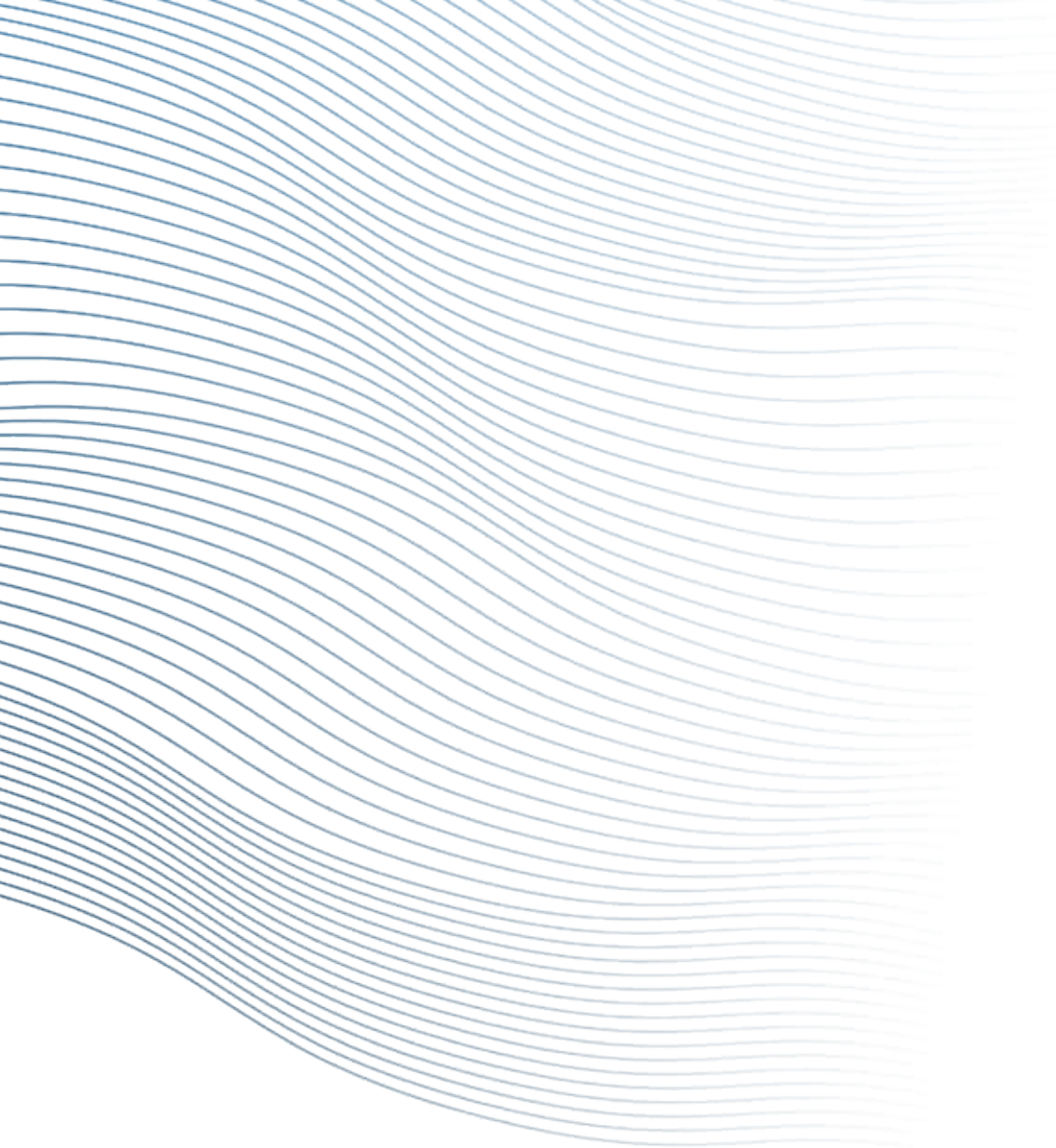


# Defence Industry Outlook



MINISTERIO DE DEFENSA



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# **Defence Industry Outlook**

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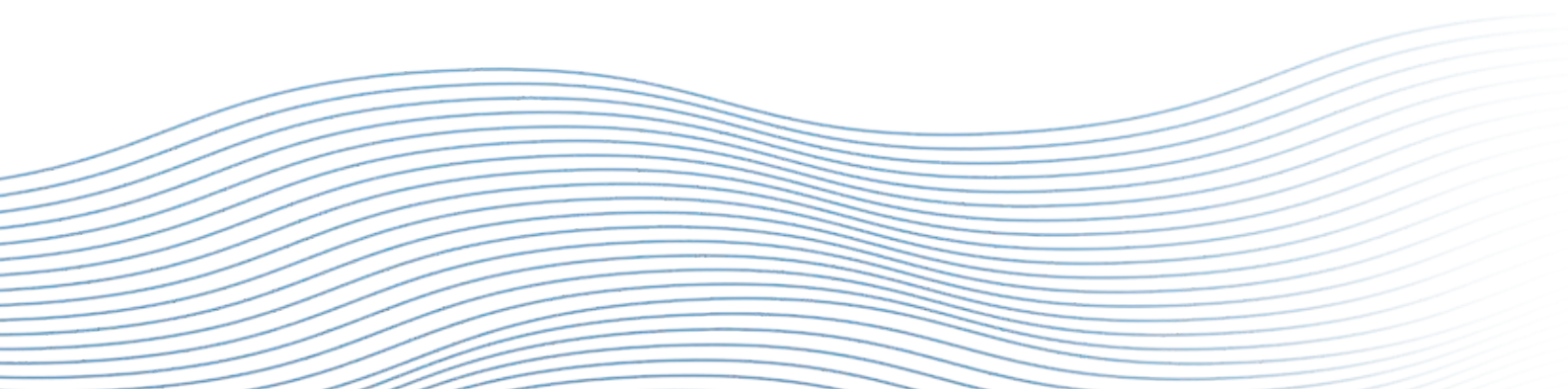
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# Carta del Secretario de Estado de Defensa

Es la principal responsabilidad de la Secretaría de Estado de Defensa satisfacer las necesidades de las Fuerzas Armadas en lo relativo al armamento y material; priorizando, a su vez, el fortalecimiento de la industria nacional de Defensa.

Ello requiere una coordinación continua con las Fuerzas Armadas a través del Jefe de Estado Mayor de la Defensa, en lo relativo al planeamiento de la defensa. Con respecto a la vertiente de índole industrial, la relación con otros organismos de la Administración y con la propia industria es igualmente necesaria y muy fluida.

Desde el Ministerio de Industria, Comercio y Turismo se está impulsando el desarrollo de agendas sectoriales, que incluyen medidas para mejorar la productividad y afrontar con garantías los retos identificados. El objetivo es incrementar la aportación de la industria al PIB nacional hasta el 20%. Así, el "Marco estratégico de la España Industrial 2030" contempla la elaboración de trece agendas sectoriales, entre las que destacan, por su interés para la Defensa, las de Automoción, Naval, Aeronáutica y Espacial. En este sentido, quiero destacar la colaboración, que desde el año 1996, mantienen el Ministerio de Defensa y el de Industria, Comercio y Turismo. Colaboración desarrollada principalmente en el ámbito de los programas especiales de armamento, mediante la suscripción de un convenio y las adendas que lo amplían.

Las industrias relacionadas con la Defensa pertenecen de forma transversal a los sectores específicos que abarcan las agendas establecidas por el Ministerio de Industria, pero a su vez constituyen un grupo homogéneo que comparten una característica común, su contribución a la Defensa Nacional. La importancia para España de este objetivo compartido, el volumen de inversiones acumulado y su elevado nivel tecnológico recomiendan tratar a estas empresas como un conjunto con significado propio, digno de análisis particularizado y de reconocimiento institucional.

De esta manera, partiendo de las estrategias ya definidas en el ámbito del Ministerio de Defensa, la Estrategia Industrial de defensa de 2015 y la Estrategia de Tecnología e Innovación para la Defensa 2015; y aprovechando el hito que supone la celebración de la primera Feria Internacional de Defensa y Seguridad en España, resulta oportuno presentar un documento sobre "Perspectiva de la Industria de Defensa". Con dicho documento, se pretende aportar una herramienta que favorezca el desarrollo de las citadas estrategias y por ello, de la propia industria. Herramienta que a su vez pueda ser complemento de las agendas sectoriales del Ministerio de Industria, Comercio y Turismo, proporcionándoles transversalidad y orientación mediante medidas específicas aplicables a la Defensa. Todo ello, sin olvidar los objetivos más cercanos que tenemos por delante, como es el de la internacionalización, especialmente, en el ámbito de la Unión Europea.

A portrait of Ángel Olivares Ramírez, a middle-aged man with glasses, wearing a dark suit, white shirt, and a striped tie. He is smiling slightly and looking towards the camera. The background is a blurred office setting with a blue flag featuring yellow stars, likely the flag of the European Union, visible on the left.

***Ángel Olivares Ramírez***

# Carta del Secretario General de Industria y de la PYME

No cabe duda de que vivimos tiempos de cambios acelerados en la industria. Los principales países del mundo, y entre ellos España, tratan de situar a la industria como uno de sus ejes de actuación prioritarios para asegurar el crecimiento de sus economías y, en definitiva, el bienestar de sus ciudadanos. Constatadas las ventajas que el sector industrial presenta en relación a la estabilidad y la calidad del empleo, como motor de innovación, con una capacidad de resiliencia ante los cambios de los ciclos económicos muy superior a la de cualquier otro sector productivo, parece una decisión sensata. La UE no es ajena a este fenómeno, y de manera permanente viene poniendo de manifiesto la necesidad de impulsar una política industrial europea activa en un contexto en el que nuestros competidores de otras áreas geográficas han apostado fuertemente por sus industrias y Europa ha perdido fuelle en algunas áreas tecnológicas claves.

Y en este contexto, el sector industrial de la defensa y de la seguridad está también experimentando una auténtica revolución que, al igual que en el resto de los subsectores industriales, se va a ver acelerada en los próximos años. Tras los grandes procesos de reordenación de capacidades industriales y concentraciones empresariales de las décadas anteriores, ahora estamos inmersos en una nueva ola de cambios derivados de la combinación de factores como las nuevas demandas de las FF.AA. y los Cuerpos de Seguridad, derivadas de la aparición de nuevas amenazas, la irrupción de la era digital, las siempre escasas disponibilidades presupuestarias de los Estados que obligan a una constante mejora en la utilización de los escasos recursos públicos, la creciente complejidad tecnológica, la aparición de nuevos competidores globales, el cambiante contexto europeo y mundial y, por supuesto, los compromisos medioambientales y sociales.





