Key Skills and Competences for Defence

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Executive Summary

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This study explores key skills and competences for defence

At its meeting in December 2013 the European Council recognised the need for the European Defence Technological and Industrial Base (EDTIB) to be sustained into the future, as well as a need to reduce dependencies on non-European countries for the supply of military capability. The Council has called on European institutions to seek to identify and map key European defence skills and competences and identify ways to help maintain them for the future.

The pressure on defence budgets across Europe has reduced confidence that the large procurements of yesteryear, which supported the diversity of the skills in the EDTIB as well as the volume of skills, will continue into the future. The increasing complexity and cost of major procurements means that the interval between one platform and the next is increasing, making it harder to sustain the key skills and competences in the industrial base during the interval period. In some areas, the demographic of the defence workforce in industry and government is tending towards the older generation and fewer graduates are choosing defence as their career path. The combination of these factors can lead to the erosion of important skills.

This study's purpose is to determine key skills and competences for the EDTIB, identify skills gaps and propose recommendations for skills sustainment
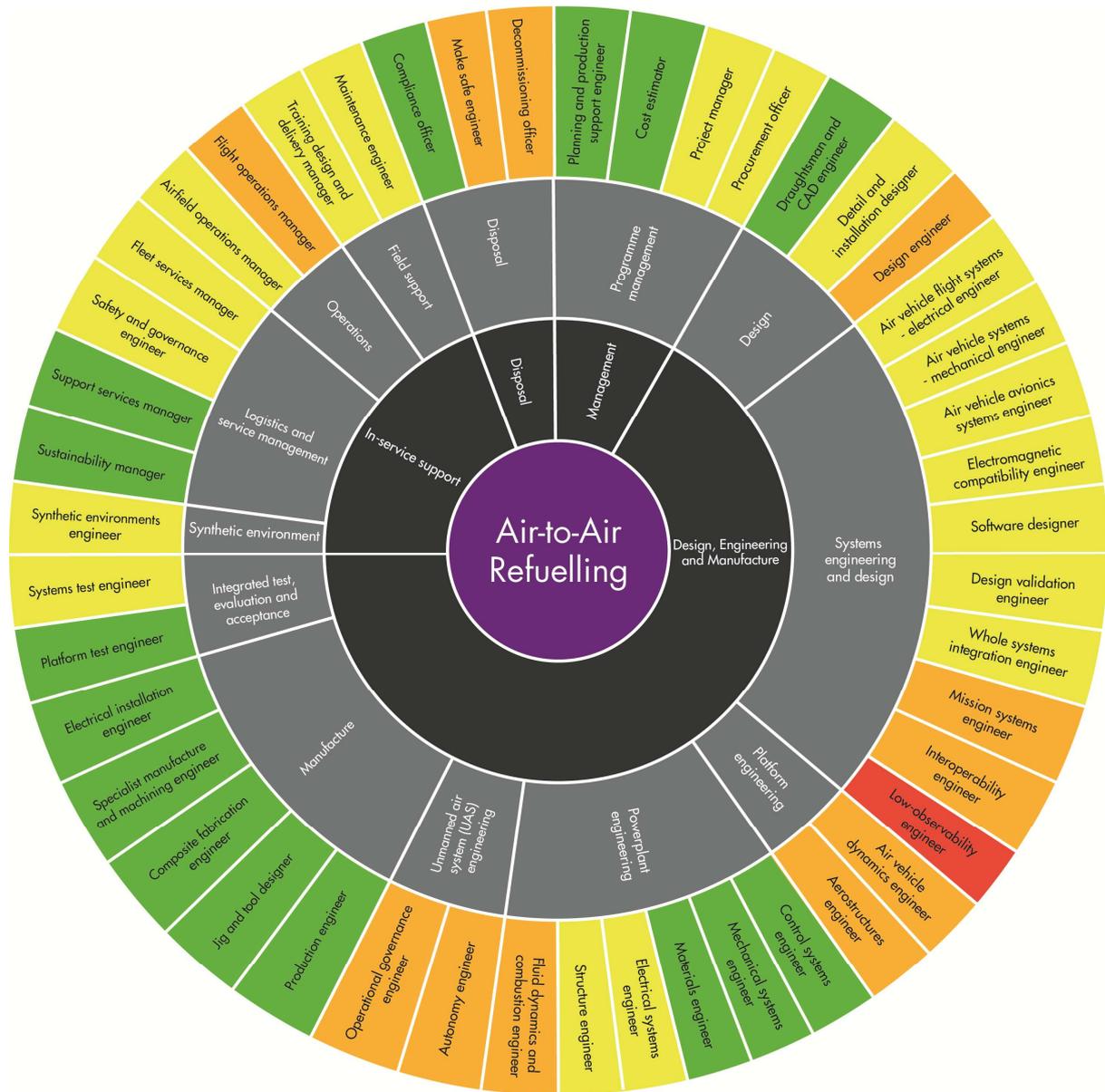
This study has four main components:

