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The Airbus Effect: Paths to Interoperability and Cohesion

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RESEARCH REPORT

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RESEARCH REPORT

Introduction

The EU finds itself in a complicated and fragile security environment, characterised by Russia's military ambitions and strained relations with China, coupled with a growing number of hybrid attacks and a weakening transatlantic alliance (White Paper for European Defence – Readiness 2030, 2025). In particular, Russia's invasion of Ukraine pushed the European Union to reassess its security approach, starting a "race" to mitigate its vulnerabilities and dependencies, while improving its readiness and deterrence (White Paper for European Defence – Readiness 2030, 2025). In this race towards a stronger EU defence, one of the most pressing issues is the lack of interoperability between Member States (MSs), which is detrimental to conducting successful joint military operations necessary to respond to the deteriorating security landscape (Zandee et al., 2025). While the European Union is aware of its limits, as exemplified by the great amount of defence policy initiatives that it has adopted, there is still much to be done; moreover, there are also disparities between different defence sectors, particularly regarding interoperability and coordinated development (Becker & Kempin, 2025; Mordor Intelligence, n.d.; Kluth, 2018). In particular, it is possible to observe a more cohesive EU-level development of the air sector, while the growth of the EU land forces remains fragmentated (Kluth, 2018). Notably, within the former, there are few "giants" responsible for a better and cohesive development of doctrines, armaments and technological standards, one of which is Airbus (Mordor Intelligence, n.d). Against this background, this research aims to understand how Airbus's, a trans-European private company, contribution to the EU airspace can serve as a model to promote interoperability among the EU land forces.

This paper will proceed in structured steps. First, it will examine the EU's air-domain regulatory architecture to show how shared rules and civil–military coordination play a fundamental role in advancing the sector's interoperability. Second, it will zoom in on the land forces, giving particular attention to the sector's industrial fragmentation and the lack of a unified regulatory base vis-à-vis the air sector. The paper's third section will then use Airbus as a case study and present it as one of the main actors that pushed for the harmonisation of EU airspace. Here, attention will be given to the role of dual (civilian and military) integration and industrial consolidation. Finally, before a brief conclusion, the paper will present final reflections and evidence-based, realistic policy recommendations to improve the interoperability and cohesion of EU land forces.

This research argues that the air domain enhanced interoperability because industrial consolidation developed alongside a unifying regulatory framework, whereas the land domain lacks both a comparable industrial champion and an equivalent institutional framework. Therefore, this paper argues that Airbus demonstrates that industrial consolidation and regulatory harmonisation can significantly improve interoperability across the EU. Building on this model, establishing a similar framework for land forces could be fundamental to reducing fragmentation, fostering operational capability and strengthening the EU's collective defence posture.

2. The Regulatory Foundations of Air-Domain Interoperability

In the EU, military aviation remains a national competence, as the European Union cannot regulate military operations directly (Joint Air Power Competence Centre, 2022). Nonetheless, the EU has adopted different legislation regarding civil aviation. The main instrument governing the development and interoperability of the air sector is Regulation (EU) 2024/2803 on the implementation of Single European Sky (SES 2+), here referred to as "the Regulation." Entered into force on December 1, 2024, the Regulation was designed to address the high level of fragmentation in the EU's aerospace sector, improve air traffic congestion and delays in air navigation (Corain & De Maria, 2024).

While the Regulation was introduced to address inefficiencies and vulnerabilities in the civil aerospace sector, it explicitly embeds military coordination through civil-military interoperability mechanisms (European Parliament and the Council of the European Union, 2024). This is clear from the beginning: Recital 11 highlights the shared nature of the EU aerospace sector, which should consider the security and defence needs of Member States. Furthermore, Recital 12 recalls the 2004 general statement on military issues related to the Single European Sky, calling for closer civil-military cooperation in air traffic management (European Parliament and the Council of the European Union, 2024). Article 2 of the Regulation defines the concept of Flexible Use of Airspace (FUA) (European Parliament and the Council of the European Union, 2024). The FUA concept is based on the principle that airspace is neither exclusively civil nor exclusively military, but should rather be considered a continuum in which all user requirements are accommodated to the greatest extent possible (European Parliament and the Council of the European Union, 2024). FUA illustrates that, while the Regulation EU does not hold competence over military operations or training in the aerospace sector, it still encourages coordination to ensure that the military dimension is considered when organising and managing the EU airspace (European Parliament and the Council of the European Union, 2024). Consequently, the FUA concept plays an important role in institutionalising the idea that the European Union's airspace is not divided by sectoral boundaries but can serve both civilian and defence purposes in a complementary manner (European Parliament and the Council of the European Union, 2024).

