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PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

Action Plan on synergies between civil, defence and space industries

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1. Introduction

One of the most important and long-lasting innovations in the automobile industry originates from the defence industry, here in Europe. After working on ejector seats in fighter jets for a European aeronautics company, Nils Ivar Bohlin, a Swedish mechanical engineer, went on to design a new seat belt for a European car company. Inspired by the harness jet pilots used, the three-point seat belt became a global standard in the car industry and has saved more than one million lives since its introduction.

This example illustrates what President von der Leyen had in mind when tasking[1] her Commission to 'ensure cross-fertilisation between civil, defence and space industries' and 'focus on improving the crucial link between space and defence and security'. To this end, in March 2020 the Industrial Strategy for Europe[2] announced 'an Action Plan on synergies between civil, defence and space industries, including at the level of programmes, technologies, innovation and start-ups', which was welcomed by the Council[3].

This Action Plan (the **'Three-Point Belt Plan'**) lays the ground to deliver concrete policy actions under three headline objectives:

- enhancing complementarity between relevant EU programmes and instruments to increase efficiency of investments and effectiveness of results (the '*synergies*');

- promoting that EU funding for research and development, including on defence and space, has economic and technological dividends for EU citizens (the '*spin-offs*')[4];

- facilitating the use of civil industry research achievements and civil-driven innovation in European defence cooperation projects (the '*spin-ins*').

Synergies: In a challenging international environment, where the EU needs to maintain its technological edge and support its industrial base, the EU Multiannual Financial Framework 2021-2027 (MFF) significantly scales up investment in technologies for defence or related civilian use, such as security, mobility, health, information management, cyber and space. Relevant MFF programmes cover research, development, demonstration, prototyping and deployment (procurement of innovative products and services) in a complementary fashion.

The pervasiveness of emerging and disruptive technologies across civil, defence and space industries creates new opportunities for synergies among EU programmes and instruments[5]. A structured approach, establishing appropriate processes and mechanisms among these instruments while taking into account their specific purposes and limitations, will lead to more impactful funding, reduce duplication risks and maximise added value for EU taxpayers.

Spin-offs: Increased investment in defence must also present a dividend for the economy at large, while fully respecting the constraints inherent to the defence sector (e.g. the role of national authorities in steering demand, information handling or specific rules for intellectual property rights). Increasing public awareness of the substantial multiplying effect of EU

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[1] See mission letters to Executive Vice President Vestager and Commissioner Breton.

[2] Communication COM(2020)102 of 10.3.2020

[3] Council Conclusions on Security and Defence, 8910/20 of 17 June 2020: 'The Council …welcomes the call for more synergies between civil and defence industries, including space, in EU programmes, while respecting the different natures and legal bases of respective EU programmes and initiatives, including the civilian nature of European space programmes, with a view to making more effective use of resources and technologies and creating economies of scale.'

[4] In the medium to long term, when the need to protect key operational superiority assets will no longer apply.

[5] Annex IV of 'Regulation establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination' has specific provisions for synergies with other programmes.

security, defence and space expenditure in research and development (R&D) also helps to consolidate public support for these initiatives.

These expenditures address the public need for greater security and constitute a long-term investment in sustained technological development, economic resilience and growth. Several world-class European companies owe their position to spin-offs from European defence research, from fibre technology to civilian aircraft or even canned food. Similarly, many innovations first used in space have become civilian success stories, such as digital imaging sensors, insulin pumps or wireless headsets. Space data and services generated by Galileo, EGNOS and Copernicus are used for applications in numerous areas inside and outside the EU, providing substantial gains in terms of economic welfare and general quality of life.

Spin-ins: It is in many cases increasingly difficult to draw a clear line between civil and defence research, particularly for basic technology (low Technology Readiness Levels – TRLs). Civil applications of technology are becoming ever cheaper, driven by globalisation of knowledge, access to a wider public and generalised access to data. At the same time, many emerging and digital technologies offer substantial potential for defence, including Artificial Intelligence (AI), microelectronics, data cloud infrastructures and robotics.

Innovation in these areas often comes from start-ups, Small and Medium Enterprises (SMEs) and Research & Technology Organisations (RTOs). Where possible, Europe's defence industry should be able to draw on EU civilian industry research achievements to avoid costly duplicated research[6].

Fostering synergies among relevant EU-funded instruments and facilitating civilian-space-defence cross-fertilisation (spin-ins and spin-offs) can enhance European economic growth, further develop the Single Market and improve security for European citizens.

Drawing on expertise from across the Union, beyond well-established leaders in civil, defence and space industries, including SMEs and start-ups, will contribute to enhanced European cooperation, competitiveness and resilience.

Against this background, this Action Plan presents **11 actions**[7] that: (a) strengthen the capability-driven approach in the security sector; (b) enhance synergies between EU programmes and instruments; (c) support start-ups, SMEs and RTOs; (d) monitor critical technologies to reduce dependencies; (e) foster standardisation for hybrid civil/defence standards; (f) boost innovation and cross-fertilisation between civil, defence and space industries; and (g) launch three flagship projects that may become game-changers.

While the remit of this Action Plan is limited to EU programmes and instruments[8], promoting synergies at EU level may trigger similar actions at national and regional level including through national co-funding of EU projects, thereby multiplying the expected positive effect.

