Key Skills and Competences for Defence

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Annex E

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Annex E - Case Studies

This Annex accompanies Chapter 5 and presents in detail five case studies of programmes, structures or institutions which seek to help sustain defence-relevant skills. These case studies have been identified throughout our research and aim to provide an illustrative sample of different initiatives and of good practice already being implemented. They do not seek to be representative of wider trends and any attempts to replicate them nationally or on a European level should carefully consider the context in which they operate.

1.1. Case study identification

Throughout our research we have identified five case studies of different good practices to sustain defence industrial skills. Based on the literature review conducted within Task 1 and Task 3 and informed by stakeholder consultation and discussions with the EDA, the study team has identified five case study examples of good practice aiming to help nurture and sustain defence industry-related skills for the future. These case studies were selected to provide an illustrative sample of a range of different practices and aiming to provide examples from different EU countries, namely:

1. A national-level government-backed/military-led initiative to sustain skills
2. A collaborative programme between industry and a university/training college
3. A collocated hub of industry, specific education provision and training facilities
4. An industry skills development/training initiative
5. A European-wide programme for improving training and sustaining skills

In Table E.1, we provide a short summary of the rationale behind the selection of specific case studies.

Table E.1. Rationale for selection of case studies

Type of case study	Rationale	Case study
A national-level government-backed/military-led initiative to sustain skills	Mechanisms employed by a national-level initiative could be translated to other countries or to a European level	1. Defence Growth Partnership (UK)
A collaborative programme between industry and a university/training college	Illustrates communication and cooperation mechanisms between supply and demand actors	2. Finmeccanica's Higher Technical Institutes (Italy)
A collocated hub of industry, specific education provision and training facilities	Demonstrates how a hub framework can support both supply and demand for skills	3. Aviation Valley (Poland)
An industry skills development/training initiative	How demanders of skills implement internal training programmes to address their specific skills requirements	4. Safran University (France)
A European-wide programme for improving training and sustaining skills	The implementation of existing European level training initiative mechanisms	5. ERASMUS+ (EU)

In the following sections, each case study is presented as a narrative and structured along the same lines to allow for an easier identification of key features across different case studies:

- Short explanation of the initiative
- A more detailed analysis of its key features (main actors/collaborators; financing mechanism)
- Key activities of the initiative
- SWOT analysis

1.2. Case Study 1: Defence Growth Partnership – Trailblazer Apprenticeship, UK

The Defence Growth Partnership (DGP) was officially launched in 2012 as a collaborative partnership between industry and the government in the UK, designed to boost the sector's global competitiveness whilst improving and modernising its capabilities. The DGP is jointly led by the UK Department of Business, Innovation and Skills (BIS) and the UK domestic defence industry, with the support of the UK Ministry of Defence. Its core objectives are to:

- Grow the UK's global market share, through increased exports;
- Foster greater collaboration and innovation across the sector, bringing products and services to the market that meet customer needs;
- Improve competitiveness through the whole value chain.[1]

1.2.1. Key features

Main actors

The DGP has been established to engage with key stakeholders across wider government, academia, trade associations, the industrial value chain in the UK (from prime contractors to SMEs), and trade association ADS which represents companies operating in the UK aerospace, defence, security and space industries. DGP's industry partners include: Airbus, Atkins, Babcock, BAE Systems, Cobham, Finmeccanica, General Dynamics, HP, Lockheed Martin, Marshall, MBDA, QinetiQ, Raytheon, Rolls-Royce, Serco and Thales.

In order to facilitate its objectives, eight senior teams have been established within the DGP comprising representatives from both government and industry. The DGP identified two specific areas of activity on which to focus – air capabilities and intelligent systems. The other teams include international business; technology and enterprise; value chain competitiveness; engagement; strategy; and skills.

Financing

The UK Government and industry have aligned resource equivalent to £30 million over the next three years (2014-2017) to mobilise the DGP, with the intention of it becoming fully operational by mid-2015. Cooperation programmes to be implemented by the DGP include establishing the UK Defence Solutions Centre to provide a centralised collaborative and strategic facility, jointly resourced by government and industry, to identify innovative defence capabilities.

DGP Skills Team

Skills were identified as being a key enabler of the DGP's remit and objectives, and a dedicated Skills team was established with the aim of ensuring that the UK has access to world leading business and engineering skills, providing market differentiation in terms of intellectual capital and coherence across adjacent

[1] Defence Growth Partnership (2014:10).

