



Annex D: France

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 D. France

Figure D.1 Executive summary - France

France	
DITB size	Composed of around 10 prime contractors and 4,000 SMEs; turnover € 15B; ~ 200,000 employees
Domain focus	Cross-domain, in particular air, space, sea, land
Defence capabilities	Manufactures aircraft, helicopters; submarines, naval vessels, weapons & missiles; space launch vehicles Selected upcoming acquisitions: ~1,700 armoured vehicles (army); 5 frigates, 4 nuclear-powered attack submarines, 9 offshore patrol vessels (navy); 12 in-flight refuelling tankers, 28 upgraded Rafale fighter jets, 55 upgraded Mirage 2000 fighters (air)
Exports	~€6.9 billion in exports in 2018 (aircraft, helicopters, missiles, surface vessels and submarines, tanks, etc.)
Selected companies	Airbus Group, Dassault Aviation, Nexter Group, Naval Group, MBDA, Thales, Safran Group
Identified skills gaps and challenges	<ul style="list-style-type: none"> Skills that are in short supply include engineering; digital including data management, cyber and AI, for which programs are only recently emerging; as well as operators and technicians

Skills supply landscape		Identified top-down initiatives		Identified bottom-up initiatives		
National skills strategy	Includes defence skills?	Education programmes	Other top down initiatives	Industry-led initiatives	Collaborative initiatives	Investment in R&D?
✓	✓	✓	✓	✓	✓	✓
Skills focus		Engineering (Aerospace, aeronautical mechanics, marine); Pyrotechnics and Propulsion, naval architecture; sensors, geolocation and navigation; complex systems; CBRN technologies and engineering	Practical technical training, in-service support and operations (seafaring)	Cross-functional skills; management; in-service support; testing; design; naval technologies and engineering	Engineering; Project management; Naval systems design and engineering; energy production systems and platforms; Nuclear technology;	Increased investments in digital transformation, new enabling technologies and "factories of the future", with a strong training component
Examples		ISAE-SUPAERO MSc, Advanced Masters at the ENSTA Bretagne	Sessions organised by the Institut des hautes études de défense nationale (IHEDN) and initiatives of the French Naval Academy	Safran Helicopter Engines Academy, Airbus Training Centre Europe, apprenticeships at Dassault and Thales, Naval Group Professional Bridges	Public-private collaborations led by ENSTA Bretagne, the French Naval Academy and CEA's Military Application Division, AEROCAMPUS Aquitaine	CampusFab; Factory Lab

Source: RAND Europe

D.1. Background

France's Military Planning Law (MPL) 2019-2025 and its 2030 Ambition programme¹ set out planned defence spending increases to reach 2 per cent of national GDP by 2025, up from the 2017 level of 1.78 per cent.² President Macron of the French Republic approved a 2030 Ambition programme for the French Armed Forces, which focuses on securing critical operational capabilities for the country's defence and ensure their strategic autonomy. As part of this plan, the President has taken the decision to make up to 198 billion euros available to the armed forces; Ministère des Armées. The MPL identifies EUR295 billion for requirements and guarantees these will be covered until 2023.³ Further, EUR1 billion (increased from EUR730 million in 2018) will be made available for research and development (R&D) in 2022.⁴ France's DTIB is composed of approximately ten large companies operating internationally and almost 4,000 SMEs, of which 350 are considered 'strategic' by the Ministry of the Armed Forces.⁵ The French government plays an active role in maintaining and fostering the DTIB's SMEs, mid-tier companies and global primes, helping to promote France's defence self-sufficiency and increase its geopolitical influence, including through promotion of exports.⁶

Furthermore, upholding a strong DTIB is seen as important for the wider economy and maintaining a balance of trade (with defence exports accounting for approximately EUR6.9 billion in 2017).⁷ France's defence industrial base represents 200,000 localised high-tech jobs and around EUR15 billion in turnover, excluding maintenance activities.⁸ For example, out of the 50,000 industrial jobs in the Île-de-France region, approximately 16,190 of these (30 per cent) are accounted by defence industry companies

