



# Annex I: Spain

Annex to report: Vision on defence-related skills for Europe today and tomorrow

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*Defence-related skills:*

*Building evidence on skills shortages, gaps and mismatches and defining the sector's strategy on skills*

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# Annex A. Spain

Figure I.1. Executive summary – Spain

<b>Spain</b>	
<b>DITB size</b>	Turnover € 5.7B in 2016; ~ 210,000 defence industry personnel
<b>Domain focus</b>	Aerospace and maritime, focus on electronics
<b>Defence capabilities</b>	Manufactures aircraft, ships, ammunition and weapons; imports armoured vehicles
<b>Exports</b>	Aerospace sales account for 79% of defence exports; also export frigates
<b>Selected companies</b>	Navantia, Indra, Airbus, General Dynamics European Land Systems
<b>Identified skills gaps and challenges</b>	<ul style="list-style-type: none"> <li>OECD identified digital skills as particular shortage, and contributes to reported cybersecurity skills shortages (e.g. in IT design) which is likely to impact the local IT industry in Spain</li> <li>STEM skills, crucial to the naval, aerospace and electronics sector are in high demand. However, given the high number of programmes focus on STEM skills (e.g. university, military colleges), these shortages may be mitigated</li> </ul>

Skills supply landscape		Identified top-down initiatives		Identified bottom-up initiatives		Investment in R&D?
National skills strategy	Includes defence skills?	Education programmes	Other top down initiatives	Industry-led initiatives	Collaborative initiatives	
x	x	✓	✓	✓	✓	✓
<b>Skills focus</b> →		Engineering (industrial organisational engineering, security engineering, mechanical engineering); management and systems (direction and management of acquisitions for defence, HR, logistics)	Engineering (Building Information Modelling)	Generic STEM skills (science, technology, engineering maths) e.g. coding, robotics, electronics	Naval skills and shipbuilding	Both collaborative initiatives are focused on R&D in the naval and shipbuilding sector.
<b>Examples</b> →		University Center of the Defense of San Javier , Centro Universitario de la Guardia Civil, CESDEN, CUD, University Center of Defense of the Naval Military School of Marin	Institute of Engineering in Spain (IIE)	Indra Smart Start, SASCorp MakerLab	Navantia Strategic collaboration, UDC Joint Research Unit	Navantia Strategic collaboration, UDC Joint Research Unit

Source: RAND Europe

## A.1. Background

Spain is an important player in European defence, having been a member of the EU and NATO since 1986 and 1992 respectively.<sup>1</sup> Current Spanish defence policy, included in the 2013 National Security Strategy, prioritises addressing migration in the Mediterranean and instability in the Middle East.<sup>2</sup>

Spanish defence expenditure constituted 1 per cent of GDP in 2016, and 0.86 per cent of GDP in 2017.<sup>3</sup> At the same time, Spain announced ambitious plans to double defence expenditure to 2 per cent of GDP by 2024, and approaches NATO's guideline of investing 20 per cent of defence spending in defence equipment.<sup>4</sup> This presents an opportunity for growth of recruitment, retention and development of defence-related skills in the Spanish DTIB. More than 209,100 professionals are involved in the Spanish defence industry, constituting 1.34 per cent of the country's workforce.<sup>5</sup>

In 2015, Spain's defence industry turnover was €5.89 billion (excluding civil sales), with 83 per cent dedicated to exports.<sup>6</sup> Spain has a long-standing history of designing and manufacturing defence equipment for both domestic and export markets. Established in 1941, following the conclusion of Spain's civil war, the National Industry Institute (INI) was the main player in the Spanish defence industry, producing several big companies that later became prime defence contractors, including elements of the European Aeronautical Defence and Space company (EADS), now known as Airbus Defence and Space, and major Spanish firm Indra.<sup>7</sup> Following the 2008 financial crisis, however, Spanish defence industry sales and turnover declined. These have recently been bolstered due to efforts within the DTIB to focus on defence exports to offset the lack of domestic demand, helping to sustain company turnover. This has primarily benefited internationally competitive firms that are the most active exporters, in a difficult period for local industry. In 2015 the Spanish defence industry invoiced €4.19 billion from exports abroad, compared to €2.3 billion in 2011, thereby nearly doubling its international export sales in four years. Spain accounted for 2.7 per cent of world arms exports in