- **Building a taxonomy of skills** required by the defence sector and distinguishing which skills are critical for each defence domain.
- **Mapping current supply and demand of these core skills**, and the implications of any future shifts in supply and demand.
- **Defining what makes a core skill** required by the defence sector, both now and in the future.
- **Developing recommendations** to sustain key skills and competences (KSCs) for defence in the future, with evidence-based recommendations for how this could be achieved.

The study team relied on a multi-method approach, which included: literature review, data analysis, stakeholder consultation through in-person and telephone interviews (involving 51 stakeholders from the defence industry, the education sector, national government and EU institutions, covering 18 EU countries), and a stakeholder workshop focused on the impact of different future scenarios on skills.

Taxonomy of skills and competences for the EDTIB

For each defence domain, the study team has **developed a detailed taxonomy of skills and competences**, an example of which is illustrated below.

Figure 0.1. Skills and competences for Air-to-Air Refuelling aircraft

KEY	Lifecycle stage
	Functional competence
	Occupation ranked by specialisation to defence
LOW	Commonly available and used in defence; this is a skill/competence that is widely used in the defence and other sectors; it is fully transferable
MEDIUM	Widely used by defence; this skill/competence is used widely in defence and to an extent in the civil sector
MED/HIGH	Specialised for defence; this is a skill/competence that is used in the defence sector and requires an extensive background in defence engineering
HIGH	Unique to defence; this is a skill/competence that is only used in the defence sector

The skills and competences taxonomy is divided into twenty-four platform types broken down by equipment lifecycle stage into three further levels of detail. Drawing on expert input, the study team has ranked key skills and competences based on their uniqueness to defence. Figure 0.1 provides an illustrative example of this ranking for the EDA's Air-to-Air Refuelling programme. (Note that the full taxonomies included in the annexes to the final report contain an extra level of detail describing skills coverage; this detailed breakdown of occupations is not included in the diagram to aid its readability.)

Key findings on the demand and supply of key skills

Based on literature review and consultation with a range of European defence industry, education and government stakeholders, the study team identified five key findings in relation to the supply and demand of key skills and competences for the EDTIB. These findings are interlinked and should be read and interpreted together to ensure a comprehensive understanding of the nature of the demand and supply of key skills and competences for the European defence industry.