Pero a pesar de estos cambios que ya empiezan a vislumbrarse en el horizonte más cercano, el sector industrial de la defensa y seguridad sigue manteniendo, hoy más que nunca, su tradicional carácter de líder en cuanto a innovación y generación de conocimiento que se trasvasa a muchos otros sectores industriales. Todo ello, y sin considerar sus aspectos más estratégicos relacionados con la seguridad y la defensa nacional, le hacen merecedor de una especial atención por parte del Ministerio de Industria Comercio y Turismo. Se trata de un sector prioritario y estratégico que debe jugar un papel muy relevante en la puesta en marcha de las Directrices Generales de la Nueva Política Industrial Española 2030 que hemos impulsado desde este Ministerio, con el punto de mira puesto en que la industria española se sitúe en unas cotas de desarrollo y contribución al PIB mucho mayores que las actuales, con el ambicioso, pero irrenunciable, objetivo de situar a nuestra industria nacional en niveles próximos a las economías más desarrolladas de la UE.

El momento actual de nuestra industria de la defensa y seguridad lo calificaría como especialmente esperanzador. Los nuevos programas impulsados por el Gobierno de España, y en los que el Ministerio de Industria Comercio y Turismo participa activamente en su financiación, tienen una envergadura industrial y tecnológica extraordinaria. Y es aquí donde estoy convencido de que nuestra industria va a demostrar, una vez más, que es capaz de hacer frente a los retos tecnológicos e industriales con máxima eficacia y eficiencia. El efecto tractor de los mismos sobre el conjunto del sector industrial será notable y comarcas enteras se beneficiarán del mismo. El potencial de demostración de nuestra tecnologías y capacidades a los mercados exteriores va a ser también decisivo para incrementar la proyección exterior de nuestras empresas. Se une a estos programas la tremenda oportunidad que representan las nuevas orientaciones de la política europea en materia de defensa y seguridad materializadas en el Plan de Acción Europeo para Defensa y la decidida voluntad del Ministerio de Defensa en participar de manera activa en programas conjuntos de desarrollo de los futuros sistemas de armas como el FCAS.

Esta Perspectiva de la Industria de la Defensa recoge, en el contexto anteriormente apuntado, las líneas estratégicas y las posibilidades que este sector industrial tiene ante sí en este momento y que, estoy completamente seguro, va a abordar con el entusiasmo y efectividad que le siempre le ha caracterizado, para lo que contará con el decidido apoyo del Ministerio de Industria, Comercio y Turismo.

**Raúl Blanco Díaz**





MINISTERIO DE DEFENSA

# The Defence Industry



- 1.1 Introduction
- 1.2 Current situation
- 1.3 Capacity by sector

# The Defence Industry<sup>1</sup>

## 1.1 Introduction

*Achieving the viability, continuity and sustainability of a robust national defence industry is a shared task involving public administrations and private companies, which must be competitive.*



The Spanish Defence Industrial and Technological Base (DITB) is a key element in the procurement and maintenance of the military capabilities required by the Armed Forces to comply with the missions tasked to them. The national defence industry currently generates an annual turnover of over 6,000 million euros (M€), which accounts for 4.38% of the gross domestic product (GDP) of the national manufacturing industry.

Furthermore, it has become a key element with regard to technological innovation and the generation of qualified jobs at national level. Therefore, **the Ministry of Defence's industrial policy aims to enhance defence-related industrial and technological development**, especially those industrial capabilities and areas of knowledge that affect the vital interests of defence and security.

Over the past twenty-five years, the trend in Western European nations has been to gradually reduce defence budgets, a trend exacerbated in the past decade by the economic crisis, although currently a change is taking place involving a new horizon for the industrial development of defence. In the case of Spain, the new programmes must help provide increased capacity to the defence industry, bearing in mind that the use of dual technologies can also generate synergies.

Achieving the viability, continuity and sustainability of a robust national defence industry is a shared task

involving public administrations and private companies, which must be competitive, through technological innovation and the ability to adapt to the current dynamic environment, with the proper assistance and orientation from public entities.

As in other countries, the national defence industry is led by a small number of **driving-force companies** that have the capacity to design, develop and produce complete systems. These companies exist alongside a business network of **more flexible and dynamic SMEs** that specialise in the design and/or production of various subsystems that are incorporated into the supply chain of the driving forces for their subsequent integration.

The **weapon systems** supplied by the industry are generally characterised by their **complexity, multi-functionality and high technological level**. They are developed over long periods of time and have short production runs. This entails a significant mobilisation of human and economic resources and therefore has a strong, and in particular regional, socio-occupational impact.

<sup>1</sup> The information included in this section, including all tables and charts, has been taken from the General Directorate for Armament and Materiel's Company Registry for 2017



## 1.2 Current situation

The Company Registry of the General Directorate for Armament and Materiel (DGAM) for 2017 includes 373 listed companies that performed defence sales, of which 124 carried out exports. Approximately 10% of the turnover of the industrial base was dedicated to innovation, with productivity amounting to almost €115,000 a year per employee. It is estimated that this activity provides an economic impetus that generates €2.5 for every euro invested.

Companies with defence activity



COMPANIES

**373**

of which 124 are  
exporters



INNOVATION

**≈10%**

of turnover dedicated to  
innovation



PRODUCTIVITY

**115.000€**

a year per person



ECONOMIC IMPETUS

**2,5€**

generated for every euro  
invested

### Profile of Spanish Defence companies

#### Size

83% of Spanish defence companies are small and medium enterprises (SMEs), while large companies, with over 250 employees, represent 17% of the total amount. These figures are significant if compared to the size of the industry in general, which is dominated by SMEs (99.7%) as opposed to 0.3% represented by large companies.



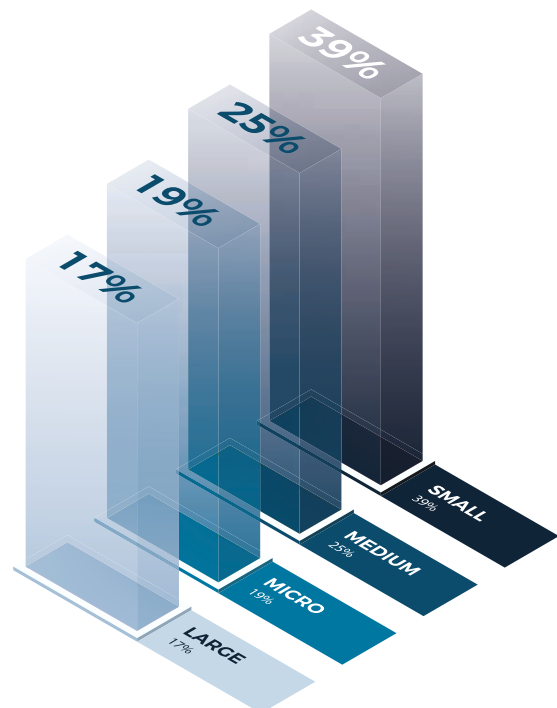
SMALL

MICRO

MEDIUM

LARGE

Distribution of companies by size

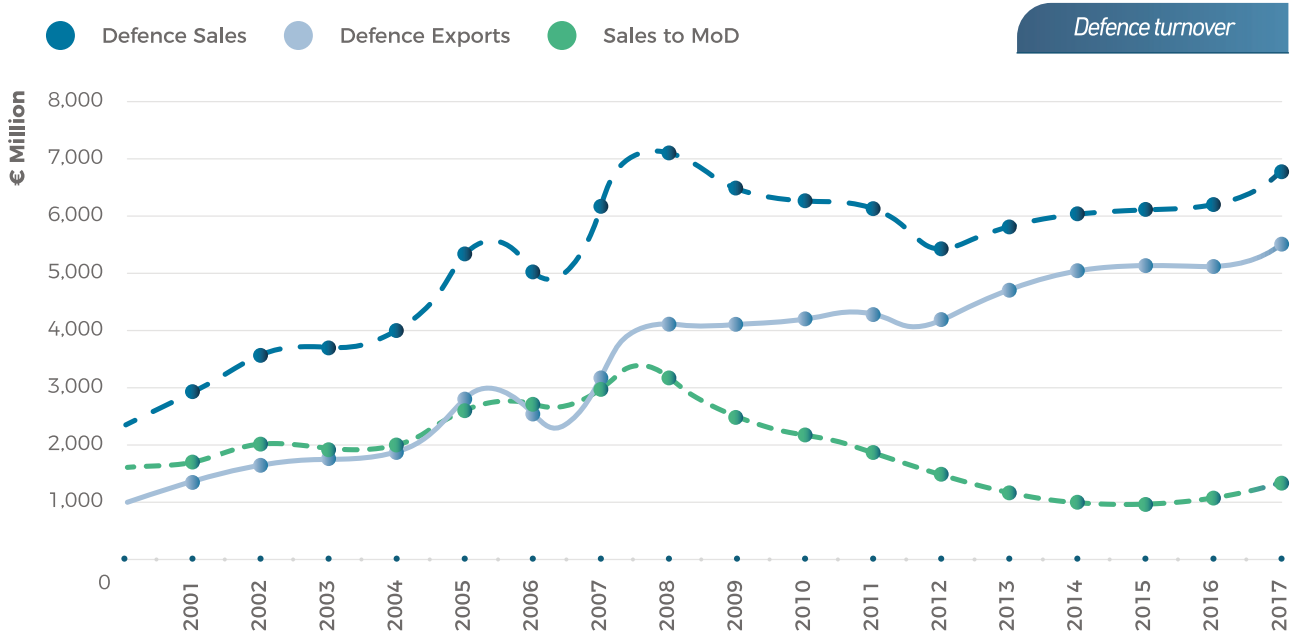


<sup>2</sup> Large company: more than 250 employees, turnover exceeding 50 M€.  
Medium-sized company: fewer than 250 employees, turnover not exceeding 50 M€.  
Small company: fewer than 50 employees, turnover not exceeding 10 M€.  
Micro company: fewer than 10 employees, turnover not exceeding 2 M€.

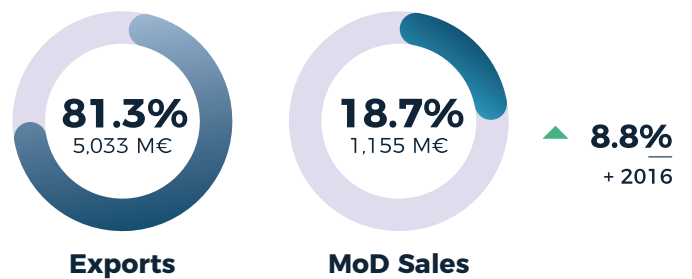
<sup>3</sup> Source: Ministry of Industry, Commerce and Tourism: "SME Figures: data as at December 2017"; Reports prepared by the Directorate-General for Industry and Small and Medium-Sized Companies, using data provided by the Ministry of Employment, Migration and Social Security on the companies registered with the Social Security authorities. Latest statistical figures available.