Although not falling within the scope of this Action Plan, relevant Member State-driven security and defence initiatives[9] will also be taken into account, particularly the Strategic Compass, the Coordinated Annual Review on Defence (CARD), the Permanent Structured Cooperation (PESCO) and the Civilian CSDP Compact[10]. EU-NATO cooperation

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[6] See, for example, the report ['Horizon 2020-funded security research projects with dual-use potential: An overview (2014-2018)'](#), EUR 30210 EN, from the Joint Research Centre.

[7] All actions must comply fully with relevant national, EU and international law, including competition rules.

[8] EU funding must comply fully with applicable law, including the Treaties, the Financial Regulation and the specific rules defined in the relevant basic act for a funding programme or instrument.

[9] Developed within the framework of the Common Foreign and Security Policy (CFSP) / Common Security and Defence Policy (CSDP)

[10] The recently established 'NIP (National Implementation Plan)-cluster' on security, technology and RDI (research-development-innovation) for national capability development in civilian CSDP, aims to identify and use relevant EU programmes.

will also be taken into account when relevant, including as regards inter-operability. Commission services will continue to work closely with the European External Action Service (EEAS) and the European Defence Agency (EDA), whose relevant activities will be taken into account when seeking synergies and cross-fertilisation[11].

In a broader geopolitical context, the EU has pledged to develop a common transatlantic approach to protecting critical technologies in light of global economic and security concerns and work together on technology, trade and standards. The transatlantic partnership and cooperation with other like-minded countries can support EU efforts in this area.

2. The capability-driven approach

The space, defence and security industries are strategic for Europe. The EU's digital strategy[12], adopted in February 2020, underlined the importance of EU leadership in digital technologies and cybersecurity and envisaged an unprecedented level of investment in the EU's digital transition over the next seven years. The European Council stressed in October 2020[13] that achieving strategic autonomy while preserving an open economy is a key objective of the Union and called for developing EU autonomy in the space sector and a more integrated defence industrial base. In July 2020, the EU Security Union Strategy[14] stressed the need to further strengthen security research and innovation; this Action Plan could also serve this need and support the EU's security industries with state-of-the-art, innovative solutions deriving from the cross-fertilisation and efficient synergies between civil, defence and space industries. The EU Green Deal set the tone for an ambitious transition towards a transformative society, which will require substantial research and innovation in technologies and social transitions and will trigger breakthroughs in many sectors.

The aerospace and defence industrial ecosystem includes the aeronautics, space and defence sectors. It represents EUR 376 billion in annual turnover, 44 000 companies and 1.5 million employees[15]. According to 2015 data[16], the security industry in Europe employs 4.7 million people and accounts for an annual turnover of EUR 200 billion across more than 20 sub-sectors of the European economy. Most companies had reported growth and expected to continue growing prior to COVID-19, which reversed this trend.

This Action Plan addresses the space and defence sectors of this ecosystem, as well their interactions with civil sectors (such as security). These industries are trying to recover from the crisis, but also to respond to, and shape the acceleration of, the twin green and digital transitions. They are high-tech, employ highly skilled employees and tend to export a large share of their products. The same large industrial actors are often involved in the space, defence as well as numerous civil sectors (such as security, aeronautics or digital). They rely on international collaboration, are trying to become more resilient and have dynamic value chains. Recent technological developments show a changing trend where civil innovation, particularly from start-ups and SMEs, increasingly drives defence innovation.

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[11] This is in line with the obligation of the Commission and the Council, assisted by the High Representative of the Union for Foreign Affairs and Security Policy, to ensure consistency between external action and internal policies (Article 21(3) TEU).

[12] Communication COM(2020) 67 of 19.02.2020, 'Shaping Europe's Digital Future'

[13] European Council Conclusions, EUCO 13/20 of 2 October 2020

[14] COM(2020) 605 of 24.7.2020

[15] Calculations are based on Eurostat's 'Structural Business Statistics' and 'National accounts aggregates by industry'. Most values refer to EU-27, 2017. Missing values are replaced with the most recent available data.

[16] See 2015 report here. These data may not be fully accurate because most industrial organisations are active in both defence and security. The Commission recently launched a new study.

The space, defence and security sectors have the potential for synergies and cross-fertilisation between themselves and with other civil sectors. They face many challenges and constraints, including regulatory hurdles, lack of a level playing field in international markets, access to costly research and testing infrastructure, need for specialised skills, lack of attractiveness to women and youth in particular, access to critical materials or components, and the need for European standards and certification. They comply with specific export controls for defence and dual-use[17] items. As they develop technologies or infrastructures with possible security implications, they may become subject to Foreign Direct Investment Screening[18].

To further understand the interlinkages between these and other civil sectors, the Commission will continue to consult all relevant stakeholders. It will, in particular, try to address challenges faced by European SMEs, start-ups, RTOs and academia that impede them from playing a more active role: these challenges include high security requirements, upscaling to market, access to finance (funding, private investment) access to third markets, access to testing infrastructures and insufficient de-risking of research investments.

One way to address these challenges is to promote the capability driven approach (CDA). A CDA has two key features: first, users define what capability they need and, second, they express their intention to procure products that, once developed, will offer the desired capability. This approach has proven useful in the space and defence sectors as it allows for a clear policy steer, a forward-looking mentality, long-term planning, an inter-disciplinary approach encompassing all stakeholders and synchronisation of the various processes.