Another essential, complementary initiative promoting interoperability in the EU aerospace sector is the Digital European Sky, developed under the SESAR 3 Joint Undertaking (JU)[1] in 2017, and then further detailed in 2019 (SESAR Joint Undertaking & Vălean, 2019). This initiative aims to tackle one of the main interoperability challenges, the coexistence of fragmented national air traffic systems, by introducing shared digital services and common performance standards (SESAR Joint Undertaking & Vălean, 2019). More importantly, the Digital European Sky explicitly mentions civil/military interoperability and coordination as a key element, noting that "dual-use technologies such as those for communications, navigation and surveillance, and solutions that allow real-time exchange of trajectory information will improve the predictability of military operations and overall network capacity" (SESAR Joint Undertaking & Vălean, 2019).

The SES 2+ and Digital European Sky are strong examples of how the more advanced state of

[1] The SESAR 3 Joint Undertaking is an institutionalized EU partnership between private and public-sector partners. This partnership develops the most advanced technology solutions for controlling conventional airplanes, drones, air taxis and vehicles flying at greater altitudes by combining the critical mass of resources and experience from across the aviation value chain. Furthermore, the SESAR 3 Joint Undertaking catalyzes the acceleration of the transition towards a green, climate-neutral, and digital Europe, and enhances the resilience and competitiveness of European industry (SESAR 3 Joint Undertaking | European Union, n.d.).

interoperability in the EU air sector can be largely attributed to the parallel development of civilian and military systems under a shared framework (SESAR Joint Undertaking & Vălean, 2019; Reg. 2024/2803, 2024). By designing digital communication, navigation and infrastructures that can serve both civil and defence needs, the EU has effectively accelerated standardisation and interoperability in the air domain. This dual approach is fundamental in reducing duplication and ensuring consistent performance across all Member States and operational domains (EUROCONTROL, 2023). This progress has been driven in part by the introduction of a performance-based Communication, Navigation and Surveillance (CNS) system. CNS refers to the technology that allows aircraft and control centres to communicate, navigate and track movements safely and efficiently (Sutton, 2025). Here, the EU establishes shared performance standards (such as accuracy, reliability, and security) that both civilian and military systems must meet (EUROCONTROL, 2023). This approach makes different national systems compatible by design and ensures that information flows seamlessly across borders, a key reason interoperability in the air domain has advanced faster than in any other defence-related sector (SESAR Joint Undertaking & Vălean, 2019).

This section develops the first part of the paper's core argument: interoperability in the air domain advanced because the EU created common rules that compelled civil–military alignment, allowing actors like Airbus to operate across borders more easily and effectively (European Parliament and the Council of the European Union, 2024; SESAR Joint Undertaking & Vălean, 2019; EUROCONTROL, 2023). Equipped with a better understanding of the legal framework and the distinctive elements of the EU air sector, this research will take a closer look at the land domain's gaps and vulnerabilities, highlighting how these affect its cohesive development.

3. Fragmentation in the Land Domain: Legal and Industrial Drivers

Up to this moment, the EU defence industry remains highly fragmented (Olsson, 2021). Due to their respective histories and geopolitical contexts, EU Member States have different objectives for their security policies. Additionally, most MSs want to maintain their national defence industries, meaning that demand mainly comes from national governments and supply is geared towards national rather than EU-wide needs (Olsson, 2021; Clapp, 2024). As a consequence, this situation creates fragmentation in the defence sector, causing duplication, high prices, redundant capabilities and diminished economies of scale (Olsson, 2021). While it is crucial to highlight the existence of an overall defence fragmentation, it is also important to notice that the degree of fragmentation is not equal across all defence markets (Olsson, 2021). This fragmentation is not accidental, but it is closely linked to the structure of the European Union itself and the nature of its Treaties (Fernandez, 2023). In particular, Article 346 of the Treaty on the Functioning of the European Union (TFEU) allows Member States to bypass competition laws and the free movement of goods on military equipment, using the justification of national security (Vanholme, 2021). While legal steps have been taken to improve EU-level defence interoperability, Article 346 TFEU remains the main source of a high-level defence fragmentation between Member States (Vanholme, 2021). Nevertheless, Art. 346 TFEU alone does not justify the increased fragmentation in the land domain. This can be explained by two closely related conditions, specifically the lesser degree of fragmentation in the air domain and the latter's greater level of integration within EU legal frameworks that require civil and military actors to use compatible procedures and systems.