## Turnover

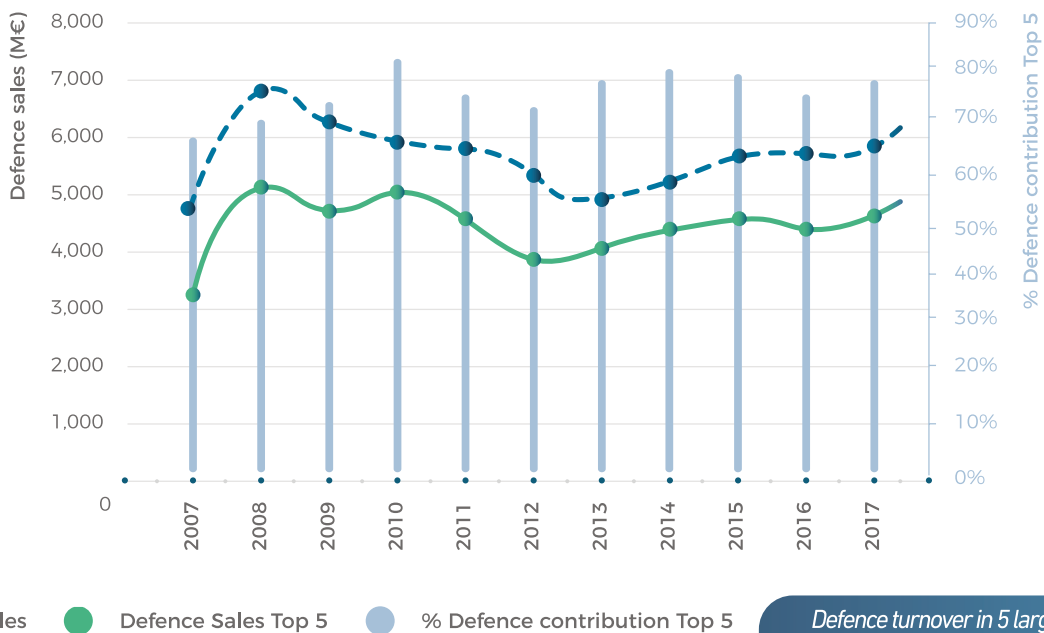
In recent years, the defence sector's turnover has generally experienced an upward trend due to export activity, while domestic sales have fallen since 2008 as a result of the economic situation, although there has been an increase since 2014.



In 2017, total defence sales amounted to 6,188 M€, an 8.8% increase on the previous year. 1,155 M€ (18.7%) of these sales were direct sales to the MoD, while 5,033 M€ (81.3%) were exports. Compared to the previous year, direct sales to the MoD increased by 18.1%, while exports increased by 6.8%.



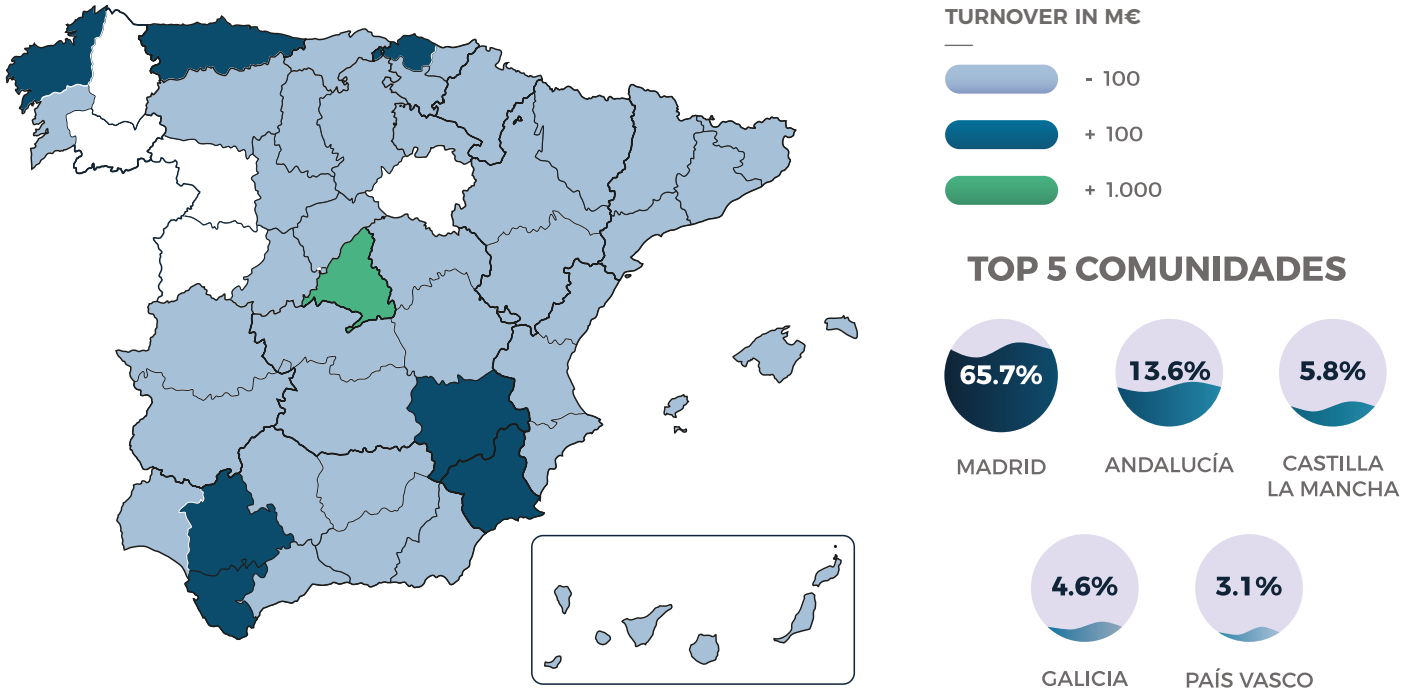
It is worth noting that, historically, around 80% of sales related to defence activities are carried out by 5 large companies and that 26 companies represent 90% of the market.



## Sales by territory

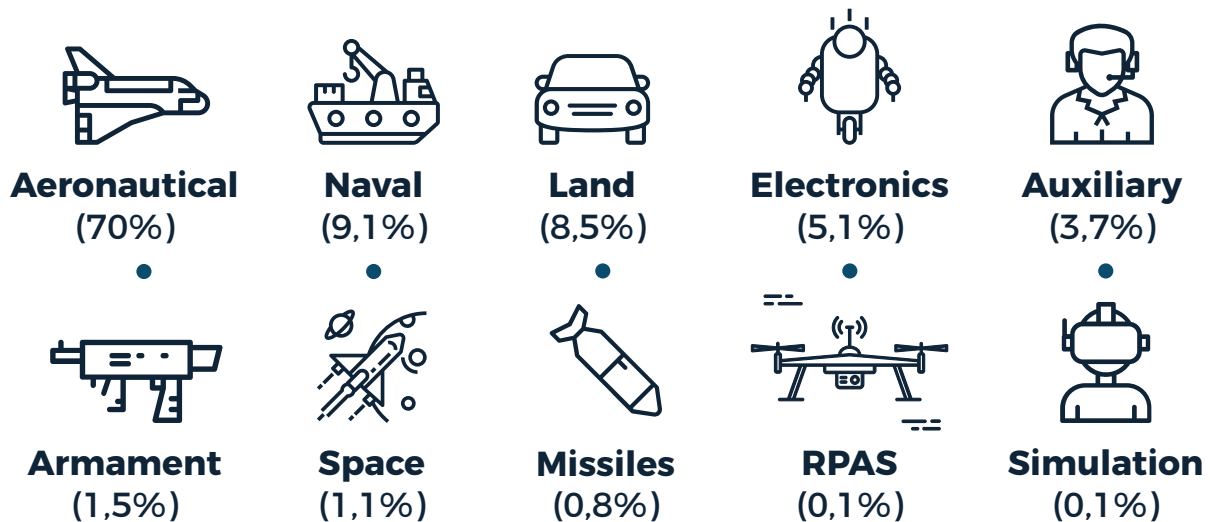
Madrid is the clear leader in defence sales by autonomous community, accounting for 65.7% of all sales, far ahead of the second-ranking autonomous community, Andalusia, which accounts for 13.6%.

This is primarily due to the fact that most companies are headquartered in the Community of Madrid and declare their activity there. Galicia, Castilla-La Mancha and the Basque Country follow.



## Sales by subsectors

The aeronautical subsector leads defence sales with 4,331 M€ (70.0% of total sales), far ahead of the following subsectors: naval, which has defence sales of 564 M€ (9.1% of total sales) and land, with 526 M€ (8.5% of total sales). The remaining subsectors contribute 12.4 % to defence sales.

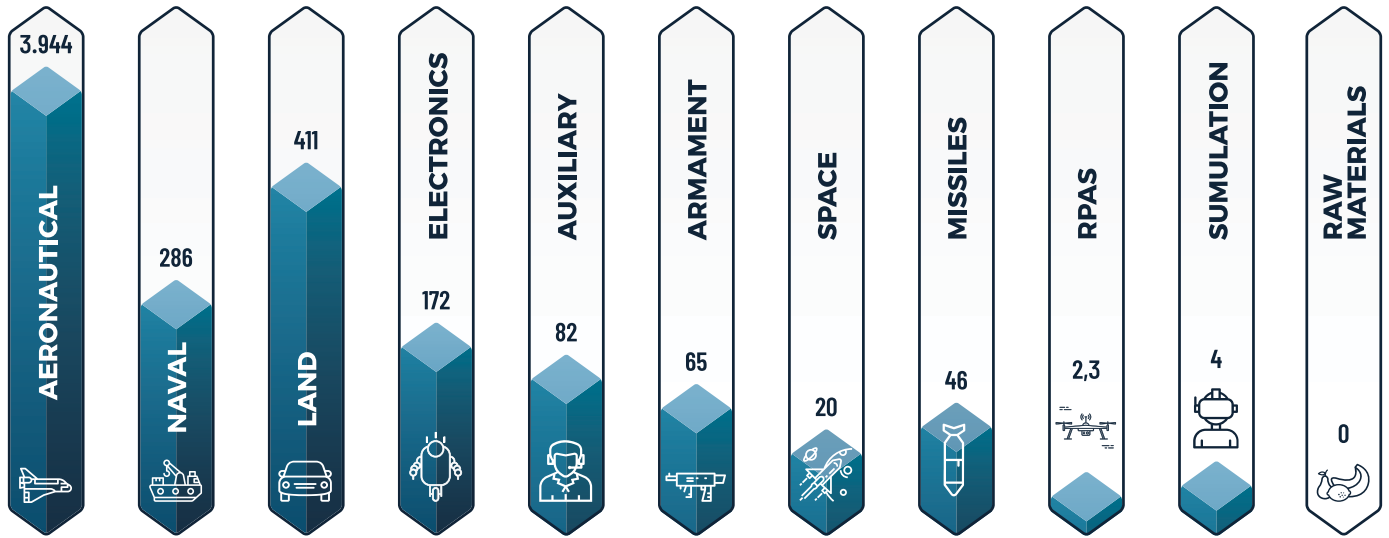


Defence sales by subsector

40.7% (2,049 M€) of defence exports have materialised by way of sales to various international consortiums, in which companies from different countries in cooperation programmes participate.

Regarding the breakdown of defence exports by subsector, it should be pointed out that the aeronautical subsector boasts the largest number of exports, totalling 3,994 M€ and accounting for 78.4% of defence exports.

