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Cutting-edge, affordable, ready

A vision for Europe's defense industrial future

Contacts

Germany

André Keller
Partner, Strategy& Germany
+49-151-2666-2881
andre.keller@pwc.com

Dr. Jan Wille
Partner, Strategy& Germany
+49-170-223-8898
jan.h.wille@pwc.com

Dr. Nils Förster
Partner, Strategy& Germany
+49-151-6404-9165
nils.foerster@pwc.com

Nick Reiff
Director, Strategy& Germany
+49-160-9701-4211
nick.reiff@pwc.com

About the authors

André Keller is a Partner with Strategy& based in Munich. He specializes in advising aerospace and defense clients where he leads projects on transformations, organizational strategy and portfolio management. Prior to his consulting activity, he has accumulated extensive experience through diverse management positions in the defense industry.

Dr. Jan H. Wille is a Partner with Strategy& based in Hamburg. Leading the aerospace and defense practice, he supports clients in dealing with their strategic challenges and major transformations, many of them technology-driven. More recently, he has focused on the transformation of the A&D industry towards greater sustainability.

Dr. Nils Förster is a Partner with Strategy& based in Frankfurt am Main and leads the public sector defense platform in Germany. He specializes in operational excellence and focuses his projects on digital transformations and on procurement and utilization programs. He serves defense and security clients in Germany and with alliance partners.

Nick Reiff is a Director with Strategy& based in Munich and specializes in advising aerospace and defense clients in the public and private sectors. His work focuses on transformations, organizational strategy and M&A.

Tobias Mueller is a Senior Associate with Strategy& based in Munich and specializes in advising aerospace and defense clients in the public and private sectors. His work focuses on the transformation of the European aerospace and defense sector and performance improvement.

Furthermore, Niklas Frings, Lukas Lehmann, and Georg Reichel from Strategy& Germany contributed to this report.

Our methodology

The study considered existing initiatives and strategies at the European level in cooperation with the German Federal Academy for Security Policy (BAKS). The key recommendations, which form the core of this study, were derived from the insights gathered during expert interviews with representatives from various relevant sectors, including the military, the financial industry, academia, and politics. Our recommendations reflect the respondents' assessments along with the strategic expertise of defense experts from PwC and Strategy&.

This report was drafted in preparation for the Munich Security Conference (MSC) 2025. Concepts and ideas were selected and developed in cooperation with the German Federal Academy for Security Policy (BAKS).

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As Europe navigates a complex geopolitical landscape marked by growing threats to its territorial integrity and ongoing conflicts at its Eastern borders, it is imperative to reassess and fortify its defense capabilities. Recent developments have exposed critical vulnerabilities in European defense forces and industry (e.g., cyber threats; capacity constraints in ammunition production; delivering cutting-edge weapons systems in the right quantity, time, and quality; mass production). These are accentuated by a significant dependence on shifting global alliances.

As the decade-long peace dividend is now fully consumed, the Europeans need to move fast to cover their increased demand for advanced defense equipment in the right quantity and quality. In Germany, the current Minister of Defense, Boris Pistorius, publicly emphasized this urgency with the words that Germany must be "combat-ready" by 2029.[1] This necessitates not only an accelerated transformation of the German – and by extension the European – defense industry, but also strong political will and unity in order to implement reforms of political frameworks, processes and decision making in all the EU Member States concerned, building on the standards, frameworks, and requirements set by the North Atlantic Treaty Organization (NATO). While the EU Member States play the key role in this process together with the European Commission, core European non-EU security partners like Norway, the United Kingdom and Switzerland[2], as well as allies like the United States, need to be involved and consulted at all times throughout the process.

Historically, the European defense industry has excelled in delivering sophisticated defense solutions – yet often with delays and budget overruns. However, limitations in driving European technological innovation, limited use of economies of scale and scope, and the high fragmentation of (national) supply chains are reducing the industry's capacity to address the requirement from the European armed forces to deliver military equipment and ammunition (e.g., for artillery) in sufficient quantity and speed. Further, the sector lacks targeted incentives and policies from the public side to enable accelerated capacity ramp-up.

1 Deutscher Bundestag (2024, June 4).
2 Also in the officially neutral Switzerland compatibility to NATO allies is important and a major requirement for many defense equipment procurement initiatives.

Forging a competitive, innovative, and future-fit European defense industry relies on three pivotal factors, enabled by both the public and private side:

Large-scale investments and higher efficiency and availability of productive capacity (capital, labor, technology)

An active role for the defense industry in its transformation towards scale, innovativeness, and resilience

Stronger intrinsic European defense industry collaboration

To navigate the overarching industry-led transformation, it is key to implement checks and balances within the sector to prevent profit-driven exploitation of defense budgets, foster a cultural shift towards shorter innovation cycles, and pursue targeted consolidation. For this evolution, a public-private collaboration with full engagement on both sides is vital to achieve critical changes. Equally, this requires mutual compromises, potentially legal adjustments in national and European law and procurement processes, and a new approach towards risk-taking on both the industry and public sector sides.

Our study proposes a comprehensive vision for the required industry transformation, with a focus on efficiency, effectiveness, innovativeness, and resilience, to be complemented by improved access to production factors, along with defense industrial policy measures.

The defense industry needs to take an active role in its transformation to achieve scale, innovativeness, resilience and greater efficiency."

André Keller, Partner at Strategy&

SECTION 1

The window of opportunity for the European defense sector

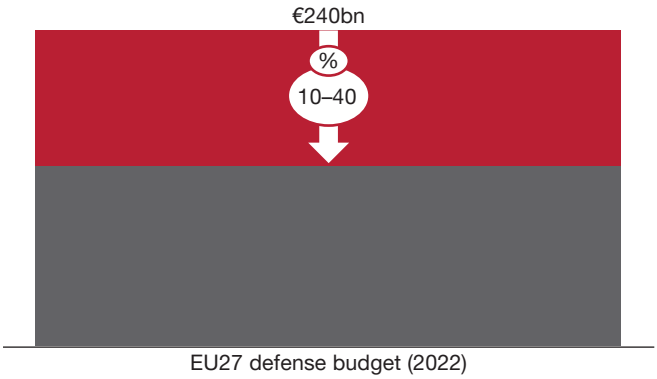
The current geopolitical landscape marks a critical juncture for the defense sectors of Germany and Europe, underscoring the pressing need for adaptation. Threat levels in European states are rising, while escalating global tensions – most notably the war in Ukraine – have exposed significant weaknesses in the defense capabilities of EU Member States. These challenges are further exacerbated by Europe's heavy reliance on external defense industries.[3] In addition, shifting US geostrategic priorities ("pivot to Asia") and growing uncertainty over American security commitments within NATO have increased the urgency to strengthen European defense.