The European Defence Fund (EDF) and its precursor programmes[19] rely on a CDA, notably by taking into account existing EU defence prioritisation tools and processes[20] that support decision-making at national and EU level. This helps to increase convergence between Member States' defence planning and provides references for a more coherent development of Europe's defence capabilities.

The established space governance framework and stable financing by the Member States through the European Space Agency and by the Union budget also enabled the implementation of a CDA for the space sector. The CDA ensures that future space systems are able to offer capabilities that can best serve EU needs for environment or security monitoring, secure communications, positioning navigation and timing, or others.

With the notable exception of integrated border management[21], **there is no similar overarching CDA process for the EU security sector**. High geographic, thematic and user diversity gives rise to different 'security sub-sectors' with various approaches tailored to their specific needs. Lack of coordinated planning can lead to overdependence on imported technologies that are available off-the-shelf. While preserving the necessary flexibility for each security sub-sector, a CDA can contribute to a modern and forward-looking security sector. It can facilitate the use of innovative technology to meet evolving security challenges for the law enforcement community (e.g. police, customs and other inspection authorities)

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[17] In line with the Council Regulation on trade of dual-use items, in this Action Plan dual-use items are defined as those goods, software and technology that can be used for both civilian and defence applications.

[18] Regulation 2019/452 of 19.03.2019. Implementation and enforcement of the Regulation can help to safeguard critical technologies and infrastructure in a way that also benefits EU operators that rely on them.

[19] The Preparatory Action on Defence Research and the European Defence Industrial Development Programme.

[20] Notably, the Capability Development Plan (and related Strategic Context Cases) and the Coordinated Annual Review on Defence.

[21] Under Article 9 of Regulation (EU) 2019/1896 on the European Border and Coast Guard, a specific capability development planning process has been established for EU integrated border management. It will lead to the coordination of Member States' national capability development plans related to border management and FRONTEX's own capability plans. This capability development planning process will support the deployment of the EBCG Standing Corps and will steer the programming of relevant EU instruments.

and thus benefit Member State authorities, facilitating also compliance with European data protection and ethical standards.

The EU is well placed to promote a CDA across the security sector. Strengthening the CDA in EU agencies, for example, can help structure user needs, identify vulnerabilities, address capability gaps, define technology roadmaps and research opportunities, ensure a successful transition from R&D to operations, and create joint procurement opportunities. Possible synergies with civilian crisis management will also be taken into account.

> **Action 1:** Before the end of 2021, the Commission will present a proposal to strengthen the forward-looking and early identification of needs and solutions in the field of internal security and law enforcement by fostering **capability-driven approaches across security sectors**, building on best practices from the defence and space sectors.

3. Synergies between EU programmes and instruments

Under the 2021-2027 MFF, the EU will scale up investment in technologies for civil, defence and space applications through: (a) research, development and deployment programmes such as Horizon Europe, Digital Europe programme (DEP), the Connecting Europe Facility (CEF), the Internal Security Fund, the EDF and the Space programme; (b) procurement[22] of innovative cross-sector technological solutions.

Defence R&D is envisaged under the EDF. Cohesion Policy programmes can also contribute to defence-related R&D provided it is in line with the relevant rules for shared management. Other funding instruments focus on civil applications, while the respective regulations often include dual-use[23] provisions. For example, in civil protection, rescEU[24] will provide funding to Member and Participating States to develop EU capacities to respond to chemical, biological, radiological and nuclear (CBRN) disasters when national capacities prove to be insufficient.

The MFF also includes horizontal instruments that support maritime and transport policies. Particularly relevant are programmes (e.g. the Integrated Border Management Fund) or EU agencies (e.g. FRONTEX, the EU Border and Coast Guard Agency) that aim to improve the internal and external security and protection of the EU. In addition, the EU Recovery and Resilience Facility and the Technical Support Instrument will support reforms and investments by Member States, provided that they are aligned with established EU priorities, particularly those related to the green and digital transitions.

The increased size of these investments, delivered through a variety of EU programmes and instruments, presents opportunities for synergies that can avoid the risk of duplication and provide more user-friendly opportunities for financing (e.g. grants, public procurement, guarantees). These will assist projects along the pathway from R&D to deployment either through market uptake or public procurement for innovation.

The MFF also includes instruments to support: investment (e.g. InvestEU); regional projects for research, innovation, technologies and SMEs (e.g. via the ERDF or the European Social Fund – ESF); technological innovation, start-ups and SMEs (e.g. Horizon Europe collaborative research including partnerships and missions, and in particular the Pathfinder

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[22] Direct EU procurement or supporting procurement by Member States.

[23] The Horizon Europe programme envisages that synergies with the EDF will benefit civil and defence research, although activities under the Framework Programme will have an exclusive focus on civil applications.

[24] rescEU is part of the EU Civil Protection Mechanism.

and Accelerator instruments of the European Innovation Council – EIC) or the European digital innovation hubs.

Where security exemptions are foreseen in EU programmes, the Commission and EU Agencies will, where there are duly justified reasons, limit participation in procurements to legal entities established in Member States, or which are not controlled by third countries.

Measures to enhance access to finance and synergies within the MFF programmes can include:

- **Blending** facilities at EU level, involving a combination of different forms of investment support from the EU budget (e.g. grants and repayable resources) and other sources of financing to achieve greater impact.

