



REPORT  
THE FUTURE OF  
EUROPEAN DEFENSE

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Italian Army

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of the 500th anniversary of the Battle of Pavia 1525-2025

Municipality of Pavia

Intesa Sanpaolo

University of Pavia

*Pavia, October 25, 2025*

FOURTH EDITION

# CONFERENCE REPORT

## THE BATTLE OF PAVIA

### AND THE FUTURE OF EUROPEAN DEFENSE (1525-2025)

*On the occasion of the 500<sup>th</sup> anniversary of the Battle of Pavia*

**Pavia, 25 October 2025**

*With the contribution of:*

Comitato Promotore per la Rievocazione del Cinquecentenario della Battaglia di Pavia

Fondazione Monte di Lombardia

Leonardo

*in collaboration with:*

Italian Army

Municipality of Pavia

Intesa Sanpaolo

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*The views expressed in this document are solely those of the authors, and cannot be attributed to the organizations or companies that employ them, or to the organizers and promoters of the Conference, or to the organizations that publish this Report.*

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<https://www.aspeninstitute.it/la-battaglia-di-pavia-e-il-futuro-della-difesa-europea-1525-2025-iii-edizione/>

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# *The Battle of Pavia and the Future of European Defense (1525-2025)*

## **Letter to Conference Attendees**

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*Dear Attendee,*

The international Conference *La battaglia di Pavia e il futuro della difesa europea (1525-2025)* (“The Battle of Pavia and the future of European defense (1525-2025)”) of 25 October 2025, the year of the battle’s 500<sup>th</sup> anniversary, continues the reflection begun with the first three Conferences organized in Pavia in 2022, 2023, and 2024. This path of reflection emphasizes the analogies between the Battle of Pavia, a European and modern event, and present-day geopolitical challenges, through encounters spurring debates and proposals. We hope these proposals will yield responses to the challenges that the future holds in store, starting from European common defense, with a view to maintaining the values of peace and security on our continent during a time of seeking new global balances, of concern over new conflict situations, of technological acceleration, and of the consequent political and military strategies.

This preparatory Report is conceived as a resource for the Conference’s attendees, in order to further inform them about some of the key themes inspiring the event, as well as to anchor the debate to the current challenges. While the Report presents no solutions or proposals, it is a starting point that aims to offer a brief opportunity for reflection on some of the main aspects of the contemporary debate on European defense, while remembering the Battle of Pavia and its modernness.

In particular, this year’s Report also relies on contributions by the Italian Army and, exactly 500 years after the Battle of Pavia, offers reflections on the development of ground conflicts. While the wars in progress point to new technologies and new tactics being asserted on the battlefield, they also signal the rediscovered need for heavy armored forces, artillery, and other forces that seemed no longer destined to constitute the centerpiece of a modern army.

We have sent you this Report in the hope that you might adhere to the spirit of the Conference, which aims to achieve a path of collaboration among high-level attendees through a constructive and interdisciplinary debate during a historical period that demands ideas and solutions. And it is also our hope that this event might make a contribution towards building a safer and more peaceful world, one of shared prosperity and intergenerational solidarity around the common values of Italy and Europe.

### **Giulio Tremonti**

Chairman, Aspen Institute Italia; Chairman of the Foreign Affairs Committee. Chamber of Deputies

### **Mario Cera**

President, Fondazione Monte di Lombardia

### **Stefano Pontecorvo**

Chairman, Leonardo

## 1. The future of the EU's common defense, between European projects and the European Commission's White Paper

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Today's Europe stands at a historic crossroads, a juncture where the need for a more robust and integrated common defense has become an inescapable priority. While the *White Paper for European Defence* published by the European Commission in March 2025 marked a crucial step towards outlining the future of European security, it also continued a path that began with European integration and then accelerated during the last decade.<sup>8</sup> This document provides a general overview of the strategic change taking place, and its political, military, and industrial articulations, and then also advances an analytical framework of use for understanding the reinforcement of the defense industrial base and greater cooperation among EU countries. This first chapter of the Report analyzes the strategic change taking place, the effects of increased military spending, and the need for European armed forces to face the present and future challenges.

### 1.1 Strategic change

The Russian invasion of Ukraine in 2022 marked a watershed for European security, shattering the illusion of a lasting peace on the continent and prompting Europe to reconsider its geopolitical role.<sup>9</sup> This strategic change is articulated over three main dimensions: the transition from crisis management to global strategic competition; the rise of the Russian threat over the medium-long term; and the strategic repositioning of the United States.<sup>10</sup>

*From crisis management to strategic competition.* After the end of the Cold War, Europe focused mainly on managing regional crises and on peace missions like those in the Balkans or in Africa.<sup>11</sup> However, the return of high-intensity conflicts like the one in Ukraine underscored the need to prepare for scenarios of strategic competition with global powers like Russia and China. This change requires a paradigm shift: Europe's armed forces must be able to operate in multi-domain settings by integrating land, air, naval, space, and cyber operations. The *White Paper for European*

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<sup>8</sup> European Commission, *White Paper for European Defence – Readiness 2030* (Brussels: European Commission, 2025).

<sup>9</sup> Henry Farrell and Abraham L., *Underground Empire: How America Weaponized the World Economy* (New York, NY: Henry Holt & Co., 2023), pp. 112-144.

<sup>10</sup> Alessandro Marrone, Elio Calcagno, Ottavia Credi, Michelangelo Freyrie, Giancarlo La Rocca, Karolina Muti, Michele Nones, Nicoletta Pirozzi, Paola Tessari, *La guerra russo-ucraina, la sicurezza dell'Europa e la difesa europea* (Rome, Italy: Istituto Affari Internazionali, 2022).

<sup>11</sup> Luis Simón, "'Back to Basics' and 'Out of Area': Towards a Multi-Purpose NATO," *The RUSI Journal*, Vol. 159, No. 3 (2014): 14-19; CSDP, Luis Simón, "Strategy and Crisis Management: Out of Area or Out of Business?," *The International Spectator*, Vol. 47, No. 3 (2012): 100-115.

*Defence* emphasizes the importance of developing capabilities that allow the EU to act autonomously in crisis situations, thus reducing dependence on the United States for high-level operations. In particular, in addition to bridging the existing gaps in capability (quality), in many areas and functions the insufficiency of forces (quantity) must also be addressed.

*The rise of the Russian threat.* Russia represents the main threat to European security today, not only for its aggression in Ukraine, but also for its hybrid activities, like disinformation and cyberattacks, that strike the EU countries directly.<sup>12</sup> The Russian threat also extends to the domain of energy and trade, with implications for the continent's economic stability. As a consequence, the countries of Eastern Europe, like Poland, Lithuania, Latvia, and Estonia, have intensified their efforts to strengthen national defenses: in addition to significantly increasing their military budgets, these countries are even withdrawing from the Ottawa Treaty and its ban on anti-personnel mines, in order to better defend their borders. The White Paper identifies the need for urgent investment in air and missile defense, drones, and long-range artillery systems in order to counter Russian superiority in these sectors, as well as to ramp up the defenses currently in place on the borders with Russia, offering neighboring cities and countries appropriate protections in any scenario.

*The strategic repositioning of the United States.* The United States, the historic pillar of European security through NATO, has been shifting its strategic attention towards the Indo-Pacific in order to counter a rising China – a trend that has been sharply accelerated with the new Trump administration.<sup>13</sup> This repositioning has prompted the EU to pursue a greater strategic autonomy, as shown by the Strategic Compass of 2022 and the White Paper of 2025. Although NATO is still of key importance for collective defense, Europe is seeking to develop autonomous capabilities for managing regional crises without depending exclusively on the United States.<sup>14</sup> This includes strengthening the capacity for power projection, like the EU's rapid reaction force, as well as investing in advanced technologies like AI and reinforcing existing expertise in settings, like cyber-related areas and space, whose importance is growing exponentially. This strategic change has profound implications not only for the armed forces, but also for the defense industry and for political dynamics within the EU. While the need for a coordinated approach is clear, it requires a balance between national interests and the common goal of an integrated European defense. Considering the new American strategy, a key issue remains that of European nuclear deterrence.<sup>15</sup> While France is currently the only EU member that has atomic weapons, American tactical nuclear weapons are present in many EU countries, all of which belong to NATO. But what does the future hold in store? Clearly, at least today, the Russian nuclear arsenal is decidedly

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<sup>12</sup> *"The Hague Summit Declaration issued by the NATO Heads of State and Government participating in the meeting of the North Atlantic Council in The Hague 25 June 2025* (Bruxelles: NATO HQ, 2025).

<sup>13</sup> Pivot to Asia, etc. Stefan Theil, "Trump's Return Would Transform Europe," *Foreign Policy* (November 4, 2024).

<sup>14</sup> European Commission, *White Paper for European Defence*.

<sup>15</sup> *The future of European Competitiveness* (Luxembourg: Publications Office of the European Union, 2025); Andrea Gilli and Francesco Nicoli, "How can Europe's nuclear deterrence trilemma be resolved?," *Working Paper* (Brussels: Bruegel, 2025)

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superior to that present in the EU. France and Germany, also during 2025, have begun to grapple with the issue. This is perhaps one of the most complex and delicate aspects when we think about European common defense.

Clearly, for both economic and political reasons, all European countries would greatly prefer a return to arms control; however, bringing Russia back into the INF Treaty was impossible before the Ukraine conflict began, and appears unlikely in the short term, also because the new treaty ought to include China – and China, too, seems to have no intention of joining it.

*Global instability.* These trends and changes in Europe and Eurasia, and on both sides of the Atlantic, come on top of growing global instabilities, particular originating from Asia. Hamas's attack on Israel on October 7, 2023, reopened hostilities between Israelis and Palestinians – a conflict that soon expanded to include Lebanon, Yemen and, lastly, Iran. Israel's military intervention against Iran in June 2025, an intervention later joined by the United States, demonstrated the importance of technological superiority in conventional conflicts – while, however, highlighting the considerable complexity of modern military operations. In 2025, the historic tensions festering between India and Pakistan exploded in a new conflict triggered by a terrorist attack in Kashmir that New Delhi attributed to armed groups based in Pakistan. India responded with targeted military operations beyond the Line of Control (LoC), provoking a harsh reaction from Islamabad. The quickly intensifying clashes involved both land and air forces, leading to an increased risk of nuclear escalation. However, for observers, the main concern is obviously still East Asia, and China in particular. The possibility, once considered remote, that Beijing might attempt to conquer Taiwan with a naval blockade or a combined amphibious and air action, is becoming increasingly tangible for many observers. This is why the United States wants to prioritize this theatre over Europe and (apparently) the Middle East.