As technological innovation in the military and civil sectors is accelerating fast (e.g., AI, miniaturization, space, advanced electronics, cyber security), the European defense sector needs to adapt to the rapidly-evolving nature of warfare. Modern conflict demands a delicate balance between cutting-edge technologies and scalable, mass-production capabilities like armored vehicles, artillery, and small drones. Space defense has also emerged as a critical challenge, with growing demands for satellite protection and offensive capabilities in orbit. While European companies have demonstrated their ability to deliver world-class products, as seen in Ukraine, Europe still faces significant deficiencies, particularly in scaling ammunition (especially missiles) and broader air defense. Moreover, insufficient R&D investment, reliance on non-EU supply chains, and a lack of interoperability underscore the urgent need for a more unified and adaptable European defense industry (*see Exhibit 1*).

3 78% of defense procurement spending allocated to non-EU suppliers between mid-2022 and mid-2023 (European Commission 2024).

EXHIBIT 1

Projected savings from intensified European defense cooperation



Annual savings potential via enhanced collaboration: €25bn – €100bn

Source: European Parliament Research Service (2023)

Economic constraints are a central challenge for Europe's defense sector, underscoring the need to improve shared defense capabilities and reinvest in the sector to strengthen its resilience and readiness. Russia's unlawful invasion and the ongoing need for Western support to Ukraine outlined the severe capacity limitations within the European defense industry, following decades of underinvestment during the "peace dividend" era after the Cold War. Struggling economies and constrained defense budgets intensify the need for comprehensive reforms to close these gaps and enhance industrial readiness across Europe. But by improving economies of scale, fostering the provision of shared defense capabilities, and reducing administrative inefficiencies, it is estimated that the EU could generate significant savings of €25 to 100 billion annually[4], or up to 40% of the €240 billion aggregated EU27 defense budget (2022)[5]. These savings could then be reinvested instead to meet the enormous challenges ahead, fostering a more resilient, innovative, and self-reliant European defense sector.

Efforts to strengthen defense collaboration and industrial integration in Europe have so far delivered only modest outcomes, and complex procurement processes that have proven to be relatively resistant to change. Cooperation on armaments and joint procurement initiatives remain constrained. Multinational projects, such as the Future Combat Air System (FCAS) or the Main Ground Combat System (MGCS), face additional barriers, including disparities in technological capabilities, conflicting national interests, differences in defense industrial policies,[6] and cumbersome bureaucratic processes. Limited shared experience (e.g., through OCCAR) in executing large-scale defense programs needs to be overcome. It requires a more integrated approach to risk-sharing, rethinking the "juste-retour" ("fair return") principle, clear project management, and technological exchange. An EU-wide ecosystem, including the smaller Member States, with fair involvement and sharing could support this process.

The geopolitical, technological, economic, and industrial dynamics underscore that, after more than three decades of underinvestment, Europe faces a critical window of opportunity to overhaul its defense sector. While solutions to Europe's defense challenges have been identified for years, national self-interest and fragmentation have often hindered progress. Today, however, the pressure from emerging multidimensional challenges makes it clear that European states need to unite and agree on common solutions. In essence, Europe needs to scale its defense industrial capacities, produce more weapons, and modernize capabilities to respond effectively to new threats. By embracing innovation and bridging the gap between cutting-edge technologies and practical defense needs, Europe can strengthen its strategic autonomy, align with global defense trends, and ensure preparedness for an unpredictable future. As overall budgets are rising, a pragmatic but fair approach to work-sharing might be agreed for the first time. Furthermore, the cooperation with European non-EU security partners like the United Kingdom, Norway[7] and Switzerland as well as the US and Canada across the Atlantic needs to be clarified, including their involvement in joint defense projects.

The EU Member States and the European Commission are in the driver's seat of the European defense sector transformation. But they also need to ensure strong buy-in from existing global allies and key stakeholders, by facilitating regular dialogue and collaboration. They have to reach EU-wide alignment towards the common goals and set the right conditions and frameworks for the defense industry to deliver. Moreover, as most EU Member States are also members of NATO, they must equally deliver to the military equipment, interoperability and readiness requirements of NATO.

4 European Commission (2021).
5 European Defence Agency (2022).
6 E.g. Patent holding in France is undertaken by the Direction générale de l'armement (DGA), the French defense procurement agency, which is not the case in other European states, where industry holds the patents.
7 Norway is part of EEA and EFTA, and thereby a close EU-partner, and is participating in for example in the ASAP (Act in Support of Ammunition Production).

Within these guardrails, optimizations and improvements of the political frameworks and foundations of European defense sector transformation are required, and could include:

- Further strengthening existing and fostering new EU-wide and intergovernmental defense agreements, including the involvement of non-EU security partners.

- Continuing EU-wide defense projects like FCAS, MGCS, and Eurodrone, while ensuring that industry competition is maintained and targeted incentives are set.

- Implementing robust and harmonized central governance and oversight mechanisms, e.g., by the European Commission, to ensure collaboration, orchestration and alignment of the individual EU Member States' national defense industrial strategies.

- Continuing to align defense market regulations across EU Member States (particularly concerning Military Schengen, tendering laws, and exports) to reduce administrative burdens for defense firms and to create a seamless defense market across the EU.

- Enhancing European defense sharing and pooling initiatives[8] such as the European Air Transport Command (EATC)[9] to increase efficiency by combining resources.[10]

- Promoting more joint procurement of defense equipment via existing frameworks.

- Accelerating procurement processes and introducing fast-track mechanisms, to close the capability gaps fast. This could involve exchanging best practices between EU defense procurement authorities, consulting industry experts, or learning from non-EU competitors (such as the US), who are often more sophisticated in terms of long-term planning and maintaining a consistent agenda.

- Focusing on "best bang for the buck" to ensure that resources are allocated efficiently, maximizing the impact of defense spending. This includes prioritization of projects to optimize utilization of industrial capacities and distinguishing between urgent defense procurement needs and industrial policy considerations, building on NATO-defined capability requirements for its member states.