In the land domain, the number of active national manufacturers is quite high (Olsson, 2021). Around ten EU countries produce Fighting Vehicles (IFVs)[2], and at least six MSs produce their own main battle tanks, (Subran et al., 2025). Furthermore, for main battle tanks [3],[4] infantry fighting vehicles and self-propelled howitzers, the market is split between many different designs, as illustrated by Figures 1, 2 and 3. In each segment, the largest single system accounts for roughly 40–50% at most, with the remaining share dispersed across numerous platforms (Olsson, 2021).

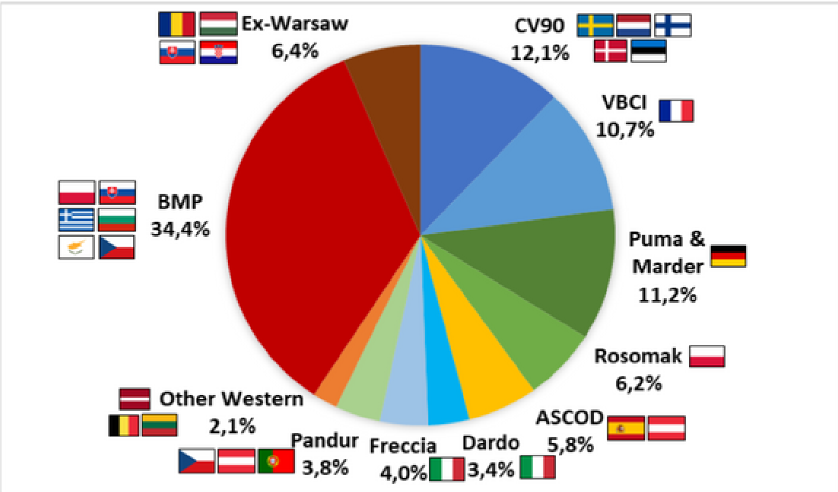

Figure 1: Market Segment Infantry Fighting Vehicles, 2021 (Olsson, 2021, p. 3)

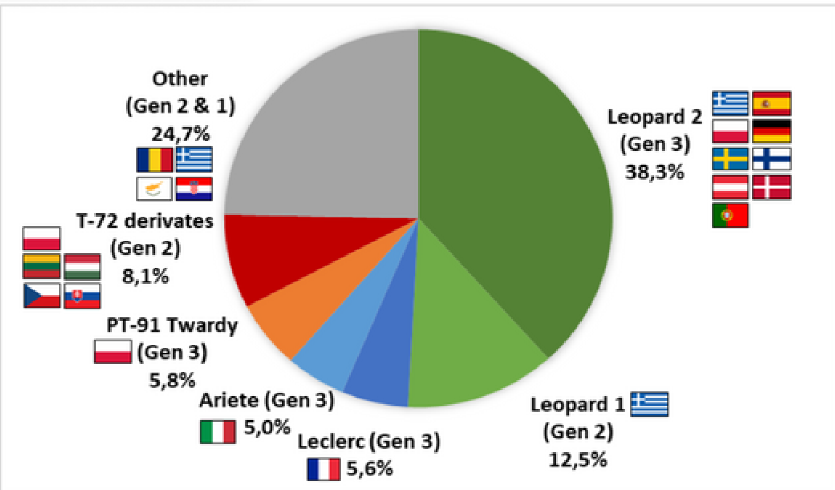

Figure 2: Market Segment Main Battle Tanks, 2020 (Olsson, 2021, p. 2)

In contrast, the air domain is less fragmented. While the EU has around twenty types of fighter jets and combat aircraft in service, only six can be considered modern and actively used (Olsson, 2021; Subran et al., 2025). As a result, modern fighter fleets are already concentrated around a small number of platforms[5], making the air domain far less fragmented than the land domain (Olsson, 2021).

[2] Furthermore, in the IFV market segment, no IFV type dominates the market. Here, Member States use many different models, which, in turn, exacerbates fragmentation (Olsson, 2021, p. 3).
[3] For example: Leopard 2 in Germany, Leclerc in France, Ariete in Italy, Challenger in the UK (Subran et al., 2025, p. 36).
[4] Legacy platforms such as Leopard 1, M109 and ex-Warsaw Pact vehicles remain in service, locking armies into multiple
[5] maintenance and training chains, which, in turn, slows down any convergence around shared development (Olsson, 2021, p. 2)
For example: Eurofighter, F-16, Rafale, Gripen (Olsson, 2021, p. 5).