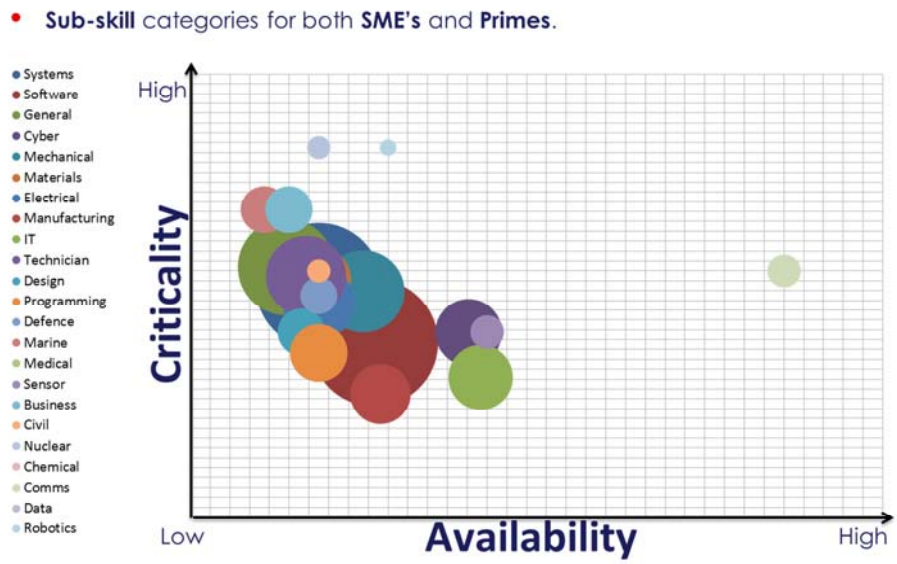
sectors. The team is envisaged as developing a defence skills strategy, establishing an ongoing assessment of the industry's demographics; identifying current and future critical skills needs; promoting defence as a career. The DGP Skills team's approach is based on evidence collected through a survey of 30 companies asked to identify the criticality of skills, their availability and sourcing. Based on the responses from 18 primes and 12 SMEs, the following skills were identified as 'key', meaning: highly critical, low in availability and likely to constitute a problem in the next five years. These skills are:[2]

- **Systems Engineering**
- **Software Engineering**
- **Project Management**
- **Mechanical Engineering**
- **Technicians**

While the results of the survey present a list of competence level skills (rather than occupation level which this study has focused on), systems engineering and software engineering have also been identified as key skills for defence by this study.

Figure E.1. presents a detailed map of skill's criticality and availability as identified by the DGP Skills Survey. The bubbles represent the scale of the 'critical skills issue' as a proportion of the overall response. In this survey, criticality is understood in terms of the ability of companies' to meet their business needs within the UK market.[3]

Figure E.1. DGP Skills survey results of criticality and availability of skills



Source; DGP Presentation, May 2014.

[2] Defence Growth Partnership (2014).

[3] Interview by RAND Europe, December 2014.

The DGP intends to regularly run a more considered skills survey going forward, using a taxonomy to allow for a more uniform view of industry's skills requirements.[4]

In an effort to close the gap between the demand and supply of these skills, the DGP Skills group considered a number of potential actions based on their analysis, centering around three main implementable concepts in order to support the Skills team's objectives, comprising:

- General STEM outreach programme
- Training hubs
- Trailblazer apprenticeships.

1.2.2. Key activities

STEM outreach

The idea to implement a general STEM outreach programme was not taken up as a priority action as there already exists a comprehensive network of STEM outreach programmes in the UK; the DGP therefore sought to avoid duplicating effort. For example, STEMNET (the Science, Technology, Engineering and Mathematics Network) is a UK-based independent charity which receives funding from government departments and a charitable foundation. Its aim is to support a network of volunteer 'STEM Ambassadors' to promote STEM subjects to young learners; provide advice and support to schools that want to boost STEM learning outside of the classroom; and offer a STEM advisory network to enhance the STEM curriculum in schools.[5] The UK government also launched the 'YourLife' project, intended to encourage young people, especially girls, to study mathematics and physics in post-16 secondary education. The campaign is also backed by businesses including Ford, Airbus, Samsung, and McLaren Group which have pledged to do more to highlight the career opportunities open to those studying STEM subjects, with some creating new entry level job opportunities and others extending their outreach programmes.[6]

Regional training hubs

Regional training hubs are a concept developed under the Government's Employer Ownership Pilot (EOP) skills initiative. One example is the solution developed by BAE Systems under round 1 of the programme and now adopted by other employers as part of the Aerospace Growth Partnership (AGP) Industrial Participation solution for EOP2. These training hubs aim to deliver high quality apprenticeships to SMEs, not just exclusively in the defence and aerospace sector, but for any local employer with a matching skills need. The current solution is focused on a Level 3 Advanced Engineering Apprenticeships for both craft or technician delivered over 42 months. The benefit for SMEs is that lead employers share their facilities and expertise as well as being able to redirect many of the high-calibre trainee applications that they receive. BAE Systems is currently delivering 31 apprenticeships to 12 local

[4] Interview by RAND Europe, December 2014.

[5] STEMNET (n.d.).

[6] Gov.uk (2014a).

SMEs from its training centre in Preston with plans to establish a second training hub from their facilities in Portsmouth from September 2015. Under AGP, similar schemes are being planned by Airbus, Finmeccanica, GKN and Safran for 2015.[7]

Trailblazer apprenticeships

Trailblazer apprenticeships already exist as a wider government programme of promoting employer-led training schemes, reforming training and designing new apprenticeship standards led by the Department of Business Innovation and Skills (BIS). Phase 1 of the national Trailblazers scheme began in October 2013 in eight sectors. Eleven apprenticeship standards were initially produced in March 2014, with the first apprentices starting to train towards Phase 1 standards in September 2014.[8]

Drawing on this evidence base from industry (through the DGP Skills survey), DGP identified systems engineering as being a suitable area around which to support the development of a new Defence Apprenticeship Trailblazer to attract new graduates to the industry as well as up-skilling the existing workforce. This Trailblazer will therefore develop a new Masters-level standard (level 7) in Advanced Systems Engineering.[9]

