sales are related to public customers in Europe (mostly ESA).

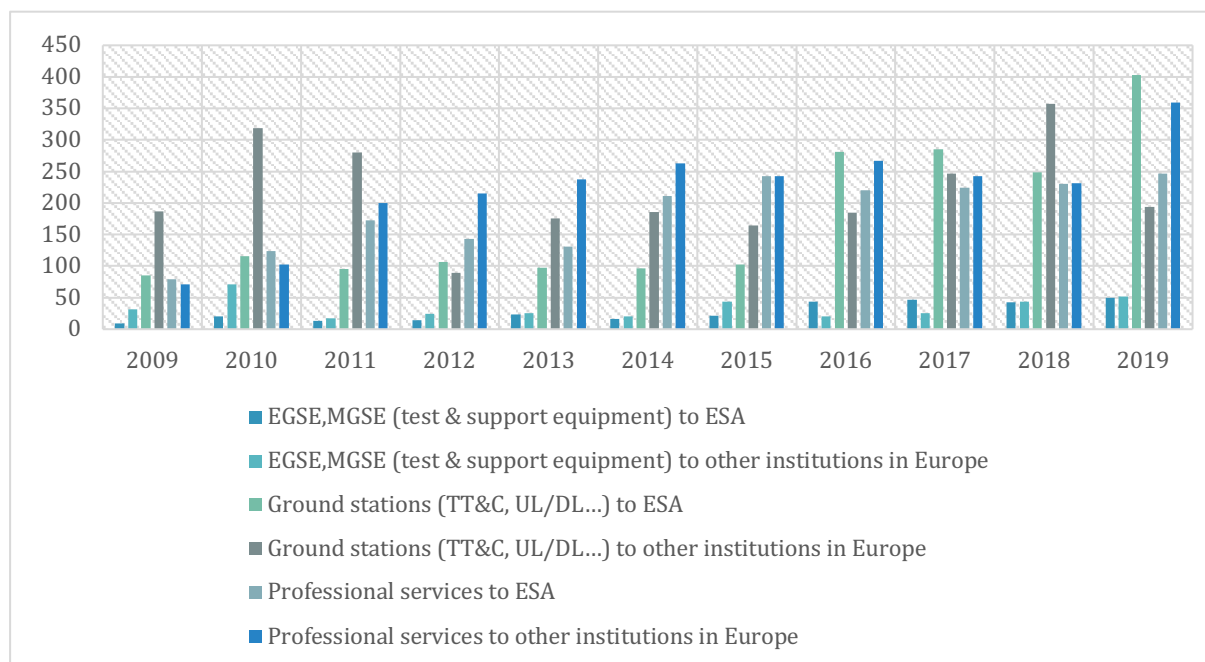
Ground segment sales - Europe vs Exports (M€)



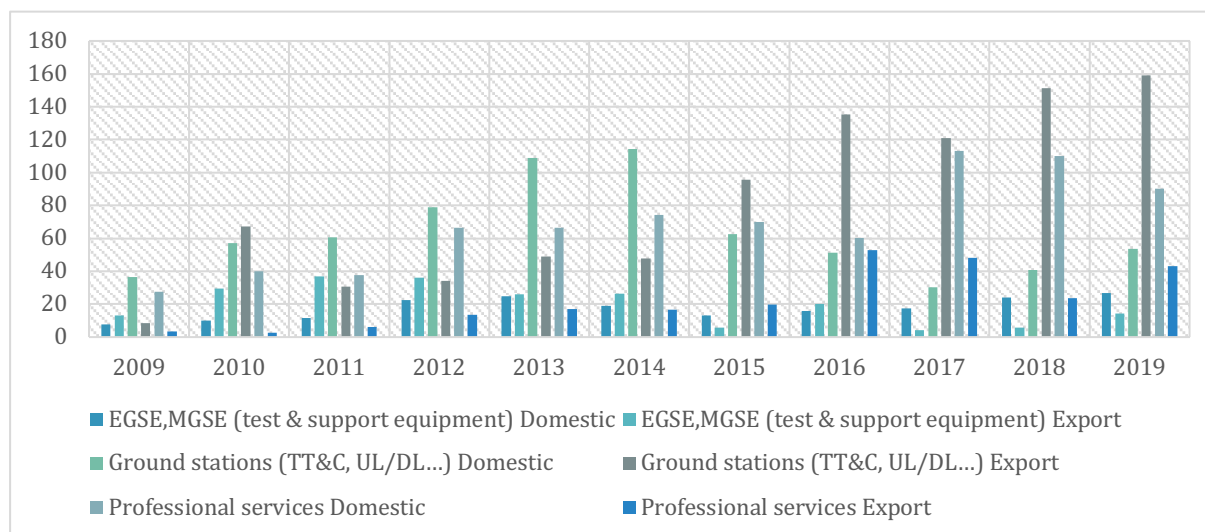
Ground segment sales - Private vs Public customers (M€)



Ground segment sales - Focus on European institutional customers (M€)



Ground segment sales - Focus on Commercial and Exports customers (M€)



Sales in the ground segment category are mostly located in Europe, with exports representing 13% of the total. Sales are mostly relevant to public customers, with ESA at the forefront with 701 M€, i.e. 41% of the total ground segment sales of the European space industry.

Ground segment: sales matrix (M€) in 2019

M€	Private customers Europe	Public customers Europe	Private customers RoW	Public customers RoW	Total
EGSE, MGSE (test & support equipmt)	6	102	2	8	118
Ground stations (TT&C, UL/DL...)	31	600	58	87	776
Professional services	42	607	29	9	687
Total	79	1309	89	104	1581

Output of the European space industry in 2019

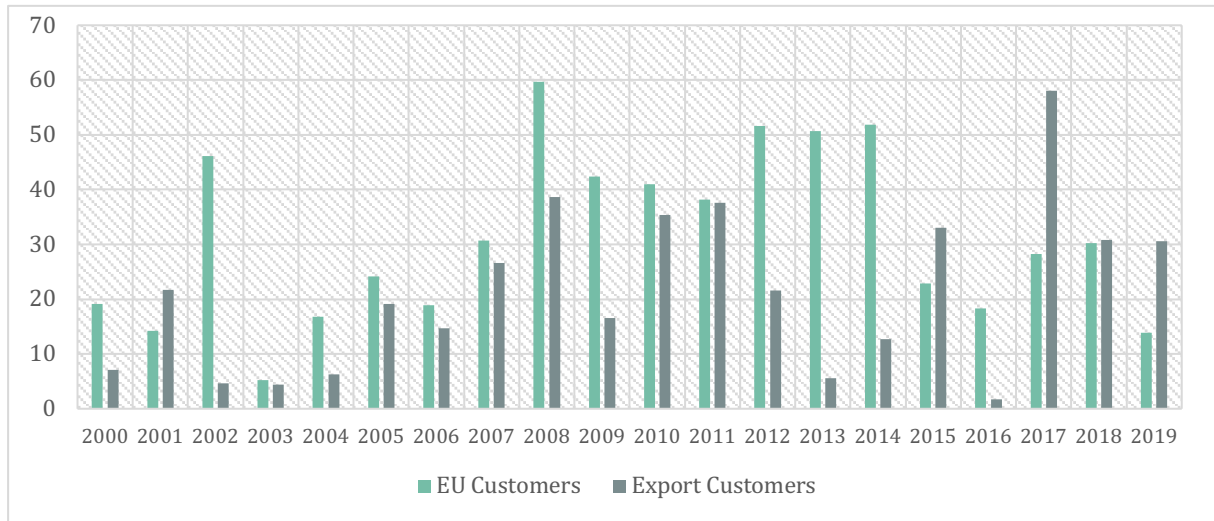
European spacecraft launched in 2019

The European space industry was involved in the production of 50 large spacecraft delivered for launch in 2019. In addition to these, 39 small satellites (i.e. less than 120kg) were produced in Europe, including very small satellites (less than 10kg) often developed in universities and laboratories.

