

AIRPORTS IN THE AGE OF DRONES: BALANCING UAS INTEGRATION AND COUNTER-DRONE SECURITY IN THE EUROPEAN AVIATION FRAMEWORK

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Abstract

The rapid expansion of unmanned aircraft systems (UAS) has fundamentally transformed the regulatory landscape of European aviation. Airports are no longer merely infrastructure supporting conventional air transport but have become central actors in facilitating UAS integration while protecting critical aviation infrastructure from drone-related threats. Recent developments, including the large-scale use of drones in the war against Ukraine and the European Commission's renewed focus on drone safety and security, have reinforced the need to reconcile these objectives within a coherent governance framework.

This paper examines how airports can perform this dual function under the evolving European legal and policy framework. It employs doctrinal legal analysis of EU aviation legislation, complemented by a governance-oriented assessment of regulatory and policy instruments concerning UAS integration and counter-UAS security. The analysis demonstrates that airports increasingly act as dual governance actors by simultaneously enabling lawful drone operations and strengthening resilience against malicious or unsafe UAS activities. It further identifies legal and institutional challenges relating to the allocation of responsibilities, multi-level coordination, and the balance between innovation and security.

The paper argues that recognising airports as dual governance actors provides a useful conceptual framework for developing more coherent European regulation that supports both the safe integration of UAS and the protection of critical aviation infrastructure.

Keywords

Unmanned aircraft systems; airport governance; aviation security; UAS integration; counter-UAS regulation.

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1. INTRODUCTION

The integration of UAS into the European aviation ecosystem has become one of the most significant regulatory and operational challenges facing contemporary aviation law¹. Unlike previous technological developments in civil aviation, UAS deployment affects not only aircraft operations but also the governance structures responsible for managing airspace, airport infrastructure, and aviation security. The rapid expansion of commercial, governmental, and recreational drone activities has transformed unmanned aviation from a niche sector into an essential component of the broader aviation system².

European regulatory policy has largely approached this development through the objective of safe integration. Since the adoption of the European Union's harmonised drone framework in 2019, substantial efforts have been devoted to creating operational categories, establishing certification requirements³, and developing the U-space concept as a foundation for future traffic management involving both manned and unmanned aircraft⁴. The strategic vision outlined in the European Commission's Drone Strategy 2.0 further confirms the Union's commitment to enabling large-scale drone operations and advanced air mobility services within a safe and sustainable regulatory environment⁵.

¹ Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 and Council Regulation (EEC) No 3922/91, [2018] OJ L212/1.

² European Union Aviation Safety Agency, *Drone Strategy 2.0 Supporting Study: Mapping the Current Situation and Development of the Drone Market* (Cologne: EASA, 2022).

³ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, [2019] OJ L152/45.

⁴ Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space, [2021] OJ L139/161.

⁵ European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, COM(2022) 652 final (Brussels: European Commission, 2022).

At the same time, the increasing accessibility of drone technologies has generated new forms of risk for civil aviation. Incidents involving unauthorised drone activity near airports have repeatedly demonstrated the vulnerability of aviation infrastructure to relatively inexpensive and widely available technologies. The disruption of operations at Gatwick Airport in December 2018, which affected approximately 140,000 passengers and resulted in the cancellation or diversion of more than one thousand flights, remains one of the most significant examples of the operational consequences that can arise from drone activity in airport environments. Similar incidents reported at several European airports have reinforced concerns regarding both aviation safety and aviation security⁶.

Recent geopolitical developments have further transformed the legal and policy debate surrounding drone governance. The large-scale use of drones during the ongoing war against Ukraine has demonstrated that unmanned aircraft are no longer merely tools for commercial innovation or recreational use. They can also serve as instruments capable of threatening critical infrastructure, including airports and other aviation-related facilities. Although most European airport drone incidents have historically been associated with unauthorised or negligent operations, the experience of Ukraine has highlighted the possibility of deliberate and coordinated attacks involving unmanned technologies⁷. Consequently, drone governance can no longer be understood exclusively through the lens of aviation safety; it must increasingly be analysed within a broader framework encompassing resilience, security, and critical infrastructure protection⁸.