1. Where there is uncertainty and limited communication in relation to equipment requirements, this hampers industry's ability to manage skills through recruitment and retention

Unlike many other sectors, defence is dominated by a monopsony market structure, with national governments acting as the largest purchaser of defence industry products. In areas/domains deemed as strategically important or a matter of national sovereignty, defence industries act as monopolies, creating a unique monopoly-monopsony dynamic. In this set-up, decisions taken by one side of the market have a major impact on the other side. Due to the political uncertainties with regard to future budgets and the unpredictability of future geopolitical developments, the requirements, timing, schedule and the level of competition for future programmes are uncertain and the political support for investment in defence may change with every new election. In this uncertain context, national governments may be reluctant to communicate their intentions regarding potential future equipment plans to industry to avoid making what might seem to be commitments, in case these change unexpectedly. As a result, however, the defence industry faces uncertainty with regard to future equipment requirements, hampering its ability to put in place long-term strategies for skills planning. In areas that are not identified as crucial to national security or of vital strategic interest, this uncertainty is even greater as the domestic defence industry is more likely to compete for procurement contracts with a broader range of European and international competitors.

Defence capabilities that are protected as a matter of national sovereignty often rely on the presence of highly specialised skills and competences that are unique to defence. Without greater clarity of a longer-term perspective on future equipment plans and a clear identification of key future capabilities (e.g. in a national defence industry strategy), the European defence industry may not have sufficient incentives to invest in retaining these skills in-house or retaining up-to-date skills in sufficiently high volume to be able to pick up production when the need emerges. While R&D programmes and procurement of lower value equipment may help maintain design engineering skills and some production and maintenance skills, the highly specialised skills developed and sustained through new high technology programmes could be lost without new programmes that require such skills. Based on our discussion with stakeholders familiar with

both defence primes and small and medium-sized enterprises (SMEs), having a sustained 'order book' is crucial in order to maintain the nature (and volume) of skills. The current level of uncertainty, often linked with downsizing/redundancies, may make defence appear a 'risky' long-term proposition to potential entrants who possess the skills sought by the industry.

2. The lack of a strategic approach to the management of skills across government, industry and the education sector means there is little coherence in skills planning, demand and supply

Our analysis shows that European defence primes are reasonably proactive in their approach to attracting and retaining the right people with the right skills. However, industry-led initiatives and collaboration with the education sector only seek to address skills shortages or issues related to the nature of skills on a tactical/operational level. A strategic approach to skills that would actively involve national governments, the education sector and the defence industry is often absent within EU Member States (MS). Such an approach would first require a survey of defence skills present in the industrial base of each EU Member State to identify those that are in short supply (either in terms of volume or quality) and then would require a nationally coordinated strategy to address the skills gaps in collaboration with education institutions. Such a nation-based assessment is beyond the scope of the current study, which focuses on Europe-wide trends and seeks to draw conclusions relevant for the EDTIB as a whole. Given the diversity of EU Member States in terms of defence spending, strategic priorities and the treatment of higher education and vocational training, only this level of information would provide sufficiently granular evidence to help formulate effective nation-specific actions. Moreover, this approach would require national governments to overcome some of their reluctance to communicate with the defence industry regarding potential future equipment requirements, to enable a shared understanding between them on the skills requirement and to then communicate these jointly to the education sector.

3. Where there are negative perceptions of the defence sector, these may make defence companies less attractive to new employees and graduates

Multiple stakeholders consulted throughout this study have noted that negative perceptions of the defence sector play an important role in hampering the defence industry's efforts to attract skilled people from the labour market. While a detailed assessment of the causes of the negative perception of defence is beyond the scope of this study, we can report possible causes based on the input from our interviewees. Several interviewees cited concerns about the defence sector as based on declining government spending, with fewer procurement programmes, offering little variety or opportunity to make an impact in one's work. On the other hand, however, three interviewees noted that they had not observed this trend. In their experience, defence engineering work has been attractive to young engineers seeking a dynamic environment where cutting-edge technologies are developed and applied. In addition, several stakeholders from large defence primes noted that companies with strong 'brand recognition' tend not to face recruitment difficulties and are seen as attractive companies to work for. As with many other industries, the geographical location of defence industrial sites plays a role in the level of people's awareness of the industry's presence and their consideration of the defence industry as a potential employer. Most interviewees from tier 0, 1 and 2 companies confirmed that the main collaborative initiatives between the

defence industry and the education sector take place locally: through industry's presence on course advisory boards at universities, scholarship funding for PhD or Masters theses, availability of work placements, apprenticeships and internships, etc. Physical proximity to a defence industry hub may, therefore, also shape the perception of defence, in both positive and negative ways. Beyond interaction with education providers, geographical proximity to a defence actor or hub can also have an effect in other ways as, for example, it negates the necessity for local employees to relocate.