## **1.2 Increased military spending by EU countries**

In this scenario, some EU countries have been increasing their defense spending for some years now. The approximately € 180 billion total expenditure by EU countries in 2014, the year of Russia's annexation of Crimea, has grown to about € 320 billion, with the share in procurement rising from under € 50 billion to upwards of € 90 billion during the same time frame.<sup>16</sup> Without a doubt, the country that is increasing these investments the most, in terms of billions of euros, ratio of defense spending to gross domestic product, and innovation from the choices made in the past, is Germany. One need only consider that, in 2024, German defense spending exceeded \$ 88 billion, a record level in comparison with the \$ 67 billion spent in 2023, or the approximately \$ 50 billion in 2020, before Russia's invasion of Ukraine in 2022.<sup>17</sup> On 18 March 2025, the

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<sup>16</sup> Andrea Gilli, Mauro Gilli and Niccolò Petrelli, "Before Vegetius: Critical Questions for European Defense," *Policy Brief*, No. 31 (Milan: Institute for European Policy-Making, 2024).

<sup>17</sup> European Defence Agency, *Defence Data 2023-2024* (Brussels: European Defence Agency, 2024).

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Bundestag, Germany's federal parliament, approved a massive investment plan that amends constitutional budget rules precisely to foster the country's rearmament and modernization.<sup>18</sup>

This is a choice that, in a matter of just a few years, will likely result in Germany having Europe's largest land and air forces at its disposal. Meanwhile, as for navies, France, the United Kingdom, and Italy will continue to have the biggest ones in terms of number of units, tonnage, weaponry, and availability of aircraft carriers.

Germany's increased military spending is certain to have major consequences for the industry as well. With an expanding domestic market, German defense industries will have the opportunity to initiate new collaborations in Europe from a position of greater strength – and with solid balance sheets and growing profits.

Italy, too, has decided to boost its defense spending, considerably. In the latest budget law, the resources assigned to the Ministry of Defense (including the costs for the Carabinieri corps that comes under that ministry's purview) neared the threshold of € 32 billion. In 2024, the resources for the Ministry of Defense equaled about € 29 billion, against € 28 billion in 2023 and € 26 billion in 2022. This, then, is a major, constant increase, given that, looking further into the past, the resources allocated to this ministry did not even reach € 21 billion in 2018<sup>19</sup>. Moreover, these resources do not even include those for military investments managed by the Ministry of Enterprises and Made in Italy (MIMIT), those for international missions, and other, lesser items.

These greater allocations have already resulted in the announcement of major new investments for Italy. Some examples would include the total number of F-35s on order increasing from the previous 90 to the present 115 – 95 of which for the Italian Air Force and 20 for the Italian Navy; or the Army's request for 21 High Mobility Artillery Rocket Systems (HIMARS); or the new heavy destroyers in the DD(X) program for the Italian Navy – units that, in terms of onboard missile systems and tonnage, will be without equal in Europe.<sup>20</sup>

With the NATO leadership in the Hague, the NATO countries have pledged to ramp up defense spending to 5% of GDP by 2035, bringing the core expenditure items like weapon systems, troops, and ammunition to 3.5% of GDP, and connected investment items (infrastructure, cybersecurity, innovation) to 1.5% of GDP. If these commitments are maintained (and not just formally), Europe might approach 500 billion in military spending in just a few years, nearly triple what was spent a decade ago. This will have strategic implications of course (a Europe that is stronger towards

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<sup>18</sup> Guntram Wolff, Armin Steinbach and Jeromin Zettelmeyer, "The governance and funding of European rearmament," *Policy Brief*, No. 15/25 (April 2025).

<sup>19</sup> Camera dei Deputati, "Le spese per la difesa nel bilancio dello Stato 2025-2027," *Studi - Difesa: Difesa e Sicurezza Internazionale* (Rome: Camera dei Deputati, Documentazione Parlamentare, 2025).

<sup>20</sup> Pietro Batacchi, Nuovi dettagli sugli incrociatori pesanti DDX, RID: Rivista Italiana Difesa, 14 October 2024.

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Russia and more independent towards the United States), but political, industrial, and military ones as well. Clearly, increased spending capacity will have an impact on the delicate industrial equilibria, but also on the various countries' political weight within the EU itself.

### 1.3 Europe's armed forces, between capability and necessity

In spite of the major existing capabilities and the progress made in recent years, Europe's armed forces continue to suffer from certain shortcomings in terms of capability and interoperability. The White Paper identifies several priority areas for investment: air and missile defense, drones, ammunition, cyber warfare, logistics, and AI. These priorities reflect the need to prepare for multi-domain conflicts, in which technological superiority and rapid response will be decisive.<sup>21</sup> A key problem is the fragmentation of military capabilities. In fact, each member state has different weapon systems and procedures, which complicates interoperability in joint operations. Projects like those for new-generation fighters, like FCAS (France, Germany, and Spain) and Tempest (United Kingdom, Italy, Japan) aim to overcome this fragmentation by developing shared platforms that integrate advanced technologies like AI and unmanned systems.<sup>22</sup> However, these programs take decades to achieve full operativity, and in the meantime Europe must face immediate shortcomings, like the ammunition shortage and dependence on suppliers from outside of Europe.

Recruitment presents another crucial challenge.<sup>23</sup> Countries like Germany and the United Kingdom struggle to maintain adequate staffing due to a declining population and competition with the private sector.<sup>24</sup> To overcome this, some countries, like Sweden and Finland, have reintroduced compulsory military service, while others are investing in recruitment campaigns targeting women and young people.<sup>25</sup> The White Paper proposes developing European-level joint training programs in order to standardize skills and improve operational readiness.

Lastly, Europe's armed forces must prepare for emerging threats, like hybrid warfare and climate change.<sup>26</sup> Disinformation and cyberattacks necessitate a ramping-up of cyberdefense capabilities, while climate change requires operations to be planned in order to deal with natural disasters and resource conflicts. Countries like the Netherlands are already investing in green technologies to reduce the ecological footprint of their armed forces, a model that might see Europe-wide adoption.

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<sup>21</sup> Andrea Gilli, Mauro Gilli and Gorana Grgić, "NATO, multi-domain operations and the future of the Atlantic Alliance," *Comparative Strategy*, Vol. 44, No. 1 (2024): 73-91.

<sup>22</sup> Juan Mejino-Lopez and Guntram Wolff, "A European defence industrial strategy in a hostile world," *Policy Brief 29/2024* (Brussels: Bruegel, 2024).

<sup>23</sup> Julia Monn, "Europe's militaries struggle to attract the next generation," *Neue Zürcher Zeitung* (April 4, 2025);

<sup>24</sup> Laura Pitel, "German army struggles to get Gen Z recruits 'ready for war'," *Financial Times* (15 2025).

<sup>25</sup> Tibor Szvircsev Tresch, Vida Česnuiytė, Kairi Kasearu, Teija Sederholm, Johan Österberg (eds.), *Conscription as Subject of National Security Comparative Perspective in Europe at the Beginning of the 21st Century* (Wiesbaden: Springer-Nature, 2025).

<sup>26</sup> Andrea Gilli, Mauro Gilli, Gorana Grgic, Marina Henke, Hugo Meijer, Alexander Lanoszka, Luis Simon, Max Smeets, Nina Silove, "Strategic Shifts and NATO's new Strategic Concept," *NDC Research Paper* (Rome: NATO Defense College, 2022).

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## 1.4 Options and scenarios for European defense

In the presence of geopolitical changes and the growing threats, the future of European defense depends on the member states' ability to balance strategic ambitions, political and economic realities, and the trans-Atlantic relationship. A Europe unable to strengthen its own defense risks being vulnerable to military, technological, and commercial threats from other global powers. This section of the document, in order to offer reflections that are also alternative to one another, identifies five different scenarios for the future of European defense, each with distinct implications for security, the EU's cohesion, and the continent's global role.

*Hypothetical scenario 1: The destructured Europe.* In this scenario, the efforts to strengthen European defense fail, leading to further fragmentation of military and political capabilities. Although unlikely, this possibility cannot be ruled out, especially in a setting of growing political differences among the EU's members. This hypothesis, a negative one for the EU, sees European countries pursuing discordant national priorities, with some (e.g. Poland, the Balkan countries) strengthening their military posture towards NATO, and others (e.g. the Mediterranean countries) focusing on regional crises like migration and terrorism. A lack of coordination might prevent shared projects like the European Defence Fund (EDF) and the Strategic Compass from bringing tangible results. In this scenario, military investment remains uneven, with countries like Germany increasing their spending while others, constrained by economic pressures, maintain limited budgets. A destructured Europe would weaken the EU as a whole. Differences in defense policies would be reflected in other settings, like trade and energy, thus undermining the EU's cohesion. Dependence on NATO and the United States would increase, thus diminishing Europe's strategic autonomy and its ability to face global threats. Political and military fragmentation, combined with economic constraints, is the main challenge. The lack of a shared vision might exacerbate internal tensions, making the EU less relevant on the global landscape.

*Hypothetical scenario 2: European decline.* In this scenario, Europe is unable to significantly strengthen its military capabilities, while it remains mired in bureaucratic obstacles and political differences. This possibility, although remote, reflects the risk of strategic inertia. Defense investments like the FCAS and Tempest programs proceed slowly due to high costs and lack of consensus. The 5,000-strong rapid reaction force established by the Strategic Compass remains uncompleted, while military spending does not reach 2% of GDP in many countries. While cooperation with NATO remains strong, Europe depends increasingly on the United States for critical technologies and operational capabilities. A declining Europe would see an unbalanced trans-Atlantic relationship, with the United States dominating strategic decision-making. The EU's ability to respond to hybrid threats like cyberattacks or disinformation would be limited, exposing the continent to increasing risks. Internally, the lack of military progress might feed the public's discontent with an EU perceived as ineffective. The main challenges include European bureaucracy, competing national priorities, and difficulty of maintaining political support for long-term investment in a setting of economic pressures.

*Hypothetical scenario 3: Europe continues with its current policies.* This scenario describes a Europe continuing its current approach of small, incremental steps, with no meaningful change of course. And this approach, while politically safe, is strategically limited. In this scenario, the EU maintains existing projects like the EDF and joint NATO exercises, but without accelerating military integration. The countries gradually increase defense spending, but not enough to bridge the technology gap with powers like China and the United States. The rapid reaction force becomes operational, but with limited capabilities, while programs like FCAS proceed slowly due to the partners' differences. Although a plodding Europe guarantees a certain stability, preserving the trans-Atlantic relationship and internal cohesion, it cannot keep pace with global military and technological acceleration, and risks being left behind in sectors like AI and space warfare. The deterrence capability remains adequate for regional threats, but insufficient for global challenges. The EU's lack of ambition and its slow decision-making are the chief obstacles. Moreover, competition among member states for resources and influence might further slow progress, thereby limiting the effectiveness of common initiatives.