Subject to approval from BIS, the Systems Engineering Trailblazer will launch in September 2015 with an intake of approximately 100 students for the 3-5 year scheme with support from over 20 organisations. The apprenticeship is aimed at graduates with a first class or upper second class degree, individuals with equivalent industrial experience, or individuals with a level 6 apprenticeship.[10]

The content of the training schemes are designed by the employers themselves with academic training provided by existing suppliers, such as Cranfield or Loughborough universities. BIS provides financial support for the academic content of the Trailblazer with other costs (e.g. cost of employment, loss of productivity) borne directly by the employer.[11]

1.2.3. SWOT Analysis

Below we present a summary of an analysis of strengths, weaknesses, opportunities and threats pertinent to the DGP Trailblazer Apprenticeship initiative.

[7] Interview by RAND Europe, December 2014.

[8] Department for Business, Innovation and Skills (2014:4).

[9] Defence Growth Partnership (2014:10).

[10] Interview by RAND Europe, December 2014.

[11] Interview by RAND Europe, December 2014.

Table E.2. SWOT Analysis: Trailblazer Apprenticeship

Strengths	Weaknesses
• Higher retentions rates through apprenticeships than graduate schemes • Built on an existing successful government-led programme of training reform • Provides opportunity for skills-specific collaboration between academia and industry • Quality and content of training is guaranteed	• Misconception of apprenticeships being aimed exclusively at 16-18 year old students • Defence-specific results/success are yet to be measured • Defence-specific implementation is yet to be witnessed • Utility of courses depends on accuracy of industry expression of need
Opportunities	**Threats**
• Expand scheme to cover other critical skills areas	• Inability to ensure sufficient number of graduates/individuals with relevant experience • Rate of uptake of apprenticeships across all sectors in UK falling since 2010[12]

Source: RAND Europe analysis

[12] Gov.uk (2014b).

1.3. Case Study 2: Higher Technical Institutes for Finmeccanica, Italy

Finmeccanica's Higher Technical Institutes were launched in 2009 after a Memorandum of Understanding was signed between Finmeccanica and the Ministry of Education, Universities and Research. The HTI were implemented in 2008[13] by the President of the Council of Ministers for the development of special schools of technology offering a tertiary educational path merging theory, practice and on-site training. This two-year programme is thought to train 'super-technicians'[14] highly-skilled students provided with both theoretical knowledge and skills required by companies and that have been identified as key for the future of the manufacturing defence industry and for the '[revitalisation of] the know-how culture.'[15] Finmeccanica sponsors seven of these private foundations by adhering to the foundations through its operating companies in Lombardy, Piedmont, Campania, Apulia, Tuscany, Friuli Venezia Giulia and Liguria in sectors relevant for its activities and eight of its companies are currently supporting the programme. Every graduate from high school meeting the criteria relevant for a specific training course can apply and compete to enter one of these institutes. The underlying idea is for Finmeccanica to take an active stand in the training of the engineer of the future consistently with its forecast needs while for the Italian government it is a way to support youth employment and to trigger economic growth.

1.3.1. Key features

Each of the HTIs focuses on a specific technical sector identified as relevant for Finmeccanica's activities. The company's sponsorship implies that students follow their two–year programme using Finmeccanica's classrooms and laboratories, that they are trained on-site, directly working with Finmeccanica's personnel and that Finmeccanica's employees are educating them as internal teachers.[16]

As for the candidates' selection, criteria are identified by local technical and scientific committees, one for every foundation and they include 'excellent final grades, technical and team working skills, willingness and enthusiasm for lifelong learning[17]

Each of the foundations is highly specialised in a specific sector and offers very specific courses. For example, Piemonte's HTI focuses on aerospace and mechatronics and offers courses such as senior technician for automation. Lombardy's HTI is specialised in transport and intermodal logistics and provides training for technicians for the maintenance of aircraft or for technicians for the design and installation in aircraft construction. The technological sectors addressed by the HTIs and supported by Finmeccanica are sustainable mobility in Campania,[18] transport and intermodal logistics in Lombardia,[19]

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[13] Istituto Tecnico Superiore (n.d.).

[14] Finmeccanica (2014a).

[15] Cf. Ibid.

[16] Cf. Ibid.

[17] Cf. Ibid.

[18] Istituto Tecnico Superiore - Campania (n.d.).

aerospace and mechatronics in Piemonte,[20] aerospace in Puglia,[21] mechanical systems in Toscana,[22] mechatronics and aeronautical maintenance in Friuli Venezia Giulia[23] and innovation processes and mechanical products in Liguria.[24]

The Memorandum of Understanding Finmeccanica signed with the Italian government was extremely clear and precise in the sense that the company could chose the regions, the sectors of activity, and the partners based on excellence criteria. This 'variable geometry' agreement allows Finmeccanica to adapt their involvement to the market and to its forecast evolution.

Main actors

The HTIs bring together technical and vocational schools, enterprises and industries, local authorities from provinces and municipalities, universities and research centres as well as public and private entities like Chambers of Commerce and the Ministry of Education, Universities and Research.[25] They target young graduates from high school with high potential, technical skills and motivation.

