



Annex B: Concepts and recommendations on a KIC on defence or on dual-use technology

Annex to the report: European vision on defence-related skills and supporting actions to solve the skills gap today and tomorrow in Europe

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Defence-related skills:

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

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Annex B. Concepts and recommendations on a KIC on defence or on dual-use technology

B.1. Introduction

The European defence sector experiences challenges in sourcing and retaining the required pool of skills,¹ which could have detrimental implications for European defence capabilities, value for money, innovation capacity and economic competitiveness.² Mismatches in the supply of and demand for skills could mean that the defence sector encounters difficulties in delivering defence equipment programmes efficiently, due to increased risk and challenges meeting cost, capability and schedule targets, which could detrimentally affect both the affordability and exportability of European defence equipment.³ Moreover, according to the European Commission, the European defence industry accounts for a €100 billion turnover and generates 1.4 million direct and indirect jobs,⁴ and the industry is also an important driver for prosperity and innovation. Skill shortages and mismatches could undercut the European defence industry's capacity for innovation and ultimately, Europe's military, industrial and technological competitiveness.

As part of the wider Commission project to develop a European defence sector skills strategy, an analysis of the supply of and demand for skills as well as the drivers of skills gaps and shortages in the defence sector was conducted, in order to understand the challenges encountered by the defence industry in accessing the necessary supply of skilled talent.⁵ Specifically, evidence shows that the European defence sector faces skills gaps, shortages and mismatches not only in the general engineering skills required of graduates entering the labour market, but also in terms of more specialised defence technical and domain-specific skills. Furthermore, the sector encounters mismatches in skills relating to new technologies and the soft skills required of successful defence-specific project managers. Ensuring access to an adequate supply of skills within the European defence technological and industrial base (EDTIB), which a

¹ Cauzic, Francois, Helene Colas, Nathalie Leridon, Sofiene Lourimi & Elisabeth Waelbroeck-Rocha. 2009. 'A comprehensive analysis of emerging competences and skill needs for optimal preparation and management of change in the EU defence industry.' Eurostrategies. As of 20 December 2018:

<https://www.eda.europa.eu/docs/default-source/procurement/14-cps-op-030-q-a-nr1-annex-1-97-skills-report-vf-1.pdf>; Bekkers, F., M. Butter, E. Anders Eriksson, E. Frinking, K. Hartley, M. Leis, M. Lundmark, H. Masson, A.

Rensma, T. van der Valk & G. Willemsen. 2009. 'Development of a European Defence Technological and Industrial Base.' European Commission.

² Galai, Katerina, Lucia Retter, Julia Muravska, Marta Kepe, Alice Lynch, Anna Knack, Jacopo Bellasio, Antonia Ward, Sofia Meranto, Davide Maistro, Liga Baltina & Terence Hogarth. 2019. *Vision on defence-related skills for Europe today and tomorrow*. European Commission, EASME/COSME/2017/014. As of 28 January 2019: https://eu-ems.com/event_images/Downloads/1%20Main%20report.pdf, p.35.

³ Ibid., p.35.

⁴ European Commission. 2017d. 'Blueprint for Sectoral Cooperation on Skills: Responding to Skills Mismatches at Sectoral Level.' As of 28 September 2018: <http://ec.europa.eu/social/main.jsp?catId=1415&langId=en>

⁵ Galai et al. (2019) op. cit.

Knowledge and Innovation Community (KIC) might in future help to support, is made difficult by a number of challenges including:⁶

- Fragmentation of efforts regarding defence-related skills in the EDTIB (e.g. across different nations or companies), which results in missed opportunities to exploit economies of scale and in inefficient duplication of effort;
- Insufficient coordination amongst European industry stakeholders, and between industry and public authorities, which has sometimes limited the effectiveness of skills initiatives undertaken by both parties;
- Strict division of labour between national ministries of defence and education, which detracts from efficient policy ‘ownership’ of defence skills issues and can lead to duplication of governmental efforts to address skills mismatches in the European defence sector.

The defence sector has also traditionally experienced challenges accessing certain funding instruments available to civilian industries, due in part to the negative public perception of the defence sector as well as other factors.

The pursuit of defence-related skills development through a potential KIC could therefore contribute towards the enhancement of Europe’s innovation potential. KICs are multi-stakeholder, pan-European partnerships that are managed by the European Institute of Innovation and Technology (EIT), an independent body set up by the European Commission in 2008 to support innovation and entrepreneurship across Europe (a more comprehensive overview of the KIC model is given below). Recognising this innovation potential, this annex has been prepared in the context of the European Defence Action Plan (EDAP) requesting the exploration of further measures to improve the knowledge and innovation base.

In the past decade a series of EU and national policy initiatives has focused on the role of skills as a key part of European defence industrial competitiveness. The skills aspect was progressively developed in successive EU policy documents, and the 2016 EDAP signalled the European Commission’s pledge to support the implementation of measures and initiatives to address defence industry skills needs. Furthermore, recommendations for a KIC on defence or on dual-use (i.e. technologies, products and services that have both military and civilian applications) are relevant to the Commission’s innovation strategy and policies. In 2012, the European Commission launched the *A Stronger European Industry for Growth and Economic Recovery Action Plan*, which sought to develop improved demand-side innovation policies that increase the uptake of innovations in society.⁷ Additionally, it was noted that a possible KIC on defence or on dual-use could make considerable contributions to the Commission’s Innovation Union flagship initiative, in line with the *Europe 2020 Strategy* for smart, sustainable and inclusive growth.⁸

A Working Group on the Knowledge Triangle⁹ – Knowledge and Innovation Community (KIC) on Defence or Dual-use (WG KIC) was therefore set up in 2018 to consider the potential relevance of establishing a KIC in the defence context. The WG KIC comprised experts from European defence and

⁶ Ibid., p. 69

⁷ European Commission. n.d. ‘Demand-side policies for innovation.’ As of 27 March 2019: https://ec.europa.eu/growth/industry/innovation/policy/demand-side-policies_nn

⁸ European Commission. n.d. ‘Innovation Union.’ As of 27 March 2019: https://ec.europa.eu/info/research-and-innovation/strategy/goals-research-and-innovation-policy/innovation-union_en

⁹ European Institute of Technology. N.d. ‘Catalysing innovation in the knowledge triangle: practices from the EIT Knowledge and Innovation Communities.’ As of 28 June 2019: <https://eit.europa.eu/collaborate/documents/catalysing-innovation-knowledge-triangle-practices-eit-knowledge-and>

dual-use industry, clusters, innovation organisations and academia. Its objective was to develop two concepts on either a potential KIC on defence or on dual-use technology.¹⁰ This report therefore presents an analysis of these two concepts, each addressing a different area that would potentially benefit from a large-scale knowledge triangle partnership such as a KIC. Each KIC concept includes inter alia the proposed business model, addresses its envisaged education and training component, defines potential business and skills targets and activities, and proposes the sets of partners that would need to be engaged for its successful implementation should the KIC be taken forward. However, it should be noted that establishment of either KIC concept is likely to be a long-term goal, which therefore places limitations on the level of specificity and content of the proposed approaches presented within this annex. The two KIC concepts presented are based on current conditions and no future scenarios are considered.