Customer segment	Spacecraft name	Customer name	Spacecraft mass (kg)
Europe - Institutional	CSG 1	ASI	2205
Europe - Institutional	PRISMA	ASI	879
Europe - Institutional	ANGELS	CNES	27
Europe - Institutional	Eye-Sat	CNES	7
Europe - Institutional	CHEOPS	ESA	273
Europe - Institutional	EDRS C	ESA	3186
Europe - Institutional	OPS-SAT	ESA	7
Europe - Academia	Astrocast-2	Astrocast SA	4
Europe - Academia	ATL 1	Budapest Uni	0,5
Europe - Academia	SMOG-P	Budapest Uni	0,25
Europe - Academia	ROBUSTA 1C	Montpellier Uni	1
Europe - Academia	TTU101	Tallin Uni	1
Europe - Academia	BeeSat 9	TU Berlin	1
Europe - Academia	MOVE 2b	TU Munich	1
Europe - Academia	Qarman	Von Karman Institute	4
Europe - Academia	SONATE	Wuerzburg Uni	4
Europe - Academia	KrakSat	AGH Uni	1
Europe - Commercial	AISTECHSAT 3	Aistech	3
Europe - Commercial	Noor 1A & 1B	Alba Orbital	0,75x2
Europe - Commercial	CAS 7B	CAMSAT	3

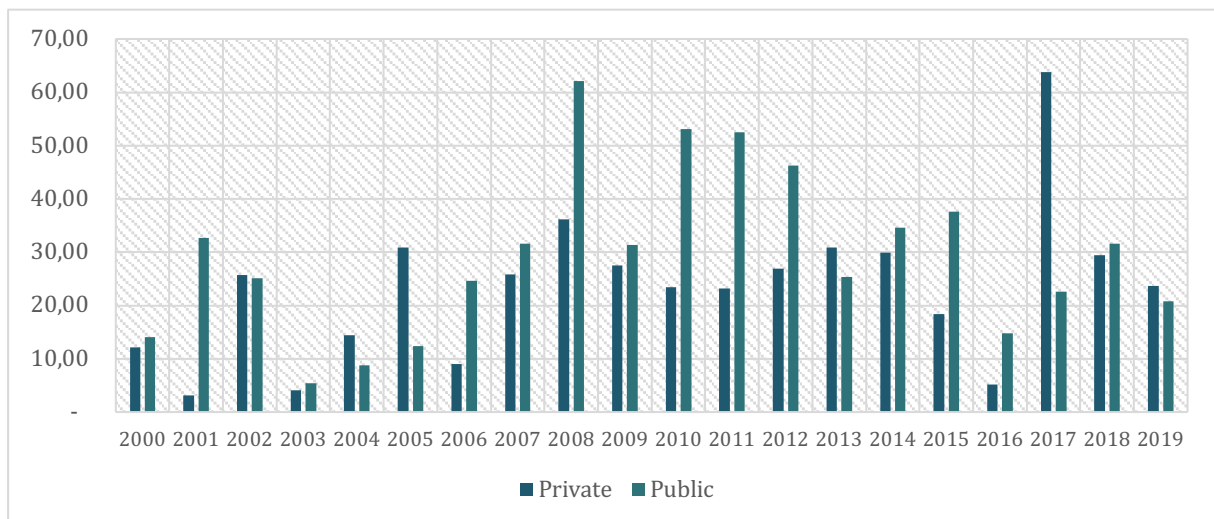
Customer segment	Spacecraft name	Customer name	Spacecraft mass (kg)
Europe - Commercial	CarboNIX	Exolaunch	30
Europe - Commercial	FossaSat 1	Fossa Systems	0,25
Europe - Commercial	D-Star One EXOCONNECT	German Orbital Systems	4
Europe - Commercial	D-Star One LightStar	German Orbital Systems	4
Europe - Commercial	ICEYE X4 & X5	ICEYE	80x2
Europe - Commercial	Inmarsat-5 F5	Inmarsat PLC	4007
Europe - Commercial	EntrySat	ISAE	4
Europe - Commercial	M6P	NanoAvionics	8
Europe - Commercial	O3b FM17, 18, 19 & 20	O3b Networks	700x4
Europe - Commercial	IOD-GEMS	Satellite Applications Catapult	4
Europe - Commercial	Swiatowid	SatRevolution	2
Europe - Commercial	Lucky-7	Skyfox labs	1
Europe - Commercial	SEAM 2.0	SSC	4
Europe - Commercial	DoT 1	SSTL	20
Europe - Commercial	OTB 1	SSTL	138
Europe - Commercial	BRO 1	UnseenLabs	8
Export - Egypt	Tiba 1	Gouvernement of Egypt	5640
Export - Israel	NSLSat1	NSLComm	8
Export - Russia	Yamal 601	Gazprom	5700
Export - Taiwan	FORMOSAT 7A, B, C, D, E & F	NSPO	278x6
Export - UAE	Falcon Eye 1	United Arab Emirates Armed Forces	1197
Export - USA	BlueWalker 1	AST&Science	8
Export - USA	AT&T T-16	AT&T	6350
Export - USA	Iridium-NEXT 167 to 180	Iridium	860x10
Export - USA	OneWeb 0006 to 0012	OneWeb	147x6
Grand Total			44444

Long series: European-built spacecraft by customer segment - European vs Exports (mass at launch/tons)



Historically, European spacecraft were sold exclusively to institutions (and all of them in Europe) with ESA, National agencies and Eumetsat being the main customers. The first commercial customers for European spacecraft were also European, but they were soon expanded with export customers. The comparison over time of the evolution of the mass of European spacecraft against the customer exhibits two interesting trends. First, the European industry has largely increased its production (measured in mass), second, the share of European customers usually exceeds that of exports. The mass impact of human spaceflight programmes (ATV, Columbus) on the series is significant since these programmes require very heavy spacecraft (e.g. ATV: 20 tons, ISS Node 15 tons). This is slightly compensated by the trend in geostationary communications satellites whose mass routinely exceeds 5 tons.

Long series: European-built spacecraft by customer segment - Public vs private customers (mass at launch/tons)



In the nineties, annual deliveries of European spacecraft for launch were mostly associated to public customers (space agencies and public satellite operators). In the past decade, where we have seen a growing share of deliveries to private customers. This market segment, worth 20 to 40 tons of spacecraft deliveries per year, is mostly composed of large geostationary telecommunications satellites.

Correlation between spacecraft mass at launch and industry revenues

Ariane and VEGA launches in 2019

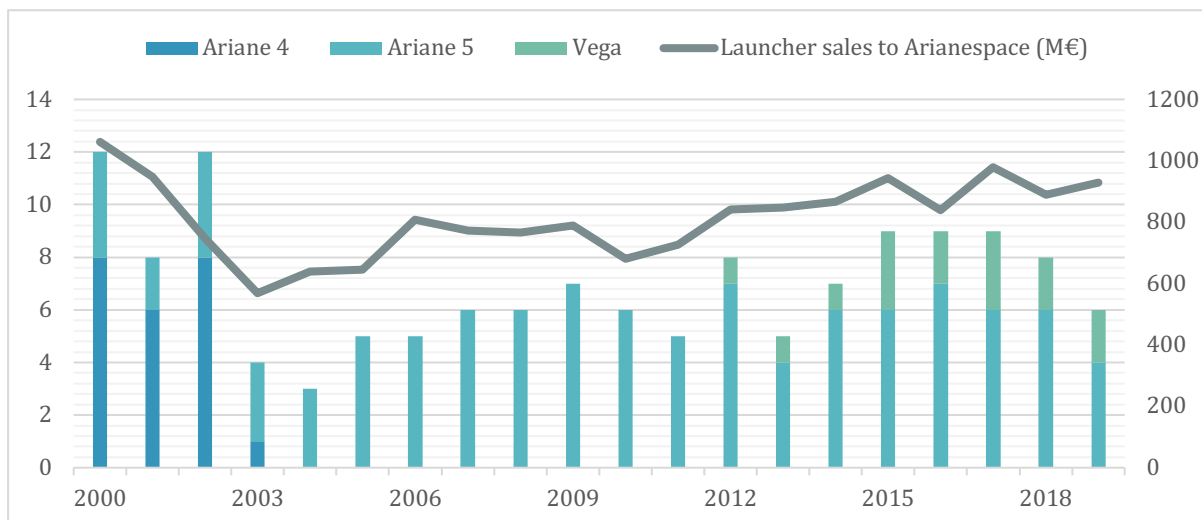
Spacecraft launched by Ariane and Vega in 2019

Launcher	Date	Spacecraft	Mass (kg)
Ariane 5	05/02/2019	GSat 31	2536
		HellasSat 4	6495
	20/06/2019	AT&T T-16	6350
		Eutelsat 7C	3400
	06/08/2019	EDRS C	3186
		Intelsat 39	6600
	26/11/2019	Inmarsat-5 F5	4007
Vega	22/03/2019	PRISMA	879
		Falcon Eye 1	1197
Grand Total			40290

In 2019, the European launcher industry delivered 4 Ariane-5 systems and 2 Vega systems for launch by Arianespace. The launchers were used to loft 8 geostationary satellites and 2 low Earth orbit spacecraft. All were successfully injected in the expected orbital location.