Some of Finmeccanica's companies have joined the foundations and are actively supporting and taking part in the training and educational programmes: AgustaWestland, Alenia Aermacchi, AnsaldoBreda, Ansaldo STS, OTO Melara, Selex ES, SuperJet International and WASS; they are all involved in a course relevant for their area of expertise.

Financing

According to Article 12 of the Decree issued by the Presidency of the Council of Ministries on 25 January 2008, the work and establishment of HTIs is financed through funds available from the Ministry of Education, Universities and Research.[26] Reports indicate that in 2013 funds destined to HTIs by the central government reached 13.5 million euros.[27] A review of the websites of Finmeccanica-affiliated HTIs, however, highlighted a diversification of sources of funding, which also vary between different institutions. Whilst ministerial funds are listed on all websites, funds from regional institutions (Tuscany, Lombardy, Friuli, Piedmont) and regional entities (Ente Autonomo Volturno) are also destined to support local HTIs. Furthermore, Finmeccanica affiliated HTIs in Lombardy and Friuli also benefit from

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[19] Istituto Tecnico Superiore - Lombardia (n.d.).

[20] Istituto Tecnico Superiore - Piemonte (n.d.a).

[21] Istituto Tecnico Superiore - Puglia (n.d.).

[22] Istituto Tecnico Superiore - Toscana (2014).

[23] Istituto Tecnico Superiore – Friuli Venezia Giulia (2013).

[24] Istituto Tecnico Superiore - Liguria (n.d.).

[25] Istituti Tecnici Superiori (n.d.).

[26] Presidenza del Consiglio dei Ministri (2008).

[27] Linkiesta (2013).

funds disbursed by the European Social Fund.[28] Lastly, Finmeccanica is listed among the main sponsoring institutions for the HTIs of Campania and Piedmont.[29]

1.3.2. Key activities

Students who complete their course of studies within HTIs receive a technical diploma (*Diploma di Tecnico Superiore*) that is currently recognised both at the national and European levels. Furthermore, HTIs diplomas allow students to continue their studies towards an undergraduate degree since HTIs' foundations partner universities recognise transferable university-level credits in light of the work carried out to achieve an HTI diploma.[30]

After the completion of the first two-year education cycle, Finmeccanica reports that for the 7 foundations of which it is a partner member 181 students completed training thanks to the work of 231 internal teachers. The average work placement rate for this batch of students is reportedly 60 percent with peaks of 100 percent successful work placement through the HTIs of Piedmont and Apulia.[31]

[28] Istituto Tecnico Superiore - Lombardia (n.d.); Istituto Tecnico Superiore – Friuli Venezia Giulia (2013).

[29] Istituto Tecnico Superiore - Piemonte (n.d.b); Istituto Tecnico Superiore - Campania (n.d.).

[30] Istituto Tecnico Superiore (n.d.); Mantovani (2011).

[31] Finmeccanica (2014b).

1.3.3. SWOT Analysis

Below we present a summary of an analysis of strengths, weaknesses, opportunities and threats pertinent to Finmeccanica's Higher Technical Institutes.

Table E.3. SWOT Analysis: HTI, Finmeccanica

Strengths	Weaknesses
• Example of partnership between business, academia and public authorities in providing systemic response to mismatch between supply and demand on technical job market • Example of a leading manufacturing company taking an active part in the post-secondary education of engineers • Case study highlights engineering and technical skills as critical and core for defence industry's sustainability • Example of a company actively and properly training and educating its own highly qualified engineer of the future consistently with its own needs and interests	• Dependence on governmental and European funds and consequent vulnerability to shifts in funding priorities. • Outside Finmeccanica, the broader government-sponsored HTI initiative uses curricula not aimed specifically at the defence industry.
Opportunities	**Threats**
• Development of large pool of technical expertise for re-vamping country-level industries and development of niches of competitiveness and excellence beyond national level. • Precedent for other national and foreign companies • Beneficial for the whole defence industry since the students are provided with skills that are key to the whole sector and not only to the company	• Post-training workforce migration to better remunerated job markets or non-defence sector. • Slow response and adaptation of curricula to evolving needs in commercial and technical landscape • Potential budget cuts or discontinuation of the HTIs initiative due to governmental spending reviews and shifting priorities.

Source: RAND Europe analysis

1.4. Case Study 3: Aviation Valley, Poland

The Aviation Valley Association was registered as a not-for-profit organisation in 2003 and now incorporates more than 70 companies from within the Polish aviation industry.[32] The long-term objective of the Aviation Valley Association is to transform Southeastern Poland into one of Europe's leading aerospace regions. Its aims include:

- The development of a low cost supply chain for the aerospace industry
- Cooperation between the aerospace industry and science.
- To make impact on the Polish government's economic policy
- To attract foreign investors
- To harmonise higher education and school programmes with the aerospace industry needs
- Development of international cooperation

Aviation Valley is located in the town of Rzeszów in Southeastern Poland, a region key for the Polish aerospace industry as it produces 90 percent of the country's aerospace industry output and is home to aerospace companies, scientific research centres and educational and training facilities such as pilot training centres.