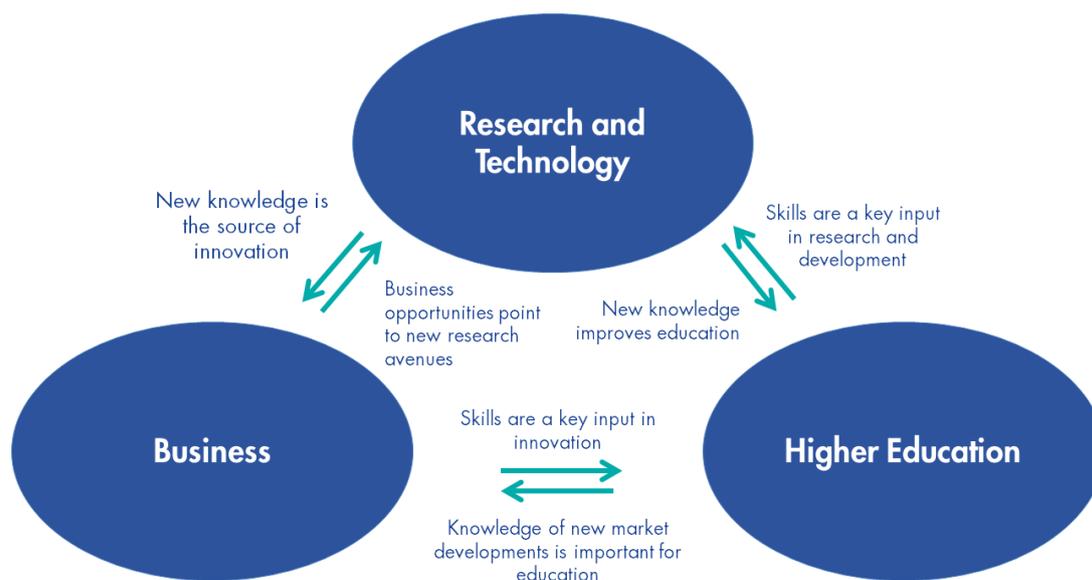
Nevertheless, it is likely that European needs and requirements in relation to both defence and dual-use technology will be subject to significant change in the medium to long term and it is essential that any future potential KIC is responsive to such change. Therefore, it will be critical to leverage the available expertise and the ‘bottom-up’ innovative capabilities of the various actors that make up the knowledge triangle if and when either of the two concepts are pursued in future.

B.1.1. Introduction to Knowledge Innovation Communities

KICs are innovation platforms managed by the EIT that pursue a combined approach embedding education and skills development within their wider innovation work. KICs are multi-stakeholder, pan-European partnerships that assemble businesses, research centres and universities for long-term collaboration on a unified strategic objective that addresses a particular societal challenge. KICs are based on integrating the so-called ‘knowledge triangle’: comprising the three elements of higher education, research and business (see Figure B.1). Long-term collaboration amongst this diverse assemblage of stakeholders is envisaged to engender trust, mutual learning and the effective coordination of resources and capacity. The importance of trust was particularly highlighted during interviews and stakeholder engagement, and is recognised as being necessary if the open innovation model is to harmonise with the defence sector’s own particular innovation culture, which is characterised by high levels of regulation, sensitivities over national security, and restricted processes.

¹⁰ Dual-use items are goods, software and technology that can be used for both civilian and military applications.

Figure B.1. The Knowledge Triangle



Source: EIT (N.d.) *Op cit.*

As of February 2019, there were six KICs in operation: the Digital-KIC, Health-KIC, InnoEnergy-KIC, Climate-KIC, Food-KIC and RawMaterials-KIC. Two new KICs, EIT Manufacturing and EIT Urban Mobility, are also entering their start-up phases in 2019. The EIT *Strategic Innovation Agenda (SIA) 2021–2027* has identified a number of new areas of strategic focus, including security and resilience; inclusion, integration and migration; water, marine and maritime; and the cultural and creative industries.¹¹ The EIT plans to take the total to 13 EIT KICs, creating entrepreneurship and innovation hotspots across Europe up until 2027.¹² In preparation for its upcoming FP9 research and innovation framework programme, the European Commission will also be producing a legal proposal for the EIT SIA 2021–2027 that builds on the EIT proposed strategic agenda.¹³

B.1.2. Organisational structure and governance

While KICs operate under the EIT, each holds a significant degree of autonomy and is an independent legal entity in its own right, with its own Chief Executive Officer (CEO) and the power to establish its own legal status, mechanisms, processes and working methods.¹⁴ This high level of autonomy creates an environment conducive for experimental research, while fostering the technical and entrepreneurial talent required for commercialising innovation. The role of the EIT is then to provide talented individuals from the scientific and technological community with entrepreneurial education. The EIT also supports communication and coordination between stakeholders, and helps to identify resources for the KICs. The

¹¹ (Government webpage) EIT. n.d.a. 'EIT Strategy 2021–2027.' Eit.europa.eu. As of 21 January 2019: <https://eit.europa.eu/eit-strategy-2021-2027>

¹² Ibid.

¹³ Ibid.

¹⁴ (Government webpage) EIT. n.d.b. 'What makes KIC KIC?' Eit.europa.eu. As of 21 January 2019: <https://eit.europa.eu/activities/innovation-communities/what-makes-kic-kic>

EIT Governing Board and Executive Committee strategically oversee the selection procedure for the KICs and ensure alignment between the strategic objectives of the EIT, the Commission and the KICs.¹⁵

Within each KIC, the Governing Board is comprised of the CEO and members of the KIC.¹⁶ These usually include those individuals that led the drafting of the proposal for each KIC, and KICs can differentiate between full and associate members depending on their relative input. Full members may have higher membership fees and no cap on the potential returns on investment, whereas associate members may have lower membership fees and a cap on returns on investment.

Each KIC also has access to a small number of co-location centres with physical sites in various cities in Europe. This is seen as being conducive to building symbiotic networks and linkages and allowing members easy access to local KIC services. The EIT also encourages inter-KIC cooperation in order to further maximise synergies and cross-pollinate knowledge and expertise between the communities.

B.1.3. Funding, monitoring and evaluation

The EIT offers a ‘smart funding’ model in which it provides up to 25 per cent of the budget for a KIC and the KIC is expected to leverage co-financing mechanisms and other public, private and third sector revenue streams for the remaining share.¹⁷ It is thereby expected that an innovation community will attract further funding beyond its partners’ revenues and ultimately become financially sustainable.¹⁸ For example, the Climate-KIC receives an annual grant, as well as funding from public and private partners.¹⁹ The Health-KIC receives fees from all 140 of its core and associate partners.²⁰ EIT InnoEnergy also generates revenue through its investment in products, services and start-ups developed by the relevant KIC. Rather than committing to substantive funding investments, the EIT therefore acts as a catalyst to integrate several financial resources together.

Another key aspect of the KIC model is the high degree of prioritisation it places on results-oriented evaluation and monitoring. This is in order to ensure that the activities of KICs and partners are aligned with the stated strategic goals – including consideration of whether the intended impacts have been accomplished, whether plans and budgets have been suitably justified and whether good practice has been adhered to during the course of a given project. To support institutional learning across the KICs, the EIT also creates mechanisms that are aimed at capturing good practice identified from disparate initiatives and sharing them with relevant stakeholders across the KICs. This strategy is geared at reinforcing capacity and performance where it is required.²¹ Survey and peer evaluation data on project results, and impact thereof, is also collected systematically and standardised across KICs to ensure clarity on targets and deliverables and to accurately measure relevant indicators. Monitoring is thus designed to

¹⁵ (Government webpage) EIT. 2016. ‘On the rule of procedure of the EIT Governing Board and Executive Committee.’ Eit.europa.eu. As of 21 January 2019: https://eit.europa.eu/sites/default/files/gb_decision_8-2016_revised_rules_of_procedure.pdf

¹⁶ Ibid.

¹⁷ (Government webpage) EIT. n.d.c. ‘EIT funding model.’ Eit.europa.eu. As of 21 January 2019: <https://eit.europa.eu/eit-funding-model>

¹⁸ Ibid.

¹⁹ (Government webpage) Climate-KIC. n.d. ‘Our organisation: how are we organised?’ Climate-KIC.org. As of 21 January 2019: <https://www.climate-kic.org/who-we-are/our-organisation/>

²⁰ (Government webpage) EIT Health. n.d. ‘EIT Health.’ EIT.europa.eu. As of 21 January 2019: <https://eit.europa.eu/eit-community/eit-health>

²¹ (Government webpage) Council of the European Union and the European Parliament. 2013. ‘Decision No 1312/2013/EU of the European Parliament and of the Council of 11 December 2013 on the Strategic Innovation Agenda of the European Institute of Innovation and Technology (EIT): the contribution of the EIT to a more innovative Europe.’ Publications.europa.eu. As of 21 January 2019: <https://publications.europa.eu/en/publication-detail/-/publication/1784f5db-6c06-11e3-9afb-01aa75ed71a1/language-en>

be continuous, adaptive and bespoke,²² which is perceived as crucial for the continuous improvement of processes. Examples of monitored metrics vary from project to project, but could include: the creation of new businesses, products and services; the measured increase in skilled personnel or job opportunities; and benchmarking of the KICs' performance against relevant international practices and recognised standards.²³

B.1.4. Activities and functions

Any potential KIC can be designed to incorporate a range of functions to support the commercialisation of innovation and the integration of the knowledge triangle. This can include:

- Identification of market opportunities
- Investing and fundraising
- Training for business development
- Education through technical and vocational training that results in accredited degrees
- Support for business planning
- Provision of networking and outreach opportunities.