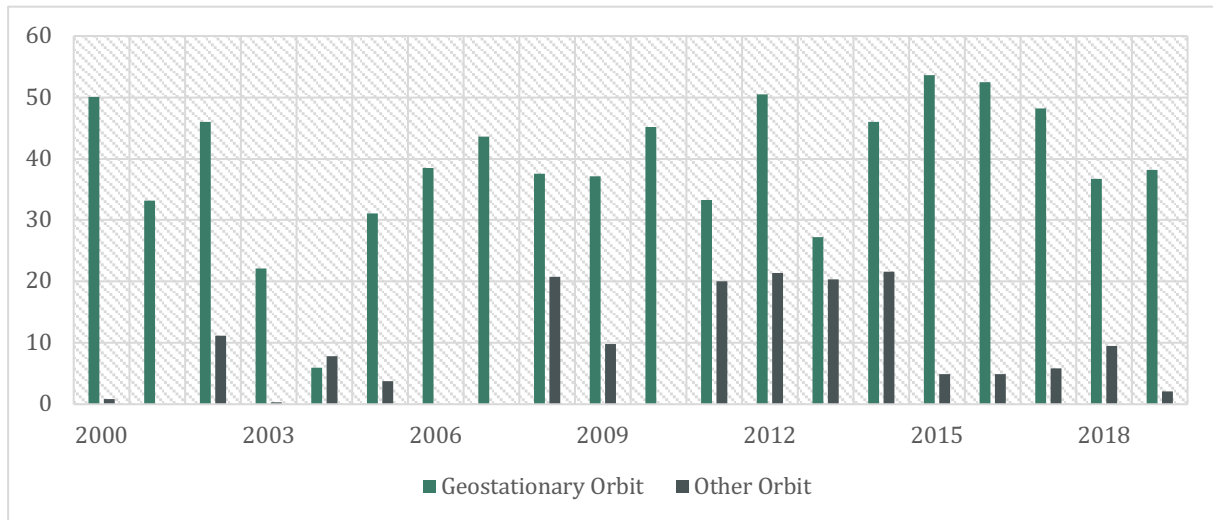
In 2019, the launchers built by the European industry have successfully put a total of 40 tons in orbit.

Ariane and Vega launches (left) vs. Industry revenues (right, M€)

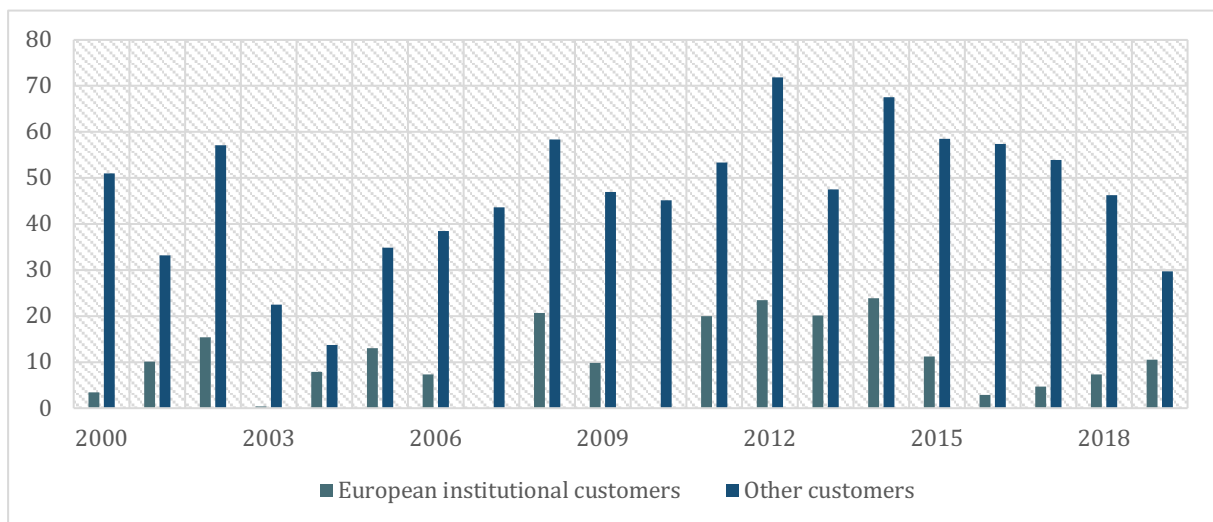


The value of industry launcher sales to Arianespace is closely correlated to the number of launchers delivered to Arianespace in the same year. It shall be noted however that not all systems delivered are launched in the year of delivery, thus the series are not perfectly aligned. In addition to the revenue from systems sales, industry also performs specific services for Arianespace on location at the spaceport in French Guyana, to support launcher/payload integration aspects and launcher readiness for launch. This factor is being corrected in most recent data series.

Mass launched by Ariane and Vega by orbit (tons)



Mass launched by Ariane and Vega by customer (tons)



The Ariane system has been mainly used to deliver spacecraft in geostationary orbit, although it has also served low Earth orbit on specific occasions (e.g. ATV launches). The Ariane launch system is the preferred choice of commercial customers, and this is reflected by the high share of commercial launches in Ariane's launch history. European institutional customers (ESA, Eumetsat and national agencies in Europe) are not the primary customers of the Ariane system, but it is interesting to note that they have been the only ones using Ariane to reach other orbits than the geostationary orbit.

Methodology

Introduction to the survey

Every year Eurospace, the association of the European space manufacturing industry, issues the annual update of its facts & figures statistical series.

Since its inception, the statistical collection aims at measuring the value of the market for space systems design, development and production in Europe (i.e. the space industry manufacturing activity). Space systems are defined in detail (see “products definitions”) in order to ensure an appropriate data collection and to avoid misinterpretation of the data sets.

This statistical effort is supported by two main driving principles:

- 1) The focus on manufacturing activities (with the exclusion of all services related to the exploitation of space systems: launch services and satellite operations). Service activities associated to the manufacturing process of space systems (such as engineering and test services, consultancies etc.) are included in the perimeter of the survey. A share of ground systems operations is included also, when they are performed for Space agencies in Europe.
- 2) The effort to measure the value of the end-market, with the elimination of all inter-sectoral business that could be counted twice or more.

Perimeter of the survey

The Eurospace facts & figures survey focuses on measuring the economic value of industrial activities associated to the design, development and manufacturing of space systems (also called the upstream sector) in Europe.

It does not consider non-space products (such as missiles or consumer-end terminals such as GPS receivers, Satellite TV receivers and dishes, etc.) nor the provision of services based on the exploitation of space assets. This means that the revenues and employment of such companies as Eutelsat, Paradigm, Inmarsat, Arianespace, SES Global, and other operators are not included in the perimeter of the survey.

Data Collection

The data collection is supported by companies with space activities operating in Europe (not limited to Eurospace membership). Companies answer a questionnaire providing detailed information on their sales and employment relevant to space systems design, development and manufacturing. All information released to Eurospace is protected by a confidentiality agreement. The quality of the survey is only as good as the data provided by participating companies.