- The **Pathfinder and Accelerator instruments of the EIC**, which will aim to make the most of Europe's strong research base and seek to support game-changing innovations.

- **Synergies between Horizon Europe and other directly managed MFF programmes** (when respective legal bases allow it), offering a wide range of strategic leveraging through the possibility to combine funding. Programmes under shared management (e.g. the ERDF) can also be considered for transfer of funds (voluntary transfers between funds or to instruments managed directly and indirectly, and the seal of excellence mechanism).

Further to these measures, the Commission also recalls its support, as stated in the European Defence Action Plan of 2016[25], and the European Council Conclusions of December 2016[26], for an adaptation of the lending criteria of the European Investment Bank (EIB) to the defence sector within the limits of the Treaties.

> **Action 2:** Before the end of 2021 and with a view to the 2022 work-programmes, the Commission will further enhance its internal process **to promote synergies** between space, defence and related civil industries by improving coordination of EU programmes and instruments and by launching actions to facilitate access to finance.

4. Support for start-ups, SMEs and RTOs

With few exceptions, the level of participation by start-ups, SMEs and RTOs in the defence markets and security market is still low. Given the potential of these types of organisations, there is a need to facilitate the creation of opportunities for 'spin-ins' from civil industries to defence. To achieve this, SMEs and start-ups throughout the Union:

- should become better aware of potential business opportunities, particularly in the defence market;

- should acquire a comprehensive overview of opportunities offered by calls launched under EU space, defence and related civil industry programmes;

- need to adapt their products/business models to the specificities of these markets.

RTOs could play an important role in support of SMEs, as they can bring innovative ideas and approaches. Such innovation has the potential to shape existing networks and create new interactions between defence institutions, industry and RTOs. The ability to engage SMEs and RTOs throughout the Union will be critical in order to secure the diversity needed in terms of innovation and specialisation.

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[25] COM(2016) 950 of 30.11.2016

[26] The European Council conclusions of 15 December 2016 invited the EIB "to examine steps with a view to supporting investments in defence research and development activities".

From space data providers like Galileo or Copernicus to new forms of data representation and analytics like Destination Earth[27], European Digital Innovation Hubs can bring together innovative SMEs along the data value chain. To further support EU SMEs, start-ups and RTOs, and ensure cross-fertilisation between civil, defence and space industries, the Commission intends to:

- step up its awareness raising activities, also involving the European Network of Defence-related Regions, the European Defence Research and Innovation Network, the Enterprise Europe Network and industrial clusters such as those on the European Clusters Collaboration Platform[28];

- use EU communicators on the ground such as the Commission Representations, as well as EU outreach networks present in the Member States, to help in disseminating key messages and building partnerships;

- build on existing networks and EU bodies to develop industrial and scientific partnerships in critical technologies;

- facilitate access to EU support via a multilingual interactive tool that guides companies to the best EU funding for their project;

- assess opportunities to create national focal points for all participation aspects in the EDF, seeking synergies with other entities that promote EU funding opportunities;

- further promote opportunities offered by the space entrepreneurship initiative CASSINI for business acceleration, incubation, seed-funding and pre-commercial procurement as well as innovation partnership and procurement of innovation;

- work together with the EIC to provide business accelerating services for civil high-tech start-ups/SMEs to reach defence and security markets;

- support the establishment of European digital innovation hubs, as envisaged by the EU industrial strategy, which can act as one-stop-shops for companies to access technology testing and showcase innovative solutions for the civil, defence and space markets;

- provide technical support and hands-on trainings for start-ups, SMEs and RTOs interested in applying to the relevant EU programmes and instruments;

- organise outreach activities such as challenges, hackathons, start-up-labs, technology days, innovation forums, serious gaming, foresight and skills development workshops.

> **Action 3:** Starting in the second half of 2021, the Commission will announce targeted actions for **start-ups, SMEs and RTOs** to raise awareness about EU programmes and instruments that offer funding opportunities, provide technical support and hands-on training, provide business-accelerating services, showcase innovative solutions, and facilitate market entry to the defence, security, space or other relevant civil markets.

5. Critical technologies and technology roadmaps

In her 2019 political guidelines, President von der Leyen underlined that 'it is not too late for Europe to achieve **technological sovereignty** in some critical technology areas'. The 2020 EU industrial strategy stated: 'Europe's strategic autonomy is about reducing dependence on others for things we need the most: critical materials and technologies, food, infrastructure,

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[27] 'Destination Earth' is an EU initiative that aims to develop a very high precision digital model of the Earth to monitor and simulate natural and human activity, and to develop and test scenarios that would enable more sustainable development and support European environmental policies.

[28] https://www.endr.eu/, https://www.edrin.org/, https://een.ec.europa.eu/, https://www.clustercollaboration.eu

security and other strategic areas. They also provide Europe's industry with an opportunity to develop its own markets, products and services which boost competitiveness.' The EU will therefore support the development of critical technologies that are strategically important for Europe.

For some of these technologies, the Commission has used its convening power to launch Industrial Alliances[29]. Such alliances already exist for energy technologies (batteries, clean hydrogen) and raw materials while more are under consideration.