Notwithstanding this flexibility, a common critical feature of the KIC organisational model is the premium it places on education and training as a driver of innovation.²⁴ KICs offer educational programmes that combine technical, scientific and entrepreneurship skills and mentoring on how to commercialise innovative ideas. The aim is not only to equip students with the technical skills required, but also to help them bridge the gap from being students or academics to becoming successful entrepreneurs.²⁵ Furthermore, EIT-labelled qualifications are intended to help stimulate international recognition of EIT-labelled degree graduates.

Crucially, another key activity of any KIC is its role in institutionalising continuous learning about 'what works' through the evaluation and feedback mechanisms discussed above. KICs develop feedback mechanisms such as evaluations to ensure that what works and what does not is identified and shared rapidly between stakeholders. It is hoped that learning from success and failure will ensure that the best innovation practices and capacity building efforts operate in a synergistic, positively reinforcing loop that continuously increases the ability of the EU to excel at innovation.

²² (Government webpage) EIT. n.d.d. 'Monitoring and assessment.' Eit.europa.eu. As of 21 January 2019: <https://eit.europa.eu/monitoring-and-assessment>

²³ Council of the European Union and the European Parliament (2013) op. cit.

²⁴ EIT (n.d.a.) op. cit.

²⁵ (Government webpage) EIT Digital. n.d. 'EIT Digital Annual Report.' Eitdigital.eu. As of 21 January 2019: https://www.eitdigital.eu/fileadmin/files/2018/publications/EIT-Digital_Annual-Report-2017.pdf

B.2. Two concepts for a potential KIC on defence or on dual-use technology

This annex presents concepts for two separate KICs with a focus respectively on defence technologies and skills and on dual-use technologies and skills. The selection of these specific cases by the Commission for further investigation illustrates the recognised need for action across the EU in these two areas, with this annex providing the detail justifying the case for each. Inherently, of course, there will be some overlap between the two proposals, as dual-use technologies and skills include a sub-set of elements that relate to defence and civilian applications.

The two concepts have been developed through a review of the evidence and analysis of the wider ‘Defence-related skills: Building evidence on skills shortages, gaps and mismatches and defining the sector's strategy on skills’ project, a review of EIT and KIC documentation, interviews with KIC stakeholders, and an iterative, collaborative working process with the WG KIC, partially through an in-person workshop in Brussels and partially through written communication. Furthermore, the KIC concepts have been informed by available academic thinking and the knowledge of industrialists across Europe. Consequently, they reflect both generally applicable features of innovations systems theory as well as relevant theories of the education and skills sectors. Building on the best understanding of skills and innovation systems provides the firm foundations that increase the likelihood of these concepts succeeding, assuming one or both of them are taken forward, as well as of successfully achieving the outcomes of improved indigenous defence and security for the EU.

Specifically, the two concepts presented in this report are:

1. A Concept for a KIC on Defence: The concept of the defence KIC is to **increasingly embed the principles of open innovation, knowledge exchange and learning in the defence sector, whereby the conditions for exchange between key actors is increased** – be that between companies, government, the military and academia, between sub-sectors within defence, or ultimately between countries. This is a radical change from the current fragmented nature of the defence sector and would consequently need to evolve with care and consideration, respecting the security sensitivities inherent to this sector. The key focus is to enhance the defence sector through the sharing of best knowledge and practice, which could include absorbing both from the civil sector.
2. A Concept for a KIC on Dual-Use Technology: The concept of the dual-use KIC is to **increase the interchange of skills and innovation across sectors** such that they constructively blur the distinction between ‘defence’ and ‘civil’ to the benefit of all participants. The change here is to encourage more actors to exploit the full spectrum of opportunities for learning, innovation and the application of new technologies, and thus to increase their market opportunities. This means understanding and responding to the needs of sectors in which they hitherto may not have operated. The key focus is to enhance the integration of sectors traditionally defined as defence and civil through the sharing of best knowledge and practice to the betterment of both sectors.

Each of these concepts is presented in greater detail in the next two sections, following a similar structure to the KIC concepts presented in the EIT Strategic Innovation Agenda and the KIC business plan structures.²⁶ The two concepts are presented in five sections:

1. The challenge, outlining the societal challenge that the KIC concept could help address;
2. The envisioned Knowledge and Innovation themes for the KIC concept, outlining the areas of potential focus for the KIC;
3. Envisioned activities, outlining the activities, including education and training components, that the KIC could undertake;
4. Membership and partners, featuring an overview of the possible membership and partnerships for the KIC concept;
5. Synergies and complementarities with existing initiatives, outlining synergies with existing KICs and other EU instruments.

Each of the two concepts has been developed in line with the EIT's guidance on developing new thematic areas for potential future KICs, where the thematic concepts are left intentionally broad in order to harness the bottom-up innovation capabilities of the experts in the field at the point of their development and implementation. As such, they do not represent a fully comprehensive nor definitive roadmap to implementation, but rather recognise that full elaboration of these initial concepts would be required as part of a bottom-up approach, should one or both concepts be taken forward in future.

In addition, for each KIC concept the following two sub-sections discuss:

1. The potential implementation pathway, featuring a discussion of the possible business models for the KIC concepts;
2. Relevance and potential impact, outlining the business case and potential benefits of pursuing a defence or dual-use KIC concept.

B.2.1. Potential implementation pathway

As already noted, the development and implementation of KICs are guided by the EIT. The Institute sets out the thematic areas and societal challenges that new KICs should address in the EIT Strategic Innovation Agenda (SIA). The current SIA covers the time period 2021–2027 and comprises the EIT's future role and position in the Horizon Europe Framework Programme for Research and Innovation.²⁷ Specifically, the draft strategy covers four potential thematic areas for future KICs:

1. Security and resilience
2. Inclusion, integration and migration
3. Water, marine and maritime
4. Cultural and creative industries.

These thematic areas were intentionally left broad by the EIT to enable the KICs themselves to decide where and how the biggest impact can be achieved, as well as to empower and ensure buy-in from the consortium and the partners engaged in implementing the KICs.

The implementation of a KIC on defence or dual-use would begin with the inclusion of the concept in the next revision of the SIA, feasibly within either of the next two EU multi-annual financial framework periods (i.e. 2021–2027 and 2028–2035). The EIT is also exploring the option of an open call for societal

²⁶ See, for example: <https://eitrawmaterials.eu/business-plan-2019/>

²⁷ EIT (n.d.a.) op. cit.

challenges to be proposed bottom-up by innovation stakeholders in order to remain flexible and adaptive to emerging requirements, which may enable the ad hoc creation of KICs outside the thematic areas outlined in the SIA.²⁸ The next step would be to open a call for proposals so that different consortia, formed of core groups of educational, research and industry partners in defence, could come together to submit their proposal for a KIC on defence. Based on broad guidance for the KIC in question,²⁹ bidding consortia would be asked to develop their own objectives and expected impact, specify the associated business model, and devise a structure to deliver the results envisioned through their conceptualisation of the KIC. This would take place through an open competitive procedure led by the EIT and assessed following the technical and other evaluation criteria set by the EIT Governing Board.

The successful consortium would receive a mandate from the EIT to set up the KIC on defence or dual-use and would initially have seven years to deliver their expected results, which could be further extended to up to 15 years in total. In the initial phase of setting up the KIC, the consortium would have to undertake several key initial activities, including to:

- Consolidate the consortium
- Develop the KIC strategy
- Set up an interim management team
- Set up a legal entity
- Define the role of the management team
- Identify partners for the KIC.

Particularly important would be the organisational and financial aspects. The consortium would have to agree on the appropriate legal entity for the KIC on defence and how its governance structure should be set up, both which are considerations left purposefully at the discretion of the KIC by the EIT. Existing KICs have set these up in varying ways, as seen in the tables below.