1.4.1. Key features

Main actors

Most of companies associated with Aviation Valley are located in Podkarpackie, a region that has been associated with the aircraft industry for 70 years. In addition, both the University of Technology, which has a strong Aerospace Engineering Faculty, and Rzeszów-Jasionka Airport are located there.

The Association includes 12 large companies, 60 SMEs and one research institution (Rzeszow Technical University including the CAT 'AeroNet – Aviation Valley' laboratory).[33] The Association comprises over 22,000 employees and the goal is to reach 100 members.[34]
Some of the main actors involved in the Association include:

- WSK 'PZL-Rzeszów' S.A.[35] (aerospace manufacturing, research and design)

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[32] See the profile of Aviation Valley Association at the European Aerospace Cluster Partnership. See: European Aerospace Cluster Partnership (n.d.).

[33] The R & D Laboratory carries research and development tasks in the area of advanced material technologies for aerospace industry with collaboration with WSK "PZL-Rzeszów" S.A. and the universities associated in the Centres of Advanced Technology: AERONET "Aviation Valley" and CAMAT. See: AeroNet Dolina Lotnicza (n.d.).

[34] See: European Aerospace Cluster Partnership (n.d.).

[35] One of the leading players in the Central Europe aerospace industry. It was state owned for over 60 years and joined the United Technologies corporation family in 2002. WSK "PZL - Rzeszów employs almost 4000 workers in one facility located in the city of Rzeszów, on the Wisłok river bank. See: WSK "PZL – Rzeszów" (2012). United Technologies is a major shareholder in WSK "PZL-Rzeszów".

- PZL Świdnik/AgustaWestland (helicopters manufacturer)[36]
- Hispano Suiza Polska Safran Group (international high-technology group)[37]
- Goodrich Krosno (producer of landing gear components for commercial and military aircraft)
- MTU Aero Engines Polska (producer of engines)[38]

International partners include: 'Wings for Region' – aerospace clusters network; Hungarian Aerospace Cluster; HEGAN – Basque Aerospace Cluster; Aero Montreal; and ClusterAvatik.ch. It is also a member of the EEN Aerospace Working Group.

Financing

Aviation Valley is financed through membership fees (30 percent), EU projects (65 percent) and other projects (5 percent) and operates as a not-for-profit organisation.[39]

1.4.2. Key activities

The Aviation Valley Association has participated, co-organised and collaborated on a range of projects and initiatives, including:

- Establishing a portal with an intranet open to industrial association members including information on SME needs in relation to R&D and professional training and opportunities at Rzeszow Technical University[40]
- Co-organisation of Technology Days during Paris Air Show and Berlin Air Show
- Training Centre for Computer Numerical Control operators which trains 1000 operators annually
- Works with ten technical secondary schools in the region as well as with high schools[41]
- Involved with patronage over schools
- Initiator and a founder member of European Aerospace Cluster Partnership (EASP)[42]
- Study visits to partner regions (Pohjois-Pohjanmaa in Finland and the Border, Midland and Western Region of Ireland)

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[36] With over 60 years of experience and having produced over 7,400 helicopters, PZL-Świdnik is the only Polish OEM with the capabilities to undertake helicopter design, research & development, system integration, manufacturing, support, training and upgrades.

[37] Core businesses: Aerospace Propulsion, Aircraft Equipment, Defence and Security. See: Safran (2009a).

[38] Engineering & Operations and Parts Management (Externals & Accessories) for V2500 engine. See: MTU Aero Engines (2014).

[39] See: European Aerospace Cluster Partnership (n.d.).

[40] European Commission (n.d.a).

[41] 35 million USD scheme has paid for new buildings and training of specialist teachers to nurture technicians and assembly workers at 12 high schools. The under-10s are have monthly "fun" lessons (in physics and flying) conducted by Aviation Valley professionals. See: Flight Global (2014).

[42] Aviation Valley Association Poland (n.d.).

- Conference on the outlook for the aeronautics industry in an enlarged Europe (164 participants from 17 Member States)
- A workshop on the usefulness of clusters at the Paris Air Show at Le Bourget, in France[43]
- Cluster and Network Cooperation for Business Success in Central Europe
- AIRVET – Aeronautic Industry Skills Resolution for a more Efficient VET Offer: the main objective of the project is to design, develop, evaluate and disseminate new or adapted curricula (especially for vocational education and training) addressed to the aerospace industry as it requires highly skilled personnel.[44]

Since the launch of the project, both the aerospace industry in the region and the membership of Aviation Valley itself have grown significantly, illustrated below in Table E.4.

Table E.4. Membership of enterprises and employees, Aviation Valley.

	2003	2010
Enterprises	18	85
Employees	9000	23000

Source: Aviation Valley presentation, 2010.[45]

Based on the study team's analysis of open source evidence, the Aviation Valley Association faces a number of challenges, namely:

- How to ensure sufficient number of engineers and other specialists in upcoming years (Aviation Valley Virtual University, CEKSO Learning and Training Centre, Children University/ Exploratorium)
- How to develop efficient international supply chain
- How to increase participation in R&D projects
- How to secure stable and reliable future cluster financing

1.4.3. SWOT Analysis: Aviation Valley

Below we present a summary of an analysis of strengths, weaknesses, opportunities and threats pertinent to the Aviation Valley Association.

[43] European Commission (2014a).