4. Where defence companies face a skewed demographic and competition from other sectors, effective recruitment and retention strategies are crucial for maintaining key skills

Given the aging workforce of many defence primes and the competition for skilled workers from other industries, particularly in the cyber area, effective strategies are required for defence companies to retain staff who have been trained and are intended to replace the retiring workforce. Responding to these trends will require greater focus from the defence industry on adopting different recruitment and retention strategies. Some of these might include: greater outreach to schools, universities and vocational training institutions, joint development of training and other education courses to enhance existing talent and attract new talent, and collaboration with national and regional authorities to identify strategic skills priorities. Internally, defence companies may consider adopting a range of internal company retention initiatives, for example focused around personal development, mentoring, diversity of work, loyalty and recognition schemes. While retention strategies are within the remit and responsibility of defence companies, wider trends are nonetheless important in helping skills development, particularly on the recruitment side. Initiatives aimed at combating the negative perception of defence and increasing collaboration with the government and the education sector to focus energy on retaining key skills for defence are two important factors in helping to increase the defence industry's ability to attract talented graduates, apprentices and experienced staff.

5. Security and nationality considerations can hinder development and cross-fertilisation of skills, exacerbated by a lack of common competency frameworks

The increased movement of STEM (science, technology, engineering and mathematics) students across European borders in recent decades has increased the pool of talented people for recruitment by a defence company. Unlike many other sectors, however, working in defence is often impossible for non-nationals and in some cases even for dual nationals due to national security restrictions. As a result, the available pool of potential recruits for defence industries can be limited. Nationality and security considerations may even complicate exchanges between two branches of the same company located in two different countries. Additionally, the transfer of specialised skills between different companies may be complicated due to a lack of a detailed European-wide competence framework for defence specialised skills. While much work has been done across the EU on implementing the European Credit Transfer System (ECTS) and the European Credit system for Vocational Education and Training (ECVET), without a common understanding of competency levels within a given skills area, the movement of trained employees between companies may be restricted.

Prioritisation of skills and competences for the EDTIB

Following the identification of skills and competences for the EDTIB, the study team conducted a systematic analysis to arrive at a prioritised list of key skills for each defence domain. This process is outlined in Figure 0.2.

Figure 0.2. Methodology for prioritisation of key skills and competences for the EDTIB
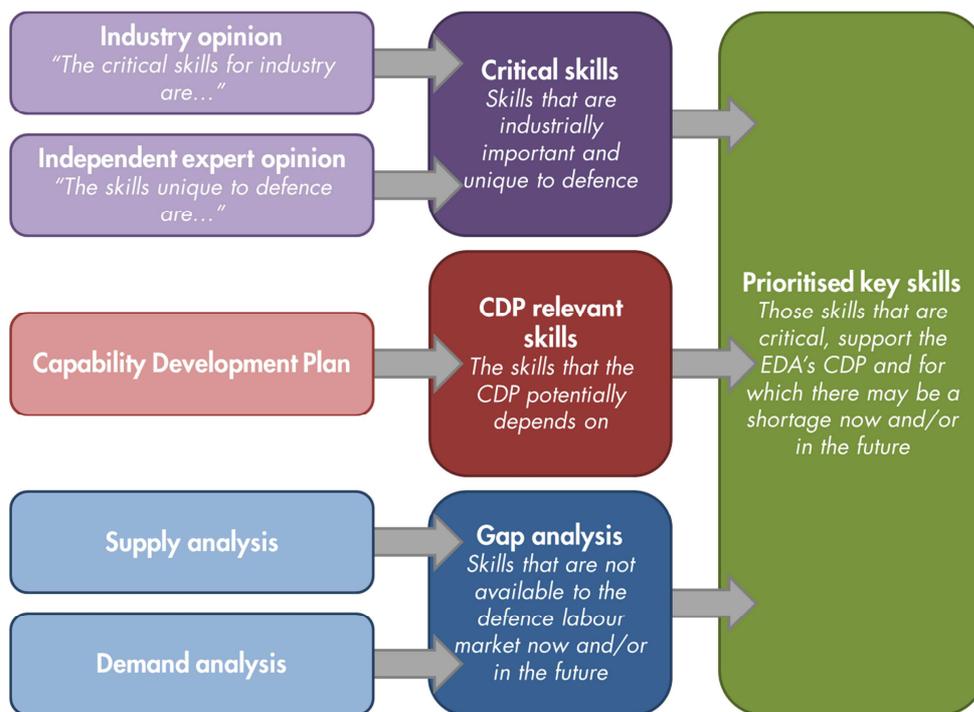
Source: RAND Europe analysis. Note: CDP refers to the EDA Capability Development Plan