¹ Ministère des Armées. 2018. 'Draft Military Planning Law 2019/2025.' As of 28 August 2018: [https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20\(EN\).pdf](https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20(EN).pdf)

² Ministère des Armées. 2018. 'Draft Military Planning Law 2019/2025.' As of 28 August 2018: [https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20\(EN\).pdf](https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20(EN).pdf)

³ Ministère des Armées. 2018. 'Draft Military Planning Law 2019/2025.' As of 28 August 2018: [https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20\(EN\).pdf](https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20(EN).pdf)

⁴ Ministère des Armées. 2018. 'Draft Military Planning Law 2019/2025.' As of 28 August 2018: [https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20\(EN\).pdf](https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20(EN).pdf)

⁵ Ministère des Armées (2018b)

⁶ Ministère des Armées. 2018. 'Draft Military Planning Law 2019/2025.' As of 28 August 2018: [https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20\(EN\).pdf](https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20(EN).pdf)

⁷ Ministère des Armées. 2018. 'Draft Military Planning Law 2019/2025.' As of 28 August 2018: [https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20\(EN\).pdf](https://www.defense.gouv.fr/content/download/523961/9053454/file/MPL%202019-2025%20-%20Synopsis%20(EN).pdf); MacDonald, Andrew. 2018. 'France reports falling defence exports in 2017.' *IHS Jane's Defence Weekly*. As of 25 September 2018: <https://www.janes.com/article/81534/france-reports-falling-defence-exports-in-2017>

⁸Ministère des Armées. 2018b. 'Industrie.' As of 29 August 2018: <https://www.defense.gouv.fr/english/dga/industrie2/industrie>

Dassault (military and civil aviation), Thales (electronic and mission systems), Naval Group (maritime), MBDA (complex weapons), SNECMA (aerospace engines) and SAGEM (electronics).⁹

The industrial base is supplemented with a wide range of public sector and government resources, including skills available through military academies, universities, state-owned research institutes and various other agencies and organisations.¹⁰ The French government and its ministries and agencies undertake a range of defence industry supporting activities in areas such as research and investment, cooperation, support to exports, acquisitions, and protection with regard to foreign investment,¹¹ as well as promoting innovation through funding to research and education (R&E). Exports are seen as critical to ensuring a competitive defence industry and the maintenance of defence industrial skills that are in turn needed to fulfil domestic demand.¹²

The Ministry of the Armed Forces and the French Directorate General of Armaments (DGA) in particular provide a range of support to companies and maintain strong links with industry through domain specific hubs, regional clusters and informal networks. The DGA is responsible for supporting innovation in SMEs that could have defence applications.¹³ The DGA also maintains representatives appointed to specific regions and local industrial hubs to identify the needs and challenges faced by companies locally. Amongst the support the agency offers, the DGA can assist SMEs with attracting investment, finding markets and establishing good relations with systems integrators and original equipment manufacturers (OEMs).

D.1.1. Key industry players

The key players of the French defence industry cover all domains, with a particular strength in air, space, sea, and land. Selected big companies are listed in Table D.1 below.

Table D.1 Selected French defence companies

Company	Domain area	Number of employees
Airbus Group	Aerospace and defence	48,000 ¹⁴
Dassault Aviation	Aerospace and defence	9,100+ ¹⁵

⁹ Ministère des Armées. 2018. 'Industrie.' As of 29 August 2018: <https://www.defense.gouv.fr/english/dga/industrie2/industrie>

¹⁰ Ministère des Armées 2017a. 'Defence and National Security Strategic Review.' As of 9 September 2018: <https://www.defense.gouv.fr/dgris/politique-de-defense/revue-strategique/revue-strategique>