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<sup>1</sup> Gobierno de Espana. 2018. 'Spain and NATO.' As of 27 September 2018: <http://www.exteriores.gob.es/Portal/en/PoliticaExteriorCooperacion/ProyeccionAtlantica/Paginas/EspLaOTAN.aspx>

<sup>2</sup> Gobierno de Espana. 2013. 'The National Security Strategy.' As of 27 September 2018: [http://www.lamoncloa.gob.es/documents/estrategiaseguridad\\_baja\\_julio.pdf](http://www.lamoncloa.gob.es/documents/estrategiaseguridad_baja_julio.pdf)

<sup>3</sup> Eurostat 2018. 'Government expenditure on defence.' As of 28 September 2018: [https://ec.europa.eu/eurostat/statistics-explained/index.php/Government\\_expenditure\\_on\\_defence](https://ec.europa.eu/eurostat/statistics-explained/index.php/Government_expenditure_on_defence); export.gov.

2018. 'Spain- Aerospace and Defence.' As of 27 September 2018: <https://www.export.gov/article?id=Spain-Aerospace-and-Defense>

<sup>4</sup> IHS Jane's Defence. 2018. 'Poland: Defence Production and R & D.' As of 9 September 2018: [https://janes.ihs.com/Janes/Display/polas160-ceur#Other military industrial sectors](https://janes.ihs.com/Janes/Display/polas160-ceur#Other%20military%20industrial%20sectors)

<sup>5</sup> World Bank. 2017. 'Labor force, total.' As of 27 September 2018: <https://data.worldbank.org/indicator/SL.TLF.TOTL.IN>; Ministerio de Defensa. 2018. 'Catalogue: Spanish Defence Industry.' As of 23 December 2018:

[https://publicaciones.defensa.gob.es/media/downloadable/files/links/c/a/catalogue\\_dgam\\_17\\_18.pdf](https://publicaciones.defensa.gob.es/media/downloadable/files/links/c/a/catalogue_dgam_17_18.pdf)

<sup>6</sup> Ministerio de Defensa. 2018. 'Catalogue: Spanish Defence Industry'. As of 23 December 2018: [https://publicaciones.defensa.gob.es/media/downloadable/files/links/c/a/catalogue\\_dgam\\_17\\_18.pdf](https://publicaciones.defensa.gob.es/media/downloadable/files/links/c/a/catalogue_dgam_17_18.pdf)

<sup>7</sup> Duch-Brown, Néstor, & Antonio Fonfría. 2014. 'The Spanish defence industry: an introduction to the special issue.' *Defence and Peace Economics* 25(1):1–6. doi: 10.1080/10242694.2013.857462

2013–2017, with ships and multinational aircraft programmes (e.g. Eurofighter Typhoon or A400M) accounting for the majority of exports.<sup>8</sup>

### A.1.1. Key industry players

Spain's defence industry is primarily concentrated in the aerospace, naval (surface) and electronics sectors. Companies are a heterogeneous mix of international, state-owned and Spanish-headquartered enterprises. Additionally, of the 608 defence companies in Spain, 81 per cent (492) are SMEs with fewer than 250 employees.<sup>9</sup> Table I.1 lists the major Spanish defence companies and the domains in which they operate.

Table I.1. Overview of the main defence companies in Spain

Name of company	Domain(s) of operation and specialisations
Airbus	Aerospace (defence and civilian), space
Indra	Information technology and defence systems, civilian (e.g. transport and traffic, healthcare, media, etc.)
Navantia	Shipbuilding (defence and civilian)
Santa Barbara Sistemas (part of GDELS)	Armoured vehicles
SASCorp	Structural aerospace systems
SENER	Electromechanical systems, systems for submarines and modernization services for helicopters, COMINT, aeronautics, aerospace
URO	Armoured vehicles (trucks)

Source: RAND Europe analysis

Regarding the employment and skills profile of the Spanish defence industry, Spain's DTIB is concentrated around Madrid and Seville.<sup>10</sup> In the naval sector, state-owned Navantia is one of the prime European companies, producing a range of surface vessels and competing on international export markets across and outside of Europe.<sup>11</sup> In defence electronics, Indra is a major player.<sup>12</sup>

<sup>8</sup> SIPRI. 2018. 'Arms Transfers Database.' As of 27 September 2018:

<https://www.sipri.org/databases/armstransfers>

<sup>9</sup> Gobierno de España. n.d. 'Agenda para el fortalecimiento del sector industrial en España.' As of 27 September 2018: <http://www.mincotur.gob.es/industria/es-ES/Servicios/Documents/Agenda-fortalecimiento-sector-industrial-Espa%C3%B1a-Definitivo-Publica-Correccion-2-2.pdf>

<sup>10</sup> European Parliament. 2013. 'The development of a European Defence and Technological Industrial Base (DTIB).' As of 30 August 2018:

[http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/433838/EXPO-SEDE\\_ET%282013%29433838\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/433838/EXPO-SEDE_ET%282013%29433838_EN.pdf)

<sup>11</sup> *Ibid.*

<sup>12</sup> *Ibid.*

## A.2. Overview of skills gaps and shortages

Core technical and STEM skills are in high demand in the Spanish DTIB, not least because they are drawn from the same pool as the civilian industry. This demand is exacerbated by the advent of Industry 4.0, in both the civilian and defence sector, which combines traditional manufacturing methods with the Internet of Things (IoT) and cyber-physical systems, requiring a STEM-skilled workforce to operate effectively. There are several major skills gaps and shortages in the Spanish DTIB. The EU Skills Panorama cites **engineering** as a high-priority shortage occupation.<sup>13</sup> Design, systems, production and industry engineers are in particular demand.<sup>14</sup> There is also demand for aerospace and aeronautical engineers, with graduates in this field having a 94 per cent employment rate – one of the highest in Spain.<sup>15</sup> In addition, there is a gender skills gap within engineering, with female engineering students only accounting for 30 per cent of the entire cohort nationally.<sup>16</sup>

The high number of military and civilian programmes focused on promoting engineering and STEM skills suggest that engineering is seen as a key skills gap for the local DTIB (see Section A.3). Importantly, the shortage of engineering skills is also affecting the move to Industry 4.0 within the defence sector. This is difficult in Spain given that industry representatives cite **systems architecture and manufacturing of the future**, which require engineering skills and qualifications, as skills gaps within the country, and skillsets they struggle to successfully recruit for. Spanish DTIB additionally identifies a shortage of skills in **cybersecurity**, including crisis response. Spain also has shortages in experienced personnel in computers and electronics, and experiences challenges in the availability of digital skills.

## A.3. National and regional policies and programmes

### A.3.1. Overview of national and regional policies

Whilst the 2015 Spanish defence strategy recognises the importance of the DTIB and the promotion of R&D, it does not specifically reference the importance of defence skills in aiding and expanding the sector.<sup>17</sup> Despite the awareness of the need for Spain to increase the competitiveness of its DTIB, its national and regional policies do not make reference to the specific skills needed to ensure the strength of the DTIB and the defence industry as a whole. However, the 2014 *Agenda For Strengthening the Industrial Sector in Spain* is a government strategy document that outlines the need to adapt the educational model to the needs of companies, by increasing training contracts for young people, promoting the labour insertion of students, novice and unemployed professionals, involving

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<sup>13</sup> Skills Panorama. 2018. 'Shortage (skills shortage).' As of 12 November:

<https://skillspanorama.cedefop.europa.eu/en/content/shortage-skills-shortage>

<sup>14</sup> Skills Panorama. 2016. 'Spain: Mismatch priority occupations.' As of 30 August 2018: [http://skillspanorama.cedefop.europa.eu/en/analytical\\_highlights/spain-mismatch-priority-occupations#\\_shortage\\_occupations](http://skillspanorama.cedefop.europa.eu/en/analytical_highlights/spain-mismatch-priority-occupations#_shortage_occupations); RAND Europe survey analysis (2018)

<sup>15</sup> Skills Panorama. 2016. 'Spain: Mismatch priority occupations.' As of 30 August 2018: [http://skillspanorama.cedefop.europa.eu/en/analytical\\_highlights/spain-mismatch-priority-occupations#\\_shortage\\_occupations](http://skillspanorama.cedefop.europa.eu/en/analytical_highlights/spain-mismatch-priority-occupations#_shortage_occupations)

<sup>16</sup> *Ibid.*

<sup>17</sup> Ministerio de Defensa. 2015. 'Estrategia Industrial de Defensa.' As of 30 August 2018: <http://www.defensa.gob.es/Galerias/dgamdocs/estrategia-industrial-defensa-2015.pdf>

private companies in the design of training programmes and study plans, and promoting dual training.<sup>18</sup>

### **A.3.2. Overview of national and regional programmes**

The majority of national programmes are focused on developing skills at the university level, and on the provision of wider industrial skills, especially in engineering.