Our analysis of different ways of prioritising the skills to identify those that are most important for defence has considered importance to industry, uniqueness to defence, the relevance to delivery of the EDA Capability Development Plan CDP 2014 Priority Actions, and any anticipated gaps in availability. In conducting the different levels of prioritisation, it is apparent that similar skill areas show up in each analysis and it is possible to combine these and say with some confidence that these are the most important skills for the EDTIB. Based on our analysis, we suggest that the most important skills are in the following areas:

- **Low observability**
- **Mission systems**
- **Electronic warfare**
- **Complex weapons**
- **Land weapons systems – ballistics.**

Low observability is a priority because it is unique to defence and has been identified across numerous domains within the taxonomy, and the case is similar for mission systems. Electronic warfare is a part of C4ISTAR, which is unique to defence, and C4ISTAR is the domain that underpins all of the others; for

this reason we consider electronic warfare to be particularly important for defence. We also consider complex weapons to be a priority skill area for defence because, by definition, they are unique to defence and are important for the air, land and naval domains as they provide the lethality that underpins so much capability. We have included land weapons systems on account of their uniqueness to defence and the anticipated gap in some aspects of related skills.

We consider that skills for the submarine area are also important and if submarine capabilities were part of the CDP then we would have included these in our overall list. However, submarine capability is largely outside of the EDA's area of activity (and only a limited number of EU MS have industrial capability in this sector), so it has been omitted from the final list of prioritised areas.

Summary of recommendations

During this study we have developed a range of potential measures that could help to address some of the problems identified in the labour market for defence key skills. The dynamics of the defence labour market is highly influenced by the specific actions adopted by relevant players (the defence industry, education institutions), by local and regional circumstances, national policies and strategies. In our recommendations, we have focused on areas where action can be taken at a European level to add value to existing national, regional or company-led initiatives. Our recommendations are:

- **Recommendation 1: The EDA should coordinate a strategic approach to the defence labour market with active involvement of the defence industry, national governments and the education sector. To facilitate this, the EDA should set up a permanent EDA Skills Special Advisor to the Chief Executive.**
- **Recommendation 2: The EDA should take the initiative to maximise the skills impacts of EDA joint procurement programmes.**
- **Recommendation 3: The EDA should act as a forum for the defence industry, the education sector and national governments to share good practice on existing initiatives to address skills gaps.**
- **Recommendation 4: The EDA should help facilitate access to the European Commission's instruments with relevance to key skills and competences for the EDTIB.**
- **Recommendation 5: The EDA should support knowledge and information sharing to improve the image of defence.**