¹¹ Ministère des Armées 2017a. 'Defence and National Security Strategic Review.' As of 9 September 2018: <https://www.defense.gouv.fr/dgris/politique-de-defense/revue-strategique/revue-strategique>

¹² Ministère des Armées 2017a. 'Defence and National Security Strategic Review.' As of 9 September 2018: <https://www.defense.gouv.fr/dgris/politique-de-defense/revue-strategique/revue-strategique>

¹³ Ministère des Armées. 2018c. 'Petites et moyennes entreprises (PME).' As of 29 August 2018: <https://www.defense.gouv.fr/portail/enjeux2/economie-de-defense/entreprises/petites-et-moyennes-entreprises-pme>

¹⁴ Airbus Airbus. n.d. 'Airbus in France.' As of 17 September 2018: <https://www.airbus.com/company/worldwide-presence/france.html>

Nexter Group	Land systems	3,320 (In France, Italy and Belgium) ¹⁶
Naval Group	Naval defence (incl. nuclear aircraft carriers, nuclear and non-nuclear submarines, and other major surface combatants)	2,300 ¹⁷
MBDA Missile Systems	Weapons systems	10,500 in France, Germany, Italy, Spain, UK ¹⁸
Thales Group	Cross-domain (systems and sub-systems)	34,000 ¹⁹
Safran Group	Aeronautics and defence (systems and sub-systems)	58,000 globally ²⁰

Source: RAND Europe

D.2. Overview of skills gaps and shortages

While France aims to become a champion for technical skills, the defence industry is faced with the challenge of responding to rapidly emerging needs and fast-paced technological developments that require agility in developing and implementing relevant skills programmes. Education establishments may find it difficult to respond to this pace. French industry representatives have reported a shortage of a number of defence related skills, including **systems and software engineering, system architecture, software and data management, cyber, artificial intelligence (AI), energy hybridisation, and factory of the future-related skills**, including virtual and augmented reality, robotics and additive manufacturing.²¹ These shortages are particularly pertinent given the country's growing defence sales and on-going domestic equipment programmes.

Defence companies report **difficulties in meeting their skills needs through the job market as well as in attracting and retaining talent**.²² Many prominent French defence companies have considerable order books,²³ which can make skills shortages critical, affecting the production, product quality, timely delivery

¹⁵ Dassault Aviation. n.d. 'Company profile.' As of 17 September 2019: <https://www.dassault-aviation.com/en/group/about-us/company-profile/>

¹⁶ GICAT. 2017. 'NEXTER.' 23 May. As of 17 September 2018: <https://www.gicat.com/membre/nexter/?lang=en>

¹⁷ Garnier, Claire. 2018. 'Naval Group recrutera 320 salariés à Cherbourg en 2018.' *L'Usine Nouvelle*, 5 March, 1.88 p.m. As of 25 September: <https://www.usinenouvelle.com/article/naval-group-recrutera-320-salaries-a-cherbourg-en-2018.N661654>

¹⁸ MBDA. n.d. 'Engineering Graduate Programme.' As of 28 September 2018: <https://www.mbdacareers.co.uk/university-students/engineering-graduate-programmes/>

¹⁹ Thales Group. n.d. 'France.' As of 17 September 2018: <https://www.thalesgroup.com/en/countries/europe/france>

²⁰ Safran. n.d.c. 'Group – Safran at a glance.' As of 17 September 2018: <https://www.safran-group.com/group-0>

²¹ Maillard, Cécile. 2018. 'L'industrie en manque de compétences.' *L'UsineNouvelle*. As of 29 August 2018: <https://www.usinenouvelle.com/editorial/rh-l-industrie-en-manque-de-competences.N634428>; Safran (n.d.e)

²² Maillard, Cécile. 2018. 'L'industrie en manque de compétences.' *L'UsineNouvelle*. As of 29 August 2018: <https://www.usinenouvelle.com/editorial/rh-l-industrie-en-manque-de-competences.N634428>