*Hypothetical scenario 4: A stronger Europe.* In this scenario, Europe truly strengthens its collective defense without requiring federal integration, balancing strategic autonomy and trans-Atlantic cooperation. It is a pragmatic path that exploits existing structures to improve resilience. The EU accelerates defense projects like the EDF and the Strategic Compass by financing advanced technologies (e.g. drones, cyberdefense) and improving interoperability. It increases ammunition stockpiles and ramps up staffing and the number of available units. The rapid reaction force becomes operational by 2026, with a capability for deployment in regional crises. The member states increase military spending towards 2% of GDP, allocating funds to joint programs like FCAS and Tempest. A European defense council is established to coordinate strategies, harmonizing priorities among the various members. A stronger Europe would reinforce its position as an equal partner in NATO, reducing dependence on the United States without compromising trans-Atlantic ties. Greater military integration would promote internal cohesion and stimulate the defense industry, creating economic opportunities. The EU would be able to respond effectively to regional threats and contribute towards global security. Coordination among the 27 members remains complex, with possible differences owing to cultural reasons, for example, or to geographical position. The high costs of technological programs require constant financial commitment, while the risk of tensions with the United States might emerge if strategic autonomy were to be perceived as a challenge to NATO.

*Hypothetical scenario 5: Europe, the power.* In the most ambitious scenario, Europe emerges as a global military power able to cooperate on an equal footing with the United States and to compete with China, possessing military capabilities considerably superior to Russia's and full control over the geopolitical developments at its borders. This scenario would require an unprecedented military and political integration, even without a federal Europe. In this scenario, the EU creates

a centralized command for national military forces, supported by a standing force of tens of thousands of troops and advanced air and naval capabilities. Programs like FCAS and Tempest are unified into a single European system, while France shares part of its nuclear capabilities for a European deterrence umbrella. A common defense budget funded by taxes or Eurobonds permits massive investment in strategic technologies like space and AI. The EU sets up military bases in key regions, like the Mediterranean and the Indo-Pacific. Europe the power would position the EU as a leader in global governance, holding sway over security, trade, and the climate. Strengthened deterrence would reduce vulnerability to outside threats, while the defense industry would become an economic engine. However, the trans-Atlantic relationship would have to be redefined, with Europe as an equal partner. The yielding of national sovereignty for a European army would encounter resistance. France's nuclear sharing would be politically controversial, and financial costs might reduce resources for other sectors. Moreover, tensions with the United States might impair trans-Atlantic cohesion.

## 2. How national defenses between NATO and the European Union are changing

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In recent decades, Europe's armed forces have undergone a profound transformation, accelerated by Russia's invasion of Ukraine in 2022. This event marked a turning point, forcing European governments to reassess their own defense priorities, increase military investment, and modernize their ability to handle growing threats. This chapter analyzes the transformation of Europe's defenses through five key areas: (1) the impact of the invasion of Ukraine, (2) technological modernization, (3) strengthened NATO/EU cooperation, (4) future challenges and priorities, and (5) responses to emerging threats. These areas illustrate how Europe is adapting its security posture to an increasingly unstable global context, balancing strategic autonomy with trans-Atlantic cooperation.

### 2.1 The impact of the invasion of Ukraine

Russia's invasion of Ukraine in February 2022 sounded an alarm for Europe, underscoring the continent's vulnerability to direct military threats and forms of conventional warfare that appeared to belong only to the past. After decades of relative stability, the war highlighted many European states' reliance on obsolete equipment and the need to prepare for high-intensity conflicts. This geopolitical shock encouraged governments to reconsider their defense strategies, prioritizing military investments and the strengthening of their own capabilities. The Ukraine War also prompted profound reflection upon the importance of "quantity" of weapon systems over "quality": quality on its own cannot win conflicts. Issues like number of stockpiles, ammunition, available units, combat troops, and industrial capabilities have regained currency.

*National developments.* In response to this scenario, many European countries have significantly increased their defense budgets. Germany marked a sea change with its *Zeitenwende* (turning point), already announced by the previous Chancellor Olaf Scholz. The German government pledged a special fund of € 100 billion to modernize the Bundeswehr, breaking the tradition of decades of limited military spending, as also pointed out in chapter 1. The goal is to reach 5% of PIL for defense, in keeping with NATO commitments, thus reinforcing land, air, and naval defense capabilities.

Poland, one of the countries with the highest military spending as a percentage of GDP (already 5% in 2025), has accelerated its expansion plans. Warsaw has announced the purchase of Abrams tanks and HIMARS missile systems from the United States, with the goal of building one of the continent's most robust armed forces, at least on land. Moreover, the Polish government is aiming to expand its army to 300,000 troops by 2035, thus consolidating the country's role as NATO's eastern bulwark.

The Nordic countries have reacted decisively, too. Traditionally neutral Finland and Sweden abandoned their non-alignment policy and applied to join NATO, achieving membership in 2023 and 2024 respectively. Finland has increased defense spending, exploiting its robust capacity for civic mobilization, while Sweden has already reintroduced the draft to guarantee a combat-ready force. These changes have significantly strengthened NATO's northeastern flank.

*Implications.* The invasion of Ukraine has thus been the catalyst for a revitalized European commitment to collective security. Increased military spending and NATO's expansion have strengthened deterrence against Russia, while the integration of Finland and Sweden has enlarged the Alliance's strategic range. These developments have also highlighted the need for a more autonomous and resilient Europe, able to respond quickly to regional crises – or to crises not purely military in nature, from disinformation to hybrid attacks and cyber warfare.

*Challenges.* In spite of the progress, significant challenges remain. Many European countries still rely on dated equipment, and differences in national priorities make it more complicated to harmonize capabilities. Moreover, the transition towards higher military budgets requires ongoing political support, above all in uncertain economic settings and with a variety of public opinions regarding defense, especially in certain EU states. The need to balance long-term investments with immediate needs remains a critical priority, one compounded by the inevitable political pressure which, in a period of inflation and economic uncertainty, demands interventions in other settings as well, from the crisis in the automotive sector to the climate, to cite just two examples.

*Transition.* The urgency of responding to modern threats, as shown by the Ukraine conflict, has not been limited to increased spending, but has prompted Europe to invest in advanced technologies to face the military and strategic challenges of the 21<sup>st</sup> century.

## **2.2 Technological modernization and the importance of innovation**

The war in Ukraine has demonstrated the importance of advanced technologies, like drones, cyber warfare, cyberdefense, and precision-guided munitions in determining the outcome of modern conflicts. Europe's armed forces have consequently initiated ambitious programs to modernize their arsenals, with the aim of bridging the technology gap and improving operational readiness. This takes time, also considering that Europe's industrial capabilities, albeit sizable even in 2022 at the start of the conflict, did not have – and still lack – the ability to respond quickly to the governments' growing demand in terms of quality of products and technologies.

*Developments in Weapon Systems.* A key area for investment is that of new-generation combat air systems. France, in collaboration with Germany and Spain, is working on the Future Combat Air System (FCAS) program to develop a sixth-generation operational aircraft by 2040. In parallel, Italy, joined by the United Kingdom and Japan, is taking part in the Global Combat Air Programme, which aims to create a similar air system by promoting synergies among allies. Both of these air systems will integrate manned and unmanned aircraft, emphasizing artificial intelligence (AI) and advanced connectivity to improve coordination in battle. Drones have taken on a crucial role. Poland has purchased Turkey's Bayraktar TB2 drones, while Germany is developing armed drones, manufactured domestically to reduce dependence on foreign suppliers. Cyber warfare and cyberdefense are also growing priorities. Countries like Estonia and the Netherlands have invested in protection capacity against cyberattacks, reinforcing critical infrastructure against hybrid threats. Military logistics is another area being given attention. The Ukraine war has underscored the importance of an efficient logistics to support prolonged operations. Germany and the Netherlands have ramped up investments in ammunition stockpiles, transport networks, and military infrastructures in order to guarantee greater mobility and operational resilience. Lastly, all countries, including Italy, are strengthening their armies' heavy forces, by introducing or designing new tanks or new tracked infantry fighting vehicles.

*Implications.* These investments are transforming Europe's armed forces, making them more adaptable to high-intensity and hybrid conflicts. Adopting advanced technologies not only improves deterrence capacity, but also allows Europe to reduce its dependence on foreign partners like the United States for critical technologies. Moreover, collaborative programs like FCAS and Tempest promote industrial and military integration among European countries.

*Challenges.* The new systems' high costs and long development times present a major challenge. Projects like GCAP and FCAS require multi-decade investment and stable cooperation among partners with diverging interests. Moreover, the rapid evolution of technologies like AI and space warfare requires continuous updating of modernization strategies.

*Transition:* Although technological modernization strengthens national capabilities, the success of these efforts depends on Europe's ability to coordinate its forces towards reinforced international cooperation, particularly within NATO and the EU.

### **2.3 Strengthening NATO-UE cooperation**

The transformation of Europe's armed forces has been accompanied by a renewed commitment to international cooperation. NATO has retaken its central position as a platform for collective defense, while the European Union has redoubled its efforts to develop strategic autonomy, reducing its dependence on the United States in technology, industry, and – ultimately – military capabilities.

*Developments in NATO.* NATO responded immediately to the invasion of Ukraine by shoring up its presence in Eastern Europe. Countries like Poland, Romania, and the Baltic States have hosted a growing number of multinational troops and battalions, with military bases reinforced to guarantee rapid response to potential threats. Joint exercises like Defender Europe have been intensified to improve interoperability among the allied forces. In 2022, NATO updated its Strategic Concept, identifying Russia as a direct threat and China as a systemic challenge. This has prompted the member states to diversify their capabilities for dealing with global threats, including sectors like cyberdefense and space security. In 2023, NATO intensified its attention to innovation, launching its startup accelerator DIANA (Defence Innovation Accelerator for the North Atlantic), and its own private equity fund (the NATO Innovation Fund). Lastly, in 2025, the Allies decided, by common agreement, to ramp up military spending to 5% of GDP by 2035.

*Developments in the EU.* In parallel, the EU has made progress towards greater defense integration. The European Defence Fund (EDF) has financed collaborative projects for the development of military technologies like communications systems and advanced weaponry for an amount equaling € 7.3 billion for 2021-2027. The Strategic Compass adopted in 2022 has outlined a plan to strengthen the EU's capacity to respond to global crises, including the creation of a 5,000-strong rapid reaction force slated to be operational before the end of 2025. This force aims to permit rapid interventions in crisis situations, complementing NATO's role. The Act in Support of Ammunition Production (ASAP) of 2023 allocates € 500 million to ramp up ammunition production in the EU, setting a target of 1 million rounds of ammunition a year. Another important accomplishment was the € 300 million allocation for the European Defence Industry Reinforcement through common Procurement Act (EDIRPA), a piece of legislation that entered force in 2023 and aims to incentivize common defense procurement among EU countries. The European Defence Industrial Strategy (EDIS) and the European Defence Investment Programme (EDIP) (2024) are aimed at promoting joint procurement, interoperability, and defense production, with € 1.5 billion for 2025-2027. The ReArm Europe Plan/Readiness 2030 (2025) mobilizes up to € 800 billion, including € 150 billion in loans (SAFE instrument) and fiscal flexibility to increase defense spending. The European Peace Facility has provided several billion euros in military aid to Ukraine, in support of training and equipment. Lastly, the Military Mobility plan improves the movement of troops and equipment in the EU by dealing with bureaucratic obstacles. Taken together, this host of initiatives and programs can offer tangible responses in terms of financial resources and political commitment.