Table B.1. Legal entity structures of existing KICs

KIC	Legal entity type
EIT Climate-KIC	Dutch limited liability company
EIT Digital	Association under Belgian law
EIT InnoEnergy	Societas Europaea
EIT Health	Association under German law (eingetragener Verein (e.V.))
EIT RawMaterials	Limited liability company under German law (GmbH)
EIT Food	International non-profit association under Belgian law

Source: EIT (2017b)

²⁸ (Government webpage) EIT. 2017. 'The Future EIT Strategic Outline'. Eit.europe.eu. As of 21 January 2019: https://eit.europa.eu/sites/default/files/eit_strategic_outline_0.pdf

²⁹ Example guidance for a KIC call for proposals can be found here: https://eit.europa.eu/sites/default/files/framework_of_guidance_2018.pdf

Table B.2. Governance structures of selected existing KICs

KIC	Governance structure
EIT Climate-KIC	<ul style="list-style-type: none"> - Assembly, with one representative from each core partner and two elected affiliate-partner representatives. - Strategically, led by a governing board with representatives of its Innovation Hubs and regional centres. - Operationally, it is led by a CEO and an Executive Team.
EIT Digital	<ul style="list-style-type: none"> - General Assembly of partners that decides on strategic issues and the business plan and elects the Executive Steering Board. - Executive Steering Board includes two core partners from each of the six regional nodes, appoints its chairman, the Innovation Community Chief Executive Officer and the other main officers, and provides guidance to the CEO. - The Management Committee includes the CEO and other key executive officers.
EIT InnoEnergy	<ul style="list-style-type: none"> - Partners' Assembly with Core Partners and Network Partners. - A Supervisory Board leads the Innovation Community's Strategy and supervises the Management Board. - The Management Board, chaired by the Chief Executive Officer, is jointly responsible for managing business and operations, and implementing the integrated Strategic Agenda and annual business plans. - An Intellectual Property Board, a Committee on Ethical, Legal and Social Implications, and a Compliance Committee are additional advisory bodies associated with the Management Board.

Source: EIT (2017b)

As the future composition of the consortium for a KIC on defence is unknown at this stage, it is not feasible to recommend a particular legal entity or governance structure at this point and it would be up to bidding consortia to include these aspects in their respective bids to the EIT.

A sustainable business model and financial plan

The KIC consortium would also have to develop a business plan for the KIC that combines activities and funds from various sources to form an integrated portfolio of innovation work. While the EIT funds up to 25 per cent of the KIC budget, each KIC must aim to become financially sustainable within a period of seven to 15 years after its implementation.

The KIC on defence or dual-use consortium would therefore have to develop a sustainable business model and financial plan that integrates the core EIT funding with other funding sources, as well as clearly articulates the value proposition of the KIC, the assets it could create, the value it could add, and what business opportunities it could help bring its members and wider European society.

Table B.3. Possible sources of funding for a KIC on defence

Funding type	Description
Membership funding	E.g. membership fees from KIC members and partners.
National funding	E.g. national research and innovation grants, regional development

	grants, etc.
Joint programmes	E.g. joint R&D or procurement programmes between participating nations.
International funding	E.g. EU or non-EU funding streams such as EDF, ESF, Erasmus+, etc.
Commercial revenue	E.g. Return on investments, revenue sharing, licensing, equity stakes in start-ups, , selling services and consulting, etc.
Education and skills revenue	E.g. tuition fees, fees for short-term education courses, apprenticeship fees from industry, etc.

Source: EIT (2017b)

As the composition of the KIC on defence or dual-use – and the commercial and education activities it would undertake – ultimately will be decided by the winning consortium, it is not possible to recommend a specific distribution of funding sources at this stage. However, it is likely that a mix of funding and revenue streams would be required for a KIC on defence or dual-use to be successful, and based on the experiences of existing KICs it would be crucial to consider financial sustainability early on in the KIC development process. Moreover, interviewed stakeholders agreed that developing a business model for the financial sustainability of the KIC would be a process to be designed, negotiated and refined in the early phases of the KIC’s establishment, given the various challenges involved.

One interviewee from KIC InnoEnergy described the long-winded process of establishing a KIC and underlined that as one of the first wave of KICs, the main lesson learned was to integrate a plan on the financial sustainability of the KIC from the beginning and to invite external specialists and financial experts to critically assess its feasibility. In KIC InnoEnergy, a product that the KIC has invested in must be in the market within a maximum of 5 years; after this 5-year period, KIC InnoEnergy takes a percentage of the revenue made by the product, whereupon the revenue is re-injected into innovation support services, including technical and entrepreneurship skills development. Rather than provide a lump sum, the KIC pays the ecosystem to help start-ups grow. The interviews also highlighted that the architect of a KIC’s business plan ought to be from the private sector and that the eventual business plan should be constructed in the early phases of the KIC as in order to develop this business model, part of the process involves testing and validating which marketing and other services could be effective at meeting the KIC’s goals, as well as developing the KIC’s credibility to gather enough critical mass to move forward. Although KIC InnoEnergy is part of a small number of Commission-funded projects, the Commission only accounts for around €500,000 of the funding required by the KIC to subsist. Learning from the experience of organisations that have been criticised for ‘eating at too many plates’ and reaping funding from multiple Commission funding instruments, KIC InnoEnergy selectively picks European funding opportunities considered by the consortium to be of strategic importance (the European Technology and Innovation Platform on Batteries is considered one such example).

Another interviewee from EIT Health described the lengthy, bureaucratic process involved in establishing a business plan and underscored that although funding instruments may be available, a business plan required time to generate because, in the experience of previous KICs, there was insufficient guidance provided. Additionally, every Member State was subject to heterogeneous legal and regulatory constraints, making the process of designing the business model more complex. Moreover, in the inception phase of the EIT, political buy-in had to be taken into consideration as the education aspect of the KIC model was not equally well-received across the various Member States. Some countries, for example, sought to resist the possibility of the Commission playing a role in national education policy. In EIT Health, ideas for the

business plan were designed by suggesting activities for independent expert review, which were then funnelled into the concept business plan, followed by the formation of the team for the embryonic KIC. Following the proposal on the business plan and the team, a feasibility assessment is undertaken and only then is the business plan conceptualised – including identification of which activities will be undertaken and linking them to the strategic plan of the KIC as established by the consortium. To help fund the set-up of EIT Health before the mature business plan was developed, EIT Health was therefore established as an association that asked for a membership fee of 10 per cent of revenues to fund overhead costs.

B.2.2. Relevance and potential impact of implementing a KIC on defence or dual-use

One of the findings of the *Vision* report³⁰ is that the defence innovation ecosystem across the EU is fragmented and incoherent, with comparatively limited experience of working across national and institutional boundaries to deliver defence innovation as a pan-European activity. The discussions during a Working Group KIC workshop underlined that as EU funding has not traditionally been used for directly promoting defence innovation, there is a lack of a mature ecosystem of actors, institutions and processes to provide the capacity required to immediately increase trans-boundary innovation performance across Europe to meet defence needs. Thus, the European defence innovation ecosystem was expressed by the Working Group KIC as currently lacking the institutions and mechanisms, or awareness of such, needed for different actors of different nationalities to work together on a range of different defence innovation topics. Collaboration across EDTIB stakeholders should therefore be focused on skills and knowledge transfer and development and should not be limited to only technical aspects.

Within this context, establishing a KIC on defence or dual-use could generate significant benefits across a range of impact areas. In summary, a KIC on defence or dual-use could:

- Formally recognise the European defence industry's contribution to societal challenges through the endorsement of the European Commission;
- Contribute to the institutionalisation of open innovation in the culture of the defence industry;
- Catalyse cooperation between the defence sector and other sectors represented by other KICs;
- Enable the consolidation of mixed funding streams;
- Offer access to infrastructure (such as prototyping, demonstration lines, laboratories and test facilities) that supports the acceleration of defence innovation and the creation of new businesses and start-ups;
- Support strategic alignment by formulating definitions, focus areas, milestones, incentives and concrete measures that hold members accountable to the EIT and members of the KIC, incentivising them to pursue these defence-specific focus areas;
- Further develop and sustain an appropriate and future-proof skills base in Europe able to meet the capability requirements of European defence and security stakeholders;
- Contribute to increased visibility and synergy across civil-military research, thereby creating stronger linkages and partnerships.

³⁰ Galai et al. (2019) op. cit.