²³ Safran. 2018. 'Safran and The Adecco Group sign strategic agreement to provide professional training to support the transformation of the aerospace industry.' 29 March. As of 17 September 2018: <https://www.safran-group.com/media/safran-and-adecco-group-sign-strategic-agreement-provide-professional-training-support-transformation-aerospace-industry-20180329>

or other essential operations of the company.²⁴ While there has also been a strong push from the French government in the last few years to promote new and emerging skills related to AI and Big Data, there have not been a sufficient number of education and training providers and the programmes are not yet fully established. Furthermore, a number of defence-related skills programmes have a high percentage of foreign students, which can present a challenge for French industry. Due to inherent **national security considerations and security clearance requirements**, industry is often unable to hire competent foreign nationals, further restricting the pool of skilled graduates from which to recruit. One challenge identified by industry is a **lack of sufficient knowledge transfer between generations** as experienced employees retire or move elsewhere, particularly in the absence of government funding for new design and development programmes to test and train up the next generation. This risk is particularly acute for traditional skills, such as mechanics and electronics on which, despite the emergence of new technologies, defence industry will continue to depend for decades to come given the long life-span of defence equipment.

D.3. National and regional policies and programmes

D.3.1. Overview of national and regional policies

The stated French approach to maintaining and enhancing defence-related scientific and technical skills is to invest in the national DTIB as far as its national resources allow, and promote exports and bilateral or multilateral European collaboration to offset the limitations of those resources.²⁵ The 2017 Defence and National Security Strategic Review provided high level guidance on skills strategy, noting that skills and specialised competences must be preserved and access to them maintained.²⁶ Given France's emphasis on maintaining military capabilities necessary for a broad-spectrum of threats and engagements, as well as ensuring industrial and technological autonomy, the **country is focused on maintaining wide-ranging skills**, spanning the entire defence equipment production process from design to disposal.²⁷ This can raise considerable challenges for the sustainment of the requisite breadth and depth of industrial skills, given finite political, financial, organisational and human resources. Therefore, France continues to support the recruitment and retention of talent and skills critical to the defence sector.²⁸ To complement France's general strategy of preserving its scientific and technological potential, the creation of a national defence investment fund of EUR50 million for SMEs was announced in May 2017.²⁹ The fund will focus on

²⁴ Maillard, Cécile. 2018. 'L'industrie en manque de compétences.' L'UsineNouvelle. As of 29 August 2018: <https://www.usinenouvelle.com/editorial/rh-l-industrie-en-manque-de-competences.N634428>

²⁵ Ministère des Armées. 2013. 'White Paper on Defence and National Security 2013.' As of 9 September 2018: <https://www.defense.gouv.fr/english/dgris/defence-policy/white-paper-2013/white-paper-2013>

²⁶ Ministère des Armées. 2017a. 'Defence and National Security Strategic Review.' As of 9 September 2018: <https://www.defense.gouv.fr/dgris/politique-de-defense/revue-strategique/revue-strategique>

²⁷ Ministère des Armées 2017b. 'Strategic Review of Defence and National Security 2017 – 9 Key Points.' As of 9 September 2018: <https://www.defense.gouv.fr/content/download/514686/8664672/file/2017-RS-PointsClesEN.pdf>

²⁸ Ministère des Armées. 2017b. 'Strategic Review of Defence and National Security 2017 – 9 Key Points.' As of 9 September 2018: <https://www.defense.gouv.fr/content/download/514686/8664672/file/2017-RS-PointsClesEN.pdf>

²⁹ Ministère des Armées. 2017a. 'Defence and National Security Strategic Review.' As of 9 September 2018: <https://www.defense.gouv.fr/dgris/politique-de-defense/revue-strategique/revue-strategique>

supporting companies at the industrialisation phase as well as companies that are important to national weapons programmes.