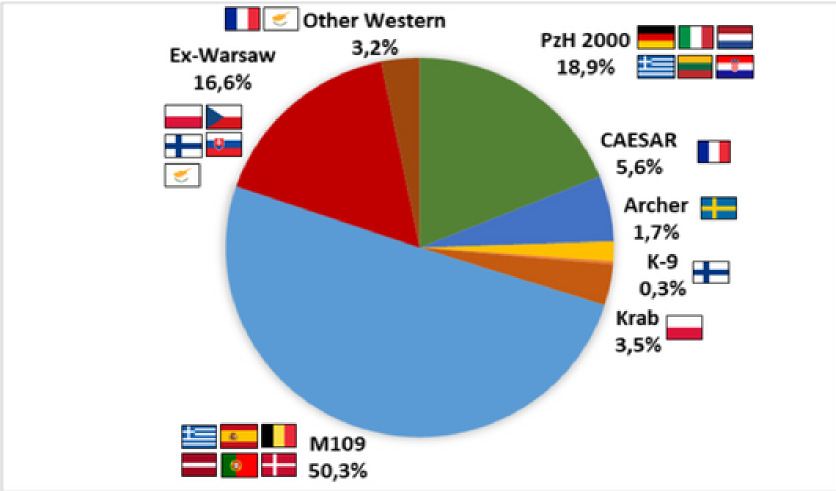

Figure 2: Market Segment Main Battle Tanks, 2020 (Olsson, 2021, p. 2)

Additionally, the air domain witnesses less fragmentation because military aviation is embedded in EU-level legal frameworks that require civil and military actors to use compatible procedures and systems. The Single European Sky (SES 2+) and the Digital European Sky, for example, seek to reduce fragmentation in European airspace and establish common rules, performance requirements and approaches to communications, navigation and surveillance (SESAR Joint Undertaking & Vălean, 2019; Soone, 2024). Civil aviation is highly regulated at the EU level, and military aviation must interface with these same systems, creating a "bridge" for interoperability between national air forces (EUROCONTROL, 2006).

The absence of any equivalent unifying legal framework (in other words, no shared standards, no joint operational rules, no common digital backbone) means that the effects of Article 346 TFEU are likely to be more acute in the land domain than in the military aviation sector. Without a unifying structure to counterbalance national discretion, Member States face fewer incentives to converge on a common ground, which helps explain why fragmentation persists more strongly on land (Mejino-Lopez et al., 2024).

This paper's section presented the "mirror image" of the air domain logic: while aerospace benefited from regulatory convergence and a dominant industrial integrator, the land domain combines legal permissiveness, industrial dispersion and the absence of a unifying framework, exacerbating EU-level fragmentation. Here, Figure 4 visualises these disparities clearly, demonstrating that even the most common land platforms have much lower market concentration than their air-domain equivalents, making harmonisation significantly more challenging.

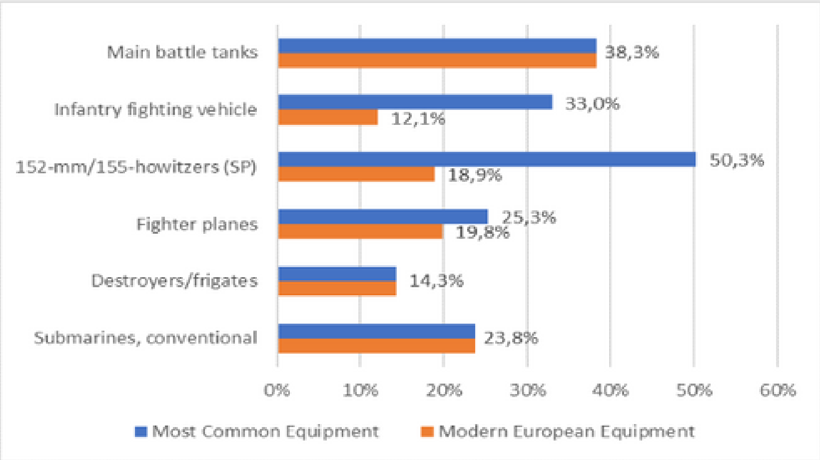

Figure 4: Market Concentration, Market Share of Most Common and Modern Equipment Type, 20201 (Olsson, 2021, p. 8)