*Implications.* Strengthened cooperation between NATO and the EU has improved the interoperability of Europe's armed forces and has enabled a more coordinated response to global threats. In particular, the EU is emerging as a player complementary to NATO, and its focus on scientific, technological, and industrial issues allows Europe to act independently in regional crisis scenarios.

*Challenges.* However, fragmented military capabilities still pose an obstacle. The variety of weapon systems and national procedures complicates interoperability, while balancing NATO's role with the EU's autonomy demands continuous political coordination. Furthermore, dependence on outside financing for joint projects raises risks in the event of economic instability.

*Transition:* In spite of the progress made in cooperation and modernization, Europe's armed forces face structural and operational challenges that must be overcome in order to guarantee a sustainable transformation.

## 2.4 Challenges and future plans

In spite of significant progress, Europe's armed forces face structural challenges that limit their effectiveness, range of action, and duration of use. These include fragmented capabilities, recruitment difficulties, and economic constraints. Looking to the future, the European countries are defining strategic priorities to consolidate their security posture.

*Main challenges:*

- **Fragmented capabilities:** each European country has different weapon systems, procedures, and priorities, and this hampers interoperability. While projects like FCAS and GCAP aim to overcome these divisions, they require considerable time and resources. Countries like Germany and the United Kingdom are also grappling with shortages of military personnel due to competition with the private sector and declining populations. To deal with this problem, Sweden has reintroduced compulsory military service, while other countries are launching recruitment campaigns targeting women and young people.
- **Economic constraints:** ambitious modernization programs require massive investment, which may be difficult to support in settings of fiscal pressure or economic instability.
- **Setting priorities:** Europe's armed forces are currently focused on three chief priorities: strengthened deterrence, technological innovation, and European integration. Europe is reinforcing its conventional nuclear capabilities, with France playing a key role as the only European country with a nuclear arsenal. Emphasis is given to artificial intelligence, space warfare, and cybersecurity, in order to maintain a competitive edge. Joint projects like the EDF and the rapid reaction force aim to share resources and reduce costs, thus promoting greater political and military unity.

It also bears noting that, in addition to conventional conflicts, Europe's armed forces must continue to ready themselves for hybrid and asymmetric threats, which require a multidimensional approach to security.

## 2.5 The role of emerging threats

Not merely preparing for conventional conflicts, Europe's armed forces are also grappling with hybrid and asymmetric threats, like disinformation, cyberattacks, and the use of irregular militias. Furthermore, climate change is emerging as a new challenge for security, requiring innovative strategies.

*Developments.* Countries like Lithuania and Estonia, having direct experience with hybrid threats due to their proximity to Russia, are developing strategies to counter disinformation and cyberattacks. In particular, Estonia is a leader in cyberdefense, sharing its skills with other members of the EU and NATO. Climate change is another, growing challenge. Europe's armed forces are planning operations to deal with natural disasters, mass migrations, and conflicts over resources like water and arable land. The Netherlands, for example, is investing in green technologies like sustainable fuels for military vehicles, in order to reduce their armed forces' ecological footprint.

*Implications.* These initiatives demonstrate the need for a multidimensional approach to security that combines traditional military capabilities with strategies for facing non-conventional threats. The sharing of expertise among European countries reinforces collective resilience, while attention to climate change is preparing Europe for new crisis scenarios.

*Challenges.* Hybrid threats require investments in specialized skills and technologies that may be hard to finance in parallel with conventional modernization programs. Moreover, the transnational nature of these threats requires even closer international cooperation.

To conclude, we may therefore observe that, since 2022, Russia's invasion of Ukraine has accelerated the transformation of Europe's armed forces, prompting governments to increase military spending, modernize technologies, and strengthen NATO/EU cooperation.

Europe has responded decisively, with countries like Germany, Poland, Finland, and Sweden adopting ambitious measures to strengthen their defense posture. In parallel, attention to emerging threats like cyberattacks and climate change reflects a broader approach to safety. However, challenges like fragmented capabilities, recruitment, and economic constraints require continuous commitment. In the years to come, Europe will have to balance strategic autonomy with trans-Atlantic cooperation, guaranteeing that its armed forces are prepared to protect citizens in an unstable global context.

## **3. Transformation and integration of land forces towards 2030**

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### **3.1 The new operational paradigm for European land forces**

The evolving international geopolitical context, marked by Russia's invasion of Ukraine and by the intensification of global strategic competition, has prompted profound reflection upon the future of Europe's land forces.

After more than three decades of a prevailing focus on stabilization and peace-keeping operations, the continent's armies now find themselves having to regain combat capability for high-intensity scenarios, while at the same time needing to adjust to the technological innovations that are transforming the modern battlefield. Russia's invasion of Ukraine has demonstrated that contemporary land operations are characterized by the simultaneous presence of three dimensions of conflict:

- a **traditional dimension** reflected in the massive use of tanks and artillery, in addition to a return to wars of attrition with trenches and minefields;
- a **technological and innovative dimension** determined by the extensive employment of new weapon systems, like the various models of drones in use, loitering munitions, hypersonic missiles, and cyberattacks;
- lastly, a **hybrid dimension**, with growing recourse to activities beneath the threshold of armed conflict, like acts of sabotage or strategies of influence and disinformation that in fact extend the confrontation to the cognitive dimension and considerably expand the concept of national security threat.

The main challenge facing European armies today is represented by the need to quickly regain the capacity to conduct large-scale combat operations (LSCO) while at the same time maintaining the flexibility needed to operate along the entire spectrum of military operations. This is in the awareness that, for many European countries, land forces require thorough regeneration due to decades of insufficient funding, downsizing, and attention and resources being allocated to low-intensity operations; all this has left gaps in operational capabilities – gaps that will have to be quickly bridged in order to be able to face the security challenges taking shape on the horizon.

Change can no longer take place at the speed sustainable during periods of relative stability, but must adjust to the times imposed by an increasingly uncertain and competitive international context. What is needed then are strategic choices and a decisive change of pace, in order to be able to have organized and modern land forces, with a capacity for real deterrence and capable, where necessary, of confronting potential adversaries on at least an equal footing.

### 3.2 Trends and characteristics of ground combat

The most recent conflicts – and in particular the war between Russia and Ukraine and the conflict pitting Israel against Hamas, Hezbollah, and Iran – have refocused the attention of public opinion on aspects that, to a certain degree, had been considered no longer current. These aspects include the concept of mobilization, the generation of equipped and trained reserve forces, and the availability of weapons and ammunition stockpiles in order to be able to sustain prolonged combat operations marked by significant attrition rates and a high rate of equipment consumption.

Alongside these aspects, trends have also been seen in the land domain that affect all formations and tactical level units, and that therefore impact the process of transforming and integrating land forces. In particular:

- the so-called **“transparency” of the modern battlefield**, due to the massive use of a wide variety of sensors available down to the lowest levels of command, which allow the presence of forces on the ground to be promptly detected, thus limiting the ability to exploit the “surprise” factor;
- **expanding battlefield geometries**: front lines are further and further away, and distances of engagement have grown accordingly;
- the **central role of heavy armor**, a decisive element in ground combat, **and of artillery**, a vital element for ensuring adequate fire support for the development of ground maneuvering;
- **extensive use of a variety of drones**, like One Way Attack drones, loitering munitions, and Unmanned Surface Vehicle (USVs) that can effectively strike even larger and better-equipped formations;
- extensive **use of fortifications, trenches, and minefields**, in combination with the massive employment of artillery, which slow or even stop the enemy’s advance, thus creating significant losses to the forces seeking to break the battlefield stalemate;
- highly **difficult exercise of the Command and Control function** due to repeated cyber and electromagnetic attacks on the main decision-making nodes;
- the **complexity of the protection of own forces**, determined by adversaries’ ability to strike deeply in the battlefield, thus rendering vulnerable even units that are distant from the front and from the lines of contact;
- the growing importance of **operations in urban and underground settings**, the only areas that provide the possibility of hiding from advanced sensors, but that at the same time require adopting specific tactics, techniques, and procedures for operating in settings characterized by high three-dimensional complexity, the presence of civilians, and limited mobility;
- the **vulnerability of logistical support systems**, which are priority targets in modern doctrines of enemy formations;

- the growing importance of the **cognitive and information dimension of the conflict**, in which the telling of war-related events takes on a strategic role, influencing both public opinion and the determination of the political/military leadership and the armed forces' morale.

This battlefield metamorphosis requires a fresh approach to military operations and a continuous adaptation of land forces, with structural interventions in various areas, including:

- a thoroughgoing cultural change;
- a renewed emphasis on the forces' quantity and quality, which includes revitalizing recruitment and mobilization strategies;
- dedicated programs for modernizing and innovating weapons, units, and systems, and for replenishing stockpiles of material and ammunition;
- a complete review of the forces' organization and their training and education processes.

### 3.3 Cultural change

#### 3.3.1 Involving all the nation's sectors (instruments of national power)

In an era marked by hybrid threats and multidimensional conflicts, national security requires the synergistic integration of all the instruments of national power: diplomatic, information, military, and economic. A thorough change is therefore needed, one that involves the entire country system, leaving behind the compartmentalized approach of the past in order to provide concrete responses to the complexity of the contemporary scenario. In this setting, the Army is called upon to work in close collaboration with government institutions, academia, the defense industry, and civil society.

This integration is essential for developing innovative capabilities, accelerating acquisition processes, and guaranteeing that the land forces are fully aligned with national security needs in an increasingly complex and interconnected geopolitical context.

This approach requires the creation of permanent dialogue platforms between the Armed Forces, universities, research centers, and industry, in which military skills are fused with the country's technological and scientific excellence.

Collaboration mechanisms must be developed to allow the rapid transfer of technologies from the civil to the military sector and vice versa, creating a virtuous circle of innovation. The involvement of the country system also implies renewed attention to strategic communication and social resilience, elements essential for combating the hybrid threats that aim to destabilize Western societies through disinformation and the manipulation of public opinion. Only through this joint involvement will it be possible to build a modern, credible, and effective national defense.

### 3.3.2 Cultural change inside the Armed Forces

The renewal process initiated by the land forces is inspired by *Visione del Capo di Stato Maggiore dell'Esercito* ("Vision of the Army Chief of Staff"),<sup>27</sup> a document that articulates three inextricably interconnected "cornerstones": technology, training, and values. This paradigm requires an internal cultural change that goes beyond self-reference and promotes a dynamic organizational environment, in which:

- **technology** must permeate every aspect of the organization, transforming the Army into a digital and interconnected Armed Force;
- **training** must evolve to prepare soldiers for the complexities of the modern battlefield, integrating high-intensity scenarios with the new dimensions of conflict;
- **values** remain the Institution's unshakable foundation, guaranteeing cohesion and identity. At the same time, values will have to be articulated in a contemporary way as well, in order to respond to the ethical challenges raised by the new technologies and modes of combat.