By addressing all the areas above, a defence-related KIC could contribute to the creation of an environment that is conducive to developing the skills required by the defence industry to support innovation, due to the emphasis on strategically oriented educational initiatives as part of the KIC model. By enhancing the EDTIB's capacity for innovation and knowledge, as well as strengthening its competitiveness in this manner, a range of direct or indirect benefits to the development of defence-related skills could be captured.

B.3. Concept for a KIC on defence

B.3.1. The challenge

As per the EIT KIC guidelines, a KIC has to address a societal challenge. The *2016 Global Strategy for the European Union's Foreign and Security Policy* recognises that Europe is encountering times of existential crisis, both within and beyond the EU.³¹ The Strategy highlights a number of security challenges that threaten the unprecedented peace, prosperity and democracy to which the European project has contributed to, including geo-political security tensions in the east and south of Europe, terrorism, climate change and technology-associated challenges such as cybersecurity.³²

Since 2016, the importance of a strong Europe that can defend and protect its citizens at home and abroad has also been stressed together with an increased emphasis on the importance of innovating and pooling resources in the European defence industry. At the launch of the European Defence Action Plan, European Commission President Jean-Claude Juncker stressed that European collective security will require ongoing investment in the common development of technologies and equipment of strategic importance, as well as more cooperation between Member States and greater pooling and sharing of national resources.³³ According to European Commission, the European defence industry could risk having insufficient technical ability or skills to ensure an adequate supply of defence capabilities able to meet current and future security challenges, as well as to compete on global export markets, without sustained investment in the EDTIB supported by the EU and by Member States.

There is also a fiscal and economic case for further strengthening cooperation, skills and innovation across the EDTIB. The Commission estimates that the lack of cooperation between Member States in the field of defence and security costs between €25 billion and €100 billion annually.³⁴ The fragmented approach in the EDTIB contributes to unnecessary duplication of efforts and may lead to a sub-optimal use of skills and reduce the innovation capacity of the European defence industry and therefore also of the armed forces. A KIC on defence could therefore assist the EU in addressing the societal challenge of ensuring the ongoing safety and security of the Union, as well as contributing to the economic well-being of Europe more widely. While a KIC on defence could appear to overlap with the proposed KIC on 'Security and Resilience', the EIT explicitly states that 'international security issues, military defence and actions concurrent to armament development – addressed by national or European level defence policies – are not considered to be part of the theme [of that KIC]'.³⁵ These issues could therefore be better addressed by a defence-specific KIC.

B.3.2. Envisioned knowledge and innovation themes

In developing a KIC concept for defence, the WG KIC explored how the European Commission could support the full range of actors to build the capacity of the EU as a whole to deliver defence innovations

³¹ (Government webpage) European External Action Service. 2016. 'Shared Vision, Common Action: A Stronger Europe.' As of 31 January 2019:

https://europa.eu/globalstrategy/sites/globalstrategy/files/regions/files/eugs_review_web_0.pdf

³² European External Action Service (2016) op. cit.

³³ (Government webpage) European Commission. 2016. European Defence Action Plan: 'Towards a European Defence Fund.' As of 31 January 2019: http://europa.eu/rapid/press-release_IP-16-4088_en.htm

³⁴ (Government webpage) European Commission. 2017b. 'A European Defence Fund: €5.5 billion per year to boost Europe's defence capabilities'. As of 29 January 2019: http://europa.eu/rapid/press-release_IP-17-1508_en.htm

³⁵ (Government webpage) EIT. n.d.e. 'Potential Future EIT Thematic Areas – Input to the EIT Strategic Innovation Agenda 2021–2027.' As of 19 January 2019:

https://eit.europa.eu/sites/default/files/eit_potential_future_thematic_areas.pdf

that would give it the necessary military and commercial advantages to support its long-term strategic and policy objectives. A key prerequisite of successful collaboration in defence is trust and mutual confidence among participating members. This is an integral aspect that can only be built over time and which depends on clearly articulating the aims and objectives of any given collaboration, as well as practically demonstrating added value throughout the lifespan of the project or projects in question.

As such, the WG KIC emphasised that a KIC on defence should be created around three core tenets particularly relevant to defence stakeholders in Europe:

1. The defence innovation capacity of the EU must be built upon a solid base of skills and knowledge exchanged among the full range of actors in the innovation ecosystem.
2. Defence innovation themes should be used to demonstrate how a defence KIC could generate real tangible solutions for real defence or military problems.
3. There needs to be continuous learning about 'what works' through evaluation and feedback mechanisms to share these outputs with all actors.

While these tenets could be applicable to other KICs or other concepts, these are the core enabling features for a successful KIC on defence as articulated by the WG KIC. For a KIC on defence to be considered successful and for actors, in particular governments, to lend their active support, the KIC would need to deliver product and service innovations that materially improve defence capabilities and outcomes in a timely and cost-efficient manner, whilst also increasing the potential for exports. These innovation themes could be oriented around technologies, defence requirements or perhaps even capacity building needs. As these themes are highly dependent on the strategic, political and business priorities of the day, it is essential that a potential KIC on defence adequately analyses and articulates the themes most relevant and productive for the KIC's vision and its current operating environment. It is also important to approach the set-up of the KIC in an iterative manner. The type and content of the KIC activities should be reviewed and revised as appropriate throughout the implementation of the KIC in order to ensure that activities meet the current and future needs and requirements of the stakeholders. Likely areas for defence innovation themes could include, but are not limited to:

- Technology-led themes, for example artificial intelligence, so that the defence sector can identify how to apply the wider benefits of this technology to real defence problems and opportunities.
- Capability- or requirements-led themes, for example illustrating how the collective expertise of the range of defence actors can generate options and solutions against a defence capability need.
- Capacity-led themes, for example selecting an area for intensive capacity building to rapidly improve the capacity of the overall innovation and skills ecosystem (e.g. 'entrepreneurship' or 'attractiveness of defence to those in full-time education').

To clearly align the activities and focus areas of the KIC on defence, as well as to demonstrate its practical value, there would need to be a significant investment in continuous learning, evaluation and feedback mechanisms. Programmes that grow skills and capacity would need to show how they benefit the delivery of actual innovations and timely, tangible outputs. These innovations need to be used to enhance the overall capabilities and capacity of the ecosystem rather than simply delivering new products and services. As these activities operate in parallel there must be evaluation and feedback mechanisms that ensure that what works (and what does not) is identified and shared rapidly amongst the different actors involved.

B.3.3. Envisioned activities for a KIC on defence

The final set of activities to be undertaken by the KIC on defence would be articulated and proposed by the consortium ultimately awarded the mandate to develop and implement any such KIC. However, the basis for a KIC on defence, from a skills and innovation perspective, should be further anchored in the SOs/SAs identified through this wider project and articulated in the new European sectoral skills strategy for defence. As seen in Table B.4, a KIC on defence could contribute to four of the five strategic objectives, as well as several specific education and training components.

Table B.4. Overview of how a KIC on defence could help achieve identified SOs and SAs

Strategic Objectives (SOs) / Supporting Actions (SAs)	Description
<p><i>SO1: Reinforce a strategic focus on skills in defence industrial regulation and policymaking</i></p>	
<ul style="list-style-type: none"> • SA1: Formulate national strategic and future-oriented visions for defence-related skills • SA2: Include pathways for skills development and knowledge exchange in national and collaborative research and capability programmes 	<p>Not applicable to KIC.</p>
<ul style="list-style-type: none"> • SA1: Facilitate continued collaboration between experts and stakeholders for sharing good practice and lessons learned 	<p>A KIC on defence could provide a European Commission-supported platform for collaboration between the various stakeholders in the European defence knowledge triangle. The KIC model could be particularly beneficial in relation to the potential establishment of regional innovation centres that could help bridge regional clusters of expertise and contribute to further pan-European collaboration.</p>
<ul style="list-style-type: none"> • SA2: Build on existing and emerging mechanisms to better match the supply of and demand for defence-relevant skills 	<p>A KIC on defence could bring together the defence knowledge triangle to better inform the European defence skills landscape, particularly by developing fora or platforms to connect current and existing initiatives for skills matching with the stakeholders in the defence knowledge triangle, the European Commission and the demand-side of the sector (e.g. national governments and military end-users).</p>
<p><i>SO3: Raise the attractiveness of defence industry</i></p>	
<ul style="list-style-type: none"> • SA1: Adopt and drive new behaviour within the industry to reflect prevalent employment practices in high-tech industries 	<p>A KIC on defence could help drive a wide range of innovation and entrepreneurship activities that could help generate breakthroughs in the way in which business, higher education and research collaborate in defence. A core aspect of KICs is to combine sectoral and cross-sectoral innovation and bring together people from different sectors,</p>

