Annex F: Italy

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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Figure F.1 Executive summary - Italy

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<th>Skills supply landscape</th>
<th>Identified top-down initiatives</th>
<th>Identified bottom-up initiatives</th>
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</thead>
<tbody>
<tr>
<td>National strategy</td>
<td>Education programmes</td>
<td>Other top-down initiatives</td>
</tr>
<tr>
<td>Includes defence skills?</td>
<td>General manufacturing skills in the air and land domain</td>
<td>Industry-led initiatives</td>
</tr>
<tr>
<td></td>
<td>Mechanical engineering, aeronautical design and engineering, composite materials engineering, management, in-service support (rotary-wing aircraft)</td>
<td>Collaborative initiatives</td>
</tr>
<tr>
<td></td>
<td>Management (aerospace sector). Engineering (advanced and composite materials, naval), enabling technologies, microsatellites</td>
<td>Investment in R&amp;D?</td>
</tr>
</tbody>
</table>

Skills focus

- Programme in Aerospa ce, MA in Photonic integrated circuit sensors and network, PhD in emerging digital technologies
- Traineeships in state-owned weapons plants, training for defence leavers (pilot phase)
- Leonardo Training Academy, Fincantieri Corporate University, UNAVIA training
- Higher Technical Institutes (Leonardo, Fincantieri). DAC Research and training programmes
- Some R&D projects have a training and skills supply aspect, in the absence of a national strategic approach
- R&D investments are a priority for industry and the Ministry of defence alike

Source: RAND Europe
F.1. Background

The third largest DTIB in Europe, Italian defence sector employs around 45,000 people in the “core” value chain and around 110,000 in supporting activities and services. Although productivity has risen steadily since 2013, the average added value per worker ratio across the local DTIB is still lower than that reported in the French, German and UK's sectors. The Italian defence industrial base is active across all the domains, with a traditional focus on a range of complex products in the naval, aerospace and land sectors, and thus most, though not all, Italian military assets and capabilities are developed nationally or with national input to collaborative multinational programmes:

- Naval: large surface ships (non-nuclear aircraft carriers; FREMM multi-mission frigates, a collaborative programme with France; advanced coastal submarines built under German license), naval artillery and torpedoes;
- Land: MBT (C1 Ariete), Armoured Infantry Fighting Vehicles (e.g. Freccia, Dardo) and Armoured Personal Carriers;
- Defence electronics and subsystems: C4ISTAR systems, avionics, opto-electronics, electronic warfare, advanced radar and sensors;
- Air: Advanced trainers (M346), helicopters, and UAVs in the MALE class.

On the other hand, multi-role and carrier-based aircraft are acquired through multi-national collaborative programmes such as the Eurofighter Typhoon, and for the latest F-35 fighter Italy is a Tier 2 supplier if with an important role as home to the aircraft’s European assembly line. Heavy helicopters and turboshafts, turboprops, turbofan engines, and guided weapons are mostly imported. However, with its large portfolio of domestic defence products, Italy is among the ten main exporters of weapons in the world. In 2017, total licensed exports had a value of €10.72 billion. The main categories of licensed export materiel include bombs, torpedoes and missiles; equipment for fire control systems; land vehicles; naval vessels; aircraft (especially fixed wing advanced trainers and rotary wing aircraft); and electronic equipment. Italian defence industry has been able to invest in developing its technological capabilities though export programmes. The 2015 White Book on Defence provides strategic guidance to the Italian defence industrial policy. It provides criteria by which capabilities should either be acquired or maintained at a domestic level, acquired through collaborative programmes or else, exported. A few sources give a comprehensive overview of acquisition programmes, either as a sovereign activity or through collaborative programmes, as well as export activities. That was the case for the UAV ‘Falco’ developed and built by Selex ES, then a subsidiary of Finmeccanica (now Leonardo), under specifications from third countries.

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4 Catalano, Claudio. 2016. ‘La politica industriale nel settore della Difesa con particolare riferimento ad un quadro completo e sistematico dell’industria italiana dell’Aerospazio e Difesa quale assetto strategico nazionale di primaria importanza per la capacità operative delle Forze Armate.’ Centro Militare di Studi Strategici. As of 20 September
F.1.1. Key industry players

The Italian defence and aerospace sectors have undergone considerable restructuring since the 1990s, owing to successive defence budget cuts and privatisation of a number of large state-owned conglomerates. In 2015, the sectoral industry association ‘Federazione Aziende Italiane per l’Aerospazio, la Difesa e la Sicurezza’ (AIAD) counted 105 registered companies, of which 75 per cent were SMEs. The local DTIB is dominated by one of Europe’s largest multinational and multi-domain defence firms, Leonardo (formerly Finmeccanica), which also has a significant presence UK; and by Fincantieri, which has recently acquired STX France and is now the largest shipbuilder in Europe and fourth largest globally.