Identifying which critical technologies make a decisive contribution to key capabilities can help to decide: (i) which technologies are important for technological sovereignty (i.e. where there is a need to reduce the risk of dependence); (ii) where combined/coordinated support from different EU programmes and instruments can address such challenges. To strengthen its technological sovereignty, the EU must maintain a strong industrial competence and, where possible, seek leadership in these critical technologies. Alongside the critical technologies, the EU must also look at:

- the value chains, including the security of supply of critical (raw) materials that are important building blocks of civil, defence and space critical technologies[30,31,32].
- related research and testing infrastructure, which is key for standardisation and certification.

In the context of this Action Plan, critical technologies are technologies[33] that are relevant across the defence, space and related civil industries and contribute to Europe's technological sovereignty by reducing risks of overdependence on others for things we need the most. The following table presents a **list[34,35] of examples of critical technologies relevant across the relevant civil (including security), defence and space industries** (technologies whose relevance is limited only to one of those industries are not included).

Sector	*Technologies*
Electronics & Digital	*Artificial Intelligence, advanced analytics and big data* *Cybersecurity and cyber defence technologies* *Digital forensic technologies* *High-performance computing, cloud and data spaces* *Photonics* *Ultra-low power microprocessors, lightweight printed or flexible electronics* *Quantum technologies* *Secure communications and networking* *Sensors (including electro-optical, radar, chemical, biological, radiation, etc.)*

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[29] Industrial Alliances serve to convene and rally a wide range of stakeholders in a given ecosystem/value chain where there is: (i) an urgent rationale for changing business model; (ii) a risk of being squeezed out of markets that are key to the future of the EU's industry/economy; or (iii) a chance to capture a promising future-proof market, along with the spillover effects.

[30] EC, Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability, COM(2020) 474 final.

[31] JRC, 2019, Materials dependencies for dual-use technologies relevant to Europe's defence sector, JRC117729

[32] EC, 2020, Critical raw materials for strategic technologies and sectors in the EU – a Foresight study

[33] Including, when appropriate, relevant identified key enabling technologies, , which constitute a distinct complementary category.

[34] The list builds on critical technologies presented in the 2020 Industrial Strategy Communication and the dual-use export control regulation. It takes into account the EU list of key enabling technologies and its approach is consistent with recent EU industry analysis.

[35] Certain technologies may relate to more than one sector

Manufacturing	• Advanced and additive manufacturing
	• Advanced materials technologies and sustainable materials by design
	• Nanotechnologies
	• Robotics
	• Semiconductors and microelectronics
Space & Aeronautics	• Space technologies (including design and manufacturing of launchers and satellites)
	• Secure precision timing, positioning and navigation technologies
	• High-definition Earth Observation technologies
	• Satellite-based secure communication and connectivity
Health	• Biotechnologies
	• Chemical, biological, radiological and nuclear[36] technologies
Energy	• Energy technologies (including energy storage, energy resilience, renewables, hydrogen and nuclear)
Mobility	• Autonomous systems

Critical technologies are bound to change as new technologies emerge. The Commission will set up within its services an EU Observatory of Critical Technologies.[37] It will provide regular monitoring and analysis of critical technologies, their potential applications, value chains, needed research and testing infrastructure, desired level of EU control over them, and existing gaps and dependencies[38]. Every second year, the Observatory, in consultation with key stakeholders, will produce a classified report on critical technologies, dependencies, value chains and testing infrastructure for the defence, space and related civil industries[39].

On the basis of these reports, the Commission will develop **technology roadmaps** to stimulate cross-fertilisation between civil, defence and space industries for critical technologies. Technology roadmaps are increasingly used by the Commission[40] as a flexible technique to support strategic planning, by matching short-term and long-term goals with specific technology solutions.

Using technology roadmaps the Commission will build on the identified critical technologies and (a) address all relevant funding instruments, policy needs and access to finance opportunities in order to create synergies across EU actions; (b) target wider technology and socio-economic needs with a view to fostering cross-fertilisation; (c) bring together all relevant stakeholders, including government, industry, academia and civil society.

Technology roadmaps will use technology forecasting to identify suitable emerging technologies, avoid duplication of costs, contribute to market stability in Europe, promote

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[36] Such as for use in preventive or treatment health solutions, forensics, etc.

[37] Working as appropriate with existing EU technology monitoring tools such as those of the Commission (https://ati.ec.europa.eu/) or EDA

[38] Critical dependencies in the interplay of civil, defence and space technologies are a specific subset of (and therefore fully aligned with) the full set of industrial critical dependencies that are addressed by the EU Industrial Strategy, which has a much wider scope.

[39] The work of the EDA on critical technologies will be taken into account where appropriate, including through the Overarching Strategic Research Agenda (OSRA) and related Technology Building Blocks (TBB).

[40] See also Communication COM(2020)628 of 30.9.2020, 'A new ERA for Research and Innovation'.

cross-border cooperation and stimulate innovation by start-ups and SMEs. Each roadmap will have a specific horizon, milestones and a concrete final aim.

Based on the outcomes of the work conducted under the technology roadmaps, the Commission may decide to launch flagship projects, taking into account their likely impact on the technological sovereignty and leadership of the EU, their sources of financing and their governance (see Section 8 below).