Most companies in the space manufacturing sector have participated at least once to Eurospace survey in the past. The main players (companies with more than 100 space employees) usually support the survey on a very regular basis, while smaller players may only support the survey sporadically. When a reply is missing from a company, it is supplemented by an estimate based on a previous reply received from that company, and/or publicly available information on the company.

The space manufacturing sector in Europe is at the same time very fragmented and very concentrated. The 30 largest space units in Europe make for almost 80% of total employment of the sector. The remaining smaller

players representing barely 20% of employment. It is also interesting to note that all smaller players work almost exclusively as subcontractors to the largest players.

From a statistical point of view, this means that an efficient data collection shall focus on collecting at least the main replies (the large players, and particularly the prime contractors) that will provide a good assessment of final sales. Collecting additional replies from increasingly smaller players, adds a layer of detail to the survey and improves marginally the measurement of employment; but does not affect the overall value of final sales and has a limited economic impact.

Consolidation Model

In the Space sector, as with many other industrial sectors, the delivery of a complex system involves the participation of a large number of companies at various stages of the development and production processes. This translates into a complex contractual chain, where one prime contractor signs with the customer and then distributes the work among itself and many subcontractors.

The need for consolidation

When considering the revenues generated within the whole supply chain by the production of one space system, with the mechanism of subcontracts the cumulated value of all contracts exceeds the value of the system itself. This is due to the fact that without consolidation, some subcontracts are counted twice.

Within a given perimeter, the consolidation of sales can be done in two ways: either by measuring the consolidated sales at company level (total sales minus the value of subcontracts), either by measuring the final sales at company level (total sales minus inter-sector sales, relevant to subcontracted work). Within a given perimeter, the value of consolidated sales and final sales are identical.

Methodological update in 2010

Initially, the Eurospace survey was based on a methodology focusing on measuring the consolidated sales (i.e. the value of sales, minus the value of purchases within the sector). In 2010, Eurospace implemented a new methodology based on the accurate measure of final sales, including the identification of sales to other companies in the sector (not provided before). This methodological update was required because there were growing uncertainties with the data consolidation activities, due to missing, inaccurate or incomplete returns, particularly with regard to the measure of purchases within the appropriate perimeter.

All efforts have been made to preserve full data consistency throughout historic series, and the objective was achieved at the expense of corrections applied to previous years' data sets. These corrections have been rather minor.

Definitions

Space systems and related products considered in the survey

Eurospace survey is product oriented, i.e. it measures sales of well identified products: space systems. Space systems are organised in three different categories: launcher systems and parts, spacecraft systems and parts, ground systems and parts. Each product/system category is split in relevant subcategories.

Launcher systems

The category only considers space launchers, all missile activity is excluded from the perimeter of the survey. Launcher systems are further split between operational launcher systems and parts (sold to launcher integrators and to launch services operators) and launcher development activities (funded by space agencies, so far).

Spacecraft/satellite systems

The category includes all items destined to leave the Earth atmosphere and operate in space, either to deliver operational services in Earth orbit (satellite applications systems), either in to perform scientific mission in Earth orbit and beyond (scientific systems).

Satellite applications include: telecommunications systems, Earth observation systems (including meteorology) and navigation systems (e.g. Galileo)

Scientific systems include: science and exploration programmes (such as Gaia, Venus Express, Exomars...), human infrastructure programmes (such as ISS contributions and ATV), and microgravity equipment (racks and experiment modules to perform microgravity experiments aboard the ISS and other microgravity environments).

Ground Segment (and related services)

Ground segment activities include three categories of activities.

The manufacturing of EGSE/MGSE (electric/mechanical ground support equipment): the professional equipment used to perform calibration, integration and test activities on space systems, subsystems and instruments. Only specialised equipment designed and procured to support space programmes is included in this category. Generic manufacturing equipment is not included in the Eurospace survey.

The sales of ground stations and ground control centres, i.e. the ground infrastructure required to operate space systems (launchers during launch, and spacecraft during operational lifetime). Ground segment services are not counted in this category.

The sales of ground services. In this category are bundled two different types of services. The services provided to the manufacturing industry in support of design, development, test and integration activities, and the services provided to space agencies for the technical and financial management of their programmes, including, sometimes, ground control centre operations.

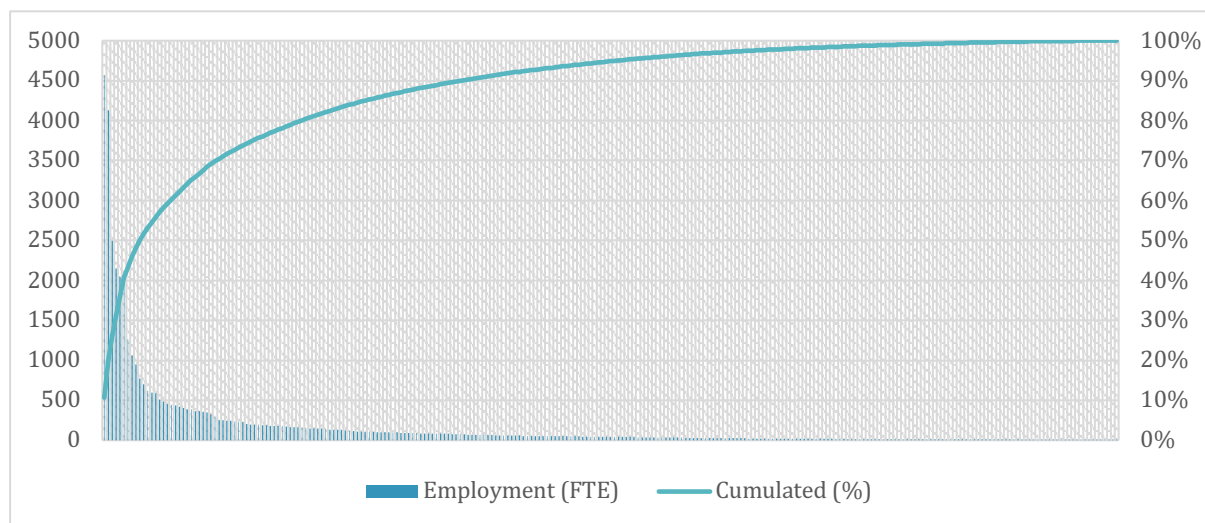
Sector concentration: employment in space units, employment by unit and cumulated %

The European space sector is at the same time very concentrated and highly fragmented. As a result, it is composed of a small number of rather large space units (notably at Airbus Defence and Space, Thales Alenia Space and SNECMA) and a quite extensive number of very small space units.

Are worth noting:

- The 10 largest space units in Europe contribute to more than half of total employment.
- The 20 largest space units in Europe are worth two thirds of total employment.
- The 30 largest space units gather three quarters of the total employment.
- All smaller space units have employment of less than 250.

- The average space unit size is 149 employees.



Note: Each bar represents the employment in one space unit (e.g. TAS-Italy, EREMS, Selex Galileo UK)

Survey information

Eurospace economic model

The Eurospace facts & figures economic model included 342 Space Units/Companies in 2020.

We provide hereafter the full list of companies included in the Eurospace economic model, with details on the status of information used for the year 2019. The regular contribution of major space players in Europe ensures the accuracy of Eurospace facts & figures economic assessment of European space manufacturing activity.

For all other companies, proxy data was used in the model. Proxy data is elaborated using information provided in previous years (when available) and/or information available from public sources, mainly the European Space Directory and company websites.

2019 Survey statistics: questionnaire return rate in % of units, sales, and employment

The survey rate of return, measured in number of units was 42%. But thanks to the good support of large players, the 144 questionnaires returned represent 86% of final sales data compiled and 76% of space employment.