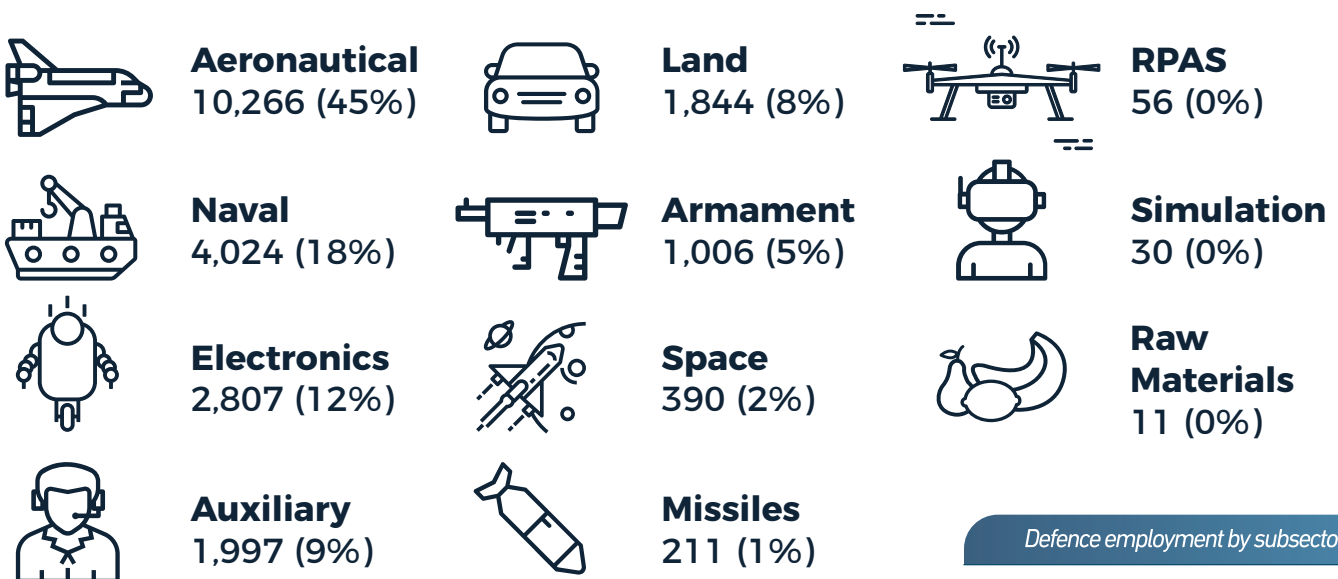
Defence exports by subsector



### Employment

In 2017, the defence sector provided 22,641 direct jobs, a figure that has not suffered a significant variation in recent years.

By subsector, aeronautical leads in the generation of direct employment, accounting for 45.3% of the total, followed by Naval, with 17.8%, and then Electronics, Auxiliary and Land, with 12.4%, 8.8% and 8.1%, respectively. The contribution to employment of the remaining subsectors amounts to 7.5%.



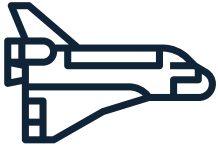
Defence employment by subsector

Average productivity<sup>4</sup> per employee amounts to €114,955, a figure that has increased by 2.9% since 2016.

<sup>4</sup> Average productivity has been calculated as ((sales-purchases)/no. of employees).



# 1.3 Capacity by sector

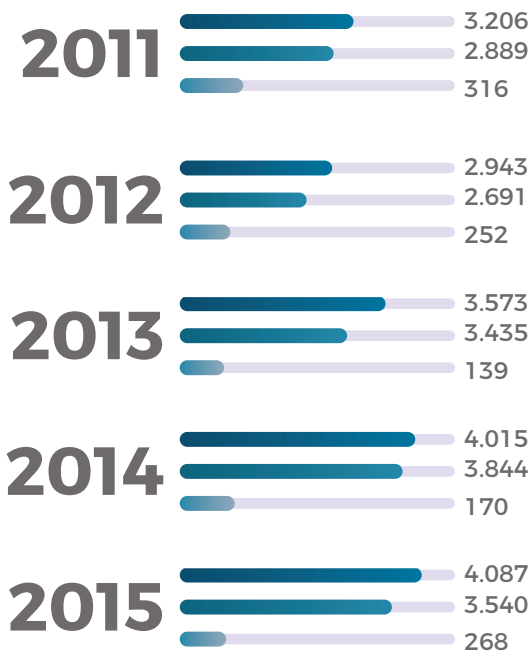


## Aeronautical

By turnover, aeronautical is the most important sector of the defence industrial base, totalling 19,814 M€ in the past five years.

Defence figures in M€

● Defence Sales ● Defence Exports ● Sales to Ministry of Defence



After maintaining a stable situation without significant variations for several years, in 2017 it grew by almost 14%. This subsector accounts for 70% of all defence sales. Furthermore, it is clearly export oriented, as 91% of its production is geared toward the foreign market. There is also a significant synergy between the trade and defence sectors regarding knowledge, procedures, technologies and innovation capacity.

The Airbus group is the biggest in this industry; the other companies are heavily dependent on it and also on their participation in large European aeronautical programmes, such as EF2000 and A400M aircraft and Tiger and NH90 helicopters.

The future will therefore probably be conditioned by the level of participation in the new cooperative programmes, such as EUROMALE and the Next Generation Weapon System (NGWS).

**Spain is one of the 12 countries capable of performing the complete production cycle of an aircraft (design, production, certification and maintenance).**

*The future will therefore probably be conditioned by the level of participation in the new cooperative programmes, such as EUROMALE and the Next Generation Weapon System (NGWS).*

Companies specialise in segments which enjoy huge international prestige, such as those dedicated to the manufacture of composite aero structures, the development of subsystems and parts for propulsion systems, avionic systems, communications and

electronic warfare and a significant auxiliary industry, which also has a distinctly dual nature.

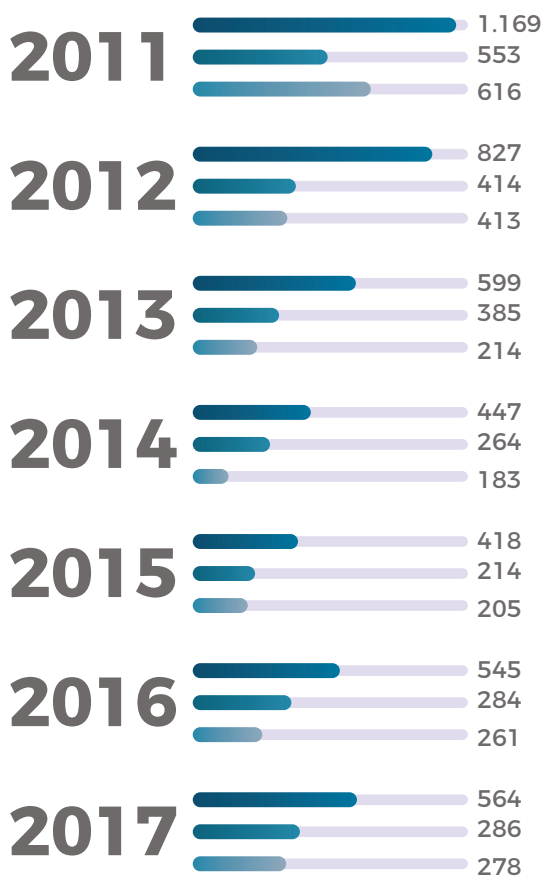


## Naval

The naval subsector has **strategic importance** given Spain's geographical location, maritime dimension and the economic and commercial development involved. It is the second most important sector; it has generated a turnover of 2,573 M€ in the past five years and has been recovering from a downward trend in recent years.

### Defence figures in M€

● Defence Sales ● Defence Exports ● Sales to Ministry of Defence



Its driving force is not as strong as that of the aeronautical sector, although it has a significant socio-economic impact in Galicia, Andalusia and Murcia and exports almost 51% of its production.

It is the only sector in which public shareholding has been maintained, through Navantia, the driving force company.

Alongside a highly developed auxiliary industry, there are civil, privately-owned, highly competitive shipbuilding companies for certain types of vessels, although they lack the capacity to develop and build more complex military naval platforms.

The subsector covers design, manufacturing and maintenance capacities for a wide range of vessels, throughout their entire life cycle and therefore has a large international presence, while it also supplies ships with a high level of technology.

*Warships are experiencing an upward trend in terms of importance, both at technical and cost level, with sensors and systems gaining ground over platforms.*

There are also capabilities for the development of a great number of on-board systems: combat systems, command and control, electronic warfare, sensors, etc. The aim is to broaden and enhance these capabilities through the new programmes, mainly the F-110 frigate programme.

Warships are experiencing an upward trend in terms of importance, both at technical and cost level, with sensors and systems gaining ground over platforms. Therefore, every effort in the improvement of these capabilities will imply improving the positioning of the national industry in the international market.

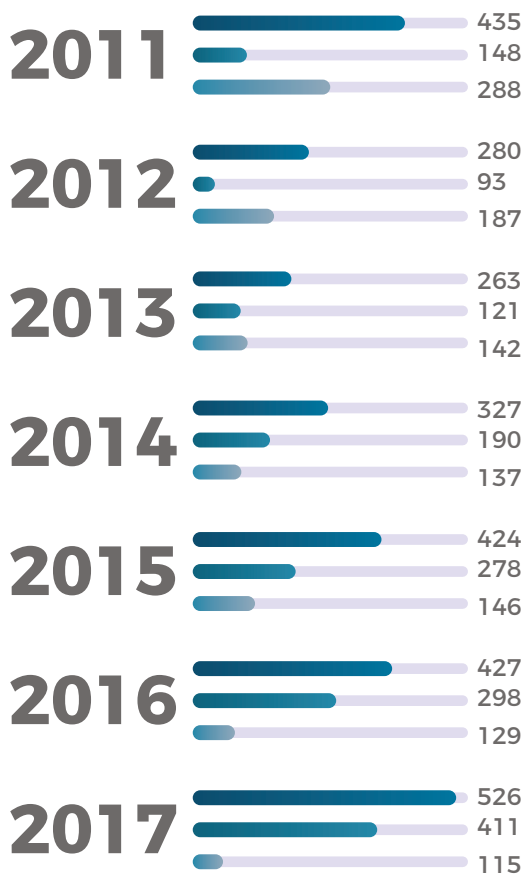


**Land**

This is the third most important subsector with a turnover of 1,967 M€ in the past five years and a growing trend since 2013 that has led it to recover and even exceed 2011 sales levels.

Defence figures in M€

- Defence Sales
- Defence Exports
- Sales to Ministry of Defence



The chart below reflects a 99-million-euro increase in sales in 2017 over 2016. General Dynamics European Land Systems - Santa Bárbara Sistemas (GDELS-SBS) is a company that plays a leading role and is the driving force for the rest of the industries.

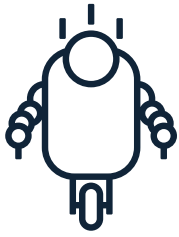
This subsector is capable of designing, integrating, producing and maintaining light vehicles and developing specific on-board subsystems, both for platforms and for systems and sensors.

Regarding heavier vehicles, thanks to recent new programmes such as Pizarro and VCR 8x8 Dragon, existing national capabilities are being enhanced, both those linked to the design and production of platforms and their key systems, and those of the main on-board systems, covering maintenance and complete life-cycle, with a view to improving the industry's international position.