<ul style="list-style-type: none"> SA2: Communicate the advantages associated with a career in defence as a high-tech player to young people <p>SO4: Maximise the skills transferability across the industries</p>	<p>backgrounds and disciplines, who otherwise would not work together, to jointly find solutions to challenges by developing innovation projects.</p> <p>A KIC on defence could help promote careers in defence through a number of education and communications interventions. A KIC on defence could engage in competitions, awards and/or internship/apprenticeship programmes to enable young Europeans to engage with the defence sector early on in their education or career. A forward-looking and innovation-focused KIC on defence may also help attract young talent in a competitive labour market.</p>
<ul style="list-style-type: none"> SA1: Develop joint skills and knowledge exchange projects between industry, government and academia SA2: Enable a more dynamic specialisation for training and education institutions in defence-related courses by establishing a standardised EU-level accreditation system <p>SO5: Leverage and adapt existing and future funding tools</p>	<p>This is a core activity of the existing KICs and a KIC on defence could particularly contribute to joint skills and knowledge exchange projects between the knowledge triangle stakeholders. This could encompass short training courses, university degrees, research programmes at the doctorate level, and online training courses. In contrast to other KICs, a KIC on defence would require closer collaboration with the end-user/customer community (i.e. governments and militaries) to ensure the relevance of the KICs' activities and outputs to evolving defence needs, which is traditionally not a dimension included in the knowledge triangle concept.</p> <p>A KIC on defence could assist in developing professional certifications for prioritised defence skills or professions. The KIC could also develop so-called 'EIT-labelled' education programmes at the university level in order to promote standardised EU-level accreditation for defence-related education.</p>
<ul style="list-style-type: none"> SA2: Optimise and create future defence-relevant skills development and sustainment funding opportunities 	<p>KICs are designed to help develop new products, services and business models. Further core aspects of KICs include fostering the development of new businesses, organising European-wide specialised business support and accelerating the time to market for new products and services. A KIC on defence could therefore substantially benefit the European defence sector and the EDTIB in terms of how best to optimise future funding opportunities and create new ones, including also for SMEs.</p>

As indicated in Table B.4, there are a number of potential ways a KIC on defence could support the wider European sectoral skills strategy. Table B.5 features an overview of specific types of mechanisms that a KIC on defence could engage in to help deliver the SOs and SAs presented above, beyond the

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initial organisational set-up and consolidation of the KIC itself. The table also features examples of activities that existing KICs are currently engaged in.

Table B.5. Possible mechanisms on skills, structures and culture for a KIC on defence

Mechanisms	Example activities from existing KICs
Mechanisms for identifying different innovation needs	EIT Climate identifies the market potential of emerging technologies for the sector. ³⁶ In other knowledge triangles, this could include feedback mechanisms such as evaluations, surveys or fora or a unified business strategy for a particular cluster.
Mechanisms for sharing knowledge	EIT RawMaterials encourages exchanges for knowledge transfer across different disciplines and businesses. ³⁷ Events such as regular meetings or conferences can also contribute to knowledge transfer relating to good practices and lessons learnt.
Mechanisms for exchanging talent	EIT Climate links research, technology and business to identify ways of mitigating or adapting to climate change and accelerating solutions to market. ³⁸
Mechanisms for accessing infrastructure	EIT RawMaterials fast-tracks start-ups and may provide them with infrastructure that supports commercialisation of business ideas. Defence companies could open their facilities to small and medium-sized enterprises (SMEs) for prototyping, demonstration lines, lab test facilities and pilot lines support. ³⁹
Mechanisms for bringing together different types of actors to co-produce innovation	EIT Food encourages participation in a yearly food trust barometer. ⁴⁰ These regular and institutionalised mechanisms could support more alignment between demand and supply and agile adaptation according to consumer views.
Mechanisms for developing the pipeline of talent into the defence sector	EIT Digital has three pan-European schools in entrepreneurial digital education programmes that provide technical as well as innovation and entrepreneurship education. ⁴¹ An accredited training module that legitimises graduates to work in the defence industry could enhance the pool of talent. EIT Health offers courses for surgeons who want to

³⁶ (Innovation institution webpage) EIT Climate. n.d. 'Our organisation: how are we organised?' As of 20 February 2019: <https://www.climate-kic.org/who-we-are/our-organisation/>

³⁷ (Innovation institution webpage) EIT RawMaterials. n.d. 'Strategic Agenda 2018–22 of EIT RawMaterials.' As of 20 February 2019: https://eitrawmaterials.eu/wp-content/uploads/2018/10/2018_10-31_EITRM_Strategic-Agenda_2018_2022_A4_.pdf

³⁸ EIT Climate (n.d.) op. cit.

³⁹ EIT RawMaterials (n.d.) op. cit.

⁴⁰ (Innovation institution webpage) EIT Food. n.d. 'Bridging the trust gap in the food sector.' As of 20 February 2019: <https://www.eitfood.eu/news/post/bridging-the-trust-gap-in-the-food-sector>

⁴¹ (Innovation institution webpage) EIT Digital. n.d. 'Annual report 2017.' As of 20 February 2019: https://www.eitdigital.eu/fileadmin/files/2018/publications/EIT-Digital_Annual-Report-2017.pdf

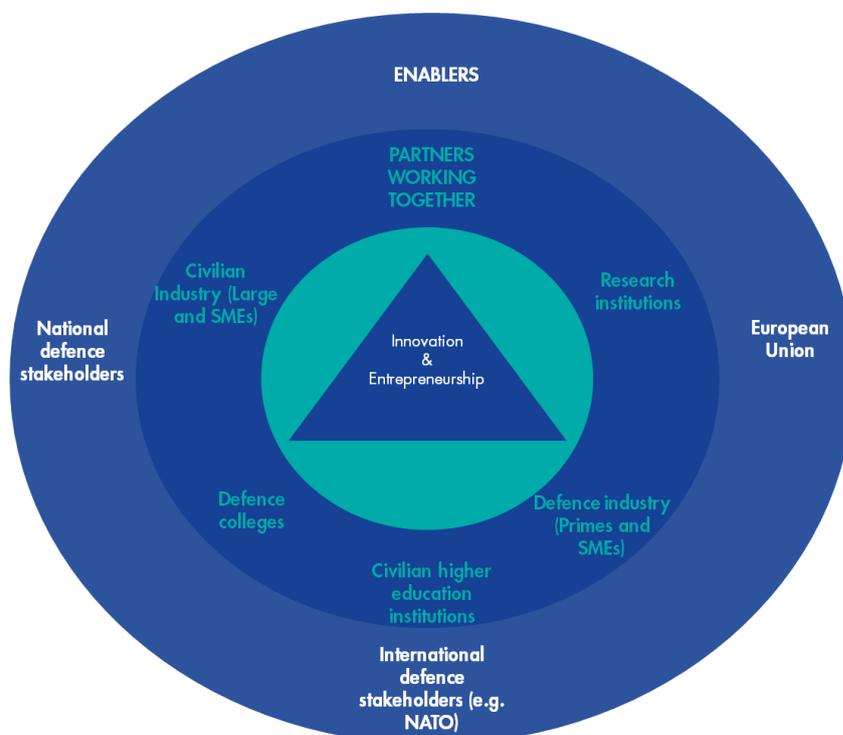
learn about new technologies that their hospitals do not pay for, which could for example be replicated as a course on emerging technologies for defence manufacturing.

B.3.4. Membership and partners

A potential KIC on defence would need to incorporate members from across the knowledge triangle, which includes the defence industry and SMEs, defence research organisations, and relevant higher education institutions. By its nature as a KIC, a KIC on defence would also work closely with the European Commission and the EIT. In order to ensure the success of any KIC on defence, it would also be essential that it delivers an appropriate representation and distribution of different partner types, as well as an inclusive representation from across Europe and different EU Member States.