Survey representativeness

Survey statistics	Nb of units	Final sales M€	Space empl.
All units in the model	342	8746	47906
Units updated	144	6342	36392
Proxies	198	2405	11514
Survey representativeness	42%	73%	76%

Companies having supported the survey in 2020

Country	Space Unit	Source	Last update
<i>Austria</i>	Aerospace & Advanced Composites GmbH	questionnaire	2020
<i>Austria</i>	Andritz	questionnaire	2008
<i>Austria</i>	MAGNA STEYR Fahrzeugtechnik AG & Co KG	questionnaire	2016
<i>Austria</i>	Plansee	questionnaire	2008
<i>Austria</i>	RUAG Space GmbH	questionnaire	2020
<i>Austria</i>	Siemens AG Austria	questionnaire	2008
<i>Austria</i>	TTTech Computertechnik AG	questionnaire	2020
<i>Belgium</i>	AMOS	questionnaire	2017
<i>Belgium</i>	Antwerp Space	questionnaire	2019
<i>Belgium</i>	Britte	questionnaire	2009
<i>Belgium</i>	Cegelec SA	questionnaire	2008
<i>Belgium</i>	Centre Spatial de Liège - ULg	questionnaire	2017
<i>Belgium</i>	Euro Heat Pipes	questionnaire	2009
<i>Belgium</i>	e-Xstream engineering	questionnaire	2008
<i>Belgium</i>	IMEC	questionnaire	2013
<i>Belgium</i>	Lambda-X	questionnaire	2016
<i>Belgium</i>	NUMECA International	questionnaire	2016
<i>Belgium</i>	OIP N.V.	questionnaire	2019
<i>Belgium</i>	Open Engineering	questionnaire	2009
<i>Belgium</i>	QinetiQ Space	questionnaire	2020
<i>Belgium</i>	RHEA System S.A.	questionnaire	2012
<i>Belgium</i>	SABCA	questionnaire	2020
<i>Belgium</i>	Serco	questionnaire	2015
<i>Belgium</i>	Sonaca	questionnaire	2015
<i>Belgium</i>	Space Applications Services	questionnaire	2019
<i>Belgium</i>	SPACEBEL SA	questionnaire	2015
<i>Belgium</i>	Techspace Aero	questionnaire	2009
<i>Belgium</i>	THALES ALENIA SPACE BELGIUM	questionnaire	2020
<i>Belgium</i>	Trasys	questionnaire	2008
<i>Belgium</i>	V2i	questionnaire	2019
<i>Belgium</i>	VITROCISSET Belgium S.p.r.l.	questionnaire	2020
<i>Bulgaria</i>	Bulgaria (Proxy)	proxy	2020
<i>Bulgaria</i>	Endurosat	proxy	2020
<i>Cyprus</i>	Cyprus (Proxy)	proxy	2020
<i>Czech Republic</i>	5M s.r.o.	questionnaire	2017
<i>Czech Republic</i>	BBT-Materials Processing	questionnaire	2020
<i>Czech Republic</i>	Czech Space Alliance	proxy	2020
<i>Czech Republic</i>	ESC Aerospace s.r.o.	proxy	2020
<i>Czech Republic</i>	Frentech Aerospace s.r.o.	proxy	2020
<i>Czech Republic</i>	Iguassu Software Systems AS	questionnaire	2015
<i>Czech Republic</i>	Space Systems Czech sro	questionnaire	2020
<i>Denmark</i>	Damec Research	questionnaire	2008
<i>Denmark</i>	Rovsing	questionnaire	2009

Country	Space Unit	Source	Last update
<i>Denmark</i>	TERMA	questionnaire	2019
<i>Denmark</i>	TICRA	questionnaire	2014
<i>Denmark</i>	Xperion ACE	questionnaire	2019
<i>Estonia</i>	Enterprise Estonia	questionnaire	2015
<i>Estonia</i>	Euro-Composites S.A.	questionnaire	2020
<i>Finland</i>	DA-Design Oy	questionnaire	2020
<i>Finland</i>	Elektrobit Microwave Oy	questionnaire	2009
<i>Finland</i>	Iceye	proxy	2020
<i>Finland</i>	Mililab	questionnaire	2008
<i>Finland</i>	Modulight, inc.	questionnaire	2011
<i>Finland</i>	Patria Aviation Oy, Systems	questionnaire	2014
<i>Finland</i>	Space Systems Finland	questionnaire	2020
<i>Finland</i>	VTT	questionnaire	2014
<i>France</i>	3D Plus	proxy	2020
<i>France</i>	Absolut Systems	proxy	2020
<i>France</i>	AD industries	proxy	2020
<i>France</i>	Air Liquide Advanced Technologies	questionnaire	2019
<i>France</i>	Airbus Defence & Space SAS	proxy	2020
<i>France</i>	Akka Technologies	proxy	2020
<i>France</i>	ALTER TECHNOLOGY TÜV NORD FRANCE	questionnaire	2020
<i>France</i>	ALTRAN TECHNOLOGIES	questionnaire	2018
<i>France</i>	Anywaves	proxy	2020
<i>France</i>	ArianeGroup SAS	questionnaire	2020
<i>France</i>	ATMEL Nantes S.A.S.	questionnaire	2017
<i>France</i>	ATMOSTAT	proxy	2020
<i>France</i>	ATOS	proxy	2020
<i>France</i>	Avantis Group	proxy	2020
<i>France</i>	Bertin Technologies	proxy	2020
<i>France</i>	Callisto	proxy	2020
<i>France</i>	Capgemini Technology Services	questionnaire	2015
<i>France</i>	Cedrat technologies	proxy	2020
<i>France</i>	Cilas	questionnaire	2017
<i>France</i>	Clemessy	questionnaire	2019
<i>France</i>	CNIM Air Space	proxy	2020
<i>France</i>	COMAT	proxy	2020
<i>France</i>	CS GROUP	questionnaire	2020
<i>France</i>	DAM Group (Dactem)	proxy	2020
<i>France</i>	DASSAULT Aviation	questionnaire	2018
<i>France</i>	ECA Group	proxy	2020
<i>France</i>	EREMS	questionnaire	2020
<i>France</i>	Eurocryospace	questionnaire	2017
<i>France</i>	Europropulsion	questionnaire	2016
<i>France</i>	Exotrail	proxy	2020
<i>France</i>	GMV Innovating Solutions SARL	questionnaire	2020

Country	Space Unit	Source	Last update
France	GTD	questionnaire	2018
France	HE Space	questionnaire	2017
France	Hemeria	proxy	2020
France	Intespace	questionnaire	2017
France	ISP System	proxy	2020
France	iXblue	proxy	2020
France	Latecoere	proxy	2020
France	Magellium	proxy	2020
France	MAP	questionnaire	2013
France	Mecano ID	proxy	2020
France	Mersen Boostec	proxy	2020
France	Microtec	proxy	2020
France	PLUG IN	questionnaire	2017
France	Pyroalliance	proxy	2020
France	Radiall	questionnaire	2008
France	RAKON	questionnaire	2020
France	Regulus	questionnaire	2020
France	SA Techlam	questionnaire	2009
France	Safran (REOSC)	proxy	2020
France	Safran Aircraft Engines	questionnaire	2020
France	SAFRAN DATA SYSTEMS	questionnaire	2020
France	Safran Electronics & Defence (Sagem)	proxy	2020
France	Saft	questionnaire	2020
France	SAP Micro	proxy	2020
France	Scalian	proxy	2020
France	Selha	proxy	2020
France	Serco	questionnaire	2015
France	SEREME	questionnaire	2020
France	SESO	questionnaire	2017
France	SODERN	questionnaire	2020
France	Soditech	proxy	2020
France	SOFRADIR	questionnaire	2019
France	Soterem	proxy	2020
France	ST Microelectronics	questionnaire	2013
France	STEEL Electronique	proxy	2020
France	Syrlinks	proxy	2020
France	Systronic	proxy	2020
France	TE	questionnaire	2013
France	Technip	proxy	2020
France	Telespazio France	questionnaire	2020
France	THALES AIRBORNE SYSTEMS	questionnaire	2017
France	THALES ALENIA SPACE France SAS	questionnaire	2020
France	THALES Communications & Security SAS	questionnaire	2017
France	THALES ELECTRON DEVICES SAS	questionnaire	2013