This cultural change implies abandoning approaches and procedures that are no longer suitable, and that slow adaptation to new challenges. A culture of calculated risk must be promoted, in which the errors resulting from initiative and innovation are accepted as part of the learning process. Commanders at all levels must be encouraged to experiment with new tactical and technological solutions, supported by proactive staffs able to transform ideas into operational realities. Cultural transformation also requires overcoming hierarchical barriers in generating ideas: as the Army Chief of Staff has emphasized on a number of occasions, "ideas have no rank." This principle must be translated into concrete mechanisms that allow each serviceperson, regardless of rank, to contribute to the innovation process. The creation of digital platforms for sharing the lessons learned, the institution of working groups drawing from all sectors, and the implementation of continuous feedback systems are essential tools for building an Army that constantly learns and adapts.

### 3.3.3 Personnel training: where the three cornerstones intersect

Training is the point where the three "cornerstones" converge to become a catalyst for transforming the Army. The new training paradigm must promote human capital, with special attention to young generations that are naturally disposed to technological innovation and lateral thinking.

Training courses must integrate advanced technological skills, innovative training methods, and a solid grounding in institutional values, preparing leaders able to operate in uncertain and rapidly evolving settings.

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<sup>27</sup> Document issued by the Army Chief of Staff at the start of the term.

Investment in youth is not limited to acquiring technical skills, but aims to form critical and innovative minds capable of questioning established schemes and proposing creative solutions. This approach requires overhauling the military education systems, by giving priority to participatory methodologies, to learning by doing, and to cross-pollination with the very best in the civilian and academic worlds.

Moreover, the new training paths will have to integrate modules dedicated to Artificial Intelligence, cyber warfare, the use of unmanned systems, and the management of multi-domain operations. In parallel, it is essential to maintain and reinforce training in the fundamentals of ground combat, creating versatile soldiers able to operate effectively both in high-tech settings and in traditional combat situations.

Training will also have to develop skills that cut across disciplines, like critical thinking, a capacity for problem solving in complex settings, and adaptive leadership. Young officers and NCOs will have to be prepared to lead units in quick-changing, highly ambiguous scenarios in which being able to make quick decisions based on sometimes incomplete information becomes crucial.

The implementation of serious games, advanced simulators and virtual and augmented reality environments will allow realistic, immersive training scenarios to be created, thus speeding the learning process and reducing the costs of traditional training. It will also be essential to institute exchange programs with the finest civilian universities and Armed Forces in allied countries, creating a generation of military leaders with a broad vision, capable of operating in multinational and inter-agency settings.

### **3.4 Sizing of the land forces**

The issue of the sizing of the land forces is without a doubt one of the most critical aspects of the transformation in progress. Current organizational models do not secure for the Army the “mass” needed to handle a possible “high-intensity” conflict, which requires – among other things – the ability to supply and replenish the forces deployed in combat.

Therefore, in order also to achieve the Atlantic Alliance’s new objectives in terms of capabilities, an increase in staffing (about 40,000 more troops than under the regulatory provisions in force) will have to be pursued, with a focus on specific capabilities that cannot be generated as needed, such as deployable medical care, subterranean combat capabilities, cyber and electromagnetic spectrum activities, and air and ballistic missile defense.

In this regard, considering that future conflicts will be increasingly data-centric and characterized by the central importance of information, the ability to operate in the cyber domain and in the electromagnetic spectrum has particular strategic relevance.

Another area of urgent intervention is deployable medical care. In fact, the lessons learned from the more recent conflicts emphasize the importance of having advanced medical capabilities directly on the battlefield, capable of operating in high-intensity environments and of guaranteeing the medical support needed to support prolonged operations. This requires not only increasing military medical staff, but also developing modular structures that can be rapidly deployed and integrated into operations.

Likewise, the restructuring of the reserve forces system is a strategic priority for ensuring the supply and regeneration of combat forces and contributing to the needs derived from operations on national territory. In this regard, work is being done to establish recruitment mechanisms that allow furloughed personnel to be automatically added to the reserve for appropriate periods of time, thus ensuring, where needed, the availability of trained forces for the rapid expansion of capabilities.

### 3.5 Upgrading combat capabilities

As relates to capabilities, the Italian Army is working intensively to become technological. The land forces' modernization process focuses on four strategic priorities:

- **upgrading the armored forces;**
- **adjusting the forces' protection** to the diversified threats present on modern battlefields and originating above all from the third dimension;
- **developing deep precision strike capabilities;**
- **modernizing the component of helicopters and of unmanned systems.**

As for armored forces, the linchpin of ground combat capability, in addition to the need to complete the modernization of the legacy platforms (the "Ariete C2" tank and the "VCC Dardo") and their maintenance in operating conditions, programs have been initiated for the "new tank"<sup>28</sup> and the "Army's new armored combat system,"<sup>29</sup> which will allow the land forces to have new-generation systems characterized by high mobility, advanced protection levels and capability to engage even in urban scenarios. Both projects offer a tangible response to NATO's objectives and serve as a bridge towards the European tank of the future.

For medium and light forces, programs to purchase the "Freccia" Medium Armored Vehicle in the "Mid-life Upgrade" version, and the "Lince 2" Light Tactical Vehicle, have already been initiated. These programs come on top of those relating to units with specialist capabilities, which call for the acquisition of platforms suitable for the deployment of parachute units, aircraft, and mountain forces with arctic and amphibious capabilities.

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<sup>28</sup> The new *Main Battle Tank* (MBT).

<sup>29</sup> *Army Armoured Combat System* (A2CS).

The second priority is to develop a capability of integrated, multilevel defense of land units against threats originating from the third dimension. In this setting, progress is being made towards augmenting the systems' performance and increasing their numbers, creating a performance continuum among the various capability segments: starting from "medium range," represented by "SAMP-T"<sup>30</sup>, and on to the "short range" system represented by the "GRIFO" program on CAMM-ER missile<sup>31</sup>, and to combating "very short-range" threats; this also includes the capability of combating drones in the Micro and Mini categories ("C-UAS"<sup>32</sup>) and counter rocket, artillery, and mortar systems ("C-RAM"<sup>33</sup>). With particular reference to "very short-range," the Army is aiming to strengthen its capabilities through the development of a system to be provided in shoulder- and vehicle-fired configurations, as well as configurations that share the possibility of employing the same missile.

The third priority is deep precision strike capability. In this segment, the Army must acquire new rocket launcher systems (HIMARS), but also wheeled self-propelled howitzers, lightweight howitzers, and their ammunition, in order to increase fire support at all levels of command. These programs are joined by those related to "Vulcano" precision ammunition and to loitering munitions, to be acquired in a variety of types in order to increase the possibilities of "selective engagement" and "range of deployment," supplementing traditional artillery.

As for helicopters, the new program concerning the New Exploration and Escort (NEES) helicopter, the AH-249 "Fenice," slated to be brought into service in 2027, is highly important; since the beginning, the Army has been working with industry to define its requirements and to introduce advanced technological innovations in the sectors of digitalization, connectivity, and integration of "crewless" systems.

As relates to the remotely piloted aircraft (RPA) segment, given their effective deployment in the Russia/Ukraine conflict in support of all land tactical activities, the Army has initiated a "massive" Micro and Mini APR acquisition program.

Lastly, the Army's modernization and renewal plan contemplates numerous other programs, from those relating to upgrading the soldier's equipment – the "Individual Combat System"<sup>34</sup> – to command and control systems (C5I<sup>35</sup>), mobility, countermobility and protection of forces, and logistics; in an interdisciplinary, synergistic, and integrated way, these all make a fundamental contribution towards the effectiveness and efficiency of the land forces.

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<sup>30</sup> *Soil-Air Moyenne-Portée/Terrestre.*

<sup>31</sup> *Common Anti-Air Modular Missile-Extended Range.*

<sup>32</sup> *Counter Unmanned Aerial System.*

<sup>33</sup> *Counter Rocket, Artillery and Mortar.*

<sup>34</sup> Among the program's main characteristics, the Army, in synergy with the country's industrial sector, has introduced new combat uniforms that are more functional for employment in diversified operational environments; among other things, a new, technical specification for camouflage, and state-of-the-art optical systems, are being developed. The near future will see the introduction of a new assault rifle (NARP) and the development of a new, nationally conceived machine gun.

<sup>35</sup> Command, Control, Communications, Computers, Cyber, and Information.

### **3.6 Logistics and operational sustainability**

Moreover, the process of transforming land forces requires traditional logistical concepts to be completely overhauled in order to adjust them to the needs of high-intensity operations and to the new systems' technological complexity. Modern logistics must guarantee support for prolonged operations in contested environments, the maintenance of technologically advanced systems, and the availability of adequate ammunition stockpiles.

The maintenance of technologically advanced platforms requires specialist skills and dedicated infrastructure that must be developed in parallel with the introduction of the new systems. The adoption of AI-supported predictive approaches will be able to optimize maintenance cycles and reduce the platforms' downtimes, while at the same time requiring significant investment in monitoring and data analysis systems.

Without a doubt, the ammunition sector is a priority: the stocks required for high-intensity operations are significantly greater than those traditionally maintained for stabilization operations. Therefore, also in light of Europe's limited industrial capacity in the ammunition sector, strategic partnerships and cooperation agreements must be developed to guarantee access to adequate supplies during times of crisis. The development of distributed production capacities and the creation of common strategic reserves are priorities that require European-level coordination and long-term investment.

### **3.7 Procurement and industrial cooperation**

In parallel, in order to speed the transformation process already underway, the procurement processes must be overhauled, and greater integration with the Italian and European industrial sector is needed.

The speed of technological evolution and the complexity of modern systems render obsolete the traditional, sequential approaches that rigidly separate the requirement-definition, development, and production phases. Therefore, in order to bring procurement times up to speed with technological innovation, rules must be simplified, and the processes governing military procurement must be streamlined.

Furthermore, to guarantee the systems' technological competitiveness and operational effectiveness, the adoption of an increasingly synergistic and proactive approach to relations with the university and research world and with the industrial sector will be a decisive factor. When conceiving, developing, and engineering technological solutions to military problems, it is absolutely essential to adopt a "country system" approach based on collaboration and cooperation between institutions, industry, universities, and the world of science and research.

In short, the relationship with the defense industry must evolve towards teamwork, with a unity of purpose and results, within which to jointly define “what is needed” and “by when it’s needed” through ongoing dialogue and exchanges of ideas with the large, medium, and small-sized enterprises operating in the sector.

### 3.8 European integration and interoperability

The process of transforming land forces must be anchored within a framework of growing European integration that optimizes the available resources and maximizes synergies between the various armies. The development of shared standards, interoperability protocols, and coordinated procurement programs is a strategic priority for avoiding duplications and fragmentation that reduce the investments’ overall efficiency.