As previously noted, it would in addition be essential that a KIC on defence engages closely with the end-user and customer community, i.e. national ministries of defence, armed forces and other defence organisations, such as the European Defence Agency (EDA) and NATO. This community would be able to advise the KIC on military capability requirements, gaps and current and future procurement plans, which would be necessary for the KIC's activities to remain valuable, timely and relevant to European defence. To this end, Figure B.2 below features an overview of the potential membership and partnership groups for a KIC on defence. While integration of the knowledge triangle is central to all KICs, it is paramount that any KIC on defence focuses on cultivating a membership and partners representative of the defence, and not the civilian, communities.

Figure B.2. Potential configuration of a KIC on defence



Source: RAND Europe based on EIT (2017b) op.cit.

B.3.5. Synergies and complementarities with existing initiatives

The creation of a KIC on defence would require leadership by a significant consortium involving actors from across the European defence ecosystem, as well as an effort to build synergies with other national, regional and European activities in support of defence-related innovation and skills. A distinguishing feature of the synergies of the KIC on defence would be the required cooperation with Member States, military end-users and other European institutions active in the defence domain, in order to ensure that innovation themes and KIC activities are relevant and fit-for-purpose. This would be an essential bond to develop to ensure that the KIC on defence demonstrates practical value to the European defence industry and national governments.

Any future KIC on defence should also explore synergies with other European-funded or led initiatives in the defence domain, including: the European Network of Defence-related Regions (ENDR), the Permanent Structured Cooperation (PESCO), the Preparatory Action for Defence Research (PADR) and the European Defence Fund (EDF), the European Defence Industrial Development Programme (EDIDP), and the range of capability requirement identification and generation activities led by the EDA. From a funding perspective, a KIC on defence could also leverage non-defence-specific European funding instruments, including Horizon 2020, FP9, the European Social Fund (ESF), ESIF, ERASMUS+, and COSME.

Depending on the activities and programmes of work eventually undertaken, a KIC on defence could also explore synergies with the existing and planned KICs that have overlapping aims or activities, including for example KIC Climate, KIC Digital, KIC InnoEnergy, and KIC Manufacturing.

B.4. Concept for a KIC on dual-use technology

B.4.1. The challenge

In recent years, two fundamental shifts have presented significant challenges for European defence: a decline in defence research and development (R&D) spending by governments and a sharp increase in civilian R&D, both in absolute terms and as a proportion of overall research spending.⁴² Since the end of the Cold War, the share of European government spending on defence has experienced an overall decline, particularly in relation to government spending on defence R&D. This means that overall a higher proportion of defence expenditure has been allocated to delivering and maintaining current equipment programmes and capabilities, rather than on innovation and development of new technologies. On the other hand, there has also been a significant shift in R&D and research and technology (R&T) activities from the defence domain to the civilian market. Where once defence departments and national defence institutes were driving radical innovation and scientific breakthrough, defence organisations today have seen their efforts surpassed by global multinational corporations and small, highly specialised SMEs alike.

Additionally, technological change and a surge in civilian R&D spending have increasingly blurred the boundaries between the defence and civilian sectors. Many technologies used by defence or other national security actors are no longer the sole responsibility of governments, but readily available commercially on civilian markets. The prevalence of these types of ‘dual-use’ technologies – such as artificial intelligence, augmented and virtual reality, unmanned systems, robotics, and energy generation and storage technologies – and the growing dominance of civilian R&D have effectively placed much of the control of radical innovation and technological development outside the direct control of national governments, and potentially also outside the control of Europe and the Western world.

‘Dual-use’ therefore refers to technology areas in civilian industries that (could) apply to both the civilian and defence sectors. The European dual-use ecosystem across defence and security, electronics, space, the civil aviation industry and other sectors often showcases radical innovation and highly competitive products. However, the dual-use ecosystem also suffers from many of the challenges outlined in Section A.1.5, which a KIC on dual-use could potentially help to address. Specifically, a KIC on dual-use technologies could help link European defence capability needs and requirements with primarily civilian R&D, products and services, and could strengthen European defence capabilities through an increased uptake of dual-use technologies in defence.

A KIC on dual-use could also offer a number of potential benefits, such as the ability to harness the resources, infrastructure and talent of civil industries. It would also be less restricted by structures such as the defence sector’s procurement rules and export controls – although exports of dual-use technologies are also subject to EU export regulations and some national controls. This means that, similarly to KIC InnoEnergy, it could be possible to use a business model that allows the KIC to extract revenue from sales produced by innovations that the KIC has invested in. Furthermore, a KIC on dual-use could facilitate closer networks across the defence, security and civil sectors, which could help draw attention to the benefits that the defence sector could offer the civil sector and contribute to greater public acceptance of the defence sector.

⁴² Galai et al. (2019) *op. cit.*

B.4.2. Envisioned knowledge and innovation themes

As stated earlier, a key focus of the KIC on dual-use technology would be to encourage more actors to exploit the full spectrum of opportunities for learning and innovation and thus increase their market, by understanding and responding to the needs of sectors in which they hitherto may not have operated in.

By definition, any KIC on dual-use should not have a too narrowly defined scope but rather consider a combination of technology and capacity-led themes to maximise the overall impact across the European dual-use market. A KIC on dual-use would also emphasise the development and uptake of emerging or future technologies, so it would be essential for there to be flexibility and agility in its design and operations in order to keep pace with rapid change. The KIC on dual-use would also need to be significantly aligned with other ongoing European technology initiatives of relevance in order to maximise synergies between R&D activities and their uptake by European industry and national institutions (both civilian and defence), as well as to avoid unnecessary duplication of effort.

Adopting a strategic focus on a particular technology area or areas could serve to reinforce other ongoing investments already made, and ensure that there is sufficient institutional capacity in Europe to take full advantage of these emerging technologies. In the current landscape, the WG KIC envisaged these technology focus areas could include but not be limited to:

- Cybersecurity – and the envisioned future European Cybersecurity Industrial, Technology and Research Competence Centre and the activities of the European Cybersecurity Organisation (ECISO).
- Artificial intelligence (AI) – to complement the activities undertaken as part of the Horizon 2020 programme and other Commission activities in support of AI.
- Quantum technologies – to complement the EU Quantum Flagship.

B.4.3. Envisioned activities for a KIC on dual-use technology

As with the concept for a KIC on defence, the final set of activities to be undertaken by the KIC on dual-use would be articulated and proposed by the consortium ultimately awarded the mandate to develop and implement the KIC. However, in developing the proposed KIC concept, the WG KIC highlighted the importance of strengthening the institutional capacity to engage with dual-use technologies. This could include a range of possible activities for the KIC on dual-use, as well as several specific education and training components, as illustrated in Table B.3.

Table B.6. Possible mechanisms on skills, structures and culture for a KIC on dual-use technology

Mechanisms	Example
Creating cohesive networks of European dual-use actors by creating strong links between business, research and education	Key Enabling Technology Platforms have created networks to support SMEs surrounding particular technology areas across all industrial sectors.
Enhancing the institutional capacity of innovation actors	Joint activities and transfer of good practices, learnings and know-how.
Developing dual-use-specific training and education efforts	Several existing KICs offer technical and business acumen educational programmes in order to equip members with all the skills required to support innovation. This could involve: team-forming, project management for innovation, general engineering, systems engineering, creative thinking and problem solving.
Developing mechanisms to harness the resources, infrastructure and talent of civil and defence industries for dual-use purposes	In Key Enabling Technology Platforms, innovation support services such as prototyping, demonstration lines, lab test facilities and pilot lines are offered for game-changing technologies. Technology scanning activities could support the identification and exploitation of potential applications of dual-use technologies for the defence sector.
Raising awareness of dual-use technologies and their importance to the EU	Conferences and fora could raise awareness of technology areas that augment the competitiveness and commercial potential of dual-use technology industries across Europe.
Assisting the defence industry and defence organisations to access and leverage dual-use technologies	Identifying and articulating defence business cases for dual-use technologies.