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<sup>18</sup> Gobierno de España. n.d. 'Agenda para el fortalecimiento del sector industrial en España.' As of 27 September 2018: <http://www.mincotur.gob.es/industria/es-ES/Servicios/Documents/Agenda-fortalecimiento-sector-industrial-Espa%C3%B1a-Definitivo-Publica-Correccion-2-2.pdf>

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Table I.2 outlines selected programmes.

Table I.2. Overview of selected national and regional programmes in Spain

Programme	Career stage	Domain	Skills focus
Joint Research Unit, Universidad da Coruna and Navantia	N/A	Cross-domain	Naval technologies and techniques
Undergraduate degree, Centro Universidad de Defensa	Entry-stage military professionals, university students	Cross-domain	Mathematics, economics, engineering and administration
Master's Degree, Direction and Management of Acquisition for Defence, Centro Universidad de Defensa <sup>19</sup>	Graduate students, military professionals	Defence acquisition	Aligned with the need for the Directorate General of Armament and Material (DGAM) of the Ministry of Defence to train individuals in management and programme management, acquisition of material for defence and planning and negotiating contracting for these programmes
Degree Industrial Organisation Engineering, University Centre of Defence (Air Academy) and Polytechnic University of Cartagena <sup>20</sup>	University students and early military professionals	Cross-domain	Degree has been created in consultation with the Ministry of Defence and defence industry to train individuals in management tools and organisational management
Degree in Mechanical Engineering, Centro Universitario de La Defensa, Naval Military School Marin and Universidad de Vigo <sup>21</sup>	University students and early military professionals	Cross-domain	Mechanical engineering

Source: RAND Europe analysis

<sup>19</sup> Centro Universitario de Defensa. 2018. 'Degree in Industrial Organization Engineering from the University of Zaragoza.' As of 30 August 2018: <http://cud.unizar.es/node/2390>

<sup>20</sup> Centro Universitario de Defensa Academia General del Aire. 2018. 'Presentation of the title.' As of 30 August 2018: <http://www.cud.upct.es/index.php/estudios/grado/presentacion-del-titulo>

<sup>21</sup> Centro Universidad de Defensa Escuela Naval Militar Marin. 2018. 'Degree in Mechanical Engineering from the University of Vigo.' As of 30 August 2018: [https://cud.uvigo.es/index.php?option=com\\_content&view=article&id=659&Itemid=61](https://cud.uvigo.es/index.php?option=com_content&view=article&id=659&Itemid=61)

## A.4. Industry-led policies and programmes

Beyond the internal provision of on-the-job training, workforce development and mentoring schemes, the majority of Spain's defence companies have externally facing defence-related skills programmes focused on a diversity of career stages, including schoolchildren and university graduates. SASCORP's Maker Lab in Leon, for example, is focused on students of PeñaCorada Secondary School. It aims to introduce them to electronics, robotics, programming languages and modern technologies.<sup>22</sup> For university graduates, Indra's Smart Start Programme recruits STEM students studying subjects including computer science, engineering and mathematics.<sup>23</sup> The programme provides training, development and evaluation in the student's first two years, as well as a mentor. The training plan focuses on technical skills and subject matter knowledge, and is provided at the Indra Corporate University and Indra Open University.<sup>24</sup>

Airbus (including its Spanish division) has a particularly well-defined approach to defence-related skills. As a company working across both the civil and defence aerospace sectors it has the task of developing the general aerospace skills base, which helps inform its approach to skills relative to defence in the aerospace sector. It has a specific competence strategy in place, to ensure that its employees have the relevant skills that will ensure the company meets future business needs. The assessment process is performed yearly and involves anticipating supply and demand of competencies, identifying, securing and developing these key competencies, and creating added value through synergies, networking and best practices. There are defined competence priorities that focus on technical aspects including workforce polyvalence and polycompetence. Polyvalence refers to the versatility of the workforce, whilst polycompetence refers to the possession of multiple skills. The strategy also aims to assess long-term competence needs for skills that may not exist yet, but will need to be developed in future to reflect changes in the technology and threat environments. It further has a number of programmes that target a variety of skills and career levels. Table I.3 provides a case study of Airbus, illustrating its skills programme at each career stage.