Table F.1 Selected Italian defence companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Focus area(s)</th>
<th>Number of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leonardo (formerly Finmeccanica)</td>
<td>Fixed-wing aircraft (especially trainers), helicopters, tiltrotor aircraft; electronics for defence, torpedoes, land vehicles, artillery, missiles, torpedoes</td>
<td>30 000</td>
</tr>
<tr>
<td>Fincantieri</td>
<td>Large and medium-size surface naval ships and submarines, and comparatively larger civil shipbuilding activities</td>
<td>7 900</td>
</tr>
<tr>
<td>Avio Aero</td>
<td>Space propulsion systems</td>
<td>4 000</td>
</tr>
<tr>
<td>Fabbbrica d’armi Pietro Beretta</td>
<td>Small arms and optics</td>
<td>3 000</td>
</tr>
<tr>
<td>Piaggio Aero</td>
<td>UAVs</td>
<td>1 300</td>
</tr>
<tr>
<td>MBDA Italy</td>
<td>Missile systems</td>
<td>1 300</td>
</tr>
<tr>
<td>Vitrociset</td>
<td>Defence electronics systems</td>
<td>1 000</td>
</tr>
<tr>
<td>Iveco Defence Vehicles</td>
<td>MBT (Ariete); armoured and light infantry fighting vehicles, transport and multirole land vehicles</td>
<td>860</td>
</tr>
<tr>
<td>Elettronica</td>
<td>Electronic warfare, cyber warfare, ISR</td>
<td>800</td>
</tr>
<tr>
<td>Intermarine</td>
<td>Minesweepers, research vessels and fast patrol boats</td>
<td>270</td>
</tr>
</tbody>
</table>

Source: RAND Europe analysis

F.2. Overview of skills gaps and shortages

Similar to many of their European counterparts, Italian DTIB employers struggle to fill many positions requiring ICT and STEM skills. In STEM disciplines, skills shortages arise due to:

- Insufficient supply of graduates from vocational technical schools;
- Heterogeneity of the quality of engineering programmes across different universities; and
- Scarce wage premium compared to the length and difficulty of the educational path.5

The lack of ICT professionals can stem from:

- Lack of information about the real career prospects and the attractiveness of these occupations;
- Lack of specific expertise and incentives in linking the education system with the industry. 6

As very few ICT skills programmes at university level have a clear focus on defence,7 the industry relies on the same limited pool of candidates as the civilian sector, which is often better positioned to offer non-financial and financial packages that attract top talent. Although a number of universities offer programmes focused on key enabling technologies, defence-specific programmes are almost exclusively limited to those provided by Italian military academies through a handful of partner universities. Furthermore, existing labour market monitoring databases are not currently set up to capture skills demand for the defence industry, as the conventional classifications are based on traditional engineering specialisations and do not distinguish between the domains or sectors of application, hindering effective monitoring of the skills base and any associated deficiencies. The overall needs of Italian industry, including defence, are estimated at 43,200 technicians and 107,800 engineering graduates in all disciplines for the period 2018-2022.8 The national engineers’ council indicates the roles of electronic, communication and industrial engineers as the most sought after.9 A large company active in the defence sector indicates cyber security and safety critical engineering as the hardest-to-fill positions. For what concerns cross-cutting defence skills, the RAND Europe research suggests that at present, skills gaps exist in the area of autonomy and unmanned system engineering, as well as in weapons design, electronic warfare and material engineering. In the near future, however, gaps are foreseen to arise in the areas of laser, RF and microwave and system integration engineering.