The international armoured vehicle market is complex and has high entry barriers, especially regarding the participation of local companies. Nevertheless, it has sold vehicles and on-board systems to third countries and has participated in the British FRES (Future Rapid Effect System, ASCOD) programme. An upward trend in its positioning in the international market is therefore envisaged.



*An upward trend in its positioning in the international market is therefore envisaged.*



## Electronics

In the past five years this subsector's turnover in the defence field has risen to 1,457M€. It has a cross-cutting nature as it supplies highly relevant subsystems to the various air, naval and land platforms, while it also has a clear dual vocation.

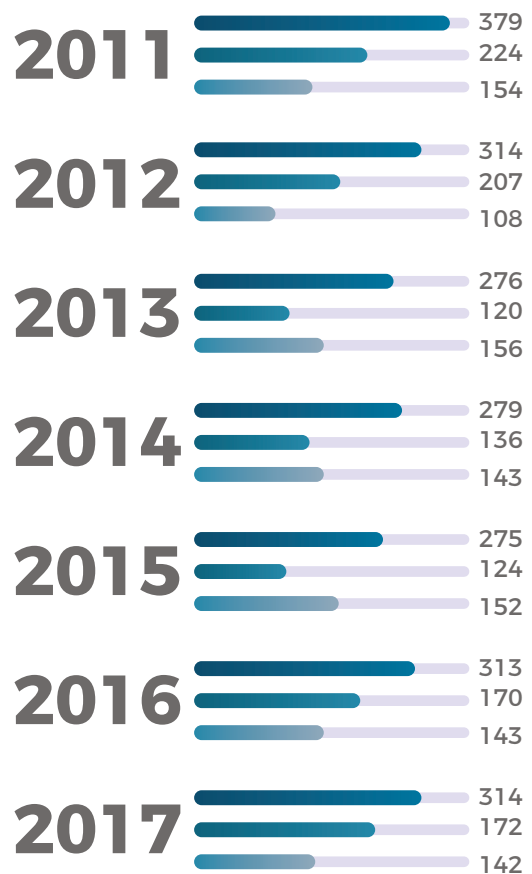
The subsector includes a large number of companies, all of which are from the private sector and have dual applications.

● Defence Sales ● Defence Exports ● Sales to Ministry of Defence

Defence figures in M€

There are numerous capabilities, divided among a large number of companies, which must be preserved and enhanced. The launch of new programmes is an indispensable vehicle to achieve this goal. The technological projects associated with the F-110 frigates and the VCR 8x8 wheeled combat vehicles, among others, are on track to strengthen existing national capabilities, which will not only have a direct repercussion on these programmes, but also on future programmes with similar technology.

The subsector is characterised by its highly technological content and also by disruptive technologies, making it the most dynamic sector with the greatest projection. All countries are putting their best efforts into developing industrial capabilities in this field.



*Is characterised by its highly technological content and also by disruptive technologies, making it the most dynamic sector with the greatest projection.*

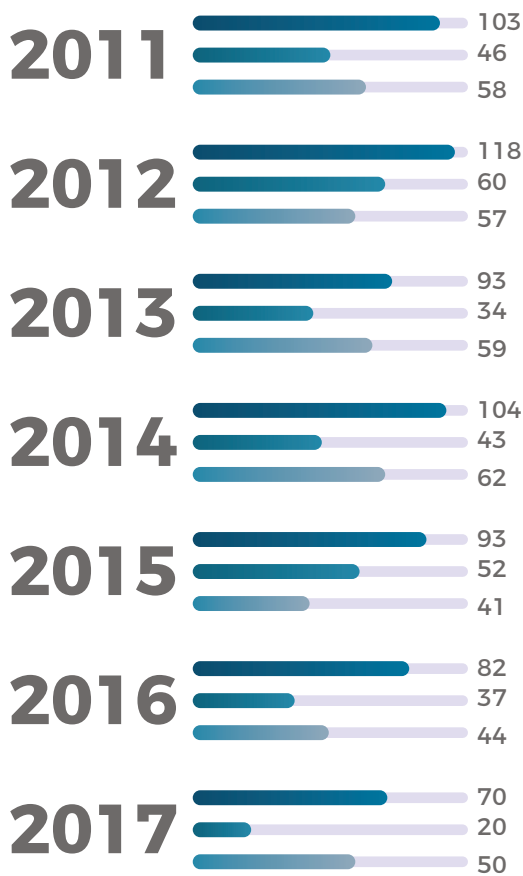




Spain's space sector industry is the fifth biggest in Europe after France, Germany, Italy and the United Kingdom. It actively participates in a number of export programmes and plays a significant role in European programmes such as Galileo, Copernicus, SST and GOVSATCOM.

Defence figures in M€

● Defence Sales ● Defence Exports ● Sales to Ministry of Defence



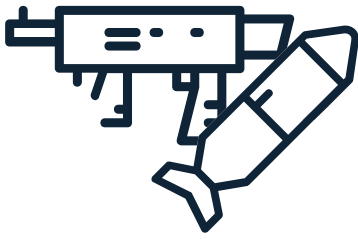
In the past five years its defence turnover has amounted to 442 M€ and it has huge growth potential.

There are state-of-the-art companies in the field of satellite equipment involved in both the civil and the military markets. The sector is highly competitive, with a significant presence of private companies.

Its capabilities include communications, Earth observation, navigation and SST (Space Surveillance and Tracking), while it also participates in the main European programmes.

This sector needs to coordinate with other national departments and with entities linked to the EU, NATO and the ESA.

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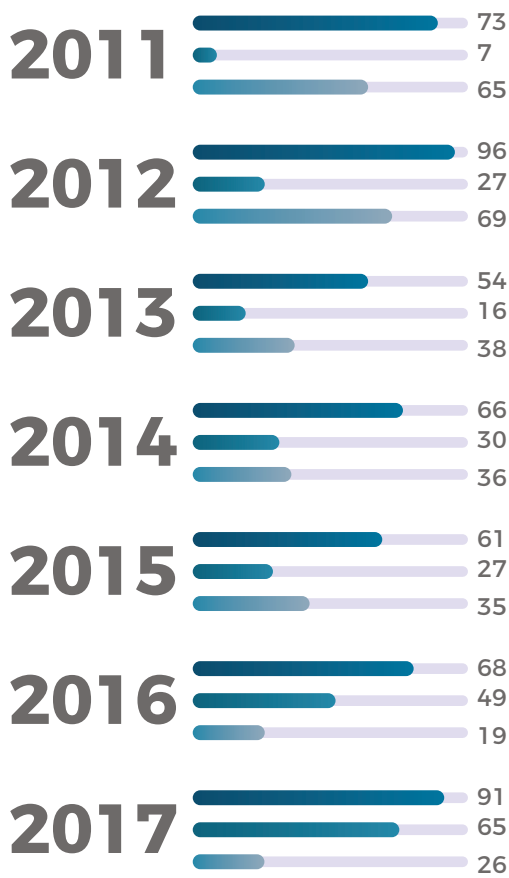


## Armament and missiles

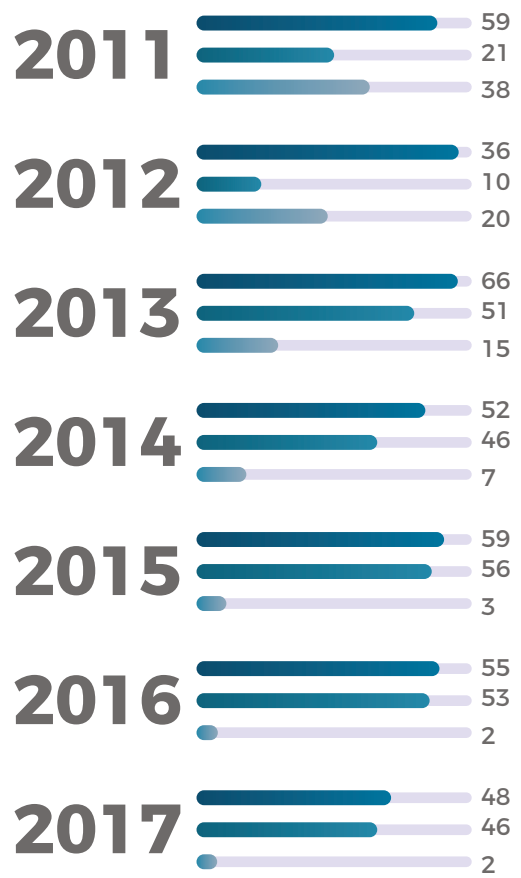
In the past five years turnover has amounted to 340 M€ and 280 M€, respectively, while export capacity is significant. However, while the armament subsector has experienced a slight increase, the missiles subsector is decreasing.

Defence figures in M€

● Defence Sales ● Defence Exports ● Sales to Ministry of Defence



ARMAMENT



MISSILES

There are several national companies with a wide range of industrial capacities and significant breakthroughs are taking place in the development of smart munition, including guided munition.





MINISTERIO DE DEFENSA



# Areas for improvement


- 2.1** Digitalisation
- 2.2** Innovation
- 2.3** Development of human capital
- 2.4** Activity-facilitating regulatory framework
- 2.5** Average company size
- 2.6** Funding alternatives
- 2.7** Sustainability
- 2.8** Logistics
- 2.9** Competitive business models
- 2.10** Internationalisation support

# Areas for improvement

The importance of having a **robust and consolidated defence technological and industrial base** goes beyond the needs of the Armed Forces, given its positive impact on various sectors, geographical areas and technological advances.

In the “Strategic Framework for Industrial Spain 2030” and the “General Guidelines for the new Spanish Industrial Policy 2030”, both documents prepared by the Ministry of Industry, Trade and Tourism, the following **action measures are established to strengthen industry and improve its productivity**, which are obviously applicable to the defence industry as well. The overall aim is to contribute to achieving the target of 20% of GDP set by the European Union for industrial activities.

In addition, it is important that the defence industry be aligned with European policies geared toward an innovative, smart and sustainable industry.