The harmonization of operational requirements and technical specifications will have to accompany the development of common doctrines and standardized operating procedures that allow units of different nationalities to be seamlessly integrated. This process requires major investment in joint training, multinational training, and the development of a *shared operational culture* that capitalizes on specific national characteristics within a consistent, European conceptual framework.

The creation of centers of excellence specializing in specific operational domains, the sharing of training infrastructures, and the development of personnel exchange programs are essential tools for speeding the **integration process while at the same time maintaining** the national traditions and identities that constitute the richness of the European military landscape.

Operational integration must also be extended to logistical aspects, through the development of common support systems and the standardization of maintenance and procurement processes. The creation of European logistics pools for specific categories of materials can significantly reduce operating costs and improve the platforms’ availability.

The success of European integration depends on the need to balance the efficiency that standardization brings with the need to maintain industrial competitiveness and strategic autonomy. This requires sophisticated approaches that promote cooperation without impairing national technological capabilities and the European industrial base.

### 3.9 A look to the future

The transformation of land forces towards 2030 is a complex challenge that requires strategic vision, coordinated investments, and a capacity for continuous adaptation. The success of this process will determine the credibility of European deterrence and the continent’s ability to contribute effectively to security in an increasingly competitive and unpredictable geopolitical context.

The integration of advanced technologies, the modernization of organizational structures, and the development of new operational concepts are fundamental elements of a transformation that must take place urgently and decisively.

The current historical context requires being able to anticipate and comprehend the changes taking place on the international security landscape. The Russia/Ukraine conflict has underscored that the modern battlefield is a synthesis of traditional and innovative dimensions.

The modern battlefield is characterized on the one hand by mechanical and armored units facing off against one another, massive use of artillery, field fortifications, and obstacles, and on the other by the use of unmanned systems, smart ammunition, and operational capabilities in the emerging domains. This complexity requires developing land forces capable of operating effectively along the entire spectrum of military operations.

The required transformation goes further than procuring new weapon systems and technologies. A thorough cultural upgrade permeating every level of military organization is needed.

Increasing staffing levels, strengthening ground combat capabilities, developing new-generation weapon systems, and establishing adequate strategic reserves are essential elements for building modern, credible land forces. It is now particularly important to be able to maintain a dynamic and innovative approach characterized by openness to continuous change and to constantly improving operational capacities.

The Army of 2030 must be configured as a military force that, while technologically advanced, is still firmly anchored to the institution's bedrock values. Readiness for high-intensity combat will guarantee the flexibility needed to adapt quickly to a diversity of operational scenarios. The maintenance and transmission of institutional values like country, discipline, and honor will be the element of continuity with the national military tradition and the cornerstone of the land forces' identity.

The complexity of the transformation path admits no alternatives. The evolving international geopolitical context necessitates having ready, modern, and effective land forces. The Army's mission – defending the country and affirming the values of peace, justice, and freedom – requires the synergistic convergence of established values, rigorous training, and advanced technologies. Only through this integration will it be possible to guarantee that the Italian Army can respond effectively to present and future challenges, while fully discharging its constitutional duty: defending the country.

## **4. The development of the European defense industry, between supply and demand**

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The European defense industry stands at a historic crossroads not unlike that presented by the Battle of Pavia of 1525, when the introduction of firearms revolutionized the battlefield, marking the end of the age of cavalry and the start of a new military phase.

Today, increased military spending in Europe, spurred by geopolitical threats like Russia's invasion of Ukraine, global competition with China, and instability in the Middle East, is transforming the industrial base of European defense. This chapter analyzes how this ramped-up military spending impacts the defense industry, exploring the dynamics of consolidation, cooperation, and innovation, without going into the strategic, operational, or specific aspects of the EU's initiatives already covered in previous chapters.

This chapter, then, focuses on how increased spending on research, procurement, and maintenance is reshaping the sector, promoting mergers and acquisitions (chiefly vertical, not horizontal), facilitating transnational collaborations like that between the Italian and German industries for tanks, and spurring innovation, led by established outfits and new operators alike. It then concludes by discussing the future challenges for a fragmented industry in a setting of growing national interests.

### **4.1 Spending growth, industry growth**

As the previous chapters noted, defense spending in Europe has increased considerably, rising from € 186 billion in 2019 to approximately 326 billion in 2024<sup>36</sup>, with projections for it to possibly reach € 500 billion by 2035, according to the commitments made by the NATO summit at the Hague.

This growth, guided by the need to face conventional and hybrid threats, is having a profound impact on the defense industrial base, with considerable investment in three key areas: science, technology, and research (S&T, R&T, R&D); procurement; and operations & maintenance. However, this spending is distributed unevenly among member states, reflecting a variety of national priorities and economic capacities. Spending on science, technology, and research (S&T, R&T, R&D) is seeing strong growth, spurred by the need to develop advanced technologies for multi-domain conflicts. In 2024, EU countries allocated about € 13 billion to defense R&D, against € 11 billion in 2023.

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<sup>36</sup> The data provided by the Council of Europe on its website are available at: <https://www.consilium.europa.eu/it/policies/defence-numbers/>

Given their size and political commitment, Germany, France, and Italy play a leading role in this scenario. In general, the three countries, albeit with differences from one case to the other, have devoted growing attention to basic research in the field of emerging technologies, cyberdefense, and the development and purchase of new systems, especially pilotless ones and those with AI capabilities. To do this, they have also exploited a number of multinational frameworks, such as the European Defence Fund, the NATO startup accelerator DIANA, and the NATO Innovation Fund. However, it bears noting that the ramped-up spending and increased commitment to research conceal an incontrovertible fact: the low levels of the past. According to the European Defence Agency, the EU's members allocate on average less than 20% of the defense investment component to research and development, against more than 80% to procurement. For just one example, the United States divides defense spending almost equally between research and development on the one hand and contracts on the other: the Defense Department's budget request for the 2025 financial year was \$ 143 billion for RTD&E and \$ 167.5 billion for contracts<sup>37</sup>.

Procurement is now the most significant component of the growth in European spending, showing an increase from € 50 billion in 2014 to no less than € 90 billion in 2024. For example, Italy has increased orders for F-35s (from 90 to 115 aircraft) and for F-2000 Eurofighters (24 new aircraft, replacing the tranche 1 planes)<sup>38</sup>, and has requested 21 HIMARS for the Army, for a total value – for these three programs alone – of approximately € 10 billion<sup>39</sup>. Poland, with a defense budget equaling 4.7% of GDP in 2025, has recently purchased 250 Abrams tanks and 96 Apache helicopters from the United States, for a total of \$ 10 billion for the helicopters alone.

As part of its *Zeitenwende*, Germany has already allocated € 30 billion of the € 100 billion established by the special fund instituted in response to the Russian invasion of Ukraine, towards modernizing the Bundeswehr, including new air and missile defense systems.

However, these new defense investments are rather unevenly distributed: while Germany, France, and Italy are investing heavily in large air and land platforms, other countries are privileging smaller platforms in lesser numbers.

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<sup>37</sup> For more in-depth analysis, see <https://eda.europa.eu/docs/default-source/brochures/1eda---defence-data-23-24---web---v3.pdf>

<sup>38</sup> <https://www.leonardo.com/it/press-release-detail/-/detail/23-12-2024-italy-places-order-for-up-to-24-eurofighter-typhoon-jets>

<sup>39</sup> In detail, we can estimate € 7 billion for the additional F-35s, about € 1 billion for the acquisition of 21 HIMARS, and approximately € 2 billion for the additional Eurofighters. Authors' estimates and data may be found online at: [https://www.difesa.it/assets/allegati/30714/dpp\\_2024-2026\\_final\\_firmato.pdf](https://www.difesa.it/assets/allegati/30714/dpp_2024-2026_final_firmato.pdf) and <https://www.analisedifesa.it/2023/12/dagli-usa-via-libera-alla-vendita-allitalia-di-21-m142-himars/>

Operation and maintenance (O&M) spending is also on the rise, reflecting the need to maintain complex equipment in working order and to support prolonged operations. In 2024, the EU countries spent on average about 25-30% of their budgets on O&M, with a total figure approaching € 80-100 billion. The Nordic countries like Finland and Sweden have increased O&M spending to support their civil mobilization forces, with Finland allocating € 1.5 billion towards upgrading logistics infrastructure.

However, countries with more limited budgets, like Greece and Portugal, allocate lesser resources to this category, privileging procurement. This uneven distribution reflects different strategic priorities: Germany and Poland focus on more numerous land forces with more recent equipment in order to combat the Russian threat, while France, Italy, and the United Kingdom invest more in air and naval capacities in order to project their power and influence (although Italy, as is widely known and as discussed in the previous chapters, has also launched a large-scale program to modernize its land forces, in particular with the purchase of new tracked vehicles, in order to close the current gaps between the Italian Army's armored forces and those of the other Western partners).

While all these investments create opportunities for industry, they also raise challenges, because companies have to adapt to diverging national requirements, thus complicating interoperability and productive efficiency. On top of this, for the time being much of the expenditure for procurement, especially as relates to capabilities considered urgent and critical in the immediate aftermath of Russia's invasion of Ukraine, has pivoted towards systems and products from outside of Europe, chiefly from the United States, but also from South Korea, with lost opportunities for developing the technological and industrial base of European defense.

#### **4.2 Consolidation of the defense industry**

Over the past five years, the European defense industry has seen its consolidation grow significantly through new mergers and acquisitions (M&A), spurred by the need to compete with global giants like Lockheed Martin in the United States, for example, and by the pressure to reduce fragmentation.

The current transformation is towards the creation of European industry "champions" able to compete with their global counterparts in terms of dimensions of scale and capacity for innovation. This process is reshaping the industrial landscape, concentrating development and production capacities in a smaller number of larger and more integrated players – although, compared with the landscape offered by the American defense industry, the European one still remains relatively unconcentrated. Since 2020, major M&As in the defense sector increased significantly, seeing a constant growth that during the first 6 months of 2025 surpassed the total numbers for the previous year.

Rheinmetall, for example, purchased Spain's Excal Systems for € 1.2 billion in 2023, thereby strengthening its position in ammunition – a crucial market for responding to the demand generated by the Ukraine conflict. As early as 2022, Leonardo had purchased a stake in Hensoldt, a German company specialized in sensors and radar, for € 606 million, thus creating new synergies in the field of defense electronics; today, its business plan includes an ambitious M&A strategy to strengthen its position in the cyber and space sectors. France's Safran has purchased, for € 220 million, Prehens, a company specialized in surveillance and AI.

An analysis of the current landscape shows an industry that, at the level of the individual states, is consolidating around a few major players. In Germany, Rheinmetall and KNDS Germany are leading the land sector, with Rheinmetall enlarging its market share to 15% in the ammunition segment.