This evolution has generated a fundamental governance challenge for airports. Traditionally, airports have been understood primarily as infrastructure providers responsible for facilitating aircraft operations, ensuring compliance with safety requirements, and supporting efficient air transport services. The emergence of unmanned aviation requires airports to assume additional responsibilities that extend beyond their conventional functions⁹. On the one hand, airports are expected to support the gradual integration of UAS operations through participation in U-space services, digital traffic management systems, infrastructure adaptation, and operational coordination¹⁰. On the other hand, they are simultaneously expected to detect, assess, and respond to drone-related threats that may compromise safety, security, or operational continuity¹¹.

The coexistence of these objectives creates a complex regulatory environment. Measures designed to facilitate drone integration may increase operational exposure to security risks, while

⁶ UK Airprox Board, *Reports concerning the Gatwick Airport Drone Disruption* (December 2018).

⁷ Scott Sullivan and Iben Ricket, "Targeting in the Black Box" in Claire Kwan, Lauri Lindström, Davide Giovannelli, Kārlis Podiņš and Damjan Štrucl, eds, *CyCon 2024: Over the Horizon: 16th International Conference on Cyber Conflict* (Tallinn: NATO Cooperative Cyber Defence Centre of Excellence, 2024) 207–220.

⁸ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

⁹ Commission Implementing Regulation (EU) 2021/664, *supra* note 4.

¹⁰ SESAR Joint Undertaking, *U-space Blueprint* (Luxembourg: Publications Office of the European Union, 2020).

¹¹ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

overly restrictive security responses may hinder technological innovation and delay the implementation of emerging drone services¹². As a result, airports increasingly occupy a position at the intersection of two regulatory paradigms: integration and protection.

This paper argues that contemporary airports should be understood as dual governance actors within the evolving European drone governance framework. Their role extends beyond the traditional provision of airport infrastructure and encompasses both the facilitation of lawful UAS operations and the protection of critical aviation infrastructure against drone-related threats.

The central research question addressed in this study is therefore: how can airports effectively perform their dual role of facilitating UAS integration while ensuring protection against drone-related threats under the European legal and policy framework?

2. AIRPORT UAS-READINESS AND THE EVOLUTION OF AIRPORT FUNCTIONS

The integration of unmanned aircraft systems into civil aviation requires more than the adoption of technical standards or operational procedures. It also necessitates a fundamental reassessment of the role of airports within the aviation ecosystem. While much of the current regulatory debate focuses on airspace integration, certification requirements, or U-space services, airports remain the primary physical interface between manned and unmanned aviation¹³. Consequently, their capacity to accommodate new forms of air operations while maintaining acceptable levels of safety and security has become a central element of contemporary drone governance¹⁴.

Traditionally, airports have been understood as critical infrastructure supporting the operation of manned aviation. Their legal responsibilities have largely focused on facilitating air transport, ensuring compliance with safety standards, protecting aviation security, and coordinating with air navigation service providers and public authorities¹⁵. Within this framework, airport governance evolved around a relatively stable operational environment characterised by identifiable aircraft, licensed flight crews, established traffic management procedures, and clearly allocated institutional responsibilities.

The emergence of UAS challenges many of these assumptions. Unlike conventional aircraft, drones may operate at different altitudes, employ varying levels of automation, and be controlled

¹² European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, supra note 5.

¹³ SESAR Joint Undertaking, *U-space Blueprint* (Luxembourg: Publications Office of the European Union, 2020), supra note 10.

¹⁴ International Civil Aviation Organization, *Manual on Remotely Piloted Aircraft Systems (RPAS)*, Doc 10019, 1st ed (Montréal: ICAO, 2015).

¹⁵ Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 and Council Regulation (EEC) No 3922/91, [2018] OJ L212/1.

remotely or through increasingly autonomous systems¹⁶. Furthermore, drone operations are no longer limited to traditional aviation stakeholders. Commercial operators, logistics companies, infrastructure managers, emergency services, and private individuals have all become potential participants in the airspace environment¹⁷. As a result, airports must increasingly interact with actors, technologies, and operational models that were largely absent from the traditional aviation system.

This transformation creates a need for what may be described as airport UAS-readiness¹⁸. For the purposes of this paper, airport UAS-readiness refers to the legal, institutional, and operational capacity of an airport to facilitate the safe integration of unmanned aircraft operations while simultaneously maintaining effective protection against drone-related risks and threats¹⁹. The concept moves beyond purely technical preparedness and emphasises the broader governance arrangements necessary to support the coexistence of manned and unmanned aviation.