Based on acquisition programmes listed in the Multiannual Planning Document for Defence (2016-2018), demand of skills can be expected to increase in every domain. The Italian Navy can expect a particular focus, given the ongoing fleet modernisation plan and the planned decommission of 51 vessels between


2004 and 2024. Future acquisition and Armed Forces modernisation programmes for which funding has not yet been allocated include high-technology assets such as missile defence systems (Surface Based Air Defence, Short Range Air Defence and Air-to-Surface systems); multi-role and transport helicopters; Chemical, Biological, Radiological and Nuclear (CBRN); and Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities. In addition, the 2015 White Paper on Defence foresees the possibility of involving the industry more heavily in the areas of technical management and of in-theatre logistic support, including through a transfer of technical competences from the Defence administration and personnel to the industrial side.\textsuperscript{10}

F.3. National and regional policies and programmes

F.3.1. Overview of national and regional policies

Italy is developing a general, systemic policy on skills building on the 2017 OECD report on a strategy for skills in Italy\textsuperscript{11} and on several instruments adopted between 2014 and 2017:

- A labour market reform;\textsuperscript{12}
- A reform of the education system with particular focus on dual education\textsuperscript{13} and on innovation;\textsuperscript{14}
- The three-year plan on Industry 4.0 for 2017-2020.\textsuperscript{15}

The national \textit{Smart Specialisation Strategy} (2014 – 2020), which includes measures supporting human capital, lists the aerospace and defence sector as one of its key strategic areas. Skills development is also one of the five strategic programmes of the Italian Cluster for Aerospace Technology (CTNA) with each aimed at improving the competitiveness of regional clusters. Among the initiatives included in the CTNA’s strategic development plan,\textsuperscript{16} large companies have already launched high-profile training

\textsuperscript{13} Legge 13 luglio 2015, n. 107. ‘Riforma del sistema nazionale di istruzione e formazione e delega per il riordino delle disposizioni legislative vigenti’. As of 3 January 2019: http://www.istruzione.it/alternanza/allegati/NORMATIVA%20ASL/LEGGE%20DEL%202015.pdf
programmes in partnership with Higher Technical Institutes, though other measures are yet to be implemented, such as the mapping of all training programmes of excellence at national and EU level.

In Italy’s decentralised governance system, regional authorities are responsible for active labour market policies, whereas the central government retains steering and oversight functions. Therefore, regional authorities play a fundamental part in establishing partnerships between companies, universities, research centres and vocational schools, and in mobilising EU funding to launch training initiatives. Regional aerospace industrial and technological districts often have training activities as one of their core functions, referring in their mission statements to the objective of aligning education programmes at both secondary school and university level to the needs of the companies based in their area.

F.3.2. Overview of national and regional programmes

The Armed Forces offer short induction programmes (4-6 weeks) to high-school students to help them familiarise themselves with some of the more technical aspects of Defence. These initiatives have a local focus and can be categorised as short dual education experiences. The Italian Navy offers students from local high schools the possibility to work at shipyards in order to elicit interest towards naval maintenance activities, whereas the Air Force has set up programmes focused on maintenance of fixed-wing and rotary wing aircraft, familiarisation with telecommunication systems, and Remotely Piloted Aircraft Systems (RPAS). The Army, for its part, has also made available its telecommunication school to focus on cyber defence and network security activities.

The Italian Ministry of Defence conducts a range of initiatives for the re-training of uniformed defence personnel about to be discharged, to facilitate their re-insertion in the civilian labour market. Alongside in-house training courses for service leavers, the MOD maintains an online database that brings together available labour (discharged volunteers) and demand (registered private companies). Neither the in-house training courses nor external job offers available as of 2018 are specifically aimed at defence-related skills. However, a 2-year agreement between the MOD and a private recruitment company has set up a pilot project whereby a group of 15 defence leavers are offered internships by aerospace companies in the Campania region. In the future, the Ministry expects to be able to offer training courses that include defence skills, and to be able to liaise directly with companies in the sector to activate traineeships and on-the-job training, which may eventually lead to the on-boarding of defence leavers.

Higher Technical Institutes deliver non-academic tertiary training, and are open to high school graduates. They are usually based on a public-private partnership between local high schools, universities and private companies, with oversight from the Ministry of Education and often drawing also on European Structural Funds. Leonardo S.p.A. has partnered with seven Istituti Tecnici Superiori (Higher Technical Institutes) offering programmes in the aerospace sector located in seven regions, and Fincantieri Group with two.