- Aiming for the right level of standardization, interoperability, and simplification of requirements for defense equipment, and balancing requirements from NATO with internal decision making in the national procurement agencies and armed forces. This includes eliminating "unnecessary" national requirements beyond NATO standards to avoid "gold-plated" solutions that increase procurement complexity, costs, and project timelines.

- Applying requirements engineering in the defense procurement agencies and industry.

- Increasing adoption of more flexible contracting models and considering innovative financing models, such as leasing arrangements for expensive equipment[11] or new financing schemes in digital spaces, like "pay by use", which could provide flexibility and cost savings.[12]

8 Also subject to NATO "Smart Defense" initiative since 2012.
9 A framework where seven Western European countries jointly coordinate military air mobility assets for air transport and air-to-air refueling under a single command.
10 Bundestag (2012).
11 E.g., offered by Saab, for the Gripen Aircraft for smaller European air forces.
12 This is especially critical for innovative new weapons systems, like laser-based air defense systems. However, state guarantees or immediate write-off opportunities for defense equipment would be required to enable these models.

Considering that changes on the policy and institutional side are often very complex and long-term, this study aims to reinforce the resilience of the European security and defense industry by focusing on the options on the industry side. We look to outline what the European defense industry could do to increase its efficiency, effectiveness, innovativeness and resilience to meet the defense requirements of the EU and NATO, while allowing for more European integration.

> There is a current window of opportunity for the defense sector to enhance European collaboration, but also to intensify the cooperation between the defense industry and the Ministries of Defense."
>
> **Dr. Jan Wille, Partner at Strategy&**

SECTION 2

The challenges for the European defense industry

Five main factors have been identified that hinder the German and European defense industry in their ability to effectively meet warfare demands and fulfil NATO tasks:

1

Based on national political decisions, many Ministries of Defense (MoD) continue to procure complex, customized, and nationalized "gold-plated solutions", often lacking coordinated procurement strategies among European states.

- Compared to the USA, the diversity of weapons systems in Europe is significantly higher: where the US deploys a single main battle tank, Europe operates 17. Similarly, Europe fields 29 types of destroyers and frigates, compared to just four in the US.[13] This extensive variety of weapons systems in Europe hinders the ability to scale production effectively, a problem exacerbated by redundancies within the industry.

- A lack of standardized technological systems is evident not only in current but also the next generation of systems. Competition between programs like the Global Combat Air Program (GCAP) and FCAS could perpetuate inefficiencies. Procurement of non-European systems, e.g., Turkish drones by Poland, underscores the fragmented approach to addressing common defense needs.

- While NATO and the EU aim to harmonize military, operational, and economic standards for defense procurement, there are significant obstacles that need to be addressed. "National eyes only" requirements and the respective lack of exchange of information, in particular, as well as the lack of multilateral recognition of certifications for military equipment remain challenging. These need to be addressed on an EU level to enable cross-European collaboration and to enable rapid roll-out of new and harmonized military systems across European militaries.

13 Source: Koenig et al. 2023.

2

After years of the "peace dividend" era, we have seen major procurement orders outsourced abroad, while domestic industry is only slowly ramping up.

- Parts of the industry remain focused on producing complex, high-cost defense systems in limited volumes, to some extent due to the requirements outlined above. Yet, this fails to address the need for rapid delivery of large quantities of weapons systems and ammunition to prepare European forces for potential large-scale conflicts.

- An underlying issue is the tendency to develop solutions tailored to highly specific customer requirements, prioritizing complexity at the expense of speed and scalability. The focus needs to shift towards offering modular solutions that balance functionality and deployment speed. This needs to happen in close alignment with combat forces prototyping ("develop as you fight"), as seen in the USA and currently in Ukraine. This ensures quick deployment of new systems that can be tested in action, allowing for rapid feedback loops with the industry, MoD, and armed forces, thus securing scalability and a significant increase in effectiveness.

- Accordingly, future system designs need to prioritize delivering 80% of the required capabilities in just 20% of the development time, instead of developing overly complex systems with significantly longer lead times. This also allows the industry to provide a foundation for immediate use, with the flexibility to add more complex features later. This approach not only accelerates time-to-market but ensures that systems are operational and scalable to meet evolving demands.

- For these reasons, many European nations, especially the ones with smaller armed forces, currently prefer to buy off-the-shelf advanced defense equipment (like jet fighters, helicopters, missiles, and air defense) from the US – perceived initially to be more cost efficient despite the high maintenance and training costs in the whole life-cycle – rather than investing in collaborative long-term European solutions and programs.

3

The European defense industry lacks agility as a basis for rapid innovation cycles due to its focus on large-scale system developments.

- The European defense industry faces obstacles in driving technological innovation, largely due to its reliance on government-funded and -directed research and development (R&D).

- This traditional approach, while historically effective, has proven too slow to meet the evolving demands of modern defense technologies. As a result, critical gaps have emerged in key areas such as unmanned aerial vehicles (UAV), space capabilities, and software-defined defense systems.

- Moreover, the industry's limited engagement with universities, research clusters, startups, and private-sector innovators exacerbates this issue, as this misses out on opportunities for cross-disciplinary collaboration and technological breakthroughs.

- Without a shift towards a more agile and diversified R&D ecosystem, the European defense sector risks falling behind global competitors and failing to address emerging strategic challenges effectively.

4

The European defense industry and its supply chain remain fragmented, a situation partly driven by political design but resulting in a lack of economies of scale.

- The European defense industry remains highly fragmented. It lacks a robust ecosystem of large Tier 1 suppliers capable of supporting all major projects, unlike the USA, which benefits from integrated industry leaders like Northrop Grumman, General Dynamics, and Raytheon. The same holds true for suppliers at T2 and below, which are mainly smaller and more specialized firms. Limited integration, both vertically and horizontally, of original equipment manufacturers (OEM) reinforces the limitations on deploying innovative solutions at scale. This is reflected in underdeveloped relationships between prime contractors and their suppliers, and presents a weakness in the defense ecosystem.

- Europe lacks a unified defense equipment market. Instead, it operates with 27 national markets, each with distinct regulatory frameworks and significant entry barriers. This complicates cross-border collaboration, hinders the industry's ability to effectively market its portfolio, and favors national protectionism of domestic industries.

5

Company and financial performance are improving, but the gap between the European and US defense industries remains, underlining the lack of global competitiveness.[14]

- The current window of opportunity and ramp-up in defense spending is reflected in the industry's financial performance, as shown in the revenue ramp-up and increasing order backlog of key companies, highlighting the growing demand in the sector.