D.3.2. Overview of national and regional programmes

France has a wide-ranging ecosystem of national and regional defence-related skills programmes, from specialist military and defence colleges targeting skills starting with basic training and including domain-specific architecture and maintenance skills, to a range of civil education institutes, focused on science and technology, engineering, or specific fields such as nanoscience. A number of these programmes are under the direction of the Ministry of the Armed Forces and have **established links with industry and sectoral hubs and regional clusters**. With regard to sector specific skills programs, there is a range of skills related support made available by government agencies. For example, the French Alternative Energies and Atomic Energy Commission (CEA)'s Military Applications Division (DAM) is involved in the nuclear deterrence industrial space, in particular in project management.³⁰ Targeting doctoral and post-doctoral candidates ensures both DAM's internal recruitment and a steady supply of qualified candidates for the national industrial base.³¹ The attractiveness of these technical and scientific professions and programmes relies on the high level of technical challenges offered as well as the clear mission directed at national defence, particularly given the competition for relevant skills from civil industry.³²

Table D.2 Overview of selected national and regional programmes

Programme	Career stage	Domain	Skills focus
ISAE-SUPAERO masters	Early-stage and mid-career professionals	Aeronautics	Aeronautics and space (design and systems), fluid dynamics, mechanical engineering, information technology, decision-making sciences, embedded systems, nanoscience, astrophysics
Institut des hautes études de défense nationale courses	Early-stage	Cross-domain	Defence and security, defence policy, armaments, maritime issues and strategies
French Naval Academy (L'École navale) masters	Early-stage	Naval	Seafaring, naval engineering and design, energy conservation, systems integration, embedded

³⁰ Geleznikoff, François. n.d. 'CEA: BITDS Francaise: Le Defi du maintien des competences et de l'autonomie strategique.' *Universite Defence*. As of 7 September 2018 : http://www.universite-defense.org/publications/les_position_papers_2017/bitds-francaise-le-defi-du-maintien-des-competences-et-de-l-autonomie-strategique-cea.htm

³¹ Geleznikoff, François. n.d. 'CEA: BITDS Francaise: Le Defi du maintien des competences et de l'autonomie strategique.' *Universite Defence*. As of 7 September 2018 : http://www.universite-defense.org/publications/les_position_papers_2017/bitds-francaise-le-defi-du-maintien-des-competences-et-de-l-autonomie-strategique-cea.htm

³² Geleznikoff, François. n.d. 'CEA: BITDS Francaise: Le Defi du maintien des competences et de l'autonomie strategique.' *Universite Defence*. As of 7 September 2018 : http://www.universite-defense.org/publications/les_position_papers_2017/bitds-francaise-le-defi-du-maintien-des-competences-et-de-l-autonomie-strategique-cea.htm

			systems, renewable marine energies
Partnership courses between École Polytechnique and ISAE-SUPAERO	Early-stage	Cross-domain	Eco-design, manufacture of transportation systems, energy management, engineering of complex systems, innovative materials
École Polytechnique, Université Paris-Saclay programme	Early-stage	Cross-domain	Digital sciences, AI and advanced visual computing, statistics, data science, 3D computer graphics, virtual and augmented reality
Ecole Nationale Supérieure de Techniques Avancées Bretagne (Ensta Bretagne) masters	Early- and mid-career professionals	Cross-domain	Civil, mechanic and electronic engineering, combustion, deflagration, detonation, energy production systems, radar, electronic warfare, optronic warfare, navigation systems, geolocation
DAM's training programmes	Early and mid-career professionals	Nuclear	Dual use: in-house training covering multi-physics and multi-scale digital simulation and modelling, electronics and advanced materials ³³