In France, Dassault Aviation and Thales are dominating aeronautics and electronics, while in Italy Leonardo is a key player in all domains, including space and cyber, with total revenues amounting to about € 18 billion in 2024. With BAE Systems, the United Kingdom is maintaining a position of leadership in air and naval systems.

SMEs remain vital, contributing with 30% of the sector's added value, often in niches like software, sensors, and drones. Countries like Estonia and Finland are emerging as hubs for cyberdefense technologies, while Poland and the Czech Republic are becoming established in the production of armored vehicles.

In spite of the consolidation taking place, the fragmentation of the defense industry in part continues to persist especially in certain sectors, with governments protecting domestic industries for economic and political reasons.

For example, France insists upon leadership of Dassault and a majority stake in the subdivision of the work in the FCAS program for a new, sixth-generation fighter. Although this equilibrium between consolidation and national interests creates inevitable tensions, it also, in certain cases, fosters greater resilience through the diversification of expertise.

In order to foster additional integration of the technological and industrial base of European defense, demand must be aggregated on a European level (for example through the lever of joint contracting), and long-term investments by European countries must be more predictable: only this can enable more effective and efficient business planning by the leading industry players, while allowing cooperation strategies to promote – and not eliminate – the expertise of each.

### 4.3 Cooperation in the defense industry: new programs, but among a limited number of states

Transnational industrial cooperation is a fundamental pillar for facing Europe's current security challenges, overcoming fragmentation, and maximizing return in terms of capacity with respect to invested resources.

In recent years, Europe has seen increased numbers of collaborations in defense programs, often guided by operational needs and supported by EU initiatives. However, these industrial collaborations remain complex due to diverging national interests, with alternating fortunes depending on the system and players involved.

One of the most significant programs is the Global Combat Air Programme (GCAP), which brings Italy, the United Kingdom, and Japan together to develop sixth-generation Tempest fighters. Led by Leonardo, BAE Systems and Mitsubishi Heavy Industries, the GCAP integrates technologies like AI and unmanned systems, with an investment assessed as exceeding € 20 billion, considering only the estimates made by the United Kingdom and Italy<sup>40</sup>. Italy in particular contributes with expertise in electronics and sensors, strengthening Leonardo's position as a technology leader. In parallel, the Future Combat Air System (FCAS) program, led by France, Germany, and Spain, and involving Dassault, Airbus, and Indra, aims to develop another sixth-generation air system. In spite of the initial investments and the ambition to actually compete with the GCAP, cooperation for this program has proceeded slowly thus far.

Another example of industrial level cooperation, this time in the land sector, is the partnership between Leonardo and Rheinmetall, which blossomed into the specially constituted Joint Venture LRMV, to create advanced armored platforms (Armored Infantry Fighting Vehicles and Main Battle Tanks) that combine mobility, protection, and engagement capability in multi-domain scenarios. The total value should surpass € 20 billion. This collaboration does not just respond to NATO's objectives, but strengthens both countries' industrial supply chains, with Leonardo supplying mission systems, electronics, and armament integration, while German industry contributes with its long and pertinent experience in the armored vehicles sector.

Another significant cooperation of late is the one between Italy and Turkey in the drones sector. Leonardo signed an agreement with Baykar in 2025, with a specially established JV for designing, developing, producing, and supporting remote pilot air systems (UAS). The partnership will combine developments based on Baykar's large platforms portfolio with the electronics and payloads of Leonardo, which will also oversee the part concerning cooperation between

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<sup>40</sup> In particular, the United Kingdom has allocated £ 12 billion for the next 10 years, and Italy about € 9 billion by 2050. For more on this, see: <https://commonslibrary.parliament.uk/research-briefings/cbp-10143/#:~:text=The%20Ministry%20of%20Defence%20has%20committed%20£2%20billion,2024%2F2025%20financial%20year%20to%20launch%20the%20development%20phase> and <https://www.iai.it/sites/default/files/iai2503.pdf>

platforms (Manned-Unmanned Teaming, Swarming) and certification. The partnership should gain entry into a European market for armed surveillance drones and pilotless fighters that is forecast to attain a value of \$ 100 billion over the next ten years.

Other examples, launched in the past and now in the development phase or already operational, include Eurodrone, in which Airbus, Leonardo, and Dassault are collaborating to develop a MALE (Medium Altitude Long Endurance) drone, in a program with an estimated value of € 7 billion, or the French-Italian cooperation on air defense systems, like SAMP/T, produced by the Eurosam consortium.

Collaborations of this kind demonstrate that, when it manages to overcome national differences over technical requirements and work allocation and to combine expertise, Europe's defense industry today has all the innovation potential and engineering skills to develop cutting-edge capabilities.

#### **4.4 Innovation in the defense industry**

Technological innovation is crucial for maintaining a competitive edge in a setting of multi-domain conflicts. For every industrial sector, it is essential to innovate in order to develop new technologies, and therefore new products, and of course to follow the market trends. This is even more the case in the defense industry, especially in a time unfortunately characterized by many conflicts.

The combined effect of the proliferation of new technological capabilities, the interdependence of systems, and the use of hybrid attack typologies straddling between the physical and digital dimensions, has given shape to a complex scenario in which the need to guarantee the security of citizens and institutions transcends the concept of military "domain" as it is traditionally understood, and instead takes on a multi-domain dimension.

Europe is now witnessing the emergence of new players and technologies that integrate civilian solutions to face the challenges of the modern battlefield. The pervasiveness of digitalization and of other disruptive technologies like AI not only has become a factor enabling new capabilities on the battlefield, but, at the same time, exposes a variety of civilian infrastructures to the risk of attacks – cyber and otherwise. An emblematic case is Helsing, a German startup founded in 2021, which has quickly established itself as one of the companies most active in the application of AI to defense. Helsing in fact develops software for real-time data analysis, autonomous drone guidance, and the management of multi-domain operations, collaborating with the German army and other European partners. In 2024, it received an investment for an estimated value of € 400 million from European and private funds, thus demonstrating the potential of startups to transform the sector. Its AI platform in fact significantly improves situational awareness and quick decision-making, responding to the needs of battlefield transparency described in Chapter 3.

Other examples of innovation include the Estonian startup Milrem Robotics, which develops unmanned ground vehicles (UGV) like the THeMIS, used for reconnaissance and logistics missions. With an estimated € 200 million contract with Finland in 2024, Milrem demonstrates how SMEs can compete in technological niches. In Italy, Leonardo has been working for some time on the Individual Combat System (SIC) program, integrating wearable sensors and augmented reality to improve soldiers' capabilities. More generally, the Italian company is wagering on supercomputing capabilities, thanks to a massive investment in the "davinci-1" High Performance Computer (HPC), among the world's most powerful in the defense and aerospace sector, as an enabler of new AI, Big Data, digital design, and simulation capabilities applied to defense.

In France, Arquus is developing hybrid vehicles to reduce the land forces' ecological footprint, with a pilot project for an estimated value of € 100 million.

All these innovations are always supported by collaborations between industry, universities, and startups, like those facilitated by the NATO Innovation Fund, for example, or by the investments of the European Defence Fund (EDF). However, the adoption of disruptive technologies requires not only investment in R&D, but also the will to integrate them into procurement processes – a challenge for European governments accustomed to traditional solutions.

#### **4.5 The European defense industry: future prospects**

In spite of the potential for transformation of the European defense industry, the future prospects are still characterized by significant challenges and uncertainties.

The idea of a completely consolidated European defense industry, concentrated around a handful of dominant players following the pattern of the United States, is still politically unlikely and probably not even desirable. National interests, as the competition among the various European programs shows, continue to prevail, with the various countries protecting their industries for economic and strategic reasons.

Fragmentation, although reduced by the recent M&As, will persist, because governments privilege national solutions in order to guarantee jobs and technological autonomy. However, it bears pointing out that these duplications are not necessarily only negative, because they allow a broader production supply chain to exist. This guarantees resilience and the possibility for different configurations and products to emerge, thus fostering a diversity of capabilities and a degree of internal competition that can increase the sector's efficiency.

Similarly, although growing, transnational cooperation might decline in relative terms if the increases in national defense budgets are not assisted by strengthened EU mechanisms in support of the defense industry. In fact, with larger budgets, countries like Poland (4.7% of GDP dedicated to defense in 2025) and Germany might opt to invest in purely national solutions rather than rely on joint European programs, or to develop procurement outside the EU.

This trend risks limiting the effectiveness of initiatives like the European Defence Fund (EDF) and the future European Defence Industry Programme (EDIP), which depend on the willingness to share resources and requirements.

In spite of success stories like Helsing and Milrem, innovation will not be easy to sustain. Producing innovation is just one part of the challenge; governments must be willing to purchase it, integrating it into their arsenals. However, bureaucratic resistance, long procurement cycles, and a preference for already known and established systems may hamper the adoption of disruptive technologies.

One difficulty relates to the cultural and cognitive transition from the platform to the system of systems: the result of the progressive “cross-pollination” between industry and digital ought to bring about a technological evolution that aims to transform the individual product (helicopter, satellite, radar, drone) into a node in a “system of systems” closely interconnected with the surrounding environment, integrated with other platforms, and multi-domain, with an increasingly extensive sphere of application. It is a transition that inevitably relates also to bureaucratic and financial processes, as well as to institutional frameworks.

Future challenges also include the resilience of the defense industry supply chains, with a dependence on semiconductors and critical raw materials that exposes Europe to global risks. Competition with the United States and China, which benefit from larger domestic markets, requires balancing strategic autonomy with trans-Atlantic cooperation. To face these challenges, Europe will have to promote a more inclusive industrial cooperation, invest in regional hubs, and support its SMEs in order to maintain a diversified ecosystem.

#### **4.6 Future challenges**

The European defense industry is grappling today with numerous structural, regulatory, and economic challenges that limit its potential for growth and competitiveness in spite of the increased military spending by EU states and the many opportunities for cooperation and innovation. These challenges require a strategic approach to guarantee the sector’s resilience and effectiveness. The long-term contracts typical of the defense sector, particularly as relates to the more complex systems, present a significant obstacle to the entry of new players. Programs like

GCAP and FCAS, with development cycles extending beyond 2035, inevitably involve multi-decade financial commitments that tie up companies' resources for long periods of time, bringing costs and a loss of flexibility that, for small outfits, are unsustainable.

For example, the Eurodrone program, valued at € 7 billion, requires high initial investment with no guarantees of immediate return – thus discouraging SMEs that lack the resources to bear these commitments.

Moreover, changes in requirements during the programs' execution – as was seen in the MGCS program for the development of a new European tank, due to differences between France and Germany – often result in delays and additional costs, thus reducing industrial efficiency.

The regulations and authorizations needed to guarantee security and compliance slow the development of productive capacity. EU regulations on exporting weapons and on data protection entail complex authorization processes that, while justified in certain settings, delay the production of critical systems like ammunition and drones. And this is on top of the broader challenges that relate to the availability of a qualified work force and the scarcity (or expensiveness) of certain raw materials – not to mention the fact that, unlike Ukraine and Russia, European countries have yet to succeed in centralizing demand (and thus securing multi-year orders for their companies), thus making it in practice riskier to expand production capacity.