- Although the profitability analyses of selected German defense companies show that the industry is on the right track, it is apparent that not only Germany but also the entire European defense industry struggles to remain globally competitive, particularly against peers from the US, the Middle East, and Asia.

- Through the improved profitability of the European industry, companies have capital at hand to proactively invest in expanding their portfolio and service offering.

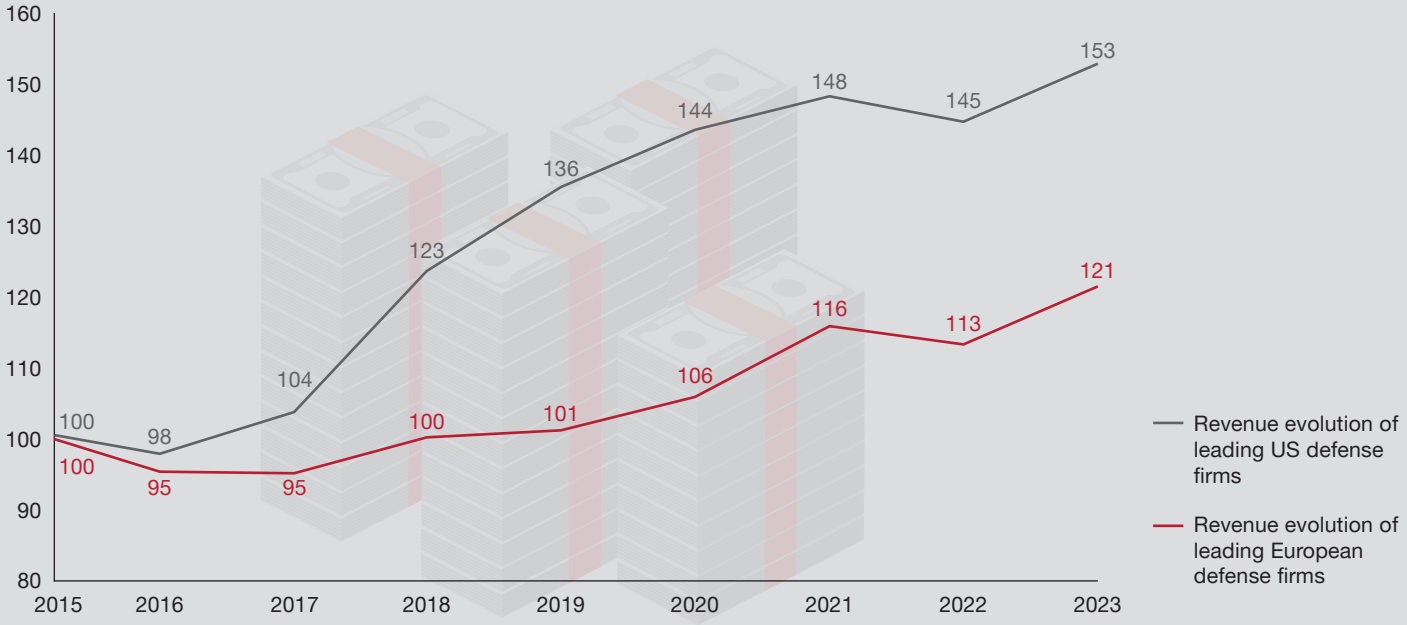
14 Source: Public company data, S&P Capital IQ, Strategy& analysis. European firms: BAE Systems, Airbus, Leonardo, Thales, Rheinmetall, Rolls-Royce, Naval Group, SAAB AB, Safran, Babcock. US firms: Lockheed Martin, RTX, Northrop Grumman, General Dynamics, Boeing, L3Harris, HII, Leidos, Amentum, Honeywell.

Revenue ramp-up of EU defense firms since February 2022 is notable – but lags behind the US

Our analysis of the revenue trends for major EU and US defense firms shows that, in fact, not only the order backlogs but also the revenues of EU defense firms increased since February 2022. Yet we also observe that the US defense industry is scaling at a much faster pace (*see Exhibit 2*).

EXHIBIT 2

Revenue trend (indexed 2015=100)



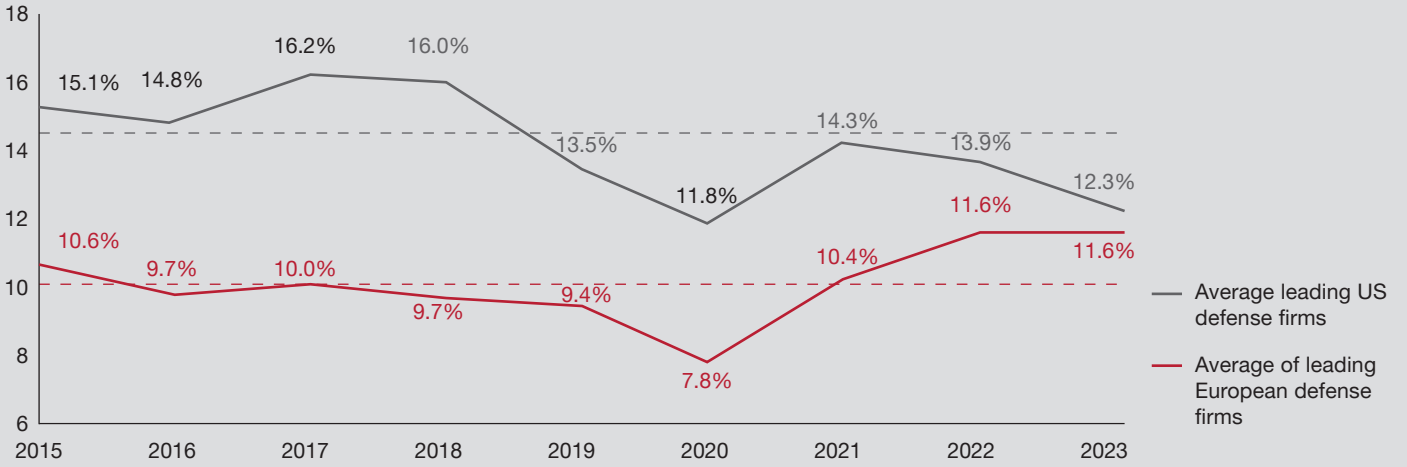
Source: Strategy& analysis

The profitability gap for European defense companies is closing

A profitability comparison of the major EU and US defense firms shows that even high-performing European companies still have a profitability gap of around 2–5 percentage points in EBITDA margin (*see Exhibit 3*).