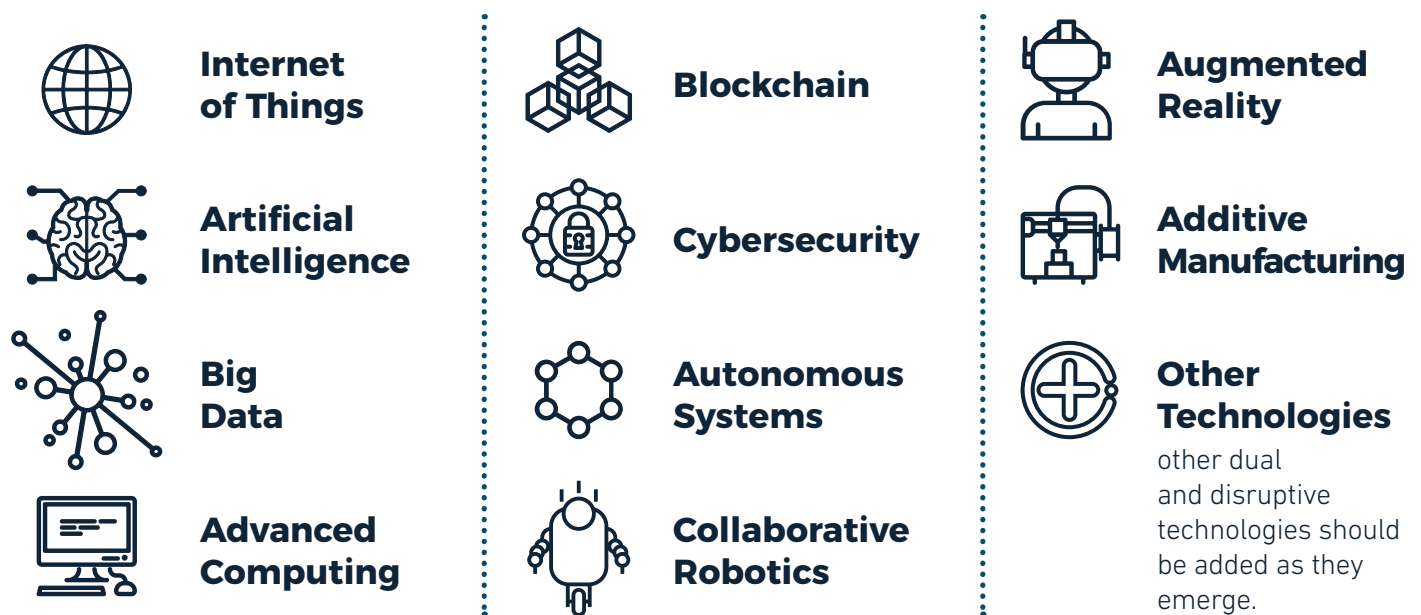
*“Defence industries must produce “Smart Weapon Systems”, to provide the Armed Forces with the material resources necessary to guarantee their superiority in action in “4.0 operational environments”.*”

## 2.1 Digitalisation

The importance of the digital transformation of the industry is such that it constitutes the first of the ten pillars established by the strategic framework.

**Defence industries must produce “Smart Weapon Systems”,** to provide the Armed Forces with the material resources necessary **to guarantee their superiority in action in “4.0 operational environments”**. A 4.0 Industry, capable of producing such weapon systems, and also capable of being internationally competitive is therefore necessary to guarantee their viability.

To this end, both the defence industry and the weapon systems it produces will begin to incorporate digital technologies that will enable the hybridisation of physical and cybernetic domains, including the following:



The weapon systems and the defence technological and industrial base constitute an indivisible pairing; progress in digital transformation must therefore be synergistic, harnessing the driving force of the upcoming large modernisation programmes of the Armed Forces.

Spain's Standardisation Organisation recently approved specifications UNE 0060 and UNE 0061 relating to Industry 4.0, the management system for digitalisation and its requirements and evaluation criteria. From the viewpoint of managing armament and materiel procurement programmes, the following should be pointed out, among others: requirements relating to “Connectivity”, “Client Applications” and “Information Security. Cybersecurity”, as they will enable the Ministry of Defence to operate on the network with the industry, suppliers and other actors involved, thus improving the industry's competitiveness and efficiency and effectiveness in programme management. To this end, the DGAM has already planned the implementation of a “**Programme Office 4.0**” pilot project.





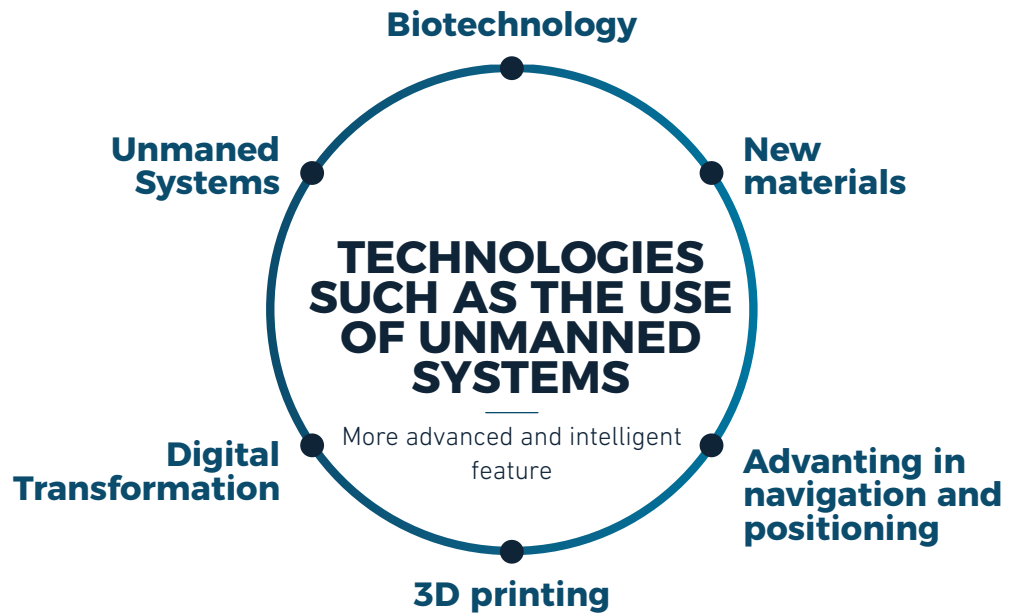
## 2.2 Innovation

In the current context of global change and the acceleration of technological advances, which in many cases are disruptive, the importance of availing of advanced R&D+i capabilities takes on particular relevance for the Ministry of Defence as an element of operational anticipation and competitive advantage in industrial and economic aspects.

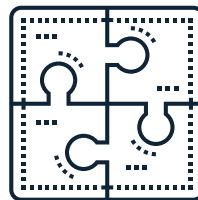
Added to this is the growing tendency to interconnect systems in network environments in order to create systems that provide the soldier with a unique skill set, far superior to those of individual systems.

The high potential for dual use of many of these new technologies acts as a catalyst for technological cooperation among the actors of the Spanish System for Science, Technology and Innovation and the Ministry of Defence, favouring the generation of synergies. The entities that make up the national technological fabric (mainly large companies, SMEs, R&D+i centres and universities) thus see improvements in their potential for growth and development. On the other hand, the actors for R&D+i coordination and funding optimise their investment endeavours through knock-on effects.

Finally, the end users of the Armed Forces avail of solutions that improve their capabilities, allowing



them to become involved in the innovation process and to add value through their experience and knowledge.



All of which encourages more collaborative endeavours at national level, where the aforementioned actors cooperate and share risks to promote the development of R&D+i activities applicable to defence.

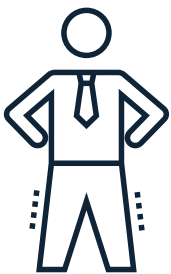
*The importance of availing of advanced R&D+i capabilities takes on particular relevance for the Ministry of Defence as an element of operational anticipation and competitive advantage in industrial and economic aspects.*

## 2.3 Development of human capital

The human factor is crucial in all activities and industrial activity is no different. The defence industry is characterised by its employees' high level of qualification and specialisation, which leads it to promote and facilitate their professional development through training and the dissemination of appropriate knowledge, not just for high-level positions, for positions at all levels: from management to assembly lines, cutting across engineering offices and research and testing laboratories.

Due to the **highly technological content of the armament programmes**, the appropriate specialisation and technical training of personnel is essential, both in the conceptual phases and in the subsequent production, testing and life-cycle maintenance phases, obtaining the necessary certifications, such as those existing in the aeronautical environment.

Knowledge of the defence market specificities at national and international level, particularly in the European Union environment, is also necessary, with a view to taking as much advantage as possible of any business opportunities that may arise. Likewise, appropriate dialogue with the client is essential to ensure the best interpretation possible of the requirements to be met, as the systems' operating environment normally envisages scenarios that are not frequent in civilian applications. To facilitate this, additional shared training between personnel from the industry and from the Ministry of Defence is necessary, and various initiatives have already been launched for this purpose.



Knowledge of digital transformation should also be explored in more depth, not just in technical terms, but also with regard to organisational and change-management capabilities. Development cannot happen without the right input from people.

*Additional shared training between personnel from the industry and from the Ministry of Defence is necessary.*



## 2.4 Activity-facilitating regulatory framework

Public procurement plays a key role as one of the instruments that must be used to achieve growth that is smart, sustainable and inclusive, while guaranteeing the best use of public funds. Progress must therefore be made in applying the provisions of **Law 9/2017 on Public Sector Contracts**, which increase transparency and facilitate the participation of SMEs in procurement procedures.

The coexistence of large companies and SMEs is a reality in all industrial sectors. The Ministry of Defence has launched initiatives to promote the participation of SMEs, such as putting into place a **Code of Conduct for defence contractors**,

the aim of which is to facilitate the subcontracting of national SMEs, thereby seeking to boost and support the role played by SMEs in the Spanish defence technological and industrial base as, due to their agility and flexibility, SMEs complement and support the capabilities of large companies.

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***Seeking to boost and support the role played by SMEs in the Spanish defence technological and industrial base as complement and support the capabilities of large companies.***

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Likewise, the use of the new association for innovation awarding procedure may be a facilitating instrument for the performance of research and development activities, which could subsequently conclude with the **acquisition of supplies, services or works**.

With a view to facilitating activities at international level, it is of vital importance to identify synergies in technical regulations in order to simplify and overcome

existing barriers. Of note in this field are activities related to airworthiness, quality assurance, cataloguing and European approval, standardisation and regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).



In international acquisition and collaboration programmes, mutual recognition among the participating countries' authorities is necessary, with a view to reducing certification costs and timeframes, thereby guaranteeing improved aviation security. This recognition facilitates acquisition in **multinational programmes** and allows national industry to take part in **international contracts**, also facilitating the export of aeronautical products developed in Spain.

In the area of **Official Quality Assurance**, mutual acceptance activities are also being carried out with NATO countries, with a view to achieving increased efficiency and economy of means. In addition, the certification of the defence industries' quality management systems is performed; this implies recognition of the Ministry of Defence granting the certifications and therefore prestige in the eyes of potential foreign clients.

Where **cataloguing** is concerned, the Spanish industry has been given the opportunity to establish a collaboration and support agreement with the Ministry of Defence, in order to catalogue all of its items in accordance with **NATO regulations** using the Ministry's own cataloguing tool. These companies may therefore participate in international tenders with the added value of offering their already catalogued

systems and making their products known through publication of the references provided in NATO's master catalogue.

The approval performed by the Ministry of Defence entails the certification process, which provides proof that a certain product meets the applicable regulations or **standards**, thereby building confidence regarding compliance with the requirements specified therein, generally based on international standardisation agreements and mainly geared toward the NATO environment, which foster mutual recognition and include requirements regarding interchangeability and interoperability. The approved products acquire the **State guarantee**, facilitating their national and international marketing.

The Ministry of Defence also disseminates the **European REACH Regulation** to the defence industry and facilitates appropriate advice, ensuring that the industry is prepared to demonstrate, in tenders if so required, compliance with the aforementioned regulation, thereby favouring opportunities in European markets.



## 2.5 Average company size

At the present time the need for companies to expand their markets and boost their export possibilities is indisputable. The international market is complex and requires companies not just to be highly competitive but also to be big enough to meet the investments and requirements set by clients.