[44] Implemented by INNpuls Sp. z o.o., a member of the Aviation Valley Association with a multidisciplinary consortium of ten partners from six countries with the support of the European Union Lifelong Learning Programme. See Aviation Valley (2013).

[45] The source for this data is a presentation of the project (Aviation Valley). See: Aviation Valley (2013).

Table E.5. SWOT Analysis: Aviation Valley, Poland

Strengths	Weaknesses
• Industry driven: the Association was initiated by leading regional enterprises[46] • Strong leadership conducive to growth and development • Successful cooperation with academia • Training and learning centre contributes to lifelong learning and also outreach • FP7 Contact Point[47] • Member of Enterprise Europe Network[48] • Active research and development initiatives: contributes to the local manufacturers being competitive and at the forefront of the aerospace industry • Cluster approach allows for economies of scale[49]	• Lack of direct focus on skills • A reluctance by small family firms to move outside their operational comfort zone, which can impede growth[50] • Local salaries still lower compared to Western Europe, which is an obstacle to attracting skilled labour (especially foreign educated Polish specialists and foreigners)
Opportunities	**Threats**
• Involvement in education (schools and universities) • Reliable supply chain being developed • Improve access to the global supply chain[51] • To increase participation in R&D projects • To attract highly-skilled Polish engineers from abroad/highly skilled foreign engineers	• Industry still in transition from local SMEs to global operations, which could threaten stability • Inability to ensure sufficient number of engineers and other specialists in upcoming years • Inability to develop efficient international supply chain • Inability to secure stable and reliable future cluster financing

Source: RAND Europe analysis

[46] The initiative was a sub-project within the INTERREG IIIC ADEP (Action to Develop, Experiment and Mainstream Innovative Schemes to Support Territories) with partners from Finland and Ireland. See: European Commission (n.d.a).

[47] European Research and Innovation Funding Programme (2007-2013), now replaced by Horizon 2020.

[48] The Enterprise Europe Network brings together business support organisations from more than 50 countries. See: Enterprise Europe Network (2014).

[49] The bulk of the aerospace industry in Poland is in one relatively small area. According to experts, this is important for countries like Poland and allows to develop economies of scale, strong links with education and a matrix of relationships between businesses. See: Flight Global (2014).

[50] See: Flight Global (2014).

[51] In the past (2010) aircraft parts travelled by truck on southern Poland's tortuous road network to airports such as Warsaw or Munich. See: Flight Global (2014).

1.5. Case Study 4: Safran Corporate University, France

The Safran University was established in 2002 by the Safran Group, an international high-technology group with three core businesses in aerospace (propulsion and equipment), defence and security, in a bid to sustain its cultural, technological and organisational transformation. The university promotes the development of a corporate culture, encourages cooperation through better mutual understanding and the exchanging of best practices across the organisation.[52] In 2009, a 'Training and Managerial Development Department' was established to oversee the restructuring of Safran University in order to better adapt it to perform its corporate goals and objectives. Its overall objective is to strengthen ties with skills and employment planning initiative, in order to anticipate potential changes in core competencies and businesses.[53] In 2010, as part of its 'Modernisation of Group Management' initiative, Safran re-vamped its in-house university project as the 'Safran Corporate University' (SCU).[54] The SCU provides continuous training and development programmers to develop Safran's human capital, regardless of workers' positions and professions (i.e. for employees in both technical and support functions).[55]

1.5.1. Key features

Main actors

At present, the SCU has active campuses in Europe (Paris), Asia (Beijing) and North America (Dallas). Furthermore, the SCU complements the training provided through its main campuses by running additional training programmes in a dozen countries worldwide, tailoring them to local industry needs and requirements. Lastly, the Safran Corporate University maintains active ties and collaboration programmes with a number of universities worldwide to provide *ad hoc* training programmes benefiting from external expertise. [56,57]

Financing

Safran currently designates approximately 4.4 percent of its payroll costs to funding training programmes.[58] Thanks to this and to the reorganisation it underwent, in the span of a few years the SCU

[52] Safran (2009b).

[53] Safran (2010).

[54] Safran (2011).

[55] Safran (n.d.).

[56] Safran (n.d.); Safran (2011).

[57] Safran, (2009b).

[58] Safran (2014).

expanded from providing approximately 73,000 hours of training in 2007, to providing more than 1.5 million hours of training to 50,000 employees worldwide in 2013.[59]

To further boost the activities of the SCU, in September 2014, a new 13 hectares 'Safran Campus' was inaugurated in Massy (France), near the group's Paris headquarters. Besides hosting the European section of the university, the campus comprises the Safran Centre, a hotel and an auditorium with a 600 people capacity for conferences, events and training initiatives.[60]

1.5.2. Key activities

Since its restructuring in 2010, training courses run by the SCU are grouped into three main categories: Leadership and Management; Professions and Skills; Employment-Training.[61]

- Courses from the 'Leadership and Management' branch aim to facilitate the adoption of shared best management practices in accordance with Safran's values and managerial priorities: embarking on a shared vision; leading by example; daring to innovate; scoring as a team; empowering people.
- The 'Professions and Skills' courses aim to enhance production and technological skills among Safran's employees. These courses are common to all of the group's companies in an effort to promote best practices and qualify workers who attend them with recognised certificates and diplomas.
- Finally, 'Employment-Training' courses are aimed at enhancing and protecting the employability and skills of Safran's staff in strategic fields identified by the group for its growth. With regards to this branch of courses, each year Safran's companies worldwide analyse what skills and professions are likely to be needed to meet technological and commercial requirements in a five to ten years timeframe.