EXHIBIT 3

EBITDA margin



Source: Strategy& analysis

> We see that the profitability gap of the European defense industry compared to major US defense firms is slowly closing. However, revenues of US firms are still growing faster compared to their European peers."
>
> **Dr. Nils Förster, Partner at Strategy&**

SECTION 3

A roadmap for a competitive, future-fit, and high-performing European defense industry

The core of this study will outline the essential actions required for the industry to enhance its competitiveness, efficiency, effectiveness and resilience, emphasizing a shift towards assuming greater responsibility. We explored the specific actions the German and European defense industry could take to enhance industry efficiency, effectiveness, innovativeness, and resilience, as well as to improve cooperation with the authorities, access to capital, and labor. We emphasize the need to shift from merely fulfilling public-sector customer orders to assuming greater responsibility within the industry (*see Exhibit 4*).

EXHIBIT 4

Pillars to forge a competitive, future-fit and high-performing European defense industry

Source: Strategy& analysis

3.1 Industry consolidation and integration as a strategic necessity for efficiency

Consolidation has become a strategic necessity for the European defense industry to achieve economies of scale, streamline operations, and bolster resilience. Unlike the early 2000s, when consolidation addressed declining demand, today's focus is on expanding capacity and maximizing the impact of defense budgets on the effectiveness of the armed forces ("bang for the buck"). This is particularly critical to enable sectors with high non-recurring costs to share R&D costs, ensure competitiveness, and drive innovation. Industry-led initiatives are needed to complement this shift, as political action may lack the momentum to address market and capacity challenges.

- Two primary archetypes mark out the consolidation roadmap for European defense. Archetype 1, as specialized pan-European firms, focuses on leading specific sectors, such as aviation or missile systems. Notable examples include Airbus and MBDA, both of which benefit from economies of scale, shared R&D costs, and cross-border production. This model could serve as a blueprint for other pan-European sector leaders. Nevertheless, effective monopoly control mechanisms are critical to prevent unjustified price increases. Archetype 2, as multi-sector but strong home-country-based firms, strengthens capabilities within national boundaries as a foundation for international expansion and complements the pan-European approach.

- Joint ventures (JVs) can help companies tackle high-cost, next-generation projects collaboratively. JVs also help to retain capabilities in partner countries, ensuring that critical knowledge remains protected. In addition, a relevant scenario is that large defense companies take on a role as system integrators and small innovations evolve from startups or small and medium-sized enterprises (SMEs), which will then be designed into complete systems. Beyond product development, JVs can play a transformative role in centralizing production, logistics, and maintenance. This reduces operational costs, for example, via shared maintenance or logistic hubs to streamline support for weapons systems, benefiting industry and governments.

- Consolidation efforts need to go beyond OEMs to address the fragmented European supply chain, particularly among Tier 1 suppliers. This fragmentation limits the sector's ability to respond to global challenges. Integrating these suppliers into a cohesive system will not only strengthen industry resilience by reducing reliance on isolated players, but also foster cross-border collaboration.

- For instance, the shared use of strategic stockpiling (e.g., critical spare parts), inspired by the example of "rescEU"[15] in the context of civil protection or disaster relief, could enhance coordination, enable rapid response, and minimize the burden of individual stockpiling. Also, it would enable the development of robust contingency plans to mitigate supply chain disruptions.

- Private equity (PE) firms, under effective control mechanisms, can further accelerate consolidation via unique streamlining mechanisms. Successful engagements have demonstrated the ability of PE firms to restructure companies while enabling the transfer of assets between prime contractors. For example, KKR facilitated the shift of Hensoldt's ownership from Airbus to Leonardo, aligning capabilities and fostering strategic partnerships across borders.[16] Such a carve-out of a standalone business unit can be replicated in other sectors, where similar opportunities exist.

15 The European Commission enhanced the EU Civil Protection Mechanism by establishing "rescEU", a fully EU-funded reserve of capacities to help EU Member States addressing disasters and emerging risks. The rescEU reserve includes firefighting aircraft, medical evacuation planes, stockpiles of medical supplies, field hospitals for health emergencies or reserves for responding to chemical, biological, radiological, and nuclear (CBRN) risks.
16 Source: Handelsblatt. 2022, April 1.

3.2 Further measures to increase defense industry efficiency

In a world of rising geopolitical tensions and skyrocketing costs for advanced technologies, the defense industry needs to do more with less. Efficiency means streamlining resources to deliver cutting-edge systems faster and at lower cost. It is the key to staying competitive and meeting collective security demands. Beyond consolidation, strategies include:

- Export markets, as a crucial source of revenue, often offer higher profit margins, ensuring long-term sustainability. In this respect, internal competition between EU firms often hampers their global reach. Strategic alliances with non-European companies, such as BAE's partnership with Mitsubishi, demonstrate how collaboration can unlock access to new markets and technologies. Moreover, structured exchanges with US firms (e.g., for integration/interconnectivity of different weapons systems), inspired by programs like the F-35, could further strengthen Europe's position.

- Forging partnerships and alliances is becoming vital in fostering efficient innovation in an increasingly interconnected defense landscape. Collaborations with technology firms and startups provide access to cutting-edge advancements, particularly in areas like AI, robotics, and cybersecurity, which are critical to modern defense systems. For instance, in 2023 the German technology firm Helsing was chosen to provide the AI development infrastructure for the German Army's Future Combat Air System, accelerating the development of next-generation capabilities for European fighter jets with missile manufacturer MBDA.[17]

- Incentivization of dual-use technologies and exploring synergies with non-defense actors, such as OEMs and leading suppliers in the automotive sector, are critical. For instance, expanding the product lines of machinery or electronics to include dual-use technologies not only broadens market potential, but also creates opportunities for cost-sharing across civil and defense applications. This approach encourages innovation while providing defense firms with a broader financial foundation, reducing their dependence on defense-specific investments.

- Lean production methods can significantly reduce costs and shorten development cycles. The European defense industry has traditionally been slower to adopt advanced practices than more market-driven sectors, such as Automotive. To overcome this, the integration of Industry 4.0 technologies, such as the latest digital design and prototyping approaches, needs to become a priority. Projects like Eurodrone or FCAS already highlight the potential of these technologies. Moreover, AI, predictive analytics, and cloud-based applications can improve operations and allow new service offerings such as predictive maintenance. Public-private partnerships can support that.