Country	Space Unit	Source	Last update
France	Thales Services SAS	questionnaire	2013
France	Timelink	proxy	2020
France	TRAD Tests et Radiations	proxy	2020
France	UMS Semiconductor	questionnaire	2009
France	Vitrociset SpA	questionnaire	2020
Germany	Advanced Space Technologies (AST)	proxy	2020
Germany	Airbus Defence & Space GmbH	questionnaire	2020
Germany	Airbus Defence and Space GmbH	questionnaire	2020
Germany	Anite Systems	questionnaire	2008
Germany	ArianeGroup GmbH	questionnaire	2020
Germany	Arquimea Deutschland	questionnaire	2015
Germany	ASP GmbH	questionnaire	2009
Germany	Astro- und Feinwerktechnik Adlershof GmbH	questionnaire	2015
Germany	AZUR SPACE Solar Power GmbH	questionnaire	2020
Germany	DSI GmbH	questionnaire	2015
Germany	ESC Aerospace GmbH	proxy	2020
Germany	GAF AG (Telespazigroup)	questionnaire	2019
Germany	GMV GmbH	questionnaire	2020
Germany	HE Space Operations GmbH	questionnaire	2018
Germany	HPS GmbH	questionnaire	2015
Germany	HTS GmbH	questionnaire	2008
Germany	IABG mbH	questionnaire	2020
Germany	Inradios.com	proxy	2020
Germany	Jena Optronik	questionnaire	2009
Germany	JOHANN MAIER GMBH	proxy	2017
Germany	Large Space Structures (LSS)	proxy	2020
Germany	MT Aerospace AG	questionnaire	2020
Germany	Mynaric	proxy	2020
Germany	OHB System AG	questionnaire	2020
Germany	Rockwell Collins Deutschland	questionnaire	2009
Germany	SCISYS Deutschland GmbH	questionnaire	2017
Germany	Serco	questionnaire	2016
Germany	Spacetechn GmbH (STI)	proxy	2020
Germany	STT-SystemTechnik	questionnaire	2015
Germany	Telespazio Vega Deutschland GmbH	questionnaire	2020
Germany	Tesat-Spacecom GmbH & Co.KG	questionnaire	2020
Germany	THALES	questionnaire	2011
Germany	UMS Semiconductor	proxy	2009
Germany	VH&S	questionnaire	2008
Germany	W.L.Gore & Associates GmbH	questionnaire	2015
Germany	Xperion ACE	questionnaire	2008
Hungary	BHE (Bonn Hungary Electronics)	questionnaire	2015
Hungary	C3S Electronics Development LLC	proxy	2020
Hungary	HSO	questionnaire	2015

Country	Space Unit	Source	Last update
<i>Ireland</i>	Captec	questionnaire	2009
<i>Ireland</i>	Farran Technology Ltd	questionnaire	2011
<i>Ireland</i>	Nammo Ireland	proxy	2020
<i>Ireland</i>	NUMA Engineering Services Ltd	questionnaire	2011
<i>Italy</i>	Advanced Computer Systems ACS SpA	questionnaire	2011
<i>Italy</i>	Aerospazio Tecnologie s.r.l.	questionnaire	2019
<i>Italy</i>	ALMA SISTEMI SRL	questionnaire	2019
<i>Italy</i>	ALTA S.P.A	questionnaire	2013
<i>Italy</i>	ALTEC	questionnaire	2020
<i>Italy</i>	ALTER TECHNOLOGY TÜV NORD	questionnaire	2015
<i>Italy</i>	Argotec	proxy	2020
<i>Italy</i>	Avio SpA	questionnaire	2020
<i>Italy</i>	Aviospace	questionnaire	2016
<i>Italy</i>	CESI	questionnaire	2008
<i>Italy</i>	Dataspazio Spa	questionnaire	2009
<i>Italy</i>	Design Manufacturing SPA	questionnaire	2017
<i>Italy</i>	HE Space	questionnaire	2017
<i>Italy</i>	IMT Srl	questionnaire	2015
<i>Italy</i>	IngeniArs S.r.l.	questionnaire	2020
<i>Italy</i>	Intecs S.p.A.	questionnaire	2016
<i>Italy</i>	IRCA div. RICA	questionnaire	2017
<i>Italy</i>	Kayser Italia Srl	questionnaire	2020
<i>Italy</i>	Leonardo SpA	questionnaire	2018
<i>Italy</i>	MEC - MICROWAVE ELECTRONICS FOR COMMUNICATIONS	questionnaire	2019
<i>Italy</i>	Microtecnica	questionnaire	2008
<i>Italy</i>	OHB Italia SPA	questionnaire	2020
<i>Italy</i>	Progetti Speciali Italiani Srl	questionnaire	2018
<i>Italy</i>	Serco	questionnaire	2015
<i>Italy</i>	Sistemi Software Integrati S.p.A.	questionnaire	2014
<i>Italy</i>	SITAE S.p.A.	questionnaire	2019
<i>Italy</i>	Space Engineering S.p.A.	questionnaire	2012
<i>Italy</i>	TECNOMARE S.p.A	questionnaire	2015
<i>Italy</i>	Telespazio Group	questionnaire	2020
<i>Italy</i>	Thales Alenia Space Italia S.p.A.	questionnaire	2020
<i>Italy</i>	Vitrociset SpA	questionnaire	2020
<i>Latvia</i>	Latvia (Proxy)	proxy	2020
<i>Lithuania</i>	Lithuania (Proxy)	proxy	2020
<i>Lithuania</i>	Nanoavionika (Nanoavionics)	proxy	2020
<i>Luxembourg</i>	CTI Systems S.A.	questionnaire	2008
<i>Luxembourg</i>	GRADEL S.A.	questionnaire	2008
<i>Luxembourg</i>	HITEC Luxembourg S.A.	questionnaire	2008
<i>Luxembourg</i>	LUXSPACE Sarl	questionnaire	2008
<i>Netherlands</i>	Airborne Aerospace BV	questionnaire	2017

Country	Space Unit	Source	Last update
<i>Netherlands</i>	Airbus Defence and Space Nederland BV	questionnaire	2020
<i>Netherlands</i>	APP	questionnaire	2008
<i>Netherlands</i>	ATG-Europe	proxy	2018
<i>Netherlands</i>	Bradford Engineering BV	questionnaire	2017
<i>Netherlands</i>	Celestia-STS	proxy	2020
<i>Netherlands</i>	Cosine Measurement Systems BV	questionnaire	2020
<i>Netherlands</i>	GTM Aerospace	proxy	2020
<i>Netherlands</i>	HE Space	questionnaire	2017
<i>Netherlands</i>	ISIS - Innovative Solutions In Space	questionnaire	2020
<i>Netherlands</i>	NLR	questionnaire	2011
<i>Netherlands</i>	Origin	questionnaire	2008
<i>Netherlands</i>	Serco	questionnaire	2015
<i>Netherlands</i>	TNO	questionnaire	2013
<i>Norway</i>	EIDEL	questionnaire	2019
<i>Norway</i>	Integrated Detector Electronics AS	questionnaire	2020
<i>Norway</i>	Kongsberg Defence & Aerospace AS	questionnaire	2020
<i>Norway</i>	Kongsberg Defence Systems	questionnaire	2016
<i>Norway</i>	Kongsberg Satellite Services AS	questionnaire	2019
<i>Norway</i>	Kongsberg Spacetec	questionnaire	2009
<i>Norway</i>	Nammo Raufoss	questionnaire	2017
<i>Norway</i>	Prototech AS	questionnaire	2009
<i>Poland</i>	Astri Polska Sp. z o.o.	questionnaire	2016
<i>Poland</i>	GMV Innovating Solutions Sp.z o.o.	questionnaire	2020
<i>Poland</i>	HE Space	questionnaire	2017
<i>Poland</i>	Institute of Aviation	questionnaire	2017
<i>Poland</i>	KP Labs	proxy	2020
<i>Poland</i>	POLAND SPACE SECTOR (GAP FILER)	Proxy	2020
<i>Portugal</i>	Active Space Technologies S.A.	questionnaire	2015
<i>Portugal</i>	Critical Software, S.A.	questionnaire	2014
<i>Portugal</i>	DEIMOS Engenharia S.A.	questionnaire	2020
<i>Portugal</i>	Edisoft - Empresa de Serviços e Desenvolvimento de Software, S.A	questionnaire	2020
<i>Portugal</i>	FHP	questionnaire	2019
<i>Portugal</i>	GMVIS Skysoft S.A.	questionnaire	2020
<i>Romania</i>	DEIMOS Space S.R.L.	questionnaire	2020
<i>Romania</i>	GMV Innovating Solutions S.R.L.	questionnaire	2020
<i>Slovakia</i>	Slovakia (Proxy)	proxy	2020
<i>Spain</i>	ACORDE TECHNOLOGIES	questionnaire	2017
<i>Spain</i>	AIRBUS DEFENCE & SPACE SAU	questionnaire	2020
<i>Spain</i>	ALTER TECHNOLOGY TÜV NORD	questionnaire	2020
<i>Spain</i>	ARQUIMEA INGENIERIA S.L.	questionnaire	2017
<i>Spain</i>	AVS	questionnaire	2017
<i>Spain</i>	Computadoras Redes e Ingeniería SAU	questionnaire	2020
<i>Spain</i>	DEIMOS Space	questionnaire	2020