### Table F.2 Selected national and regional programmes

<table>
<thead>
<tr>
<th>Programme</th>
<th>Career stage</th>
<th>Domain</th>
<th>Skills focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Technical Institutes (ITS)</td>
<td>High school graduates</td>
<td>Various</td>
<td>Aeronautics maintenance processes and technologies; aeronautics design; logistics; mechatronics; aerospace related manufacturing techniques</td>
</tr>
<tr>
<td>Bachelor degree in Naval Engineering&lt;sup&gt;19&lt;/sup&gt;</td>
<td>University students</td>
<td>Naval</td>
<td>Defence-specific naval engineering</td>
</tr>
<tr>
<td>Bachelor degree in Management of Aerospace systems for defence&lt;sup&gt;20&lt;/sup&gt;</td>
<td>University students</td>
<td>Air</td>
<td>Airfield and Flight Operations Management</td>
</tr>
<tr>
<td>Seminars on Naval Ship Engineering&lt;sup&gt;21&lt;/sup&gt;</td>
<td>University students</td>
<td>Naval</td>
<td>Defence-specific naval engineering</td>
</tr>
<tr>
<td>Special Master of Aerospace Engineering&lt;sup&gt;22&lt;/sup&gt;</td>
<td>University students</td>
<td>Air/Space</td>
<td>Dual-use applications (in part)</td>
</tr>
<tr>
<td>Traineeships in state-owned plants (National defence industrial conglomerate)&lt;sup&gt;23&lt;/sup&gt;</td>
<td>University graduates</td>
<td>Land and Naval</td>
<td>Production of ammunition and explosives, propellants, naval maintenance</td>
</tr>
<tr>
<td>Job placement service for former conscripts of the Italian Armed Forces&lt;sup&gt;24&lt;/sup&gt;</td>
<td>Mid-career</td>
<td>Various</td>
<td>Trial phase: manufacturing skills and ICT operations</td>
</tr>
<tr>
<td>Training programmes supplied by Unavia (joint venture of MoD and selected defence companies)&lt;sup&gt;25&lt;/sup&gt;</td>
<td>Mid-career</td>
<td>Cross domain (focus on Aerospace)</td>
<td>Design, manufacture, management and quality control</td>
</tr>
</tbody>
</table>

Source: RAND Europe analysis

<sup>19</sup>University of Genova. n.d.a. ‘Naval Engineering.’ As of 20 September 2018: https://unige.it/off.f/2017/cds/8738.html


<sup>22</sup>Sapienza University of Rome. 2016. ‘Studying at the school of Aerospace Engineering.’ As of 27 September 2018: https://web.uniroma1.it/scuolaingegneriaaerospaziale/sites/default/files/12.INGEGNERIAAEROSPAZIALE.pdf


<sup>24</sup>Ministero Della Difesa. n.d. ‘Sistema Informativo Lavoro Difesa.’ As of 20 September 2018: https://www.sild.difesa.it

F.4. Industry-led policies and programmes

Most companies offer entry-level programmes in the form of internships, apprenticeships or graduate schemes. When the internship is offered in partnership with a university course, the company usually makes available the resources allowing students to conduct research activity for their thesis, on a subject agreed between the company and faculty. Occasionally companies award a monetary prize to the best thesis. Although the subject can often be very narrow and domain-specific and there is no guarantee of future employment by the company, this approach helps the students build relevant expertise and gain exposure to the defence industry, ultimately making them more attractive job candidates. The companies, for their part, gain access to specialised talent should they choose to utilise it.

Leonardo has established internships agreements on a wide range of skills with major Italian universities, such as the Sapienza University of Rome, Tor Vergata University, the LUISS Business School, Link Campus University in Rome, the University of Naples Federico II, the Polytechnic of Turin, the Polytechnic of Milan and the University of Pisa. These are in parallel to the traineeships that Leonardo’s various Divisions offer based on a selection of specific topics of interest. In the maritime domain, Fincantieri, representatives of trade unions and the Liguria Regional administration signed in early 2018 a comprehensive agreement on skills and education. Over a period of two years, the company will help with identifying the skills needs of its value chain; will collaborate in updating the regional qualification catalogue; will contribute in developing a dual education system by offering internships and apprenticeships; and will also allow the regional agency for employment to open one branch within each of its three shipyards in Liguria. A similar agreement was signed in 2013 between Fincantieri and all three Regions where the company’s Italian shipyards are located (Liguria, Campania and Friuli Venezia Giulia). School guidance counselling, internships and traineeships were activated by the joint programme. The latter went as far as listing the eligible university programmes offered by partner Universities in those regions and minimum numbers of students Fincantieri committed to involve, per academic year until 2017 and per education level.