- In an era of increasing complexity, modular design has emerged as a critical enabler. By creating systems that are largely standardized but allow for limited customization, defense firms can deliver solutions tailored to specific requirements without incurring prohibitive costs. Joint initiatives for innovative concepts like DDMS can support the development of standardized platforms and shared technological infrastructure, by shifting from sequential to parallel development processes. This allows Airbus, for instance, to plan production facilities for next-generation aircraft from the start, reducing costs and shortening time-to-market. Modular production lines, which allow for efficient assembly across multiple product variants, further enhance flexibility and scalability.

17 Odnokow (2024, April 25).

3.3 Measures to increase defense industry effectiveness

In the evolving global security landscape, optimizing the effectiveness of the European defense industry is crucial. A comprehensive measures catalogue needs to be implemented, encompassing prioritization of production capacities, introducing new approaches to project management and governance, rethinking the defense supply chain, portfolio evolution and specialization, and focusing on the services business.

- Prioritization of production capacities through central European steering, e.g., via the European Commission, and delivering critical systems and products with high priority over exports would ensure that domestic defense needs are met promptly. This approach, like France's alignment of domestic demand versus export planning for Rafale jets by the French defense procurement agency (Direction générale de l'armement) and Dassault[18], could be adopted across Europe. Ensuring economic incentives in terms of attractive prices on a global scale can also support this process.

- New product management and governance approaches can significantly boost the industry's efficiency. Enhancing project management capabilities and introducing standardized Key Performance Indicators (KPIs) for large-scale projects like Eurodrone and A400M (as seen in the UK) are vital steps. Investing in project and program management competencies is key, as Europe has still limited experience in management of large-scale defense programs. Agile project management techniques can be employed to ensure timely delivery, and responsiveness to changing requirements. Developing comprehensive lifecycle support solutions and mandating long-term obsolescence concepts for all products will further increase weapons systems availability and mission readiness, by integrating public, private, and military stakeholders. Emphasizing performance-based logistics and agile procurement/ contracts will further promote transparency and customer centricity.

18 Dassault (2024, December 1).

- Rethinking the defense supply chain is vital, as traditional contract structures can be updated to integrate startups as innovation incubators in cooperation with the large defense OEMs. Another example of strengthening and diversifying supply chains is to include companies and sectors with little defense involvement, such as the mechanical engineering and automotive industries. Additionally, supporting adjacent medium-sized enterprises in the value chain and offering long-term contracts can stabilize partnerships and ensure sustained collaboration. Financial participation, including offering loans and guarantees to SMEs, and enabling additional suppliers through qualification and personnel exchange, will further enhance supply chain resilience. Major OEMs could distribute work packages across Europe, involving the most competitive contenders rather than preferred national SMEs.

- To foster portfolio evolution and specialization, the European defense industry can further develop military solutions for a global market, not just a cluster of allied clients. Especially for the German case, shifting towards the global market can create scale and broader capacity for advancements, similar to the F-35 model, which incorporates various partner levels and has already been done successfully recently.[19] Offering a broad range of solutions across multiple markets, particularly in future technologies like hypersonic missiles, drones, and artificial intelligence (AI), will require self-investment and potentially private equity backing. Focusing on core competencies and exploring targeted specialization within the European defense industry, however, can increase efficiency and reduce the diversity of types and models. Additionally, commercial off-the-shelf (COTS) development and production of systems in higher quantities, such as drones in Ukraine, could be pursued.

- Increasing the industry's focus on services, including maintenance, repair, and overhaul (MRO) business, can help to address knowledge and capacity gaps within the armed forces. Emerging full-service and performance-based logistics (PBL) solutions, such as the British example of the BAE Systems' Typhoon Total Availability Enterprise (TyTAN) for the Eurofighter aircraft in the Royal Air Force, demonstrate the benefits of private-public partnerships in driving improvements while delivering cost efficiencies. Considering the lessons-learned and best-practices from such an approach could offer significant potential for the industry and armed forces through line extensions and the development of new business models, e.g., as-a-service solutions or advanced performance-based logistics concepts, which create long-term revenue streams and additional opportunities for innovation.

19 German Federal Ministry of Defense (BMVg) (2020, February 2).

> Prioritization of production capacities and rethinking the defense supply chains are vital measures to increase the overall effectiveness of the European defense industry."
>
> **Nick Reiff, Director at Strategy&**

3.4 Measures to increase the defense industry's innovative power

Enhancing the defense industry's innovation capabilities requires a multifaceted approach that leverages existing resources, promotes foundational research, builds innovation ecosystems, and reforms public procurement practices. The following approaches aim to position the industry at the forefront of technological advancements:

- To activate the resources of defense firms more effectively, self-funded and agile R&D is key. This encourages firms to finance the early stages of innovation independently, allowing for rapid prototyping and showcasing early technological advancements. Early-stage investments in prototypes can reduce risks, shorten timelines, and enhance adaptability to shifting defense priorities. Successful examples include Rheinmetall's KF51 main battle tank and Airbus' Barracuda unmanned aerial system.

- Aligning corporate R&D priorities with strategic European goals is another essential step. The European defense R&D ecosystem must be centrally and more effectively orchestrated, both nationally and internationally. Hereby, defense companies should aim to synchronize their innovation efforts with the technology targets of the European Defense Agency (EDA) and initiatives supported by the European Defense Fund (EDF). Focusing on key emerging technologies, such as System of Systems (SoS) or Combat Cloud, will enable firms to remain competitive while addressing critical operational needs. Additionally, leveraging dual-use technologies, such as those emerging from the mobility and telecommunications sectors, can further accelerate innovation by adapting commercially proven advancements for defense applications.

- Another pillar of innovation lies in increasing investments in basic technology research. The innovation roadmap should be updated, to include emerging startups. Increased innovation could come from a widening of the ecosystem to include smaller more agile companies with dual use technologies. Disruptive base technologies, as well as hypersonic, artificial intelligence, quantum computing, autonomous systems, nanotechnology, advanced energy management, and human-machine interfaces, represent the foundation of future capabilities. Establishing government-supported venture capital funds dedicated to the defense sector can provide the resources necessary to scale promising ideas. Even though the latest national defense industry strategies, e.g., in Germany, prioritize those areas, governments and the private sector could go further to make lighthouse projects in these areas a reality. Therefore, building a robust defense innovation ecosystem and creating innovation clusters within academic institutions across Europe, such as seed incubators, to support the co-development of defense technologies is critical. While pilot projects like the Centre for Defense and Security Artificial Intelligence at the University of Lincoln, in collaboration with QinetiQ, show potential, widespread adoption across European universities remains a challenge (e.g., due to the "civil clause"[20] in Germany).