National Defense Industry

**83% PYMES** > **17% Main Companies**

The increase in the size of the industries is therefore a key factor in their future positioning at international level, especially taking into account that countries tend to establish the creation of divisions or alliances with local companies as a requirement to access their defence market.

This issue can be addressed in various ways, from the creation of **national strategic alliances**, with a view to submitting joint offers, to the **consolidation of companies** in bigger groups. Another possibility is the establishment of **alliances with foreign companies**, particularly in the European context; the latter is favoured by EU policy and Spain also has a certain amount of experience in this

area thanks to the large aeronautical programmes it participates in. Where naval programmes are concerned, recent and successful experience points to non-EU alliances.

**“The international market is complex and requires companies not just to be highly competitive but also to be big enough.”**

In any event, the logistic and financial access barriers to be overcome by companies are obvious. Therefore, another complementary option for SMEs could be **cluster associations or industrial hubs**. This would enable them to take on more ambitious projects as they could find complementarity of capabilities through association.

**“The increase in the size of the industries is therefore a key factor in their future positioning at international level.”**



## 2.6 Funding alternatives

1996

Since 1996 the Ministry of Defence has worked in close collaboration with the present-day Ministry of Industry, Trade and Tourism to fund certain armament and materiel programmes, due to their particular characteristics, through a system of refundable advance payments to the companies that lead these programmes. These investments entail a crucial technological leap forward for Spanish industry, as they foster its innovative activity and contribute to increasing its competitiveness, which is reflected in developments geared toward the civilian field.

In addition, possibilities are being explored to ensure that funding for special armament programmes is not only secured in advance but also shared with other ministries that hold powers in the industrial and technological strengthening of the national industry.

The European Union (EU), through the European Defence Fund (EDF), promotes financing instruments for R&D and the development of military capabilities. Specifically, this has led to the approval of the European Defence Action Plan (EDAP).

The **EDAP** comprises a set of measures aimed at fostering investment and reinforcing the single defence market. Therefore, for the first time, the EU can provide the European industrial fabric with **funding for military capability research and investigation activities**.

Provided eligibility conditions are met, there are two windows for the provision of this funding: one for **research** and the other for **capabilities**. For each window, the Commission has implemented a **trial period** that enables all actors involved to familiarise themselves with the process.

It is therefore necessary to foster the participation of the national industry in EU-funded projects, which requires **coordination between the industry and the Ministry of Defence and other bodies involved**.



*“The European Union (EU), through the European Defence Fund (EDF), promotes financing instruments for R&D and the development of military capabilities.”*



## 2.7 Sustainability



**Reducing the logistics footprint** by improving energy efficiency is a key factor for the Armed Forces, both in permanent national installations and in installations in the area of operations, where missions are undertaken in complex scenarios in which the security of the logistics chain could cause problems and, in the light of past experience, the price of fuel could increase by up to two orders of magnitude.

This reduction could be achieved by seeking efficiency in mobile platforms, either land, air or naval, and fossil fuel-based power generation plants; by using **renewable energy systems** adapted to the military environment, as well as **smart and decentralised energy management systems**; and by improving infrastructures where energy consumption is concerned.

## 2.8 Logistics

A basic challenge for the operability of the Armed Forces is to carry out the correct maintenance of all of its systems, for which it relies on the appropriate support from the industry, where necessary.

Depending on the type of system, the trend is toward capability procurement formats based on the availability of systems throughout their entire life-cycle, i.e. importance is placed not only on their acquisition, but also on their maintenance in the service phase and, from a global viewpoint, including the platform and the on-board systems. This presents a challenge for all of the actors involved, both institutional and business, which must evolve to respond to this new way of addressing needs.

Together with digitalisation-associated technologies, progress is being made in the continuous monitoring of systems, regardless of their geographic location and, thanks to large-scale data processing, it is possible to improve awareness of their operating conditions in



All of the above will enable fuel consumption and, therefore, emissions, to be reduced, reinforcing the existing commitment at government level to protect the environment and reduce greenhouse gas emissions. The Ministry of Defence is also involved in this process, and ensures the maintenance of capabilities on an ongoing basis.

Energy transition in national installations and deployable infrastructures will benefit from the impetus being provided by the civilian sector in a dual environment such as this one. This activity is of major importance, as **most of the fuel consumed in the operations zone is used to generate electric power for air conditioning** and other needs, more so than the fuel consumed by platforms and weapon systems.

Work is being carried out on the use of materials with a reduced carbon footprint, such as ecological ammunition, and on the demilitarisation of gunpowder and explosives.

real time, with a view to optimising time and costs in maintenance tasks.

Other technologies, such as the digital twin, cover the early phases of design and development up to the service phase, facilitating the former and enabling improved configuration control throughout the entire life cycle, individualised for each unit.

*A sustainment policy based on the implementation of common solutions enables synergies to be leveraged, resources to be optimised and economies of scale to be generated.*

The capabilities obtained from the new weapon systems, which are complex and technologically advanced, make it obligatory to rationalise their sustainment to a maximum throughout the entire life cycle. As another component of the Armament and Materiel Policy, a sustainment policy based on the implementation of common solutions enables synergies to be leveraged, resources to be optimised and economies of scale to be generated.



## 2.9 Competitive business models

Achievable business objectives must be appropriately and realistically defined, seeking a balance between specialisation, product and market diversification and the duality of applications, with a view to reducing dependency on the Ministry of Defence's budget as far as possible.

Considering the opportunities that will arise in the EU market, preparation must be made for optimum positioning, which could serve to facilitate collaborations or alliances.

Progress should also be made in improving the efficiency of organisations and their processes. Technological advances must be applied in the organisation's environment, using specific applications and tools to facilitate design and management activities, process automation and the use of increasingly automated machines and robots; such advances must also be applied in products.

Technology will always imply a competitive edge and, therefore, the Ministry of Defence, aware of the importance of this factor in the development of the industry, considers it to be one of its lines of action within the Defence Industrial Strategy. In fact, companies are assisted in the process of technology training through specific R&D projects and in procurement programmes that have highly demanding requirements in terms of the latest technology.



***“Achievable business objectives must be appropriately and realistically defined, seeking a balance between specialisation, diversification and the duality of application.”***

## 2.10 Internationalisation support

The viability of many defence companies depends on market diversification. It is therefore necessary to identify export opportunities in a controlled and regulated sector where government/institutional support is essential to generate confidence-building measures among governments.

***Government/institutional support is essential to generate confidence-building measures among governments.***

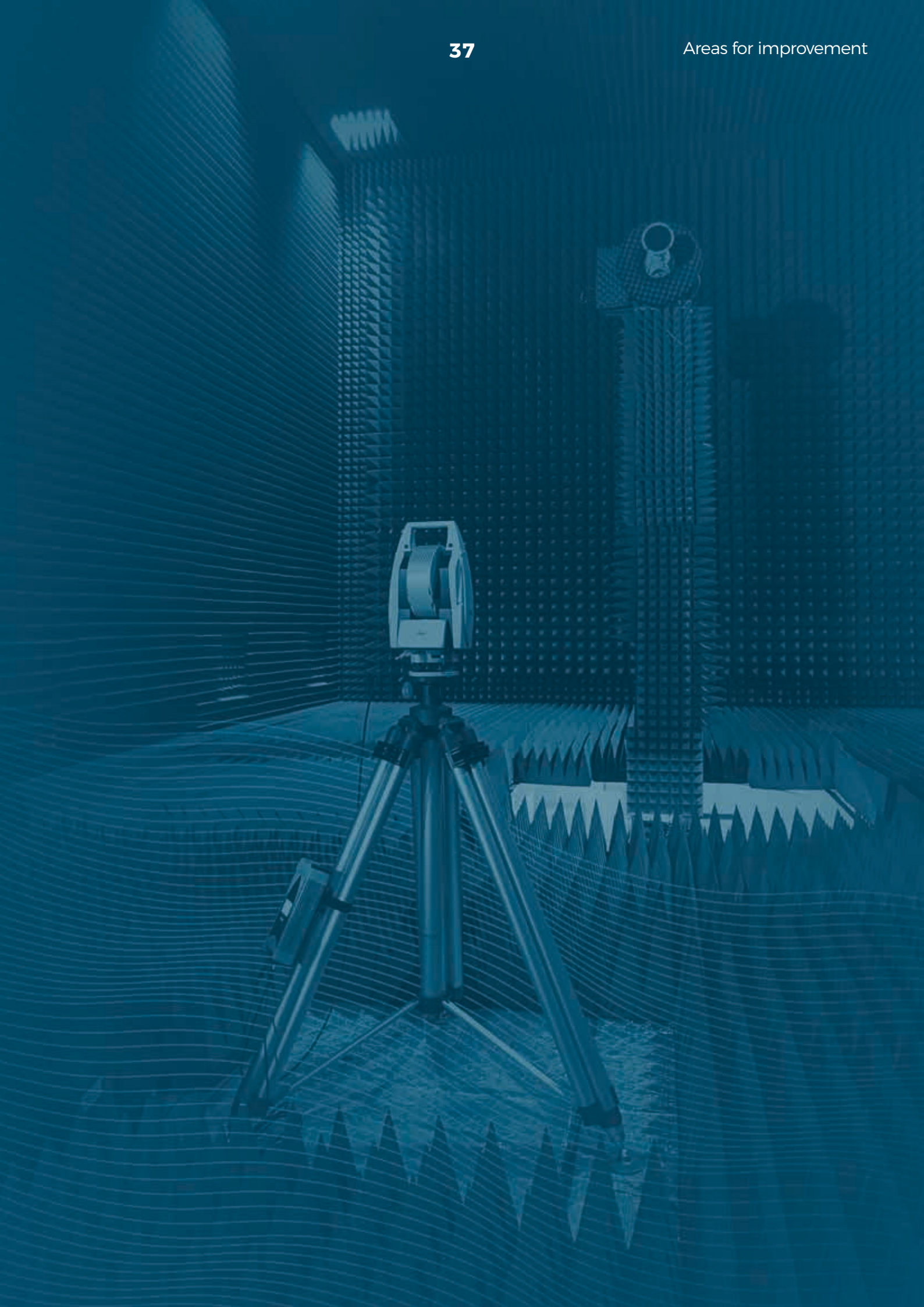
To this end, in 1993 the Ministry of Defence, through the Defence State Secretariat, initiated the "Institutional Support for the Internationalisation of the Spanish Defence Industry" concept, which consists of the support given by the Ministry to the Spanish Defence Industry in its internationalisation process. In order to make this process a reality, the External Support Office (OFICAEX), which reports to the DGAM's Deputy Directorate for International Relations and which works in liaison with various components of the Administration, was created.

Efforts are primarily being made in South America, given the region's historical ties with Spain and the ease of access provided by a common language, and also in the Asia-Pacific region, due to the spectacular growth of the region's economies and the current openings for European defence products.

Reference should be made to the expectations being generated by the future European defence market in the context of the Permanent Structured Cooperation (PESCO) and the European Defence Action Plan (EDAP), which will be dealt with in more detail in a separate chapter.