> **Action 4**: The Commission will develop **technology roadmaps** to boost innovation on critical technologies for the defence, space and related civil sectors and stimulate cross-border cooperation using all relevant EU instruments in a synergetic way. These roadmaps will be based on an assessment produced every two years by a new **Observatory for Critical Technologies** within the Commission. The roadmaps may lead to the launch of new flagship projects.

6. Standardisation

Promotion and application of common standards across sectors can contribute to cost savings in terms of production runs and cost management, but also improve operational effectiveness, by enhancing interoperability, particularly in a multinational environment.

Better linking standards with public security-related procurement programmes can help EU industry maintain its lead in critical technologies of importance to the EU's technological sovereignty. Overall, common standards can contribute to innovation and synergies.

In close cooperation with key stakeholders, the Commission will identify existing standards and best practices, and commission the development of new ones, that can be used across civil, defence and space industries and promote their use in relevant EU programmes and instruments in areas where standardisation is still lacking. Examples include:

- the planned work under rescEU, which may prove a catalyst to improve cross-border collaboration towards unified CBRN standards at user level (civil protection agencies) and industrial level or
- the planned initiative under the Digital Europe Programme on a European Security Data Space, which will contribute to the setting of quality standards at EU level.

Action may be required to develop hybrid[41] technological standards and best practices applicable across the civil (e.g. law enforcement) and defence sectors. This can include defining and harmonising standards, commonly agreed testing protocols, best practices and EU codes of conduct to reduce costs, increasing interoperability, improving the potential for synergies and enhancing comprehensibility. The EU can best serve its interests by taking leadership in developing standards at international level (e.g. on cybersecurity), taking into account EU values and priorities (e.g. EU data protection legislation).

> **Action 5:** Before the end of 2022, the Commission, in close cooperation with other key stakeholders, will present a plan to promote the use of existing hybrid civil/defence **standards** and the development of new ones.

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[41] The intention to issue hybrid standards (for example, on software defined radio) was first announced in COM(2012) 417 and SWD(2012) 233 of 26.07.2012, 'Action Plan for an innovative and competitive Security Industry'.

7. Innovation and cross-fertilisation between civil, defence and space industries

Innovation[42] is at the heart of Europe's efforts to lead the digital transition and strengthen competitiveness. Ideas and technologies can emerge from big companies, start-ups, RTOs and SMEs in any ecosystem and have a general impact on capabilities. Facilitating civilian-space-defence cross-fertilisation (spin-ins and spin-offs) will address the current fragmentation of the civil-defence innovation landscape. It can further strengthen innovation and lead to European economic growth, further develop the Single Market and improve security for European citizens.

An **innovation incubator** able to develop and accelerate technologies in the field of **dual use innovation** could become a key asset to boost innovation and create breakthrough technologies for the three industrial sectors, and to improve cross-fertilisation with other ecosystems. This innovation incubator may take the shape of a virtual network, based on close collaboration of the Commission with the EIC and the EDA. It can, for example: (i) screen successful results of relevant EU-funded research and propose them for follow-up funding or user uptake; (ii) support new technologies, with a particular focus on dual-use innovation coming from start-ups, SMEs and RTOs; and (iii) link and complement sectorial initiatives such as the European hub for security hosted by Europol.

The Commission will also establish **Defence Innovation networks**, with the goal to provide technological demonstration services (hosted by RTOs, universities or other research infrastructures) to test the relevance of technologies stemming from the civil sector in potential defence applications. Acting as innovation intermediaries between actors of different sizes and stemming from different sectors, such thematic networks will support innovation in specific defence value chains by fostering the uptake of civil technologies by defence actors, while giving civil companies the opportunity to valorise their technologies towards new defence partners.

In addition, the following two critical technology areas present promising opportunities for cross-fertilisation.

Cybersecurity and cyber defence. In 2021, the Commission will set up the Cybersecurity Competence Centre[43] (CCC) and the Network of National Coordination Centres. The CCC will contribute to shielding Europe's economy and society from cyber-attacks, maintaining and promoting research excellence and reinforcing the competitiveness of EU industry in cybersecurity. Resources for this Centre will come from Digital Europe and Horizon Europe as well as from Member States. In parallel, the European Defence Fund (EDF) will support European research and development of cyber defence solutions, such as in the areas of cyber situational awareness and operation capabilities, cyber training and exercises. The EU Space programme will continue to develop solutions for cybersecurity challenges (e.g. Galileo).

The Commission will seek to enhance cross-fertilisation and synergies between the cyber work in the civilian, defence and space spheres with a view to decrease vulnerabilities and create efficiencies[44].

Disruptive technologies, including Artificial Intelligence[45]. The term 'disruptive technology' refers to a technology inducing a disruption or a paradigm shift, i.e. a radical

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[42] The 'EU Innovation Hub in internal security and justice', recently announced by the Council (6158/20 of 19.02.2020), also aims to identify opportunities for synergies.

[43] https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2384

[44] See COM(2020) 18 of 16.12.2020 "The EU's Cybersecurity strategy for the digital decade", pages 13-19: Building operational capacity to prevent, deter and respond

rather than an incremental change. Development of such a technology is 'high risk, high potential impact', and the concept applies equally to the civil, defence and space sectors. Disruptive technologies[46] for defence can be based on concepts or ideas originating from non-traditional defence actors and find their origins in spin-ins from the civil domain.

