P-ISSN: 2709-6254	Journal of Development and Social Sciences	July-September 2025, Vol. 6, No. 3
O-ISSN:2709-6262	https://doi.org/10.47205/jdss.2025(6-III)17	[187-202]

Journal of Development and Social Sciences
www.jdss.org.pk

RESEARCH PAPER

AI Driven Defense in Europe: Shaping the Future of Military

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ABSTRACT

This research examines the way Artificial Intelligence (AI) is revolutionizing defense strategies among prominent European players France, Germany, the UK, Italy, Spain, and the EU, with a focus on its military uses. The research confines its examination to state-level and EU-level. AI integration within European defense reflects evolving geopolitical priorities, ethical challenges, and new regulatory demands. Employing qualitative case study approach grounded in Regional Security Complex Theory (RSCT), the research draws on official policy briefs and reports. Results show Germany and France dominating AI defense innovation, while the UK emphasizes ethical AI and NATO interoperability. Italy and Spain are emerging powers with growing public-private partnerships. The EU, lacking military capability, exerts normative influence through regulatory tools like the AI Act. These dynamics reshape regional defense cohesion and power relations. Future efforts will have to be focused on cooperative regulatory strategies, ethically sound innovation, and collective defense policies to optimize ethical AI militarization and strategic autonomy in Europe. Cooperative European defense initiatives and testing regulation frameworks need to be investigated in future research. Comparative analysis with Asia or North America like regional complexes would better convey how regional systems determine AI governance, innovation, and military integration worldwide.

KEYWORDS Artificial Intelligence, European Defense, Military Innovation, Regional Security Complex Theory, Strategic Autonomy, AI Governance, Ethical AI, EU AI Act, Public-Private Partnerships, NATO Interoperability, Geopolitics, Regional Integration

Introduction

Artificial Intelligence is reshaping the world at an unprecedented pace, remolding industries, economies and most importantly, the world of international politics. There are many definitions of AI. At its core, artificial intelligence is computer system capable of performing complex tasks usually performed by human-reasoning, decision-making, designing, etc (May, 2024). In broader sense, artificial Intelligence can be described as social and cognitive phenomena that allow a machine to integrate socially into a society so that it may execute competitive tasks using cognitive processes and interact with other agents in the society through the exchange of information-laden messages and shorthand presentations (Abbass, 2021)

In the time of fast addition of Artificial Intelligence in the defense strategies of countries of Europe, this technology is becoming more central in the shaping of power, security, and geopolitical dynamics. This qualitative study attempts to investigate how AI is impacting the strategic behavior & policies of European states with a special focus on defense as a key variable. This article tries to focus on the adoption and developing of Artificial Intelligence in military applications in Europe, thus showing the wider implications of AI on regional security. Europe is an interesting & important case study because of the complexity in the security environment of the region, which is marked by

cooperation and competition among its member states. The European Union and individual countries such as France, Germany, the United Kingdom, Italy, and Spain, are actively pursuing and making AI-driven defense initiatives that promise to enhance their military capabilities while keeping a close eye on ethical and regulatory issues and standards. Such activities are having a significant effect on European internal security dynamics and its comparative position with other AI superpowers including the US, China, and Russia in global affairs.

This article provides figures regarding the most significant developments, investment, and work in the present wave of implementation artificial intelligence within European defense policy. This article is also dedicated to the various European nations' strategies for deriving security benefits from artificial intelligence, including France's vision for AI-based military modernization, Germany's development of autonomous platforms, and the UK's cautious but strategic employment of AI in defense. By means of Regional Security Complex Theory (RSCT), this article proves that AI is a revolutionary force in global politics and not merely a tool of technology. It is improving competitiveness, revolutionizing the concept of strategic autonomy in Europe, and reengineering alliances. AI will play an increasingly important role in defense since it continues to evolve, impacting not only the defense department but the global geopolitical landscape as a whole. This article offers a thorough analysis of Europe's AI-driven military strategy, adding to the growing literature on AI and international relations.

Literature Review

"The Very Long Game 25 Case Studies on the Global State of Defense Artificial Intelligence" by Heiko Borchert, Torben Schütz, Joseph Verbovszky. In this book, an article named "Bright Prospects, Big Challenges: Defense artificial intelligence in the United Kingdom" by Kenneth Payne, discusses the strategic manner in which artificial intelligence is being integrated into the defense sector of the UK while showing both advantages and key challenges. In this regard, the UK has made visible progress in the establishment of institutions such as the defense artificial intelligence and autonomy unit and the newly formed defense artificial intelligence centre. This article also shows that how UK is thinking about artificial intelligence, how much UK is funding this technology and what will be its future in UK. (Borchert, Schütz, & Verbovszky, 2024). The case studies do not examine how European nations may work together to strike a balance between the gains in defense brought about by artificial intelligence and the maintenance of moral principles and regional equality. This research will investigate this gap and try to fill it.