Box F.1 Case Study: Small arms technician three-year course – IPSIA Beretta

The Fabbrica d’armi Pietro Beretta, together with local education authorities and business association, supports the “small arms technician” course, organised by the IPSIA Beretta technical school. During the three-year vocational school, students gain practical experience in manufacturing mechanical parts, in assembling/disassembling and in weapon maintenance, and also learn elements of ballistics. The course is taught by industry experts, with Beretta supplying most of the teachers. Enrolment to the course is voluntary (not part of the school compulsory curricula) and practical lessons take place after school. Students benefit from the close proximity of Beretta and satellite companies within the historical steelwork and machinery district of Val Trompia.

Source: School I.I.S. ‘Carlo Beretta’

Other programmes are also either offered by companies specialised in broad engineering consultancy services, such as Protom, which offers advanced training in aeronautical design with composite materials; or as part of Corporate Social Responsibility endeavours, such as US-owned aircraft manufacturer Boeing’s STEM 4 Future initiative, aimed at pre-high school and high school students in Lazio and Toscana regions. Mid-career programmes range from upskilling programmes set up in collaboration with universities (such as Fincantieri’s Corporate University) to certification and qualification programmes, to more specific training provided to weapon system operators for the in-service support stage of the weapon’s life-cycle.

F.5. SWOT analysis of national and industry programmes

With some exceptions, most defence-specific programmes at university level are aimed at military personnel, especially at cadet officers enrolled in the Armed Forces academies. Most publically funded STEM and management programmes, either at vocational or higher education level, supply non-defence specific skills. This suggests that defence industry is competing for talent with civilian sector, and often from a weaker position as the defence domain may be less appealing due to ethical considerations or the lower wage premium it can offer. At the local level, however, there is evidence of a well-established and fruitful collaboration of industry and education establishments to adapt school curricula. Higher Technical Institutes and vocational schools, especially in Northern Italy, report high employment rates for their graduates.

A review of the most recent framework agreements between the public and the private sector suggests that the MOD and the Ministry of Education are also increasingly willing to cooperate to improve and streamline skills supply pathways mid-career development programmes. In addition, maintaining a technological advantage in some areas has been identified as a strategic priority for government and industry alike. This recognition of the importance of the defence skills challenge fosters continued collaboration between the Armed Forces, industry and research organisation and academia.

**Figure F.2 SWOT analysis of national and industry programmes**

<table>
<thead>
<tr>
<th>Internal factors</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>Regional programmes taking place within a cluster benefit from close and established relationship between stakeholders, and thus are more tailored to the needs of the industry. Regions are also instrumental in setting up collaboration programmes with the industry and in mobilising funding for training, with input from several</td>
<td>Many retraining and upskilling programmes are often one-time only initiatives and rely on EU funding, thus being vulnerable to shifting in funding priorities. Defence is still on the whole less appealing to many potential applicants than other sectors, and some skills programmes give prominence to the civilian or</td>
</tr>
</tbody>
</table>

27 Scuolattiva Onlus. n.d. ‘Stem 4 Future.’ As of 20 September 2018: http://www.scuolattiva.it/project/stem-4-future/
national strategic approaches. The Armed Forces and the aerospace industry are increasingly targeting high school students with short-term familiarising programmes. Industry is involved in academic programmes, especially by sponsoring internships schemes.

| Dual-use aspects. | Most programmes focus on manufacturing and design skills, mainly in the air and space domains. There is insufficient supply of multidisciplinary, cross-domain skills such as system engineering and project management. |

### External factors

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter-ministerial cooperation agreements can help rationalise the various initiatives and synchronise demand sources (capability development strategies) with skills providers and industry. Future national strategy on skills could include defence skills, as part of the new understanding of defence as part of the so-called ‘country system’. The attention of the MOD towards SMEs is increasing especially with regards to support to research and innovation. The MOD is paying greater attention to defence leavers. Its central offices and regional military district could help shape new re-training programmes focused on defence skills, in collaboration with partner private companies in the aerospace and defence sector. There is untapped potential in southern regions in the form of unemployed youth that can be trained to appeal to local industry.</td>
<td>Domestic demand for skill could decrease as a result of budgetary cuts to defence spending as political priorities shift. Public funding for some programmes may decrease too. Further cuts to the defence budget, given shifting political priorities, may delay some high-technology acquisition programmes and thus have an impact on companies’ business planning. Some university courses may suffer from ageing and limited turnover of academic staff, from lack of adequate infrastructural investments and from a lag in updating the course programmes.</td>
</tr>
</tbody>
</table>

Source: RAND Europe