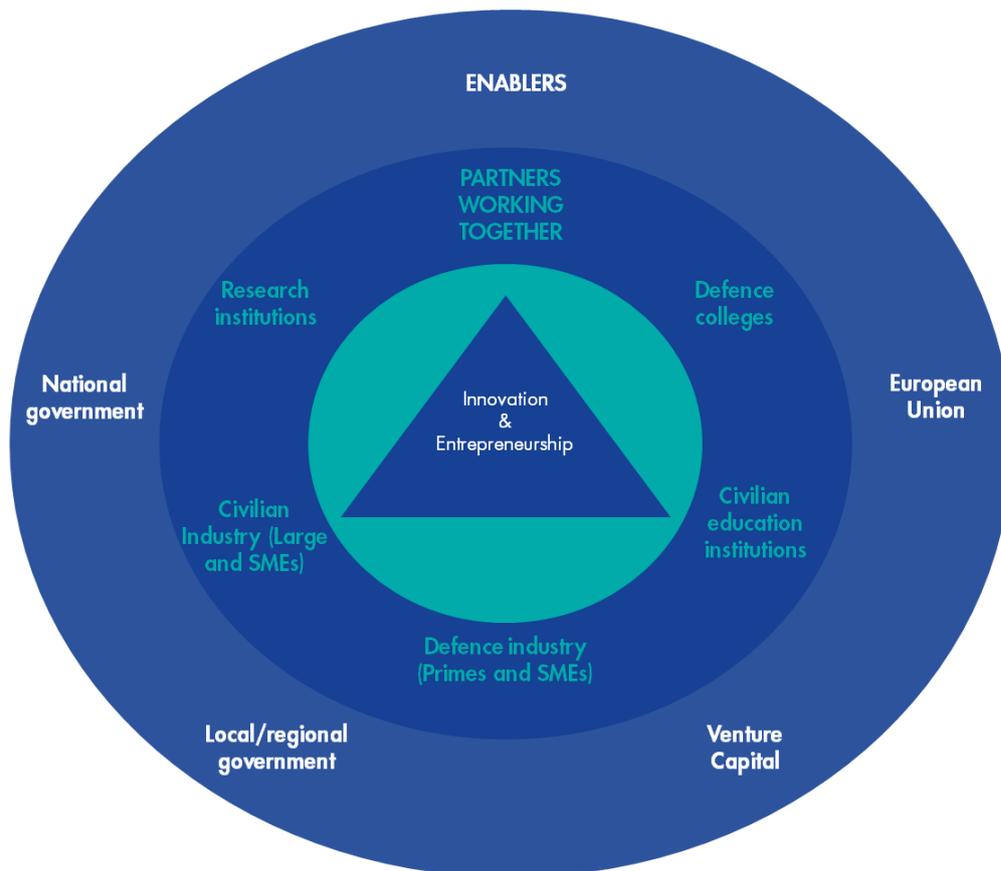
B.4.4. Membership and partners

A potential KIC on dual-use would by its scope have a broader range of potential members than most existing KICs, and should also incorporate members from across all Member States and different parts of the knowledge triangle. Although a KIC on dual-use may include more involvement from civil industries, defence and security stakeholders would nevertheless also need to be involved in order to ensure that the benefits of this KIC spill-over to the defence industry and SMEs as intended. It is also important to note that a KIC on dual-use technology would likely see a higher participation of security-focused defence stakeholders (e.g. law enforcement, counter-terrorism, border security and intelligence organisations, etc.) compared to a KIC on defence, which is likely to focus more exclusively on military defence stakeholders (e.g. national ministries of defence, national armed forces).

The involvement of defence stakeholders, regardless of their primary focus, would be required in order to allow defence authorities, end-users and customer communities to provide their strategic input on

defence capability requirements that dual-use technology could help meet (i.e. making sure that dual-use technology is fit for purpose and relevant to appropriate defence stakeholders as well). Figure B.3 represents one possible configuration of actors to give an indicative illustration of potential members and partners. As seen in the figure, the member configuration of the KIC on dual-use is much more focused on civilian, rather than defence-specific, participation and also includes a larger number of civilian enabling partners, including national, regional and local government actors.

Figure B.3. Potential configuration of a KIC on dual-use technology



Source: RAND Europe based on EIT (2017b) *op.cit*

B.4.5. Synergies and complementarities with existing initiatives

Various EU instruments such as the ESIF, EDF, Horizon 2020, the COSME programme, the EDA, the SME Instrument and the European Investment Bank could all be leveraged by the KIC on dual-use. For skills-specific projects, ERASMUS+ may also be utilised for certain projected activities. Collaborative projects with other EU initiatives such as the existing Key Enabling Technology Platforms could also bring benefits to such a KIC. The European Network of Defence-related Regions (ENDR) also supports dual-use research and could be a useful partner in a KIC on dual-use's activities.⁴³ KICs such as EIT Digital, EIT InnoEnergy and EIT Manufacturing could also be linked with a KIC on dual-use through collaborative projects in areas of common interest.

⁴³ (Government webpage) European Defence Agency. 2016. 'Dual-use research.' As of 24 January 2019: <https://www.eda.europa.eu/what-we-do/activities/activities-search/dual-use-research>

B.5. Concluding remarks

This short annex has presented two concept KICs on defence and dual-use, as part of a wider project to support the development and implementation of a European sectoral skills strategy for defence. It is clear that a KIC-model could potentially help to realise the *Defence Industrial Skills Strategy* and assist in the implementation of several of the identified Strategic Objectives and Supporting Actions. While there are synergies between the two presented concepts, there are also clear differences between a KIC on defence and a KIC on dual-use. While any KIC on dual-use may be less politically sensitive and subject to fewer contextual challenges than a potential defence-specific KIC, it would by its very definition also address a less clearly articulated societal challenge with a less well-defined stakeholder community. ‘Dual-use’ typically refers to dual-use technologies rather than a community of interest or a market itself, perhaps making it more challenging to identify, align and motivate a cohesive set of willing partners with shared interests to drive the KIC forward. It is also worth noting that many of the dual-use technology areas listed in this report could feasibly be carried forward in the future ‘Security and resilience’ KIC theme, which the EIT has already proposed for the 2021–2027 strategic period.⁴⁴ However, a ‘Security and resilience’ KIC would likely involve national security, law enforcement and border security actors rather than defence stakeholders. This could result in defence interests and requirements not being adequately captured or addressed.

In contrast, a KIC on defence would target a more clearly delineated sector that has a set of unique contextual constraints, challenges and opportunities to which the KIC could be specifically tailored, and which would fill an existing gap in provision of knowledge triangle activities. However, the two concepts are not mutually exclusive and if there is a perceived need or requirement from defence stakeholders, a KIC on defence could feasibly also pursue a dual-use technology Knowledge and Innovation theme from a defence-specific perspective. The stakeholder community in defence is already well-understood and it is clear who could potentially be involved in developing a KIC on defence. Furthermore, it is also feasible that dual-use technologies could be integrated into a work programme under a KIC on defence – potentially also engaging in collaboration with another KIC where the civilian applications of that dual-use technology might be relevant – thereby encompassing this crucial element of defence innovation and R&D. Regardless of which KIC concept is ultimately pursued, if any, the KIC would need to have sufficient support from defence and/or dual-use knowledge triangle stakeholders, as well as wider end-user and customer stakeholders, if it is to achieve its objectives.

Lastly, the working group concluded a number of overarching considerations which should be reflected upon regardless of which concept is taken forward:

- Ensure clarity in what the KIC is seeking to achieve. Once a KIC concept is agreed and a KIC is being developed, it must be built around a common purpose agreed by all partners. This could be achieved by developing working groups early on in the process to identify the strategic priorities and grand challenges that the KIC should address. Within this process, it is absolutely necessary to involve the demand side (i.e. customer communities) in addition to the core knowledge triangle stakeholders, especially in the unique defence context;
- Manage partners' expectations for the KIC, as establishing a mature ecosystem is a considerably lengthy process and momentum can wane in the founding phase of the KIC;
- Consider how to make the KIC financially sustainable from the beginning. The path to financial sustainability should be integrated into the consideration of activities and

⁴⁴ EIT (n.d.e.) op. cit.

objectives for the KIC from the start. This can be helped by ensuring that the KIC leadership also involves commercially minded people from the private sector in addition to education and research stakeholders;

- Engage partners who have previously participated in other KICs to leverage their institutional knowledge and experience in setting up and operating KICs and KIC projects;
- Ensure the construct and purpose of any KIC pursued is flexible enough to recognise the dynamic of innovation that is relevant for defence and dual-use purposes, as any defence-related KIC would still likely need to involve non-defence actors to access the best technologies and ideas. Similarly, a dual-use KIC would need to include defence actors to ensure that the exploitation into defence is achieved.