"Artificial Intelligence Military Race: Common Good Governance in the Age of Artificial Intelligence" by Denise Garcia. In this book, there are the challenges and ways to create global governance frameworks for the military use of artificial intelligence. In doing so, Garcia proposes three new humanist notions; common good governance, transnational networked cooperation, and humanity's security, to tackle the issues associated with the militarization of artificial intelligence. given its comprehensive review of the current global trends in artificial intelligence militarization and autonomous weapons, the book discusses successful past international co-operation which pave the way towards its governance. Garcia looks into diplomatic efforts and pointing that the making of an international treaty on autonomous weapons will be a beacon to lead artificial intelligence governance in upholding human dignity and global cooperation (Gracia, 2024). The book does not go for implications of artificial intelligence on other international politics tools like economy and diplomacy. The research will fill this gap.

"Cybersecurity for Artificial Intelligence" by Mark Stamp, Corrado Aaron Visaggio, and Francesco Mercaldo. In this book, there is a mention of innovative applications of artificial intelligence, including machine learning and deep learning techniques, on the solution of relevant cybersecurity problems. It will present the most advanced artificial

intelligence techniques related to explainable artificial intelligence, adversarial learning, and the cybersecurity domains like malware detection and biometrics. It seeks to provide answers as to how artificial intelligence and cybersecurity come together and therefore acts as a wide reference for researchers, advanced students, and practitioners working on the interplay between these topics. the book underlines not only the implementation of artificial intelligence but also its deeper theoretical and practical problems in the development of security enlargements (Stamp, Visaggio, & Troia, 2022). The book doesn't discuss how European countries can make sure that the use of artificial intelligence in cybersecurity. The research will focus on this and try to tackle this gap.

Research Methodology

In the research "AI Driven Defense in Europe: Shaping The Future of Military", qualitative method has been applied as there was plenty of qualitative data that was needed to view precisely how artificial intelligence is affecting the defense of Europe. Thematic analysis has been utilized for the purpose of data analysis. Pattern and theme descriptions were drawn and analyzed based on data received through case studies. Apart from that, content analysis of official reports, news, and related studies has been conducted for the purpose of gathering data for wider context of AI's impact and bearing on defense in the chosen European countries. Also, case study protocol has also been employed. There existed a standard protocol that was created and applied to carry out every case studies to build up information and for cases consistency. The protocol was one of the most important factors to ensuring reliability as well as richness in qualitative research.

Results and Discussion

Case Study in Europe of Using AI in Defense

European Union

Normative Leadership

The European Union, while lacking direct military capabilities, positions itself as a global pioneer in shaping the ethical and regulatory framework for AI, including its applications in military domain. Although the EU does not have a unified military force, it significantly influences AI governance through initiatives like the Artificial Intelligence Act, which became law on August 1, 2024, setting global standards for AI deployment while currently excluding most military applications. The EU, however, continues to call for discussions at the international level on military AI governance underlined by ethical guidelines, transparency, and human oversight. While member states are given leeway to develop their own military AI systems, the overall regulatory stance by the EU, indirectly, shapes them. The AI Act classifies the dangers of AI into four levels, minimal, limited, high, and inadmissible. It prohibits the systems that endanger security, rights, or livelihoods, such as predictive policing and citizen scoring. While the EU has opposed the autonomous weapons in the past, its AI regulation excludes explicitly military, defense, and national security uses, leaving it up to international law and the sovereignty of member states (Hernández, 2024).

The EU AI Act is a bloc-level regulatory guardrail that despite exempting military applications, is proof of the EU's world normative leadership. As Regional Security Complex Theory asserts, normative influence is a security asset, as EU policy sets member-state action and binding them together in a regulatory security community. The EU stance, from a Regional Complex Theory viewpoint, is a demonstration of its regional security interdependence, whereby the military AI breakthroughs of individual states are sovereign choices, yet influenced by the shared policies and norms at the EU level. The EU intervention regarding AI control is thus reinforces its strategic role as a regulator power. It is also using

its normative presence to drive international debate regarding responsible AI application throughout the military sphere.

United Kingdom

UK's AI Defense Strategy and Regional Security Integration

British Army's Artificial Intelligence strategy is about rapid deployment of Artificial Intelligence to all of its operations in a bid to enhance decision-making, efficiency, and security while maintaining legal and ethical standards. It thereby views Artificial Intelligence as the key enabler of contemporary warfare and has an ambitious target of becoming AI Ready by 2024 and fully AI-led by 2030 in an effort to guarantee superiority in a world where opponents are rapidly utilizing emergent technologies. The plan places an emphasize on human-centric AI, where machines assist but do not replace human judgment, to optimize intelligence analysis, cyber defense, logistics, and battlefield tactics. The Army AI Centre (AAIC) oversees this transformation to ensure that it is in lockstep with national and defense AI strategies while fostering collaboration with industry, academia, and international allies (British Army, 2023). This strategy builds on the regional complex theory and realizes that the adoption of AI is not in isolation; it's an integrated security environment where both European and global actors shape military innovation, with strong cooperation with NATO and Allied Forces. One of the most important features for sustaining strategic advantage would be AI governance, ethical conduct, and organized use of data with alliances provide overall robustness to threats facilitated by AI and thus reinforcing the Army inside a changing regional security complex. The British Army's AI Ready by 2024 theme is a man-in-the-loop solution which is prioritizing human judgment over full autonomy. It's a realistic solution to modernization. RSCT further adds that even national forces become entangled in entwinements of alliances; the UK chronology is a mobilization of NATO allies, creating an even broader regional defense net.