In Germany, Rheinmetall has reported a shortfall of no fewer than 10,000 qualified workers in 2024, while in Italy Leonardo has launched a long-term plan to further expand the hiring of personnel in professional areas relating to AI and cybersecurity.

Aggravated by Europe's declining population, these shortcomings slow innovation and the expansion of production, limiting the ability to develop advanced technologies like AI and unmanned systems. Moreover, Europe's weakened industrial base, particular in sectors like chemical engineering, is a structural threat.

The production of advanced materials like missile propellants and compounds for batteries depends on a robust chemical industry, which has lost competitiveness in Europe due to offshoring to Asia and dependence on foreign suppliers.

For example, in 2024, the scarcity of nitrocellulose, a key component for ammunition, limited production capacity, which fell an estimated 20% short of demand. This weakening reduces Europe's strategic autonomy, exposing it to interruptions in the global supply chains.

Furthermore, tariff wars, particularly between the United States, China, and the EU, are complicating access to critical raw materials and technological components. The trade war risks that followed the imposition of new universal and specific tariffs for steel and aluminum by the United States administration might damage production supply chains, for example in the field of aeronautics or radar, that depend on trans-Atlantic industrial partnerships. Similarly, Chinese export restrictions on rare earths have impacted the production of magnets for drones and missiles, creating a 15% spike in costs.

While these trade tensions require diversifying supply chains, the investments needed to do so are enormous, and take years.

Lastly, Europe's weakness in the software sector is a choke point for innovation. Although outfits like Helsing excel in AI, Europe is suffering from a dearth of global leaders in the development of defense software like strategic command and control platforms. Dependence on American suppliers like Microsoft Palantir for critical software exposes Europe to security risks and increases licensing costs, estimated as amounting to € 1 billion a year for the European defense sector.

These challenges require targeted interventions: simplified regulations, work force training programs, a strengthening of key industrial sectors, diversified supply chains, and investment in European software development. Without these measures, the European defense industry runs the risk of not fully capitalizing on the opportunities offered by increased spending and by transnational cooperation.

# *The Battle of Pavia and the Future of European Defense (1525-2025)*

## **Historical remarks: the Battle of Pavia of 1525** <sup>41</sup>

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War broke out between France and Spain in 1521, after Charles of Habsburg, King of Spain, was elected Emperor of the Holy Roman Empire, taking the name of Charles V.

Francis I of France and Charles V had been battling for supremacy in Europe, particularly in Italy, where France had the Duchy of Milan and Spain had the Kingdom of Naples. Moreover, Charles V also wanted Burgundy, which belonged to France.

The early years of the war were unfavorable to the French, who underwent a series of harsh defeats and lost the Duchy of Milan. In October 1524, Francis I marched into Italy at the head of a formidable army of 35,000 troops, determined to settle the conflict once and for all. The Imperial Spanish forces, unable to face the French in open field battle, placed a robust garrison in Pavia under the command of Antonio de Leyva, a skilled and resolute soldier loyal to Charles V. They then abandoned Milan and retreated to the Adda River. Just as the Imperial commanders had hoped, instead of pursuing and destroying the retreating Spanish army, Francis I made the fatal mistake of besieging Pavia to complete, through his possession, the conquest of the Duchy of Milan.

The French reached the walls of Pavia in late October. They had the city completely surrounded. A strong core of the besieging army camped in the large hunting grounds created by the Visconti family in the late 14<sup>th</sup> century. Surrounded by sturdy brick walls with a perimeter of 14 miles (22 km), Visconti Park extended from the northern city walls until it reached the Certosa di Pavia. The Vernavola, a stream that descended from north to south towards Pavia, ran across its entire length. Over the next few months, Pavia resisted every assault while Charles V had re-assembled an army of about 23,000 men, with reinforcement troops that had arrived from Germany. Commanding this army was Charles de Lannoy, viceroy of Naples, assisted by Charles III, Duke of Bourbon, ex-constable of France, and, perhaps most importantly, the able Fernando d'Avalos, Marquis of Pescara.

The Imperial troops set out for Pavia in the last week of January 1525 and set up camp within sight of the eastern wall of the park in early February.

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<sup>41</sup> For an in-depth look at the Battle of Pavia and its historical context, see: Luigi Casali, Marco Galandra, "Da Marignano a Pavia. Le guerre italiane di Francesco I (1515-1525)", Univers Edizioni, January 2021.

The two armies clashed for three weeks with skirmishes, hand-to-hand combat, night raids and artillery duels. Eventually, Charles V's commanders decided to act, prompted by de Leyva's pleas for help, and in a bind due to a lack of supplies and money to pay the German mercenary troops. At dawn on February 24, they entered the park by surprise through three breaches made in the eastern perimeter wall to attack the enemy army encamped further south, coming up from the rear.

The alarm was sounded in the French camp. The king readied the heavy cavalry, the gendarmerie (comprised of about 800 knights with accompanying retinue), on the left, toward the Vernavola. To his right, about 3,000 Swiss soldiers and the 4,000 landsknechts from the Black Band in the French infantry lined up. All the rest of the army near Pavia was too far away to be immediately available to take part in the battle.

In the hazy early morning light, still clouded by fog, as French artilleries opened fire on the Imperial infantry, Francis I led his cavalry in an attack on Charles V's cavalry, which was quickly overwhelmed.

Afterwards, the French cavalry stopped to regroup and rest their horses. The king was beaming. Convinced that he had already won, he turned to the gentleman from Lescun who was standing next to him and uttered the famous phrase, "Monsignor, now I want to be called Signor de Milano!"

With the victory of the gendarmerie, however, only the first phase of the day had come to completion, the medieval one, which had tricked Francis I and his knights into thinking things had gone their way, according to the age-old rituals of chivalry, and that the reconquest of the Duchy of Milan was now a done deal. The king's jubilation would soon come to an end. Shortly afterwards, the Marquis of Pescara, the Imperial army's finest commander, moved 800 Spanish arquebusiers to the right. They waited along the Vernavola and in the surrounding fields, then they began to rain a tempest of lead on the French knights, who were decimated without a chance to react. In the meantime, the Imperial cavalry had regrouped and returned to combat. Seeing that all resistance was in vain, Francis I tried to flee. Pursued by a few of his enemies, his horse was shot down by an arquebus and he was taken prisoner.

The king's capture alone would have been decisive for the fate of the day and the war. However, the Imperial victory was also completed in the center, where the German and Spanish infantries defeated those of the enemy. What was left of the French army quickly crumbled. In their attempt to escape Spanish fire, many Swiss mercenaries drowned in the Ticino River, which had risen due to heavy rains in the previous days. The battle had lasted less than two hours, but the triumph of the emperor could not have been more complete. In addition to their king being captured, the French lost between 7,000 and 8,000 men, among whom were many of France's great nobles. The prisoners numbered in the thousands. Imperial losses, on the other hand, did not exceed 500 men.

## **The End of an Era**

The Battle of Pavia was a major European battle, not only because the two most important rulers of the time, representing France, Spain and the Empire, went head-to-head for territorial, economic and political interests on a continental scale, but also because of the very composition of the armies on the field. A total of more than 50,000 men of different nationalities faced each other at Pavia: in the French army there were French knights and infantrymen, German and Dutch landsknechts, Swiss pikemen and mercenaries. The Imperial army counted Spanish and Flemish knights and infantrymen, German landsknechts and Italian infantrymen.

Militarily, the battle definitively marked the arrival of new firearms, which continued to be improved over the years. Of well-established and widespread use in all armies, but especially in the Spanish army, their tremendous effectiveness had already been demonstrated at the Battle of Bicocca in 1522, where they had wreaked havoc on Swiss foot soldiers. The new element that made Pavia the last battle of the Middle Ages and the first of the Modern Age was that the Spanish arquebusiers at Pavia sowed death not only among the anonymous mass of soldiers, but also, and most importantly, among the French noble knights, deciding the day in favor of Charles V. For the astonished and dismayed military nobility, it was tangible proof that the era of the feudal cavalry was truly over, and that times had changed. In this context, firearms enabled the humblest subjects to put themselves on an equal footing, at least on the battlefield, with nobles, thus becoming the instrument of a kind of social equalization. The Battle of Pavia is an excellent example of the triumph of technology, represented by the Spanish soldiers' arquebusiers, over the strength of the French gendarmerie, still bound to the outdated medieval tactics and noble ineptitude that had led to the disaster of Agincourt in 1415.

## **Iconographic Celebration of Imperial Triumph**

The outcome of the Battle of Pavia resounded loudly throughout Europe and beyond, stimulating the interest of painters and engravers from the start. Paintings were completed, prints were circulated, and the seven grandiose Flemish tapestries now in the Capodimonte Museum in Naples were made to celebrate the victory. The tapestries were gifted to Charles V in 1531. Designed to acclaim the great Imperial victory, the tapestries portray the main episodes of the battle with surprising accuracy.

## **After Pavia: Spain Takes Italy**

After his capture, Francis I was taken to the convent of San Paolo, just outside Pavia, then transferred to the castle of Pizzighettone and later to Spain.

In exchange for his freedom, Charles V forced Francis I to agree to the Treaty of Madrid by which the King of France renounced the Duchy of Milan, Burgundy and any claim to the Kingdom of Naples. Two of his sons (Francis, Dauphin of France, and Henry), remained in Spain as hostages.

Soon after returning to France, Francis I refused to ratify the treaty as it was imposed upon him while he was still captive. On May 22, 1526 he formed the League of Cognac with the Pope, Venice, Florence and Milan, the Italian states frightened by Charles V's excessive power grab after the victory at Pavia. The war resumed, Italy was again traversed by foreign armies, and Rome and Pavia itself were sacked and devastated, but the strategic picture outlined by the 1525 battle was confirmed. On August 5, 1529, the treaty known as the Paix des Dames was signed in Cambrai, which sanctioned Spanish rule over Italy. Spain emerged from the conflict as the major military power that would eventually dominate European battlefields with its Tercios for more than a century.

France, expelled from Italy, managed to retain Burgundy but had to give up the Duchy of Milan and its claims to the Kingdom of Naples. In late 1535, upon the death of Francesco II Sforza, Charles V took possession of the Duchy of Milan, which he later gave to his son Philip of Habsburg, the future king of Spain.

Despite the defeat, Francis I never resigned himself to the loss of Italy. Before he died in 1547, he tried twice more, unsuccessfully, to retake Lombardy and Naples. It was only with Francis I's son Henry II that France finally renounced its Italian aims with the Treaty of Cateau-Cambrésis on April 3, 1559.

Lombardy remained under Spanish rule until the Peace of Utrecht, which ended the War of Spanish Succession. It then passed into the hands of Austria, which lost it in 1859 during the Second Italian War of Independence.