Country	Space Unit	Source	Last update
<i>Spain</i>	GMV Aerospace & Defense	questionnaire	2020
<i>Spain</i>	HE Space	questionnaire	2017
<i>Spain</i>	Ibérica del Espacio, S.A.	questionnaire	2013
<i>Spain</i>	INDRA SISTEMAS S.A.	questionnaire	2019
<i>Spain</i>	INSA	questionnaire	2011
<i>Spain</i>	LIDAX	questionnaire	2015
<i>Spain</i>	PLD-Space	proxy	2018
<i>Spain</i>	SENER Aeroespacial, S.A.	questionnaire	2020
<i>Spain</i>	Serco	questionnaire	2015
<i>Spain</i>	TECNALIA	questionnaire	2016
<i>Spain</i>	Thales Alenia Space España	questionnaire	2020
<i>Spain</i>	TTI Norte	questionnaire	2015
<i>Sweden</i>	ACR	questionnaire	2008
<i>Sweden</i>	Cobham Gaisler AB	proxy	2019
<i>Sweden</i>	ECAPS	questionnaire	2016
<i>Sweden</i>	GKN Aerospace	questionnaire	2011
<i>Sweden</i>	Gomspace	proxy	2020
<i>Sweden</i>	Jirotex	questionnaire	2016
<i>Sweden</i>	Nanospace	questionnaire	2016
<i>Sweden</i>	OHB Sweden AB	questionnaire	2018
<i>Sweden</i>	Omnisys Instruments	questionnaire	2008
<i>Sweden</i>	RUAG Space AB	questionnaire	2020
<i>Sweden</i>	Spectrogon	questionnaire	2008
<i>Sweden</i>	Swedish Space Corporation	questionnaire	2011
<i>Switzerland</i>	Almatech	questionnaire	2015
<i>Switzerland</i>	ALMATECH SA	questionnaire	2019
<i>Switzerland</i>	APCO Technologies	questionnaire	2020
<i>Switzerland</i>	Clearspace	proxy	2020
<i>Switzerland</i>	Clemessy	proxy	2019
<i>Switzerland</i>	CSEM	questionnaire	2012
<i>Switzerland</i>	ELCA	questionnaire	2008
<i>Switzerland</i>	ETH (PnP Software)	questionnaire	2009
<i>Switzerland</i>	Helbling Technik AG	questionnaire	2008
<i>Switzerland</i>	Leica Microsystems	questionnaire	2009
<i>Switzerland</i>	Observatoire de Neuchâtel	questionnaire	2009
<i>Switzerland</i>	Orolia Switzerland SA	questionnaire	2020
<i>Switzerland</i>	RST Radar Systemtechnik AG	questionnaire	2017
<i>Switzerland</i>	RUAG Schweiz AG, RUAG Space	questionnaire	2020
<i>Switzerland</i>	Solenix	proxy	2020
<i>Switzerland</i>	Syderal	questionnaire	2011
<i>Switzerland</i>	TSS Innovationsprojekte GmbH	proxy	2019
<i>Switzerland</i>	Vibro-Meter SA	questionnaire	2008
<i>United Kingdom</i>	4Links Limited	questionnaire	2019
<i>United Kingdom</i>	AAC Clyde Space	proxy	2020

Country	Space Unit	Source	Last update
<i>United Kingdom</i>	ABSL Space Products	questionnaire	2017
<i>United Kingdom</i>	AEA Technology	questionnaire	2008
<i>United Kingdom</i>	Airbus Defence & Space Ltd.	questionnaire	2020
<i>United Kingdom</i>	ALTER Technology TÜV Nord UK	questionnaire	2020
<i>United Kingdom</i>	AVS	questionnaire	2017
<i>United Kingdom</i>	Axon Cable	questionnaire	2017
<i>United Kingdom</i>	BHR Group	questionnaire	2009
<i>United Kingdom</i>	CGI IT UK Ltd	questionnaire	2015
<i>United Kingdom</i>	COM DEV Europe Ltd	questionnaire	2014
<i>United Kingdom</i>	DEIMOS Space Ltd	questionnaire	2020
<i>United Kingdom</i>	e2v	questionnaire	2008
<i>United Kingdom</i>	ERA Technology	questionnaire	2008
<i>United Kingdom</i>	ESR Technology Ltd	questionnaire	2020
<i>United Kingdom</i>	ESYS	questionnaire	2008
<i>United Kingdom</i>	GKM Aerospace	questionnaire	2017
<i>United Kingdom</i>	GMV Innovating Solutions Limited	questionnaire	2020
<i>United Kingdom</i>	HE Space	questionnaire	2017
<i>United Kingdom</i>	MT-Sat UK	questionnaire	2009
<i>United Kingdom</i>	Nammo Cheltenham (Nammo UK)	proxy	2020
<i>United Kingdom</i>	Nammo Westcott (Nammo UK)	proxy	2020
<i>United Kingdom</i>	Open Cosmos	proxy	2020
<i>United Kingdom</i>	Orbex	proxy	2019
<i>United Kingdom</i>	QinetiQ	questionnaire	2013
<i>United Kingdom</i>	RAL	questionnaire	2012
<i>United Kingdom</i>	Reaction Engines	proxy	2020
<i>United Kingdom</i>	SCISYS UK Ltd	questionnaire	2015
<i>United Kingdom</i>	SELEX Galileo LTD	questionnaire	2013
<i>United Kingdom</i>	Serco	questionnaire	2015
<i>United Kingdom</i>	SIRA Technology	questionnaire	2008
<i>United Kingdom</i>	Skyrora	proxy	2020
<i>United Kingdom</i>	SPUR Electron Ltd	questionnaire	2008
<i>United Kingdom</i>	Surrey Satellite Technology Ltd	questionnaire	2017
<i>United Kingdom</i>	Telespazio Vega UK Ltd	questionnaire	2019
<i>United Kingdom</i>	Terahertz	proxy	2017
<i>United Kingdom</i>	Thales Alenia Space UK	questionnaire	2020

The survey is only as good as the data available to populate the economic model.

Companies support to the data collection is thus essential.

We wish to express our thanks to all companies that have supported the survey this year.

Survey release notes

Long series information

Long series are built by compiling data collected with three different methodologies.