The underlying aim behind these courses and initiatives is that of protecting useful skills and employees during transition phases when their profession could either change or disappear due to changes in the commercial and technological landscape the group is faced with. By means of example, in 2011 this process led to the establishment of courses focused on system architecture, industrial processes, design to cost, purchasing, sales & marketing and economics and management.[62] While these are competence at a higher level (rather than occupation level which this study has focused on), this study has also identified system architecture as one of the key skills areas. However, as this study has focused on skills that are defence-specific and cannot be easily transferred from other sectors, industrial processes, design to cost, purchasing, sales & marketing and economics were not identified as key in our analysis.

[59] Safran (2009c); Safran (2008).

[60] Safran (2009c); Safran (2009d).

[61] Safran (2011).

[62] Safran (2012); Safran (2014).

1.5.3. SWOT Analysis

Below we present a summary of an analysis of strengths, weaknesses, opportunities and threats pertinent to the Safran University.

Table E.6. SWOT Analysis: Safran University

Strengths	Weaknesses
• Industry driven • Annual review of skills and programmes needed to meet commercial and technological developments • Established worldwide connections with academia • Dedicated and proprietary infrastructure for core campus • Self-financed • Broad range of training programmes aimed at both technical and support workers	• Bulk of training provided still limited to France-based workforce • Focused solely on current Safran employees
Opportunities	**Threats**
• Developing stronger transnational skills for development and training programmes • Encouraging through training cross-sectorial and transnational mobility within group to enhance its work and growth • Developing stronger cooperation with national governmental and EU bodies to devise defence-related skills training programmes	• Post-training workforce migration to better remunerated job markets or non-defence sector. • Slow response and adaptation of curricula to evolving needs in commercial and technical landscape

Source: RAND Europe analysis

1.6. Case Study 5: Erasmus+

Erasmus+ is a European level initiative that aims to link up industry and academia in an effort to ease the matching of skills demand and supply through collaboration on joint programmes for mutual benefit. The Erasmus+ Programme aims to increase skills and employability and improve education and training opportunities. Erasmus+ will support transnational partnerships among education and training institutions to address skills gaps through:

- Collaboration between formal, informal and non-formal learning
- Cross-sector partnerships with businesses
- Traineeships for vocational education and training (VET) students and higher education students to increase their employability
- Quality improvement in all sectors through staff mobility and strategic partnerships

The programme started in January 2014 and it is expected to continue for six years until 2020.[63]

1.6.1. Key features

There are three key actions within the Erasmus+ programme, each of which considers a specific element of the EU's foundation principles.

Key Action 1: Mobility of individuals

- Mobility of learners and staff
- Erasmus Mundus Joint Master Degrees
- Erasmus+ Master Degree Loans

Key Action 2: Cooperation for innovation and the exchange of good practice

- Strategic partnerships
- Knowledge alliances
- Sector skills alliances
- Capacity building
- IT support platforms

Key Action 3: Support for policy reform

- Structured dialogue meetings between young people and decision-makers in the field of youth

Main actors

The main actors in ERASMUS+ include: higher education institutions, businesses, vocational and education training institutions and organisations and individuals looking to improve their skills.

[63] The Programme replaces other funding programmes run by the European Commission in the area of education, training, youth and sport, including the Lifelong Learning Programme (Erasmus, Comenius, Leonardo, Grundtvig and Transversal), Youth in Action and other international programmes.

Financing

The programme has an EU-funded budget of €14.7 billion.[64]

There are two key activities with relevance to defence industries and skills needed therein: the Sector skills Alliances and Knowledge Alliances. Below, we explore each of these initiatives in more detail. The Sector Skills and Knowledge Alliances under Erasmus+ are part of Key Action 2 of the Programme: 'Cooperation for innovation and the exchange of good practices'.[65]

1.6.2. Sector Skills Alliances

The Sector Skills Alliances (SSA) under Erasmus+ promote European cooperation within specific sectors of the economy in order to develop vocational skills from the perspective of labour market needs. The initiative aims to tackle the existing mismatch between the supply and demand of skills. It supports vocational education and training institutions to respond to sector-specific labour market needs and provide suitable skills. SSA's main activities include:

- Designing and delivering curricula responding to the needs of labour market and specific sectors of the economy
- Projects promoting work based learning
- Projects facilitating recognition of qualifications at EU level and contributing to labour mobility
- Strengthening the exchange of knowledge and practice between vocational education and training institutions and the labour market through work-based learning

The SSAs are designed to promote cooperation between three core groups of stakeholders: VET providers and researchers, sector stakeholders (i.e. VET beneficiaries), and VET authorities and decision-making bodies. Several sectors have been identified to have skills imbalances and which are eligible under SSA:

- Manufacturing & Engineering
- Commerce
- Information and communication technology
- Environmental technologies (Eco-innovation)
- Cultural and creative sectors
- Health care
- Tourism.[66]

Out of these, Manufacturing and Engineering as well as Information and Communication technologies are of high relevance to companies involved in defence production and research.