In addition to this support, the action of the Ministry of Defence in foreign investment processes in Spanish defence companies is both necessary and required. The activities in question are those related to the industrial capacities and areas of knowledge necessary to provide the equipment, systems and services geared toward providing the Armed Forces with military capabilities, including activities which may be destined for the design, production, maintenance and trade of weapons and defence materiel in general.





# Possibilities for the Defence Industry

- 3.1** National sphere.  
Forecast of needs
- 3.2** European defence initiatives
- 3.3** Future trends



# Possibilities for the Defence Industry

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*The Armament and Materiel Programmes currently being put into place, together with new programmes expected to commence in the near future, constitute an opportunity for the development and training of the national industrial fabric.*

”

## 3.1 National sphere. Forecast of needs

The Ministry of Defence continues in its efforts to modernise the Armed Forces through realistic plans which take into account, on the one hand, the needs of the Force and, on the other hand, the economic availability foreseeable in the coming years. The Armament and Materiel Programmes currently being put into place, together with new programmes expected to commence in the near future, constitute an opportunity for the development and training of the national industrial fabric. These programmes generate a considerable workload over time and open up possibilities in the international market.

Of note are the development and construction programme for the new F-110 frigates and the VCR 8x8 Dragon wheeled combat vehicle programme for the Army, which are also associated with a set of programmes related to technological development and risk reduction; the NH-90 helicopter programme, which has commenced its second phase, which will include a naval version; the new communication satellites; and the continuation of the programmes

related to the Eurofighter and A 400M aircraft and the S-80 submarines, which have an underlying need for an underwater intervention vessel.

The near future also presents industrial opportunities, especially in the areas of command and control, intelligence, surveillance and recognition (ISR), remotely manned vehicles, as well as participation in international programmes such as EUROMALE and the Next Generation Weapon System (NGWS).





## 3.2 European defence initiatives

Within the framework of the new global strategy of the EU, two initiatives have been developed, one as a political driving force, i.e. the Permanent Structured Cooperation (PESCO), the aim of which is to foster the cooperation of the Member States in the development of military capabilities, and another as a true economic driving force, the European Defence Action Plan (EDAP), the main aim of which is to promote a robust and competitive European Defence technological and industrial base.

These initiatives create a new European context in which, through funding from collaborative defence R&D projects, government and industrial cooperation is incentivised for the joint development of capabilities that allow requirements and

systems to be harmonised and defence expenditure to be rationalised.

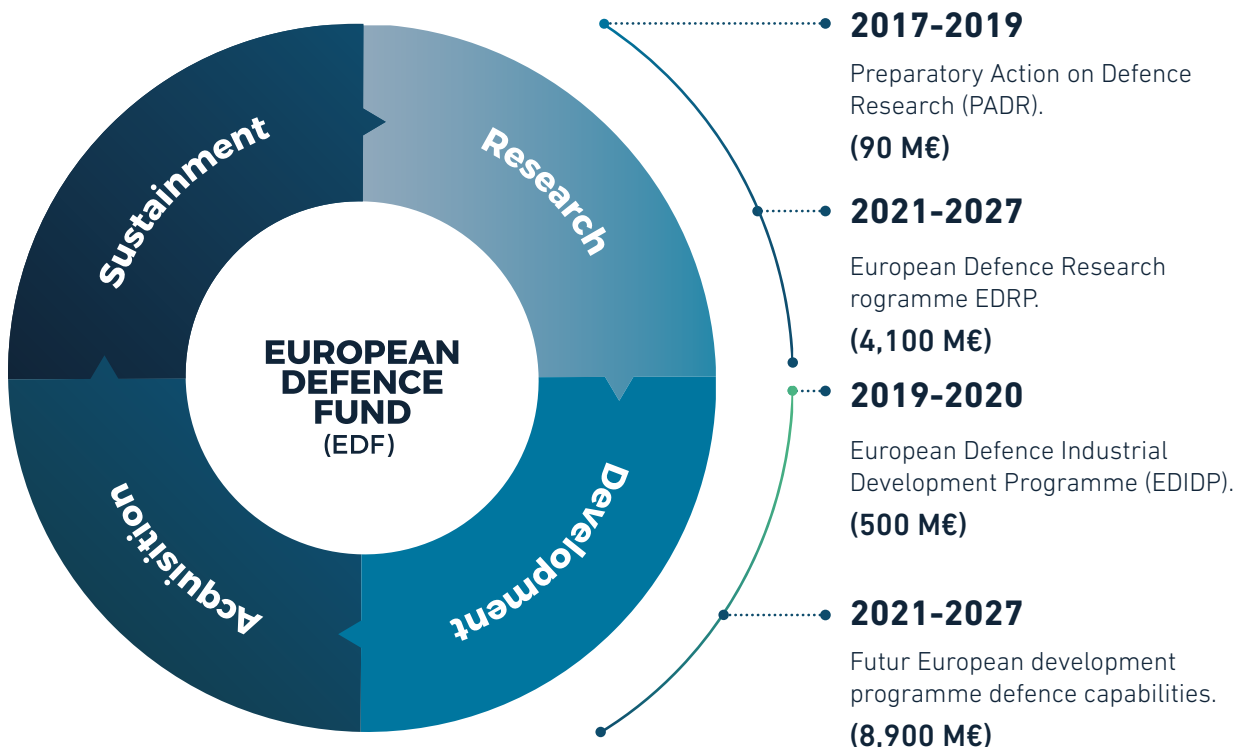
The EDAP materialises in the European Defence Fund (EDF) and also in measures aimed at fostering supply chain investments and reinforcing the single defence market.

Therefore, for the first time, the EU has provided the European industrial fabric with funding for military capability research and development activities.

The direct injection, through the recently created EDF, of over 13,000 M€ of the

common EU budget for military capability research and development, implies a before and after in the role that the EU is prepared to play in this field.

**Government and industrial cooperation is incentivised for the joint development of capabilities that allow requirements and systems to be harmonised and defence expenditure to be rationalised.**



\* Financial tools available to Members States.

Provided this funding complies with eligibility conditions, it will materialise through the EDF in two windows: one for research and the other for capabilities. For each of these windows, the Commission has implemented

a trial or transition period that will enable all of the actors involved (Member States, companies and the Commission itself) to become familiar with the process.

The eligibility conditions to access these funds require the industry to create international consortiums in which at least 3 companies located in 3 different countries of the EU are represented. The bonus system established by the EDAP favours the inclusion of SMEs and MIDCAPS<sup>7</sup> in the consortiums.

### 3.3 Future trends

In the area of armament, precision and range will increase; using new guidance and propulsion technologies munition insensitivity will be improved and advanced systems for target acquisition and fire command and control will be incorporated. In the long term, the use of directed energy weapons will increase, both laser and high-power microwave, as will the use of new electromagnetic propulsion and hypersonic technologies, and this will gradually extend to the automation of weapon systems and artificial intelligence technologies.

For electronic systems, technologies that improve performance will continue to be developed and integrated, enabling new possibilities in communication, surveillance and electronic warfare, and giving rise to light equipment of reduced size and consumption. The development of more precise and robust navigation and positioning systems will have an impact on guided munition, platform autonomy and the georeferencing of sensorial information. Finally, significant development is expected in the set of technologies that enable domination of the

electromagnetic spectrum in order to protect own forces and limit use by enemy forces.

Advanced, high-performance materials will become available, which will be lighter and more resistant to deterioration in order to improve ballistic protection and reduce detectability of the platforms and the soldier. Generalised use of additive manufacturing in missions is envisaged, thereby simplifying the logistics chain.

Where energy is concerned, an increase in storage needs is envisaged, linked to the electrification of the platforms and soldier systems, and also to the development of new systems with a high electric power demand, such as laser weapons. Progress will also be made in energetic autonomy of the bases through the use of renewable energies and improved energy efficiency.

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<sup>7</sup> MIDCAPS: Companies with middle-sized market capitalisation.

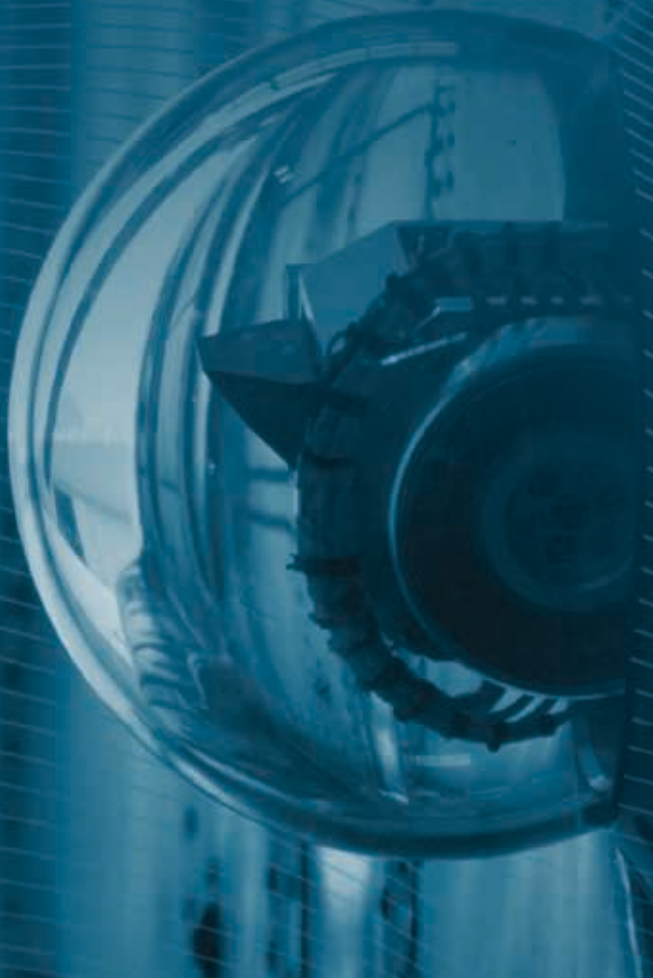


With regard to soldier systems, human skills will be increased using exoskeletons, smart textiles and advanced interfaces, including in extreme environments, monitoring health and providing support to individual decision-making. Biotechnology and soldier ergonomics will also gain increased importance.

In robotics and autonomous systems, the use of all types of remotely manned systems will increase: air, naval and land. With regard to performance, it should be noted that such systems will be interoperable, their dependency on navigation signals will be reduced, and they will be increasingly robust and resilient against cyber-attacks and capable of attacking any targets that may arise. There will also be more miniaturised unmanned vehicles, swarm systems will be developed and increased cooperation among persons and robots in missions will be achieved. Conventional manned platforms must therefore evolve to integrate unmanned platforms in their mode of operation, which will also have an effect on their modularity, scalability and multi-role capacity characteristics.

Where information and communication technologies are concerned, an increase in communication devices is envisaged to provide connectivity with military mobile networks and cloud computing. The development of the "Internet of military things" is also expected, comprising sensor networks whose signals, once processed, will improve processes and mission accomplishment.

The application of artificial intelligence in high-speed decision-making, merging huge amounts of data, including multimedia information, will enable the autonomy of unmanned systems to be increased and military intelligence to be improved. Virtual simulation and augmented reality will facilitate more effective military training, while cyber defence will become relevant across all technologies.







MINISTERIO DE DEFENSA



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