Recommendation 1: The EDA should coordinate a strategic approach to the defence labour market with active involvement of the defence industry, national governments and the education sector. To facilitate this, the EDA should set up a permanent EDA Skills Special Advisor to the Chief Executive

We have identified several recommendations which could each be implemented individually, but to achieve the maximum effect we believe the EDA needs to bring these together and lead a strategic programme of change. The EDA's role would be to lead the coordination and facilitation of the different activities and to lead efforts to improve communication between actors. We envisage the substantive action of any such programme would need to be taken by EU MS, companies and educational

institutions, acting individually or together. The programme would address how EU MS, defence companies and the education sector act together, at the national or EU level, to ensure the defence labour market is dynamic and healthy.

Our research has shown that there are information bottlenecks and that the EDA could bring together different parties to share good practice on how to maintain and develop skills, and also to provide information relating to EU instruments that could be used to fund skills initiatives, both for large defence companies and also SMEs. The EDA could also take a facilitating role in improving the image of defence by working with defence companies, national Ministries of Defence and other actors (e.g. marketing specialists) to communicate that the sector is still a vibrant place to work.

In the context of the EU Council meetings on defence (2013 and 2015) and the explicit tasking to the EDA to identify the key defence industrial skills in Europe and examine the health of the skills base, the EDA has a unique opportunity to ensure that the discussion of skills continues and that this topic remains high on the agenda in its own activities as well as those of participating Member States.

The focus of this recommendation is, therefore, on how the EDA can establish such a strategic approach, and provide the administrative support and impetus necessary to bring the different actors together. We do not envisage this requiring a large team; rather the EDA could appoint an EDA Skills Special Advisor to the Chief Executive with some administrative support. The EDA Skills Special Advisor to the Chief Executive would champion the activity within the EDA and externally and bring together a stakeholder forum representing industry, educational institutes and EU MS. This has the potential to be a challenging and time consuming task, which could require project officer support at least in the initiation phase of the skills agenda.

This individual would be a senior responsible owner of the skills agenda, a subject matter expert with recognised authority to influence high-level decision-making. Some of these responsibilities of the Special Advisor would include:

1. Providing input into meetings and planning relating to EDA joint procurement programmes, ensuring that due consideration is given to the impact of the programmes on skills (particularly those that are key for defence) (see Recommendation 2)
2. Supervising initiatives within the EDA that aim to facilitate access to European Commission (EC) instruments to support defence industrial skills (e.g. leading and supervising the preparation of a Guide to EC Skills Instruments) (see Recommendation 4)
3. Commissioning further research (e.g. a Eurobarometer survey) on the perceptions of defence and reasons for the low attractiveness of the defence sector to graduates of universities and/or vocational courses (see Recommendation 5)

Recommendation 2: The EDA should take the initiative to maximise the skills impacts of its EDA joint procurement programmes

Procurement programmes are seen as important for maintaining skills, but this is rarely the sole purpose or the specific focus of a procurement programme. The EDA is responsible for several procurement programmes that provide it with the opportunity to demonstrate exactly how procurement can be used to support and develop skills, and to then share this knowledge and experience with EU MS and other

actors. By proving the principle of how skills can be included as a focus within procurement activity, which is often in collaboration with the EDA MS Ministries of Defence and OCCAR, the EDA could become a knowledge leader, which would greatly support its ability to lead the skills strategic programme.

Implementing this recommendation would depend on programme managers in the EDA being engaged and supportive of the initiative, as this would be an extra task for them to include in their schedule. The programme managers would need to use the research in this report to help them understand which skills are particularly relevant to their programme and how critical these are to defence as a whole. Metrics would need to be developed for measuring how a skill is developed and/or maintained through the procurement programme. Having assessed the skills outcomes of the procurement it should be possible to apply these lessons to other EDA procurements. The lessons could be shared with EU MS so they can see how the techniques could be applied to their own procurements in order to support skills. Furthermore, the demonstration of how procurement programmes can be used to maintain key skills can be used as an example of good practice that the EDA can share as part of Recommendation 3.