The United Kingdom follows a conservative strategy in bringing artificial intelligence (AI) to its military planning in terms of intelligence, cybersecurity, and logistics while refraining from fully autonomous weapons systems for ethical and strategic reasons, as differentiated from more aggressive AI-led initiatives by the US and China. Back in 2021, the delayed publication of the UK's Defense AI Strategy, is a mirror of institutional reluctance, cybersecurity concerns, lack of AI-trained staff, and sluggish procurement processes, with great priority on human control in war to facilitate responsible innovation (Ertan, 2022). The UK's belated Defense AI Strategy demonstrates that institutional lag, ethical restraint and ability shortcomings can slow-down innovation that is required. RSCT would identify this as the tacit shift in tempo; UK's delay permits regional peers to cover capability gaps, thereby influencing regional AI adoption tempo. The British approach prioritizes collaboration with private-enterprise entrepreneurs, academia, and international allies in order to create mutual security through the use of AI against threat recognition, situational awareness, and simulated warfighting to strengthen its post-Brexit status in the European security system. But the UK stands to lag behind other leading global AI military powers if it does not speed up AI deployment and increase regional collaboration, possibly weakening its strategic voice within the European security complex (Wallace, 2022). Through the incorporation of AI in its defense strategy, the UK seeks to increase strategic autonomy, improve resilience to cyber and hybrid threats, and help set international norms for ethical use of AI across the military landscape in a bid to be a responsible AI innovation leader. The UK focus on human control of war reflects a virtuous line that can bound but also legitimize its AI-based alternatives. In the view of RSCT, such normative boundary generates confidence among neighbors; the UK role grounds collective norms in Europe's security complex.

The UK Defense Committee report emphasizes the transformative effect of AI on military operations, from logistics to combat, and its potential to secure strategic advantage.

The UK has a robust AI research community, but no clear defense AI industry, and there is an urgent need for investment in digital infrastructure, training personnel, and collaboration with startups and non-traditional suppliers. Though MOD's Defense AI Strategy 2022 sets priorities but the progress is hindered by bureaucratic procurement processes and limited funding, thus shows a need for risk-taking, adaptable AI development. International collaboration, specifically under AUKUS Pillar 2, is required to get AI capabilities aligned with allies and permit interoperability (Dhesi, et al., 2025). The report of the Defense Committee is an appeal for flexible procurement and collaboration, which proves that bureaucratic reform is as imperative as technology itself. RSCT envisions institutional convergence as important factor of regional resilience. The speedy development of AI systems in Britain enhances interoperability, hence facilitating integration within the European defense system. According to Regional Security Complex Theory (RSCT), UK AI policy should not only promote national security but also promote European security cohesiveness without dependence on external powers and forging an independent AI-based defense complex.

The UK's rapid adoption of AI technology in its military is a harbinger of the innovative character of AI warfare that spans from battlefield situation awareness to predictive maintenance and drone defense. Britain's recent initiatives by its Defense Ministry, such as the AI-facilitated beach-landing exercise in the English Channel and the Motherlode helicopter maintenance software, are echoes of work accomplished in optimizing combat performance and responsiveness. Supported by its foreign allies such as the U.S., BAE Systems, and Thales, the UK has been employing AI to sift through vast battlefield data so as to improve decision-making for intricate situations (Chuter, 2023). Examples of motherlode support software and beach-landing AI simulations shows the range of AI utility from data analysis to tactical operations. These are dual-use capabilities that increase joint readiness and integrating UK forces more fully into Europe's multipolar security order.

Meanwhile, the incorporation of AI-powered SmartShooter SMASH technology in counter-drone operations is a milestone in precision warfare, as UK troops are now being trained on machine-learning software to employ for high-precision UAV targeting. But with every development, theret are new challenges like threats to data security, issues of autonomous decision-making ethics, and increased technological dependencies, which require more robust governance arrangements. In a Regional Security Complex Theory framework, the UK's modernization of its military with AI places Britain at the center of the European security complex and reinforcing transatlantic defense relationship, particularly with America. As AI transforms war in the contemporary period, threats of swarms of drones controlled by AI and asymmetrical attacks necessitate international cooperation, as witnessed at the Bletchley Park summit, to establish international standards for the ethical use of AI for defense (Defense News Army, 2024). The UK's strategic push to develop AI-powered military capabilities not only improves security in the region but also reflects a broader restructuring of global power dynamics, where AI dominance is rapidly translating into military and geopolitical power.

Faculty AI is collaborating on the advancement of AI technology for use in military drones. Notably, it is more known for reselling AI models rather than developing them, since it has a strong partnership with government agencies such as NHS and AI Safety Institute AISI; hence, people started raising eyebrows at the specter of a potential conflict of interest. The Faculty has conducted research on AI-driven subject tracking, detection, and self-navigating drone flight but never on lethal targeting technology, although it has never officially owned this publicly. The UK government dependence on private AI firms such as the Faculty showcases the larger issue of regulation and ethics for AI development, especially for defense purposes, critics claim. Through the lens of Regional Complex Theory, the growing Faculty role is a testament to the securitization of AI in the strategic environment of the UK where AI-driven military capabilities become contributive to

regional security competition and dynamics. With agreements worth at least £26.6 million, the company's role in AI policy is reflection of the growing overlap of AI policy-making, military deployment, and economic interests in shaping regional power structures (Jolly, 2025). Faculty's role in UK's AI drone is to identify the common point of economics and ethics where economic imperatives in the private sector meet public security obligations.