The EDF Regulation envisages up to 8% of its budget to support disruptive technologies, promote the participation of non-traditional defence players and attract start-ups in defence projects through open calls or prizes for innovative defence applications. These innovative funding mechanisms will be a practical step to showcase innovative ideas and to facilitate the cross-fertilisation of innovation between the civil and defence domain. A very significant part of the DEP will support disruptive technologies for civil applications. Other EU funding instruments, including those of the Space programme and the EIC, envisage similar investments.

To foster innovation and ensure the competitiveness of EU industry, an ambitious policy on **skills** will also be necessary. The Commission will take targeted measures to identify possible shortages, most relevant skills and potential for synergies in the interplay of civil, defence and space sectors.

The participation of women and other under-represented groups in the defence and security sectors remains low. Given that diversity is an important factor to stimulate innovation, stronger involvement of those profiles will be promoted. The Commission will also pursue stronger participation of women innovators and address equality and inclusion goals (e.g. digital accessibility).[47]

Action 6: In the first half of 2022, the Commission will launch, in cooperation with the European Innovation Council and other stakeholders, an **'innovation incubator'** to support new technologies and shape **dual-use innovation**. The Commission will also support **cross-border defence innovation networks** that will test the relevance of technologies from the civil sector and support responsible innovation in defence value chains. These actions will also address the current fragmentation of the civil-defence innovation landscape, shortages of skills as well as equality and inclusion goals.

Action 7: From June 2021 onwards, the Commission will set up together with Member States the Cybersecurity Competence Centre, allocating the necessary resources from relevant EU programmes and instruments. The Commission will seek to strengthen synergies, spin-ins and spin-offs between the work of the Centre, the EDF and the EU Space programme on **cybersecurity and cyber defence** with a view to reduce vulnerabilities and create efficiencies.

Action 8: Starting in the first half of 2022, to support **disruptive technologies,** the Commission will present innovative forms of funding to promote participation of non-

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[45] AI developments must be conducted openly across the EU, ensure the safety, the societal and environmental soundness of AI-based applications, consider ethical aspects from the outset, assess the risks and mitigate its potential for malicious use and unintended discrimination such as gender, racial or disability bias. AI will be developed within a well-coordinated framework which respects the EU's values, ethical principles and the Charter of Fundamental Rights of the European Union. The financial contribution from the Union will guarantee a human-centric and inclusive approach that respects Union values and is in line with the "White Paper on Artificial Intelligence – A European Approach to AI" COM(65) of 19.2. 2020 for which the Commission will present a follow-up proposal in 2021.

[46] In line with the EDF regulation, the Commission can financially support actions conducive to developing disruptive technologies for defence. However, in order to ensure that the Union's and its Member States' international obligations are respected, actions relating to products or technologies the use, development or production of which are prohibited by international law shall not be financially supported. Thus, when proposing new defence products or technologies or the upgrade of existing ones, applicants should commit themselves to complying with ethical principles, such as those relating to the welfare of human beings and the protection of the human genome, reflected also in relevant national, Union and international law, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and, where relevant, its Protocols.

[47] Communication "A Union of Equality: Gender Equality Strategy 2020-2025". COM/2020/152 final

traditional players, attract start-ups and promote cross-fertilisation of solutions, building upon opportunities offered by EU programmes and instruments including the DEP and the EDF.

8. Promoting synergies and cross-fertilisation via flagship projects

A way to boost synergies between civil, defence and space industries is through the launch of flagship projects, which will support critical technologies and provide solutions to important societal or strategic challenges. Flagship projects offer great potential for synergies and cross-fertilisation: at programme level (e.g. complementary calls targeting similar domains, linking procurement needs with research, synergies in funding); through technology (e.g. dual-use technologies, especially at a low technological readiness level); and through innovation and SMEs (e.g. facilitating new interactions with the defence and security industry).

Several EU-funded initiatives lay the ground for cross-sectoral synergies, including:

- the Connecting Europe Facility, which will co-fund dual-use transport infrastructure projects to enhance both civilian and military mobility;
- Galileo, which offers a public regulated service that could be used for defence purposes;
- Copernicus, which offers environmental and security services that are regularly used by various user communities for civilian and defence purposes, in particular applications such as compliance verification and enforcement with EU law (e.g. on environmental compliance assurance and crime);
- SESAR (Single European Sky Air traffic management Research), which looks at technical solutions for flexible civil-military cooperation to maximise the use of airspace;
- the EU's Space Surveillance and Tracking (SST) services to national and commercial satellite operators using national assets;
- defence-oriented research for safe and sustainable energy models (such as energy generation, storage, efficiency and management), leading to increased resilience and operational efficiency in the context of climate change;
- the consultation forum for Sustainable energy in the Defence and Security sector[48] as well as the planned joint action with EDA to identify barriers for offshore renewable energy developments in areas reserved for defence activities and improve co-existence[49];
- medical response and CBRN activities that are (i) supported by rescEU (e.g. transport of contaminated and infectious patients), (ii) planned by EDF, or (iii) supported by the EU health programme (e.g. joint action to strengthen health preparedness and response to biological and chemical terror attacks).

To ensure that these initiatives reach their full potential, the Commission will monitor their implementation and identify opportunities to improve the return on investment. For example,

- the Commission will ensure synergies with existing EU bodies, programmes and instruments in the preparatory actions, which will be launched in 2021 for the establishment of the EU Health Emergency and Response Authority (HERA)[50], including on emerging biological threats to human health and incorporating work on a European Bio-defence response.