Source: RAND Europe

D.4. Industry-led skills policies and programmes

In response to the abovementioned challenges and skills shortages, companies have adopted a range of innovative approaches to their skills policies and programmes, exploring new partnerships to improve recruitment and retention. These varied programs include for example efforts to improve companies' abilities to recruit and retain talent, a large consortium of companies, industry associations and clusters which have partnered with an employment agency, the Adecco Group, which will share its expertise in recruitment and training. Some initiatives on the other hand focus on specific skills such as ASTech, the Greater Paris region's aerospace competitiveness cluster, helping the companies on the areas of industrial innovation and skills training. The consortium includes the Faculté des Métiers de l'Essonne, Safran, Fives Maintenance, the Groupement des Industries Métallurgiques de la région parisienne (GIM), Association pour la Formation Professionnelle des Adultes (AFPA), Association pour la Formation et le Perfectionnement du Personnel des Entreprises Industrielles de la Région Parisienne (AFORP) and Groupement des Industries Françaises de l'Aéronautique et du Spatial (GIFAS), ASTech (the Greater Paris region's aerospace competitiveness cluster) as well as a number of SMEs and medium-sized companies. The Aerocampus Aquitaine training campus is an excellent example of such a domain specific program. More information on the AEROCAMPUS Aquitaine initiative is outlined in Box D.1 below.

³³ Geleznikoff, François. n.d. 'CEA: BITDS Francaise: Le Defi du maintien des competences et de l'autonomie strategique.' *Université Défense*. As of 7 September 2018 : http://www.universite-defense.org/publications/les_position_papers_2017/bitds-francaise-le-defi-du-maintien-des-competences-et-de-l-autonomie-strategique-cea.htm

Box D.1 Case study: AEROCAMPUS Aquitaine

The AEROCAMPUS Aquitaine was founded in 2011 to provide aeronautics training and education to young people as well as to domestic and international military clients. Every year the campus trains 300 young people through its professional baccalaureate program, which provides a high school equivalent degree that includes mandatory elements of the national curriculum in addition to specialised training in the aeronautical industry, including training operators and technicians. The students benefit from internship and apprenticeship schemes with local industry as well receiving on campus teaching from industry representatives. The programme also provides students with the ability to undertake practical training on real equipment and aircraft. Part of the programme budget is publically subsidised while the rest is complemented through the campuses' training activities for international military clients, which are tailored to meet their various needs.

Source: RAND Europe

Industry has initiated many of the programmes in large training schools such as this. For another example, the Groupement des industries françaises aéronautiques et spatiales (GIFAS) has partnered with Airbus, Dassault, Safran and Thales as well as the Ministry for Defence and the Ministry of Employment to try to develop a skills strategy for the aerospace sector. A number of industry groupings are also pursuing initiatives aimed at enabling new technologies and the 'factory of the future', as outlined in Box D.2 below.

Box D.2 Case study: Factory of the future initiatives

In 2016 **CampusFab**, the training platform for the 'industrial mechanics of tomorrow' was launched in Bondoufle, Essone by a consortium consisting of Safran, Fives Maintenance, GIFAS and Dassault as well as the ASTech Paris-Région competitiveness cluster. CampusFab is part of the Ile-de-France region's 2017-2021 'Smart Industry' strategy.³⁴ It aims to support skills development and digital transformation in French industry, focusing on essential skills for the so-called factory of the future.³⁵ Its objectives includes responding to the recruitment needs of industry in **machining, mechanics, manufacturing and maintenance, improving the skills of industry employees and working on making industrial professions more attractive**. Approximately one hundred apprentices and several hundred employees will be trained at the centre annually.³⁶ The campus is expected to open in September 2019.