Germany

AI Innovation in German Defense: Strategic Autonomy and European Integration

Germany's ARX Robotics unveiled the ARX Mithra OS, an artificial intelligence-enabled operating system to convert traditional military trucks into fully autonomous, networked vehicles, without acquiring new ones. The system with a Legacy Autonomy Kit includes adaptive navigation, autonomous reconnaissance, remote operations, and real-time information sharing to enhance manned-unmanned and unmanned-unmanned teaming. A modular and scalable design allows it to be easily plugged into the wider world of defense and commercial use and allows it to be supported by legacy systems via over-the-air updates. The move follows an international trend of AI-based military modernization, such as Rheinmetall and Auterion developing NATO interoperability, Textron Systems and Kodiak Robotics in the United States, and Russia's Rostec partnering with its Prometheus system and unmanned T-72B3 Sturm tanks. The incorporation of AI in current platforms is one instance of the strategic pivot towards cost-effective, technology-driven defense enhancement to enable states to maximize operational effectiveness without unnecessary spending (Defense News Army, 2024). From a Regional Complex Theory perspective, German development of AI-powered military systems illustrates evolving European security dynamics wherein states are resorting to technology to increase deterrence and interoperability as part of coping with evolving geopolitical threats, bolstering regional defense networks and mitigating strategic dependence on foreign powers.

Germany's increased investment in artificial intelligence technology for defense reflects its increased role in the European security environment, since projects such as the Cerebras-Aleph Alpha deal redefines the military potential. US California-based technology company Cerebras Systems entered into a multi-year agreement with German AI company Aleph Alpha to supply the Bundeswehr with a supercomputer system that enhances the adoption of AI into intelligence analysis, threat evaluation, and operations planning. This new architecture, competing with Nvidia, will increase Germany's situational awareness and strategic flexibility, cementing transatlantic defense cooperation and establishing Germany as a technological leader in NATO (Cherney, 2024). The acquisition of the Cerebras–Aleph Alpha supercomputer is Germany's move towards independent AI backplane, breaking away from U.S. chipmakers' monopoly.

At the same time, the GhostPlay program, a German AI-developed virtual war zone, is revolutionizing defense acquisition by enabling officials to pilot, test, and hone unmanned systems and counter drone technology prior to deployment into combat. Through the assistance of digital twin simulation and AI-based decision logic, the platform improves adaptability against evolving threats, particularly in light of regional security concerns following Russia's invasion of Ukraine (Sprenger, 2023). According to the Region Security Complex Theory (RSCT) perspective, such developments indicate rising interdependencies within the European security community because AI technology not only restructures the military strategy but also heightens regional rivalry. As AI keeps redefining security, there is an even greater urgency for stronger international governance structures to oversee its uses in the military tech to ensure that the European AI competition makes security strong without further exacerbating geopolitical rivalries.

Helsing, a €4.9 billion Munich-based AI defense technology company, is spearheading Europe's shift towards AI-driven military capabilities with its focus on

software-driven warfare rather than conventional hardware. As European nations rush to address air and missile defense gaps exacerbated by Russia's invasion of Ukraine, Helsing has secured major contracts with the UK, Germany, France, Estonia, and Ukraine to integrate AI-powered decision-making into the Eurofighter upgrades, Airbus' Wingman system, and the Future Combat Air System. Co-founder Gundbert Scherf posits that Europe's dependence on U.S. defense technology is rooted in historical reluctance to finance local defense start-ups, which continues because of budget austerity despite the European Investment Bank liberalizing restraint on dual-use technology (Roussi, 2024). Helsing's emphasis on software war rather than hardware sets the course toward platform-independent capability as the future of force projection.

France and Germany have further strengthened their defense partnership by co-developing the Main Ground Combat System (MGCS), the future-proof tank with AI-driven systems, laser technology, and self-driving vehicles that will transform land battle. Managed by Germany and jointly funded with France, the project brings together industry heavyweights Nexter, KMW, and Rheinmetall, marking a political commitment of overcoming old disagreements and bolstering regional defense (Le Monde, 2024). The MGCS tank program is a politically sensitive project that bridges old rivalries to join forces on a new generation of terrestrial warfare vehicles. RSCT points towards joint flagship programs consolidate alliance bonds; MGCS institutionalizes French-German partnership as the hub of Europe's armored deterrence policy. In a Regional Security Complex Theory (RSCT) framework, these tendencies identify Europe's strategic drift towards defense autonomy, with diminished reliance on external powers and intensified deeper military cooperation within the European complex. While AI warfare shapes the global defense systems, efforts such as Helsing's AI integration and the MGCS initiative put Germany and France at the forefront of military AI innovation. It is further solidifying Europe's defense infrastructure and geopolitical standing.