- Fostering a culture of innovation within defense authorities and ministerial offices is also critical. Increasing funding is essential to enable such initiatives. Initiatives such as MoD-sponsored innovation awards can incentivize creativity and experimentation, fostering an environment where novel ideas thrive. Additionally, defense firms can explore "lean defense innovation," which involves scaling cost-effective, combat-proven solutions, as seen in the Ukrainian defense technology ecosystem. An agile, cross-functional and incremental approach to development, such as spiral processes, will ensure systems remain adaptable to future requirements, as exemplified by the evolving expectations for the FCAS.

20 The German case presents unique complexities in fostering collaboration between academia and the defense industry, primarily due to the restrictive Zivilklausel (civil clause), which prohibits research with military applications in many academic institutions. This regulation significantly hampers the potential for innovation transfer and collaboration within the defense sector, creating a need for a much stronger political impetus to drive change.

3.5 Measures to increase defense industry resilience

In the light of the evolving geopolitical landscape, it is imperative to enhance the resilience of the German and European defense industry. This requires a multifaceted approach. By diversifying and localizing supply chains, investing in critical domestic production, and preparing for worst-case scenarios, the defense sector can secure a robust and reliable infrastructure capable of withstanding current disruptions and future challenges:

- Central to this initiative is the diversification and Europeanization (and targeted internationalization) of supply chains. This entails collectively identifying alternative suppliers and substitutions, to reduce reliance on non-European sources for critical components and raw materials. By establishing a robust and diversified supply chain within Europe, the defense sector can mitigate risks associated with geopolitical disruptions and ensure continuity in critical operations.

- Localization of defense-critical supply chains is another key strategy. Reversing globalization trends, this approach focuses on securing essential raw materials and components domestically. Ensuring that these critical supply chains are localized will not only enhance security but also stimulate local economic growth and foster technological innovation within the defense sector.

- Investment in the domestic production of critical components is crucial, with a particular emphasis on semiconductors. Establishing local manufacturing facilities for essential parts within Europe needs to become a priority. It can reduce the industry's vulnerability to external supply shocks and ensure a steady and reliable supply of key components. It should be supported by concerted efforts from governments and industry stakeholders, including funding for research and development, private sector investment incentives, and public-private partnerships.

- Preparing back-up plans for worst-case scenarios is equally vital. The defense infrastructure needs to be fortified against the increasing threat of cyber-attacks and other hostile actions targeting critical infrastructure, e.g., from drones or espionage. Implementing robust cybersecurity measures and regular vulnerability assessments are essential to safeguard operations. Structured "warfare planning and emergency scenarios" should be a standard practice across critical defense firms, ensuring business continuity during crises. Additionally, establishing contingency plans for a potential ramp-up of arms production is crucial. For instance, German companies like Mercedes Benz have developed plans to switch to a "wartime economy" mode and redeploy their production capacities and technology if necessary. Major non-defense industrial companies should consider and develop similar plans, not only for economic reasons but also for security interests. Likewise, preparing back-up defense industrial facilities can provide additional resilience.

3.6 Measures to intensify cooperation between MoDs and industry

To foster knowledge-sharing and alignment, it is essential to increase regular dialogs between representatives of the European defense industry and MoD. Successful cases, such as the "EKZ"[21] for the Eurofighter, highlight the potential of such collaborations. However, the existing industry roundtables often only include a few selected large or highly collaborative companies, and smaller firms could feel excluded. To address this, it is crucial to broaden the scope of these discussions to include a more diverse range of capabilities. Key areas for alignment include industrial cooperation, security clearances, and procurement rules:

- Public-private cooperation is especially critical in adopting a more unified and standardized approach to developing weapons systems. On the one hand – unlike in the past – MoDs should aim for a greater commitment to common solutions, rather than a plethora of nationally-developed platforms. This is particularly relevant in dual-use areas like space, where the development of both civilian and military industries needs to be tackled at a European level, since individual countries cannot afford separate constellations.

- On the other hand, the industry has to assume a part of the responsibility and should not accept over-engineered or divergent requirements from Commercial-Off-The-Shelf (COTS) or Military-Off-The-Shelf (MOTS) standards. It is essential for industries to challenge unnecessary requirements that inflate costs and complexity. This requires institutionalized processes across the public sector that allow the industry to provide feedback and suggest cost-effective but also working alternatives, fostering a cooperative environment where both parties can work towards practical and affordable solutions. The procurement authorities must therefore engage with the industry and be willing to enter into a joint dialog.

- Rethinking and developing industrial cooperation models towards an integrated value chain will nevertheless be vital, to allow for more flexible and dynamic cooperation in the future. Planning, implementation, and utilization should be closely intertwined, for example, through development campuses (implementation) and shared data ecosystems (utilization). Innovative program management models, such as a central Design Authority, can ensure alignment and mutual accountability. This could address concerns where public entities suspect industry profiteering and, conversely, industries criticize planning uncertainties driven by the public side. Likewise, building trust can also be achieved through phased preliminary studies. Instead of committing to lengthy and expensive contracts, industries can propose initial short-term, cost-effective studies to refine requirements. This approach allows both parties to iteratively develop a leaner and more focused project scope, fostering transparency and collaboration.

21 EKZ – Eurofighter Kooperations Zelle: a ground-breaking collaboration between Airbus and the German Air Force, providing technical and logistical support for in-service Eurofighter combat aircraft.

3.7 Measures to improve access to capital

Capital access for defense companies remains a key constraint. While the industry needs significant amounts of capital (the EU estimated an additional investment volume of EUR 500bn over the next 5 years), the available funds on the public side are relatively limited, given constraints such as the EU convergence criteria and the German "Schuldenbremse" ("debt brake"). However, the opportunities arising from the adapted EU ESG taxonomy and criteria could be well leveraged. Further potential measures include:

- On the private side, banks and other private capital providers (e.g., private equity funds) remain key stakeholders to ensure sufficient funding. For this to happen, the industry needs to position itself as an attractive target for private investors. Investor sentiment has already started to shift, as evidenced by an increasing number of transactions in the European defense sector (e.g., the RENK Group IPO in 2024; see Deep-dive box on page 21). However, further actions need to be taken to attract further private capital. These include an active dialog between the defense industry and private capital providers on funding needs and distinct financing opportunities. In addition, the industry has to be willing to actively support high-risk investments and invest in defense startups, together with private capital providers (e.g. via corporate venture capital units).