The Sector Skills Alliances are financed under the Erasmus+ 2014-2020 programme in the area of cooperation for innovation and good practices. From the first 75 applications received under this action,

[64] See: The Times Higher Education (2013).

[65] European Commission (2014b).

[66] European Commission (2014c).

four pilot project proposals from the following sectors were selected: the automotive industry, health and social work, tourism and catering and energy saving technologies.[67]

To qualify for funding, the composition of a Sector Skills Alliance must include:

1. In each country covered, a Sector Skills Alliance must have at least three full partners, one from each of the categories: VET institutions, public or private entities that have sector expertise, VET regulating bodies.
2. Sector Skills Alliances must cover at least three Programme Countries.

1.6.3. Knowledge Alliances

Knowledge Alliances are partnerships between higher education institutions and businesses, the aim of which is to promote creativity, innovation and entrepreneurship by offering new learning opportunities and qualifications. They are not restricted to any particular sector.[68]

The aims of the initiative include:

- To develop new, innovative and multidisciplinary approaches to teaching and learning;
- To stimulate entrepreneurship and entrepreneurial skills of higher education teaching staff and enterprise staff;
- To facilitate the exchange, flow and co-creation of knowledge.[69]

The Knowledge Alliances would include projects that contribute to innovation in higher education, business and in the broader socio-economic environment and support the development of entrepreneurship mind-set and skills. Similarly to the Sector Skills Knowledge Alliances are financed by the Erasmus+ 2014-2020 programme.

Knowledge Alliances must involve minimum six independent organisations from at least three Programme Countries, out of which at least two higher education institutions and at least two enterprises.

1.6.4. Key activities [70]

As the Erasmus+ initiative is relatively new, it is not yet possible to evaluate its outcomes and wider impact. The European Commission estimates, however, that future planned outputs and outcomes of the initiative will include, among others:[71]

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[67] For more information on some of the outcomes of these pilots see: EACEA (2014a).

[68] Interview by RAND Europe, December 2014.

[69] European Commission (2014c).

[70] In the UK during the first two rounds in 2014 there were 1,576 applications received: 655 from schools, 214 from higher education institutions, 275 from vocational education and training institutions, 134 from adult education and 298 from youth organisations and institutions (Erasmus+, 2014). For statistics in relation to Erasmus before the new programme was introduced see: European Commission (2013).

[71] Erasmus Plus in Detail, see: European Commission (n.d.b).

- 25,000 Strategic Partnerships, involving 125,000 institutions/organisations, to implement joint initiatives and promote exchange of experience and know-how and links with the world of work
- Nearly 300 Knowledge Alliances and Sector Skills Alliances, involving collaboration between 3,500 education institutions and enterprises
- More than 200,000 teachers collaborating on line and involving more than 100,000 schools through e-Twinning
- Two million higher education students to study and train abroad
- 650,000 vocational students to spend part of their education and training abroad
- 200,000 Master's students to benefit from a new loan guarantee scheme and more than 25,000 scholarships for Joint Master Degrees
- 500,000 young people to volunteer abroad and take part in youth exchanges
- 800,000 lecturers, teachers, trainers, education staff and youth workers to teach or train abroad

1.6.5. Examples of collaboration under SSA and Knowledge Alliances:

Within the Sector Skills Alliances, the eligible sectors for funding in 2014 included:

- Textile/Clothing/Leather.
- Commerce.
- Advanced Manufacturing.
- Information and Communication Technologies (ICT)
- Environmental technologies (Eco-Innovation).
- Cultural and Creative sectors.[72]

Six proposals (out of 48) were funded under the scheme including projects that target skills for the creative economy, ICT sector skills, skills in metal and electro industries skills in the transport and e-commerce sectors.[73]

Within the Knowledge Alliances initiative, examples of funded programmes included: Education Cultural and Creative Knowledge Alliance for Tomorrow's Entrepreneurs, European Real Life Learning Lab Alliance and Knowledge Alliance e-inspiration.[74] Of the 230 proposals submitted in 2014, ten projects were selected.[75]

1.6.6. SWOT Analysis

Below we present a summary of an analysis of strengths, weaknesses, opportunities and threats pertinent to the Erasmus+ Programme.

[72] EACEA (2014b).

[73] Ibid.

[74] EACEA (2014a).

[75] EACEA (2014a).

Table E.7. SWOT Analysis: ERASMUS+

Strengths	Weaknesses
• Clear vision and goals, which improves accessibility • Provides opportunities for collaboration between businesses and academia that is needed and welcomed especially in some sectors • Wide scope • No limitation on sectors within the Knowledge Alliances programme means dual-use companies may be eligible for funding every year	• In its current form the programme is new and has not been evaluated yet • Sectoral limitation of SSA means that dual-use companies may not be eligible for funding if this sector is not chosen as a focus area for a particular year
Opportunities	**Threats**
• Allows for cooperation with EU and neighbouring countries • Encourages collaboration between industries and education sector • Strategic support to chosen sectors (through SSA)	• The programme does yet have analysis at its disposal looking at future scenarios for skills (e.g. impact of technology, innovation) which may limit its forward-looking ability and ability to identify key sectors to focus on

Source: RAND Europe analysis