The Factory Lab is a business hub launched in 2016 by the Paris-Saclay science and technology cluster A range of industry companies and employment organisations, including Safran, DCNS, VINCI Energies with Actemium, PSA, and Dassault Systèmes 3DS, CEA List, Cetim, and Arts et Métiers ParisTech as well as start-ups, will collaborate on projects under the framework of The Factory Lab.³⁷ The Factory Lab aims to identify solutions for the needs of industry, with eight initial projects identified with the objective to build

³⁴ Safran. n.d.b. 'CampusFab, the fabulous campus of the Industry of the Future.' Safran Group. As of 29 August 2018: <https://www.safran-group.com/media/campusfab-fabulous-campus-industry-future-20180618>

³⁵ Safran. n.d.b. 'CampusFab, the fabulous campus of the Industry of the Future.' Safran Group. As of 29 August 2018: <https://www.safran-group.com/media/campusfab-fabulous-campus-industry-future-20180618>

³⁶ Safran. n.d.b. 'CampusFab, the fabulous campus of the Industry of the Future.' Safran Group. As of 29 August 2018: <https://www.safran-group.com/media/campusfab-fabulous-campus-industry-future-20180618>

³⁷ The Agility Effect n.d. 'Saclay is designing the production plant of the future.' As of 29 August 2018: <https://www.theagilityeffect.com/en/article/lusine-du-futur-se-prepare-saclay/>

practical demonstrators. The Lab is in the process of selecting subsequent projects, aiming to support approximately 20 projects a year with a EUR40million budget for the period of five years.

Individual companies are also taking similar steps. **Safran** is for example investing in the factory of the future concept, which it launched in 2018 and took five years to develop. The company has identified the following priority areas in digital transformation: virtual reality, augmented reality, robotics, additive manufacturing, closed door machining and non-destructive testing. The factory of the future aims to bring together new and traditional elements of industrial manufacturing to leverage their combined potential for efficient production, performance and innovation.³⁸

Source: RAND Europe

D.5. SWOT analysis of national and industry programmes

Industry faces a number of challenges in the establishment of defence-related skills policies and programmes. With the multitude of programmes and initiatives being run in parallel by different education bodies and ministries, companies are conscious of assessing the training landscape before developing new programmes and expending effort. The programmes with company involvement benefit from companies making equipment available for training purposes and funding training opportunities.

Table D.2 SWOT analysis of national and company programmes

Internal factors	
Strengths	Weaknesses
<p>Programmes from defence colleges such as the French Naval Academy offer the ability to carry out practical training on equipment and opportunities to hone in-service support, technical and operational skills.</p> <p>The programs have advantage of providing a multidisciplinary education as well as making specialist certification courses available. The ability to study in English can improve language skills and broaden employment opportunities for graduates.</p> <p>Programs make scholarships available and some local authorities award financial incentives to industry to hire apprentices.</p> <p>Many company programmes have established reputations for training certain skills, providing opportunities for internships, traineeships, placements, and online resources and free education materials.</p> <p>Companies provide personnel with opportunities for upskilling through career bridging programmes.</p>	<p>National programmes lack mid-career, bridging and upskilling focus.</p> <p>Some national skills programmes, e.g. with regard to emerging technologies or AI are only now being implemented and will take several years to take off whereas the demand for these skills is already present.</p>
External factors	

³⁸ Safran. N.d.a. 'An industrial revolution.' Safran. As of 29 August 2018: <http://usinedufutur.safran-group.com/en/an-industrial-revolution/>.

Opportunities	Threats
<p>Several programmes benefit from their position under the direction of the Ministry of the Armed Forces or are informed by wider national strategies (e.g. IHEDN). Programmes could further leverage this element.</p> <p>Young people in France appear to have a positive view of industry in general which could be better leveraged to the benefit of industry recruitment.</p> <p>Many programs are embedded closely in or with regional proximity to sectoral hubs and clusters which can foster valuable exchanges, afford access to internships, traineeships, work placements and allow industry representatives to share knowledge and teach courses.</p>	<p>For transnational companies and their in-company programmes one major challenge is the different maturity of workforce planning between subsidiaries and countries. This makes the task of creating an overarching skills programme more challenging, given that the supply and demand of skills can vary greatly.</p> <p>The pursuit of national strategic autonomy in all capabilities and skills areas brings its particular challenges, also considering the escalation of costs and overall skills erosion trend.</p>

Source: RAND Europe