- Furthermore, financial services firms can play a supporting role in setting up dedicated funding vehicles to funnel investments into the defense industry. Under strict consideration of risks, regulatory requirements, national and European laws and opportunities, this could include collaborative vehicles such as underwriting/facilitating export credit agency transactions, special purpose vehicles, or syndicated loans and credit facilities. Banks could also offer hedging instruments and insurance products (e.g., forward contracts) to help defense contractors manage currency fluctuations, interest rates, and market volatility.

- To further enhance the sector's financial attractiveness, private capital should be encouraged to leverage investments from institutional investors to support growth, such as through IPOs or private equity investments, or utilize governmental banks and funding vehicles such as the "Kreditanstalt für Wiederaufbau" (KfW) in Germany or the European Investment Bank. Other enablers are sponsoring defense startups by establishing dedicated VC funds, improving access to financing for SMEs in the defense sector, and supporting financing for the supplier landscape.

- Developing new funding models for defense investments, such as performance-based compensation models, is a further important driver. Shaping the public debate around the necessity and benefits of defense spending, effectively addressing the "guns versus butter" argument, will also ensure that recent increases in defense budgets are sustainable and continue to prioritize defense equipment procurement and R&D.

> Beyond financial resources, human resources remain a key bottleneck for the defense industry. Workforce rotation e.g., with the automotive or public sector could help to close the gap."
>
> **Tobias Mueller, Senior Associate at Strategy&**

Private Investment Example

One very successful example showcasing the ability for private investors to participate effectively in funding the scale-up of the European defense industry is the German tank transmission manufacturer RENK Group. After previously being financed by the European private equity investor Triton, RENK Group went public on the Frankfurt stock exchange in February 2024. This IPO attracted EUR 500m in private capital to fund its growth ambitions, exceeding the initial target of EUR 450m. While this IPO strongly illustrates the increased desire from institutional investors to invest in the European defense industry, limitations remain – especially with regard to domestic German investors, as significant shares of the overall volume were contributed by international investors. As confirmed by Susanne Wiegangd: "We have been able to attract many investors from abroad. In London or New York, financial stakeholders are much more open to investigate in the defense industry."

3.8 Measures to improve access to skilled labor

Beyond financial resources, human resources remain a key bottleneck for the defense industry. The availability of selected niche skill profiles (e.g., programmers) is hindering progress and the ability to build the next generation of weapons systems. Resolving the personnel constraints is a socio-economic challenge for the entire industry, politics, and professional associations for Europe and the individual Member States. In this regard, Europe can already build on an available pool of talent across industries, driven by market-leading academic institutions and leading positions in various industries (e.g., automotive). The European defense industry could leverage these resources in the future via the following measures:

- Workforce rotation within the industry, between industries, and with the public sector leverages existing capabilities and the significant amount of talent available in other industries. While poaching these talents remains an option, it is much more attractive to ensure flexible career models allowing for knowledge transfer between industries and with the public sector (e.g., on automation and digitization of supply chains). Similar models already exist for public sector-industry collaboration, such as the US DoD's public-private talent exchange program, and could also be applied in Europe to foster the vital exchange of skills. To further increase talent mobility, expanding access to Eastern European labor and nearshoring in Europe can help address talent shortages and strengthen the sector.

- To enhance its public perception, the defense industry can position itself as an employer of choice by streamlining hiring processes, strengthening its branding, and offering flexible career models. This approach could appeal to talent from both outside Europe (e.g., US defense companies) and other European industries (e.g., automotive). An example of good practice is Rheinmetall's cooperation with the IG Metall union and the acquisition of automotive employees, which is particularly relevant in times where the civil automotive industry is challenged. Increased public visibility and marketing efforts, such as Rheinmetall's sponsorship of Borussia Dortmund, can further boost the sector's appeal, but need to be evaluated carefully.

- Easing entry requirements and removing barriers is a critical pillar for a European approach to talent management. The defense sector is limited by national security restrictions, which hinder talent mobility. To address this, the public sector should review and ease unnecessary barriers such as artificial "national eyes only" requirements, particularly outside top-security projects. This will allow a broader pool of candidates to be considered for key positions, promoting the "best person for the job" principle and encouraging greater flexibility and collaboration across sectors.

SECTION 4

Our conclusions and call to action

In concluding our study on creating a competitive, innovative, and future-fit German and European defense industry, we emphasize four pivotal claims to guide the necessary evolution of the sector.

1. A production factor-based, supply-side policy approach is essential. The industry needs to be equipped with the requisite resources: capital, skilled labor, and technology. This foundation is crucial to fostering innovation and maintaining a competitive edge.

2. A focused European Defense Industrial Policy, as recently published by the European Commission, could streamline efforts and challenge the duplication of sovereign defense capabilities and capacities for the sake of national sovereignty and protectionism. This alignment can prevent the inefficiencies caused by weapons systems diversity, which hinders scale and complicates operations and interoperability.

3. Stronger intrinsic European collaboration is vital for survival and growth. This calls for partnerships and joint value creation deals that transcend mere workshare. Recent examples, like the Trinity House Agreement on defense cooperation between the UK and Germany, exemplify the power of collaborative strategies.

4. Active industry-led transformation is essential and needs to include checks and balances within the industry, to prevent profit-focused exploitation of the historic ramp-up in defense budgets. A new modus operandi instead of 'business as usual' is required to focus the industry on innovative cycles and new structures for time-to-market efficiency. This includes industry-driven consolidation, focusing on synergies and investing in resilience and efficiency.

Our guardrails include supporting local industries to ensure public funds benefit local economies, while avoiding a narrow national focus. Decision-making must balance lead nation roles with egalitarian principles, ensuring all parties can accept and live with collective decisions.

We reiterate our most important call: Europe must act in a united manner, overcoming burdens, resistance, and barriers to tackle the security challenges today and tomorrow. The time for action is now; the future of the European security architecture depends on the design of the European defense industry.

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