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<sup>22</sup> SASCORP. 2018. 'About: Patronage.' As of 30 August 2018: <https://sascorp.es/about.html>

<sup>23</sup> Indra. 2018. 'Smart Start.' As of 30 August 2018: <http://www.indraempleo.com/es/smart-start>  
Industrial Cadets (homepage). n.d. As of 28 September 2018: <https://www.industrialcadets.org.uk/>

<sup>24</sup> *Ibid.*



Table I.3. Case study: Airbus in Spain

Stage of Career	Programme	Local partners
Apprentice	Recruitment of technical and non-technical students to teach them about the aeronautical industry, accepting applications from technical partner schools	None
University Graduate	Airbus Global University Partner Programme (AGUPP). Launched in 2014, this is a strategic initiative that aims to foster the development of strategic competences, e.g. technical and soft skills, developing training courses and encouraging universities to support diversity	University Carlos III, Madrid, University of Seville and Technical University of Madrid. Overall, 22 universities from 11 countries
Young Professionals	Airbus Minds Programme. This aims to train young professionals for the aeronautical industry, combining 12 months of practical training at Airbus with both offline and online courses	Fundación Universidad-Empresa, Universidad de Alcalá and EOI
Postgraduate students	GAIA Programme. Airbus is a partner in this programme which provides students with a Master's degree in Decision Making and Innovation	Fundación Universidad-Empresa

Source: RAND Europe analysis

## A.5. SWOT analysis of national and industry programmes

The strength of Spain's national programmes is the collaboration between the MOD and academia in providing degree programmes that focus on the core STEM skills central to the Spanish defence sector. However, many of these are not focused on the defence industry specifically, but are instead tailored to Armed Forces requirements, primarily targeting Armed Forces personnel, but allowing civilian students to participate. The strengths of industry programmes, in contrast, is that they target a diversity of skills levels and career stages, including schoolchildren, university students and apprentices. Programmes for university students illustrate collaboration between industry and academia, aimed at providing critical STEM and specialist skills within the Spanish DTIB.

The defence clusters of Madrid and Seville offer an opportunity to create regional programmes that would benefit the Spanish DTIB. The interconnected nature of the European defence industry presents the opportunity to collaborate with universities and companies across Europe to ensure the provision of STEM skills within the Spanish defence sector. The lack of identified programmes focused on cybersecurity and digital skills could pose a risk to already scarce IT skills, which are in demand in the aerospace and naval industry. The growth of Spanish DTIB is also impacted by the relatively limited defence spending (at 0.86 per cent of GDP). This affects procurement levels, and thus skills and the workforce. However, the announced increase in defence spending, should it materialise, will present an opportunity to generate additional capability programmes and thus channel investment to skills sustainment.

Figure I.2. SWOT analysis of national and industry programmes

Internal factors	
<p style="text-align: center;"><b>Strengths</b></p> <p>There is strength in the collaboration between government and academia that focuses degrees on STEM subjects relevant for both industry and members of the armed forces.</p> <p>Industry programmes target a diversity of career stages including schoolchildren, apprentices and university graduates. The programmes are focused on specific skillsets including aerospace and industrial engineering, offering both in-house and external training opportunities.</p> <p>There is collaboration between industry and a number of universities across Spain to ensure specialist skills needed within the Spanish DTIB are provided.</p>	<p style="text-align: center;"><b>Weaknesses</b></p> <p>Regarding national skills programmes, there is a lack of focus on the defence industry specifically, with many programmes concentrated on members of the armed forces, and additionally open to civilian students.</p> <p>Programmes appear to be graduate-centric with more apprentice and school-engagement programmes needed.</p>
External factors	
<p style="text-align: center;"><b>Opportunities</b></p> <p>The Spanish DTIB would benefit from greater ties with government and academia.</p> <p>Defence clusters in Madrid and Seville present an opportunity for concentrated regional programmes in collaboration with academia and industry that would benefit all three key defence industry players.</p> <p>The announced increase in defence spending presents opportunity for investment in skills sustainment, if it materialises.</p>	<p style="text-align: center;"><b>Threats</b></p> <p>There is a lack of programmes that focus on cybersecurity and digital skills, which may impact the IT and defence sectors in Spain and present challenges in terms of skills gaps and shortages.</p>

Source: RAND Europe analysis