France

Artificial Intelligence and the Reconfiguration of French Military Power

France dynamically integrates artificial intelligence in its strategic plan, placing itself at the core of the European complex security and rearranging power dynamics in the region through technology. The French Directorate General of Armaments commissioned a company headed by Hewlett Packard and Orange to create Mont-Valérien, Europe's most potent classified computer by 2025, which will house critical defense data and support AI-powered military applications. With 15 AI labs spread across defense departments and 100 engineers committed to incorporating AI into military operations, France's Ministry of Armed Forces is pursuing a three-pillar AI strategy to boost computing capacity, cultivate talent, and create a robust AI ecosystem (Ahmedullah, 2024). France's Mont-Valérien supercomputer project is a demonstration of how a sovereign AI infrastructure investment supports military innovation. It demonstrates that technology projects sponsored by governments can pay off in terms of high-speed capability gains. RSCT contends that influential nodes stabilize local security patterns; France's AI cluster makes it a central node in Europe's defense complex. By setting an example, it forces neighbors to join together and either coordinate or counter.

Also, the joint venture between Athea, Thales, and Atos, Artemis.IA, offers a sovereign platform for AI and big-data processing to improve military intelligence, cyber, and marine surveillance. It entered its operational deployment phase in 2024, highlighting France's push for strategic autonomy in technology leadership in line with its more extensive €700 million AI investment plan for 2019-2025. By encouraging collaboration and competition among surrounding nations aiming for technological independence, France's defense policy on AI benefits both its own strategic autonomy and the security environment in Europe (Machi, 2022). According to the Regional Complex Theory (RSCT), France's

advancement of military AI is strengthening its position as a major European power, forcing other nations to either challenge or counterbalance its technological leadership. This has changed security alignments and had an effect on global power structures, as AI dominance increasingly determines the outcome of contemporary conflicts. Artemis.IA platform declares the need for public–private collaboration in constructing Europe-wide AI defense networks.

France and Germany consider AI as one of the key elements in shaping security, economic growth, and governance in both national policies and joint initiatives. France has, since 2017, enhanced efforts in AI research, military applications, and ethical regulation in an attempt to gain data sovereignty over algorithms, data, and computing capacity. Its AI-driven military strategy, reflected in projects like Artemis.IA and the Defense Innovation Agency, places great importance on gaining battlefield awareness, speeding up automation, and ensuring operational superiority. Germany has the same ambition, working together with France on projects like the Future Combat Air System (FCAS) to strengthen European defense. However, harmonizing intellectual property rights, industrial competition, and governance has proven difficult, especially as the war between Russia and Ukraine pushes AI-driven military modernization at full speed. AI is not a technological race only but a governance race in which France and Germany are leading an ethical and regulated approach against more permissive global models (Zubeldia, 2023). The regional complex theory (RCT) underlines that security interdependence drives European AI cooperation because technological autonomy and military capabilities no longer respect national borders. This has spurred joint efforts under the EU AI strategy to ensure a unified regulatory framework and reduce reliance on foreign AI technology. As AI becomes central to global geopolitics, France and Germany's coordinated strategy exemplifies Europe's broader push for an AI governance model that balances innovation, security, and ethical standards, reinforcing its geopolitical influence. France-Germany AI collaboration on FCAS is a strategic reorientation from unilaterally oriented programs to genuinely pan-European defense innovation. It is a reflection of ambition and the tension of balancing national interests. RSCT would anticipate neighboring great powers to institutionalize interdependence; FCAS is a classic example of how security interlinkages tie core European states into one regional complex.

Artificial intelligence is rewriting the rules of defense in Europe, and France is looking to be at the forefront with Safran's €220 million ($236 million) acquisition of Preligens, one of the most well-known AI-driven military intelligence startups focused on satellite and drone-based surveillance. Proligens' cutting-edge AI algorithms, already being used by French military intelligence, NATO, the U.S., the U.K., and the EU, enable real-time detection of military assets, including armored vehicles, aircraft, and naval forces. Recently signed contracts further extend the influence into the Asia-Pacific. The acquisition by Safran would help to enhance the autonomy of defense in France by safeguarding key AI technologies from foreign control, just as it had done in 2020 when the French government intervened against a CIA-backed attempt to acquire Preligens. This move falls within the broader scope of France's AI-driven military modernization, including a €2 billion investment in AI under its 2024-2030 defense budget and the development of Europe's most powerful classified supercomputer. In addition, Safran's Advanced Cognitive Engine, ACE, will integrate AI-based target detection into land, naval, and aerial platforms, underlining the growing role of AI in autonomous and semi-autonomous defense operations (Ruitenberg, 2024a). Safran's acquisition of Preligens indicates France guarding core AI capabilities from foreign acquisition, a critical step toward the defense of technological sovereignty. In RSCT lens, the acquisition of core technologies constitutes a form of hard balancing; France's action does not only defend its own interest but remakes the regional balance of AI-facilitated surveillance.

French leadership in AI defense innovation strengthens its strategic position within the European security complex, driving both cooperation and competition among states and

decreasing reliance on external technological powers. Also, AI-driven intelligence, surveillance, and reconnaissance systems, such as Preligens' Robin and Xerus, are going to bring increased situational awareness in view of threats from actors like China and Russia, especially amid increased tensions and conflicts, for example, the war in Ukraine (Gosselin-Malo, 2024). With AI increasingly becoming the defining factor of military superiority, France's advancements are not only reinforcing European defense capabilities but also altering global power dynamics, furthering the strategic role of AI in regional and international security frameworks. Preligens' acoustic-warfare AI for submarine detection demonstrates the concrete military advantage of domain-specific AI. It is a shift from analog to data-based sub-sea war. France's acoustic AI enhances its regional naval power. This deepens and consolidates France's regional domination of Europe's common defense.