4. Case study: Airbus

Airbus Industrie was created in the 1970s by a group of European aviation companies to compete with U.S. airline businesses by producing short- and medium-range, high-capacity jetliners (Amir & Weiss, 2025; Schweikart & Moose, 2023). Despite the presence of EU companies in the sector, such as Air France and British Airways, no European aircraft could compete with those produced by Boeing, Lockheed, and McDonnell Douglas (Schweikart & Moose, 2023). Initially, Airbus focused on the production of civilian aircraft; over time, the company expanded into the defence sector, eventually becoming one of the largest EU players (Airbus SE, 2017). In 2014, Airbus Defence and Space was formed as part of European Aeronautic Defence and Space (EADS)'s corporate restructuring (Campaign Against Arms Trade, 2025). From the beginning, the industrial model behind Airbus Defence revolved around distributed production chains and shared development programmes, creating a "jigsaw puzzle of parts and subassemblies produced at dedicated European sites" for joint final assembly (Airbus, n.d, p. 4). In this sense, it is already possible to highlight how Airbus' production logic required common standards, shared infrastructure, and harmonised engineering practices, embedding interoperability structurally into the company and major EU aircraft long before it became an explicit EU policy objective (Airbus SE, 2017; Airbus, 2024b)

This dual civilian–military identity means that Airbus depends on cross-border coordination: its aircraft, supply chains, and operators function across multiple national jurisdictions, pushing the company to support harmonised standards as a condition for efficient production and operation (Airbus SE, 2017; Airbus, 2024b). Another case of Airbus' push to improve EU interoperability in the aerospace sector is the Future Combat Air System (FCAS) (Airbus, 2024b). The FCAS has been described as a "system of the systems," in which different types of platforms (from manned fighter jets to drones, sensors and command systems) are designed to work together across national boundaries (Airbus, 2024b). In other words, this means that the participating MSs' air forces will not only operate similar aircraft, but will also rely on shared data links, coordinated decision-making tools and common situational awareness (Airbus, 2024b).

The FCAS project has been described as a crucial step forward in achieving EU interoperability, aiming to reach full collaborative combat by 2040 (Airbus, 2024a).

Taken together, Airbus' major industrial programmes, from its early aircraft productions to emerging defence systems, exemplify a consistent strategic orientation toward integration across Member States. Figure 5 shows how firms with higher civilian–military production ratios (Airbus being the prime example) tend to be more integrated at the European level, which helps explain why the company acts as an interoperability driver.

Case	Degree of European integration	Reputed level of civilian production	Actual level of civilian production
Leonardo	Weak	Weak	Intermediate
BAe Systems	Weak	Weak	Weak
Thales	Intermediate	Intermediate	Intermediate
Airbus	Strong	Strong	Strong

Figure 5: The effect of civilian-military production rations upon firms' levels of European integration (Faure et al., 2019, p. 146)

From these examples, it is possible to understand why Airbus has often pushed for interoperability in the EU aerospace sector, as the company acts as a dual-use integrator, operating simultaneously in the civilian and defence air sectors (UK Parliament, 2022). In this sense, Airbus operates within pre-existing frameworks that bridge civil and military aviation, which, in turn, makes harmonisation not only desirable but commercially necessary (Faure et al., 2019; Airbus, 2023). This is proven by the company's close involvement in the implementation of civil-military coordination mechanisms under the SES 2+ and SESAR initiatives (Airbus, 2023). Airbus has played an important role in the development of the improved Operational Air Traffic (iOAT) Flight Plan, which allowed military planes to be validated and processed within the civil air traffic management system (Airbus, 2023). This step was crucial in improving predictability and network management for both civilian and military airspace, highlighting the dual-use interdependencies that drive Airbus's approach.

To conclude this section, Airbus can be considered one of the EU's stronger drivers of interoperability due to its business model, which operates at the intersection of military and civilian domains (UK Parliament, 2022; Faure et al., 2019). The company has repeatedly demonstrated that industrial consolidation and dual-use technological infrastructures are powerful enablers of EU-wide interoperability (Airbus, 2024b). For these reasons, Airbus stands as a practical example of what an "interoperability champion" looks like within the EU defence landscape, and why similar mechanisms could help close the gap in the land domain.