Recommendation 3: The EDA should act as a forum for the defence industry, the education sector and national governments to share good practice on existing initiatives to address skills gaps

In the current climate of declining defence budgets, pressures on public spending and the drive towards greater openness and competitiveness of the European defence market, national governments and militaries are restrained in their ability to guarantee future procurement programmes. Apart from areas defined by national governments as those of vital strategic interest, the timing, schedule and level of competition for future programmes is uncertain and the political support for investment in defence may change with every new election. Without a change in these wider trends, national governments and militaries are likely to remain reluctant to communicate uncertain capability plans to the defence industry.

Where the EDA can help create at least some certainty is in its ability to raise awareness about the benefits of good practices – already adopted by some EU Member States and defence companies – to develop and sustain critical skills for defence despite the uncertainty in equipment requirements.

During our interaction with defence stakeholders throughout this project we have identified that a number of stakeholders have established initiatives to address the specific skills gaps they are facing. Currently, however, there is no overarching or cohesive scheme in place which allows for the sharing of good practice and experience emanating from the implementation of such initiatives, meaning that the full benefit cannot be shared more widely across the European defence sector. This recommendation is therefore designed to promote information-sharing of stakeholders' experiences through the creation of a specific programme of events to encourage the sharing of good practice pertaining to skills sustainment. The EDA could coordinate a series of seminars or workshops which would act as a discussion forum for the sharing of good practice and lessons learnt. The findings could be translated into resource toolkits or practice guides based on real-life case studies, with the main features of different initiatives distilled into core component suggestions which would be transferable across Member States and defence industry sub-sectors.

Recommendation 4: The EDA should help facilitate access to the European Commission's instruments with relevance to key skills and competences for the EDTIB

At the European level, there is a range of different instruments that could help increase the pool of suitably qualified people. Some instruments could be used to target regional investment into programmes aimed at developing and sustaining important skills (the European Social Fund), while others are specifically aimed at SMEs (the EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises, COSME). Others sponsor exchanges abroad to study, train and gain work experience and create opportunities for employers to work collaboratively with education institutions – both through advancing their research activity and through creating pathways for people with the skills they are seeking in recruits (e.g. programmes under ERASMUS+). While these instruments are not relevant for highly specialised skills/competences which are unique to defence, they are relevant for funding initiatives to develop and sustain skills which are 'dual-use'. To varying degrees, these skills/competences can be used in both the civilian and the defence side of production within companies with a diversified civil/defence portfolio. Skills that are specialised for defence and require significant defence engineering background (highlighted in amber in Figure 0.1) are an area where such funding would be applicable and would add most value for defence.

To help defence companies (primes and SMEs) and education institutions access financial mechanisms already on offer from the European Commission, the EDA could act as a facilitator through generating a guide on the different instruments of the European Commission and disseminating this knowledge through stakeholder workshops and publications distributed to EU MS governments, the defence industry and the education sector.

Recommendation 5: The EDA should support knowledge and information sharing to improve the image of defence

Several of the stakeholders consulted by this study expressly noted that negative perceptions of the defence sector can play an important role in hampering the defence industry's ability to attract skilled people from the labour market. This recommendation is intended to provide a greater understanding of what the specific negative perceptions of the defence industry are amongst prospective employees across Europe. In collaboration with the European Commission, the EDA could commission a focused perceptions survey (e.g. a Eurobarometer survey), which could provide detailed and nuanced data regarding the factors that influence a negative perception of defence. With the results of the survey, the EDA would be able to assist the European defence industry in understanding some of the reasons behind possible recruitment difficulties or bottlenecks in the labour market with awareness-raising via workshops and/or targeted seminars. By gathering industry representatives and marketing professionals, the EDA could seek to stimulate discussion around possible marketing initiatives that could be implemented on a national level and/or by the defence industry to improve perceptions.