France has been proactively building artificial intelligence into its military strategies, including AI-powered acoustic warfare to better defend its seas, developed in collaboration with startup Preligens to be able to detect submarines and monitor underwater patterns. CIRA, the Acoustic Recognition and Interpretation Center of the French Navy, based in Toulon, tested AI-driven acoustic analysis onboard submarines at the end of 2024 and will operationally deploy it in 2025. This will deal with an exponential rise in data generated by passive acoustic sensors, from 1 terabyte in 2020 to more than 100 terabytes by 2030, by filtering and analyzing information so human analysts or golden ears can concentrate on high-value signals critical to combat operations. AI assists in enhancing the passive acoustic warfare by monitoring and feeling the movement of the adversary without being noticed, isolating propulsion patterns to determine speed and trace, and feeling commercial vessels, naval submarines, and small boats, which enhanced tactical decision making and operational effectiveness by cutting down analysis time from over 40 days to 4-5 hours, and expanding sonar detection ranges from 20 km during the early 2000s to over 200 km in 2020 (Ruitenberg, 2024). From the perspective of regional complex theory, the France's AI-based naval defense technologies strengthen its position as a hegemonic power in the European security complex, improving technological autonomy and diminishing reliance on foreign intelligence. Internationally, this positions France among the great naval powers, initiating the AI arms race and redefining arms dynamics globally.

France is having cautious approach in incorporating AI into nuclear command and control (C2) systems, to keep human oversight in nuclear deterrence as a way of mitigating related risks like cyber-attacks and overdependence on automation, while using AI to enhance intelligence, surveillance, reconnaissance (ISR), and missile defense. France looks at global trends and recognizes the use of AI in military modernization by the US, China, and Russia, and its potential exploitation by non-NPT states such as India, Pakistan, and North Korea, and calls for more research, public-private cooperation, and international AI governance, especially within the P5 process on Strategic Risk Reduction. Through the balance of innovation with ethical considerations and strategic stability, France is strengthening its deterrence capabilities, asserting itself in contested maritime regions, and contributing to shaping responsible AI governance within regional and global security frameworks (Fayet, 2023). France's cautious stance toward AI in nuclear command and control (C2) positions the inevitable tension between automation breakthroughs and managing the existential risks associated with their potential misuse or failure. Human agency remains the critical factor. RSCT regards nuclear deterrence as a stabilizing constant; France's moderate AI integration preserves that stabilizer, in harmony with wider regional attempts at evading destabilizing arms races.

Proligens Company, based in France, uses artificial intelligence to process satellite imagery in their advanced geospatial analysis in France. Although open-source information does not indicate the extent of availability of these services directly to Ukrainian authorities, it does suggest their potential use or accessibility through allied cooperation or indirect channels (Béraud-Sudreau, 2024). Proligens' geospatial AI for Ukraine demonstrates how

quickly AI tools can spread into zones of conflict overnight, transforming force-on-force calculations. AI assistance to Ukraine interweaves new threads of security partnership between Europe and non-Europeans. Massive implementation of artificial intelligence in European defense infrastructure at breakneck speed is transforming battlefield capabilities, especially precision fire and observation. One of these tools, Ground Warden, which is provided by MBDA and the French Army, illustrates how AI handles live imagery from UAVs and missile cameras to provide beyond line of sight situational awareness and target identification for operator. At Eurosatory 2024, the Akeron missile showcased its AI-targeting capability by following an enemy tank during flight, giving video feedback, and adjusting for targeting concealed threats with pinpoint accuracy. While AI increasingly takes center stage for autonomous targeting, human-in-the-loop models remains critical to maintaining combat as fluid and human-monitored as possible (Mackenzie & Ferran, 2024). Ground Watch and Akeron's onboard AI-guided missiles demonstrate the intersection of autonomy and accuracy in contemporary weaponry, raising ethical concerns regarding autonomous decisions to kill. In RSCT's perspective, such force-multipliers are power-projection instruments. France's AI-guided missiles redefine regional deterrence postures, which prompt neighbors to reciprocate by revising their own doctrine.

France and Singapore have deepened defense cooperation in a shared artificial intelligence laboratory for cyber defense, run by CNRS and Temasek Labs at the National University of Singapore. The collaboration, the first of its kind for Singapore's Ministry of Defense, indicates expanding use of AI in managing cybersecurity threats by using geospatial analytics, natural language processing, and computational vision. Secured in the 1997 SAFARI treaty and further entrenched by DesCartes AI in 2022, the venture is simply one among the rising trend for incorporating AI into global security infrastructure (InCyber News, 2023). The France–Singapore cyber-defense AI lab stands as an example of the worldwide scope of European engagement in AI defense, merging regional expertise and local capability with Indo-Pacific partners. This laboratory illustrates the extent to which European security actors exercise soft power and spin dense webs of deterrence. With AI-based military innovation altering global power dynamics; technological superiority becomes a determinant factor of power in geopolitics and regional stability.