5. Final reflections and recommendations

This research has highlighted that the EU's military air sector is less fragmented than the land domain due to two key factors: a unifying regulatory framework and stronger industrial consolidation (European Parliament and the Council of the European Union, 2024; SESAR Joint Undertaking & Vălean, 2019;

Olsson, 2021; Faure et al., 2019). The Single European Sky (SES 2+) established procedures, performance standards, and coordination mechanisms applicable to both civil and military air domains (European Parliament and the Council of the European Union, 2024).

Similarly, initiatives like Digital European Sky play a crucial role in embedding interoperability in air traffic management and system coordination across Member States, which helps reduce fragmentation and enhances harmonisation across borders (ASD, n.d; SESAR Joint Undertaking & Vălean, 2019). In this context, Airbus has emerged as a trans-European company with distributed production chains and a dual civilian–military identity, necessitating harmonised standards and cross-border coordination (Airbus, n.d.; Faure et al., 2019). Consequently, interoperability in the air domain is reinforced through legislation, industrial consolidation, and shared development efforts (European Parliament and the Council of the European Union, 2024; SESAR Joint Undertaking & Vălean, 2019; Airbus SE, 2017; Faure et al., 2019). Conversely, in the land domain, no EU legislation exists to structure or support land military movements, and procedures remain fragmented across national systems. As a result, there are no common rules or a unified regulatory framework to promote convergence or joint development (Chihaia, 2025; European Commission, 2025). Furthermore, the land domain still exhibits a higher degree of industrial fragmentation, with multiple national designs for tanks, IFVs, and artillery systems (Olsson, 2021). This research, therefore, demonstrates how regulatory harmonisation and industrial consolidation are essential to accelerate interoperability; to reduce fragmentation and bolster the EU's collective defence posture on land, this paper proposes the following policy recommendations:

a) Create an EU Armament Platform for the Land Domain: Taking inspiration from Airbus's cross-border production logic and "cooperative" business model, Member States could develop land defence equipment by employing common designs, maintenance systems and training techniques. This could be an efficient method to tackle the absence of interoperability, as it would give the MSs the possibility to develop and employ uniform defence tools. This platform could be developed for each market sector in the land domain or a single one (Burja, 2024; Airbus, n.d.).

b) Develop a "Single Land Domain Framework:" Mirroring SES 2+, this framework should harmonize standards for dual-use land enablers (such as mobility corridors), so that civilian and military actors rely on compatible procedures, drawing on the same civil-military logic that underpins the air domain's interoperability frameworks (European Parliament and the Council of the European Union, 2024).

c) Establish an EU Land System Digital Backbone: On the ghost of the Digital European Sky, the EU could build a shared digital architecture that ensures land platforms can exchange data and sensor information across borders, reducing fragmentation by forcing compatible communication standards and common interfaces and helping MSs gradually converge without buying new, identical platforms (SESAR Joint Undertaking & Vălean, 2019).

6. Conclusion

This research has revealed that interoperability in the EU air domain has progressed further than in the land domain because it developed under a shared regulatory framework and benefited from stronger industrial consolidation (the European Parliament and the Council of the European Union, 2024; SESAR Joint Undertaking & Vălean, 2019; Olsson, 2021; Faure et al., 2019). Concerning the land domain, EU-level frameworks created common procedures and performance requirements that pushed civil and military actors to operate through compatible systems (European Parliament and the Council of the European Union, 2024). These dynamics were reinforced by EU initiatives promoting shared digital infrastructures and dual-use coordination, enhancing predictability and cross-border operational coherence (SESAR Joint Undertaking & Vălean, 2019). Concerning the air domain, industrial consolidation accelerated air-sector convergence: Airbus' distributed production chains and dual-use developments rely on harmonised standards and cross-border cooperation (Airbus SE, 2017; Faure et al., 2019). Furthermore, programmes such as FCAS demonstrate how integration across national systems improves both capability and efficiency (Airbus, 2024b).

The land domain lacks an equivalent EU-level framework, resulting in less cohesive development, more fragmented procedures and the absence of common operational rules (Olsson, 2021). Its industrial landscape remains dispersed across numerous competing national designs, limiting economies of scale and complicating joint operations (Olsson, 2021).

A limitation of this study is that its findings are based on qualitative, sector-to-sector comparison rather than empirical measurement of interoperability outcomes, which means the conclusions depend on interpreting existing frameworks and industrial patterns rather than testing their causal effects. Future research should explore how emerging land domain initiatives might replicate the regulatory and industrial drivers that advanced interoperability in the air sector.

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