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[48] https://cordis.europa.eu/project/id/882171

[49] COM(2020) 741 final, An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future

[50] See also COM(2020) 724 of 11.11.2020 "Building a European Health Union: Reinforcing the EU's resilience for cross-border health threats"

- the Commission will ensure synergies between defence and civilian investments in cyber, cloud, processor and quantum technologies.

- to better respond to today's security challenges[51], the Commission will seek to boost uptake of the significant investment in the Trans-European secure communication infrastructure (TESTA). TESTA allows EU-wide secure connectivity (including video conferencing) between EU Institutions, and EU bodies and agencies as well as national authorities in the area of defence and security.

- in the context of the EU Maritime Security Strategy (EUMSS)[52], the Commission will further promote cooperation between agencies that have civil and defence work strands (i.e. FRONTEX, EMSA - European Maritime Safety Agency, EFCA - European Fisheries Control Agency) and support the implementation of the coordinated civil-military **maritime security** research agenda. Civil-defence cooperation is part of the basic principles of the EUMSS Action Plan[53], which includes actions on enhancing interconnection and information exchange between civil and military authorities through the maritime Common Information Sharing Environment (CISE)[54]; promoting a framework for a civil-military-related ship building industry; and enhancing civil-military cooperation on maritime Search And Rescue (SAR).

In addition, based on preliminary analysis, and building on initiatives to be funded by EU instruments, the Commission is launching three flagship projects:

- **EU drone technologies.** This flagship project will aim to enhance the competitiveness of EU industry in this critical technology area. It will identify areas of cross-fertilisation, so that defence projects benefit from innovative developments emerging from SMEs active in the field of civilian drones and that civil aeronautics benefit from developments in the field of defence. In particular, it will look at the unmanned aircraft itself as well as the development of technological building blocks needed for further automation of drone traffic. The flagship project will form part of an overall ambition to be further set out in the 'EU drone strategy 2.0' that is planned for 2022[55] as a way to enable and accelerate the further development and use of this technology in Europe, and thereby enhance technological sovereignty.

- **EU space-based global secure communications system.** This flagship project aims at providing access to high-speed connectivity through a multi-orbit space infrastructure, including low earth orbit satellites, and complementing Galileo/EGNOS and Copernicus as the third EU satellite system., By integrating quantum encryption technologies, it will ensure highly secured connectivity and communication for governmental and commercial services (e.g. better connecting key infrastructure, supporting crisis management, surveillance and potential mass-market broadband applications). It will enable access to high-speed connectivity for everyone in Europe, and provide a resilient connectivity system allowing Europe to remain connected whatever happens, including large-scale cyber-attacks on the internet. Finally, it will be a geostrategic infrastructure at the centre of specific partnerships, for instance with Africa.

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[51] In line with the goal expressed in the 'First Progress Report on the EU Security Union Strategy, COM(2020)797', to promote the resilience of digital infrastructures and increase preparedness at national and EU level by building up robust capabilities to prevent, detect, respond to and mitigate threats.

[52] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014JC0009&from=EN

[53] https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/2018-06-26-eumss-revised-action-plan_en.pdf

[54] http://emsa.europa.eu/cise.html

[55] See page 15 in COM(2020) 789 of 9.12.2020, 'Sustainable and Smart Mobility Strategy – putting European transport on track for the future'.

- **EU strategy for Space Traffic Management (STM).** This flagship project will develop STM standards and rules, which are needed to avoid collision events that may result from the proliferation of satellites and space debris and could lead to catastrophic events for EU assets in space. STM will also avoid the risk of non-EU standards becoming the norm, as this dependence would have a negative effect on European efforts to achieve technological sovereignty. This flagship should also contribute towards building an international approach to STM.

Each of the flagship projects could become a game-changer due to its size or impact as well as its potential benefits for Europe's technological sovereignty and broader society. To further develop each project, the Commission will continue to analyse use cases, technical characteristics, which critical technologies to use, costs and possible funding instruments, governance structures and innovative ideas (related to technology or the market) from SMEs, start-ups and RTOs. On this basis, the Commission will decide on possible follow-up steps for each project, including legislative proposals when appropriate.

The technology roadmaps for some of the critical technologies identified in Section 5 could also lead to future flagship projects.

The Commission launches intensified dialogue and development work on three flagship projects with the potential to become game changers. After adequate analysis and consultation with stakeholders, the Commission will decide on possible follow-up steps, including legislative proposals where appropriate.

Action 9: 'EU drone technologies'.

Action 10: 'EU space-based global secure communications system'.

Action 11: 'Space Traffic Management'.

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9. Making it happen

The Commission will oversee the implementation of this Action Plan, in close cooperation with the European Parliament and the Council. It will pay particular attention to the more effective and efficient implementation of policy priorities (thematic policies and policies promoting general competitiveness and research and innovation), while safeguarding a maximum of coherence and synergies across EU programmes and instruments.

To promote cross-fertilisation between civil, defence and space industries over the long term, the Commission will monitor the specific progress of each of the 11 listed actions and will present a progress report every two years. The timeline for the implementation of each action will be aligned with the planning of the relevant EU instruments.