Thales, a global defense technology leader, has developed an innovative metamodel for detecting deepfakes after accepting the challenge issued by France's Defense Innovation Agency. Techniques like Contrastive Language-Image Pretraining (CLIP) for visual irregularities, Diffusion Noise Feature (DNF) for detecting synthetic noise, and Discrete Cosine Transform (DCT) for spatial aberrations, this system increases biometric security, financial fraud prevention, and national defense. Thales' AI research, aided by its cortAIx accelerator and 600 AI experts, also extends to security applications such as the BattleBox toolbox that tests AI robustness against hacking attacks (Thales, 2024). Thales' metamodel for identifying deepfakes is the kind of way in which AI might enhance security against information-age danger, beyond kinetic warfare. Information integrity is a public good.

Italy

Italy's AI-Driven Military Modernization and Strategic Autonomy

Italy is enhancing its strategic mobility by embracing Leonardo's Military Space Cloud Architecture commissioned by Italian Ministry of Defense under the National Military Research Plan (PNRM) umbrella. AI, machine learning, and cloud computing-based cyber-secure satellite network will offer high-performance computing with autonomous data sharing capability, significantly enhancing Italy's defense network. The initiative, which is directed by Leonardo and supported by Telespazio and Thales Alenia Space, seeks to increase space-born combat operations by the development of multi-constellation terminal demonstrator (Segreti, 2024). The Italian Military Space Cloud demonstrates how AI and space collaborate to achieve real-time C4ISR to show how orbits are a contested defense

space. Italy's cloud structure inserts yet another node into Europe's integrated grid for security. From a Regional Security Complex Theory (RSCT) perspective, these advancements underscore Europe's push for technological sovereignty while fostering both cooperation and competition among regional actors in AI and space-based defense. Italy's advances in space technologies and military AI not only improve its standing in Europe's security complex but also reshapes the global power balance such that countries possessing superior AI-powered space strengths achieve strategic advantage in contemporary warfare and geopolitics.

Italy is moving quickly to embed artificial intelligence within its defense industry as part of its overall military digitalization strategy, but is coming into the arena later than some of its fellow European countries. Italy is transforming its army through efforts such as the Force NEC (Network Enabled Capabilities) initiative by developing communications, information exchange, and situational awareness with a €190 million outlay between 2021-2035 as well as further funding for AI-driven projects across branches of its armed forces. Key developments include the Safe Soldier System, Robotics and Autonomous Systems (RAS) Experimentation Campaign, Future Combat Air System (Tempest), Eurodrone (MALE RPAS), Naval Future Combat System 2035, and the European Patrol Corvette (EPC), all aimed at improving battlefield efficiency, autonomous decision-making, and multi-domain operations. The Defense AI Observatory at Helmut Schmidt University in Hamburg has pointed out Italy's AI-driven developments in the military, its achievement, and the ethical and operational issues it will probably face, including cybersecurity attacks, decision-making bias, and unpredictability of AI in battle (Gilli, Gilli, & Zaccagini, 2023). Italy's NEC investments demonstrate a thoroughgoing digitization campaign networking commanders, sensors, and shooters into a single fabric of information. Italy's NEC program consolidates allied synergies into one, solidifying the tactics and strategy glue of the complex. Italy's massive investment in AI, solidifying its position in the European security complex by facilitating interoperability with EU and NATO allies, gaining technological sovereignty, and initiating regional cooperation. Such a quest for military dominance through AI, however, imperils competition between the European powers for dominance in the defense innovation contest. With Italy continuing to invest in AI training, organizational designs, and advanced weaponry, its quest for strategic autonomy is reconfiguring Europe's power dynamics, reaffirming AI role in shaping the new military capabilities and regional security dynamics.

Italy is developing its military AI capabilities with assistance from state-controlled defense giant Leonardo, which together with Telespazio and Thales Alenia Space is leading development of MILSCA, Europe's initial military space cloud architecture. Commissioned by the Ministry of Defense, MILSCA places importance on strategic value of space for security and that is why put forward a combination of AI-powered in-orbit high-performance computing and a space-based cloud system to provide sophisticated secure storage and real-time access to vital military intelligence in the communication, Earth observation, and navigation arenas. With each satellite containing 100 terabytes of data and more than 250 TeraFLOPS of computing capabilities, the project enhances working efficiency and data sovereignty aligned to Leonardo's greater vision of developing interconnected digital defense platforms (Reuters, 2024). MILSCA's space-based processing puts data sovereignty as a strategic asset, where space property turns into virtual arsenals. RSCT would see it as expanding the boundaries of such complexity; a standalone satellite cloud enhances European autonomy and strengthens resilience to external dependence.