From 1991 to 1995, only a few types of customers and products were considered. After 1996, the customer and products lists were expanded in order to provide additional details. The following categories were introduced:

For customers:

- The European Commission (in 1996): EC programmes can be managed directly by the EC (a small fraction of EC space budgets: FP6 and FP7 activities for space research) or delegated to ESA for implementation (the lumpy GMES, now Copernicus, and Galileo programmes).
- Eumetsat (in 2002): as with the EC, Eumetsat delegates all space system procurements (the Meteosat programmes) to ESA, whereas it procures only ground segment activities directly from industry.
- Civil multilateral programmes (from 2002 to 2008, now discontinued - before, and after the data is included in National civil programmes).
- Private satellite operators, other commercial satellites and parts, Arianespace, and other launcher sales—before the data was bundled into one single category: commercial and exports.

For products:

- Navigation systems (in 1996) - before the data was included in telecommunications.
- Launcher development and Operational launcher systems (in 1996) - before all launcher activities were bundled together.

About ground systems and services:

- Before 2009, all sales of professional ground stations (TT&C and data stations, control centres) and related services (such as ground segment operations) were included in the associated product category (telecoms, science, Earth observation, etc.).

A major methodological update was performed in 2010 (i.e. applicable to 2009 data) that entailed some changes in the data series, and in particular:

- Military system sales are now counted separately from military customers sales.
- All ground segment activities are clearly separated from the rest, this includes the sales of professional stations and control centre operations, as well as services to industry and agencies.
- In all long series, the data is harmonised to ensure continuity.

Perimeter changes

Tracking: When a new company is included or removed from the economic model, we call this a perimeter change. Perimeter changes have an impact on figures since they may introduce a discontinuity with previous years. The details (and orders of magnitude) of these changes are provided below.

- 2019 / Europe: Six new countries added to the model (gap filler data based on ESA PECS involvement), impact on FTE +300.
- 2019 / Netherlands: Two new companies (proxies) added to the model, impact on FTE about +70

- 2019 / Germany: Six new companies (proxies) added to the model, impact on FTE about +300
- 2019 / UK: Three new companies (proxies) added to the model. FTE impact about +100.
- 2019 / France: The publication by CNES in April 2020 of a catalogue of French space companies revealed information previously unknown to Eurospace. The model was enriched with 27 more entities, and old proxies could be updated with fresher data. The positive impact on employment was in the order of 1000 FTE.
- 2017 / Spain: GTD is a Spanish company providing services in Kourou at launch sites. It has been added to the model this year, Eurospace collected data about this company which exists since 1987, the total impact on employment is below 100.
- 2017 / Netherland: the measurement of employment in the Dutch Space sector has been improved in 2017 with the fine identification of FTE count within a major Dutch company (that could only provide headcount previously). This has a negative impact in Dutch employment in the order of 180.
- 2017 / Netherlands: ATG-EUROPE was added to the model, with a proxy which added about 200 FTE to employment perimeter in the Netherlands area
- 2017 / Belgium: a decrease in the space employment was noticed in Belgium, due to a variation of 205 employment at SABCA- from 340 to 315 in 2017
- 2016 / Italy & France: in 2016,Regulus personnel (working at Kourou) part of the AVIO consolidated reply was re-allocated to France (not Italy) resulting in a change of 100 FTE lost in Italy and added to France.
- 2016 / Poland: in 2016, 28 Polish companies have been added to the model. Impact on employment is in the order of +100 FTE. Final sales have been slightly impacted.
- 2015 / Sweden: in 2015, three more Swedish companies have been added, Jirotext, NanoSpace and ECAPS. Impact on employment is in the order of +30FTE. Final sales have been slightly slightly impacted.
- 2015 / Netherlands: An additional company, ISIS Innovative Solutions in Space, has been integrated to the survey perimeter with negligible variation to final sales. Changes are in the order of +50FTE for employment.
- 2015 / France: As Thales Alenia Space's employees located in Belgium and Spain have been included in TAS France's response, a redistribution of employment data has been done for these countries since 2010. The impact is in the order of -400 FTE for France and +150 FTE for Belgium and Spain every year.
- 2015 / Belgium: Three new companies have been added to the model: V2i, LambdaX and Numeca with a very slight impact on both final sales and employment (+20FTE)
- 2015 / Other countries: Eurospace has also gathered data about a new entity in Czech Republic, BBT Materials Processing with also a weak effect on final sales and employment.
- For information related to previous year's changes please refer to previous editions of Eurospace facts and figures.

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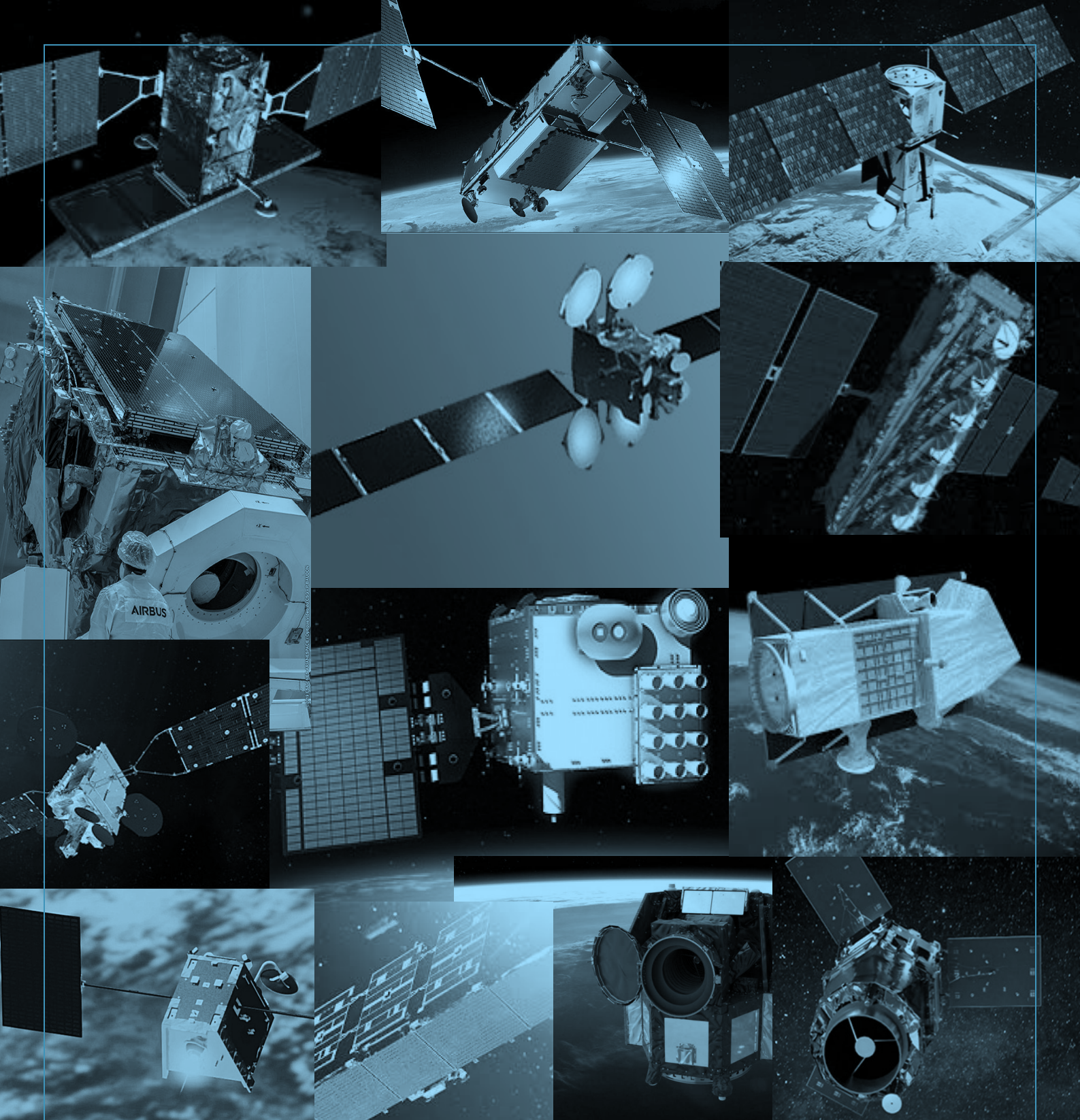
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**The survey would not be possible without the kind cooperation of participating companies (see
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