Simultaneously, Italy is expanding AI-enabled military technologies, through companies like Leonardo and Iveco Defense Vehicles, along with universities such as Politecnico di Milano and La Sapienza, developing UAVs, automated target identification, and real-time mission systems. Since 2018, Italy's Defense Ministry has funded AI military projects, with significant investments exceeding €48 million (2021-2022) and €40 million for 2023 to advance research and development in AI-driven warfare (Latina, 2023). Italy's

€48 million of AI R&D expenditure shows that even a late follower can catch up with consistent investment and unambiguous strategic leadership. Under the prism of Regional Security Complex Theory (RSCT), Italy's increased investment in artificial intelligence and space-based military capabilities elevates its score in Europe's security complex. It also enables intra-European defense integration, and accelerates the regional rivalry for AI. This pursuit of technological autonomy minimizes external dependence, which reduces Europe's overall defense dependence on others in the context of the changing global power ordering

Spain

Spain's Role in Advancing Military AI within the European Security Complex

Spain is becoming a force in AI-powered defense and governance. Indra (a global Spanish information technology and defense systems firm) collaborated with the Spanish Navy Data Monitoring and Analysis Center (CESADAR) to develop one of the world's first autonomous AI systems to manage ships. Proven under the Soprene Project, the groundbreaking system auto-learns to maintain patterns of F100 frigates and BAM patrol boats on the coast, predicting breakdowns and improving efficiency without pre-determined datasets. The capability widens broader military applications, safeguarding Spain's defense systems while strengthening its strategic position in Europe's security complex (Indra, 2020). Spain's unmanned AI naval maintenance is a pioneering prototype for predictive maintenance, minimizing costs and improving readiness at sea. Spain's innovation help reinforce maintenance and supply chains along the Mediterranean rim of Europe's defense complex.

At the same time, Spain is spearheading AI regulation with the creation of the Spanish Agency for the Supervision of Artificial Intelligence (AESIA), the first AI regulation team in Europe, aligning with the EU AI Act and National AI Strategy. This move of Spain follows the European pursuit of regulatory autonomy in AI, as opposed to China's military-driven AI approach, Italy's temporary AI restrictions, and US and UK's regulatory debates (DW Team, 2023). Spain's AESIA governance working group proposes an integrated approach that aligns defense AI with broader societal and legal principles. Spanish AI defense and regulation creation enhances its technological sovereignty.

Spain's Defense Ministry signed a contract with US drone manufacturer Skydio, in partnership with Spain's Paukner Group, for up to US$18.7 million, to supply Spain's Armed Forces with Skydio X10D autonomous drones. Artificial Intelligence (AI) drones will assist in Intelligence, Surveillance, and Reconnaissance (ISR) operations, providing greater situational awareness, working more effectively, and safe flight through dense territories. The deal is a strategic move to enhance Spain's national defense capabilities with cutting-edge autonomous technologies, as part of the growing global trend towards combining AI and autonomous systems with contemporary military strategies (Nolan, 2025).

EON Reality kicked off a strategic project to assist in the modernization of Spain's defense by launching the "AI Academy for Defense - Spanish Maritime & Aerospace Readiness Track." The Spatial AI- and XR-driven program will be applied to quickly train members of the Spanish Armed Forces in how to operate advanced naval, aerospace, and land systems like F-110 frigates, S-80 submarines, Eurofighters, and VCR 8×8. Besides Spain's Ministry of Defense, defense industries (such as Navantia, Indra), and military academies, EON Reality is offering AI-personalized immersive training modules that enable quicker skills acquisition, cost saving, and increased safety. Given that Spain is allocating defense expenditure worth €12.8 billion and a target of 2% of GDP, this project fills the gap in state-of-the-art capabilities using AI-augmented simulations, real-time interactive learning, and AI-guided career paths. The system is scalable and secure for deployment and in sync with Spain's national defense and NATO interoperability objectives. Payoffs include quicker speed of operational readiness, huge reductions in training costs (up to 65%),

increased retention and qualification rates, and increased readiness of Spain's NATO Southern Flank (EON Reality, 2025).

Conclusion

Artificial Intelligence is not only boosting the military capabilities of European countries, it is remaking the very nature of defense, deterrence, and strategic autonomy on the continent. By the lens of Regional Security Complex Theory (RSCT), AI incorporation in European defense policy uncovers an intricate interplay of cooperation, competition, and interdependence. All the EU, France, Germany, the UK, Italy, Spain, and the EU are propelling AI-driven military transformation with unique national approaches but common objectives: improved situational understanding, accelerated decision-making, operational dominance, and regional stability. France and Germany prioritize collaborative AI initiatives and defense technology under national purview, while the UK focuses on ethical AI integration and transatlantic alignment. Italy and Spain, new players in the AI defense technology race, are also swiftly building up capabilities, investing in cloud defense and autonomous technologies. Supranationally, the EU is applying its normative power through regulative means such as the AI Act to influence member state conduct and maintain a shared European security stance. All these developments point to the fact that AI has moved from being a supplementary tool and become a pillar of Europe's new defense structure. As more sophisticated AI technologies emerge, their responsible, ethical, and cooperative use will be crucial in guaranteeing peace, deterrence, and European strategic consistency in an increasingly competitive international order.

Recommendations

While this research identifies the role of artificial intelligence in driving change in the politics of international relations in Europe, certain opportunities remain open for future exploration. Future research might include cooperative European action, e.g., joint defense measures or pilot AI regulation schemes. Comparative analysis against other regional complexes like Asia or North America would also provide greater insight into the manner in which regional dynamics affect AI regulation and innovation worldwide.

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