Three dimensions of airport UAS-readiness may be identified.

First, legal readiness concerns the existence of a coherent regulatory framework defining the rights, obligations, and responsibilities of relevant stakeholders. Airports must operate within a legal environment that clarifies the interaction between airport operators, UAS operators, air navigation service providers, aviation authorities, and security agencies. Legal readiness also requires clear rules concerning liability, data governance, privacy protection, and the deployment of counter-UAS technologies²⁰. Without sufficient legal certainty, airport operators may face significant difficulties when attempting either to facilitate legitimate drone operations or to respond to unlawful activities.

Second, institutional readiness relates to governance structures and coordination mechanisms. Drone operations often involve a wider range of actors than conventional aviation activities, including civil aviation authorities, law enforcement agencies, military authorities, U-space service providers, and private operators²¹. Effective governance therefore depends on the ability of airports to function within multi-layered institutional networks. The fragmentation of responsibilities remains one of the most significant challenges facing European drone governance²², particularly in situations where operational decisions must be taken rapidly in response to emerging threats.

¹⁶ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, [2019] OJ L152/45.

¹⁷ SESAR Joint Undertaking, *U-space Blueprint* (Luxembourg: Publications Office of the European Union, 2020), supra note 10.

¹⁸ European Union Aviation Safety Agency, *Study on the Societal Acceptance of Urban Air Mobility in Europe* (Cologne: EASA, 2021).

¹⁹ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

²⁰ Pablo Mendes de Leon and Niels van der Bueren, "Liability and Insurance Issues in the Operation of Unmanned Aircraft Systems" (2016) 41:2 *Air and Space Law* 125.

²¹ Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space, [2021] OJ L139/161.

²² European Commission, *Commission Staff Working Document Accompanying the Communication "A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe"*, SWD(2022) 366 final (Brussels: European Commission, 2022).

Third, operational readiness concerns the practical capacity of airports to manage the coexistence of manned and unmanned aviation. This includes technological capabilities, situational awareness systems, emergency procedures, personnel training, and infrastructure adaptation²³. Importantly, operational readiness cannot be reduced to the implementation of U-space services alone²⁴. Airports must also be capable of detecting unauthorised drone activities, assessing risks, and implementing proportionate response measures that minimise disruption to aviation operations²⁵.

The concept of airport UAS-readiness is particularly relevant in the context of mixed-traffic airports. While future developments may eventually lead to specialised facilities dedicated primarily to unmanned aviation, the current European reality is characterised by the coexistence of manned and unmanned aircraft within shared operational environments²⁶. It is within these mixed-traffic settings that the most complex legal and governance questions emerge. Airports are required simultaneously to promote innovation and preserve resilience, support technological development and protect critical infrastructure, facilitate access to airspace and manage emerging security threats²⁷.

From a governance perspective, this coexistence reflects a broader transition occurring within European aviation policy. Early regulatory responses to drones were largely reactive, focusing on preventing accidents and mitigating safety risks associated with unauthorised operations²⁸. More recent initiatives have increasingly emphasised integration, recognising the economic and societal benefits that drone technologies may generate²⁹. However, recent security developments demonstrate that integration and protection cannot be treated as separate regulatory objectives. Rather, they represent interconnected dimensions of a single governance challenge³⁰.

Accordingly, airport UAS-readiness should not be understood merely as a measure of technological preparedness. Instead, it represents a broader model of institutional adaptation through which airports acquire the capacity to manage the opportunities and risks associated with unmanned

²³ International Civil Aviation Organization, *Manual on Remotely Piloted Aircraft Systems (RPAS)*, Doc 10019, 1st ed (Montréal: ICAO, 2015).

²⁴ Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space, [2021] OJ L139/161.

²⁵ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

²⁶ SESAR Joint Undertaking, *CORUS U-space Concept of Operations (ConOps)* (Brussels: SESAR Joint Undertaking, 2019).

²⁷ European Union Aviation Safety Agency, *Study on the Societal Acceptance of Urban Air Mobility in Europe* (Cologne: EASA, 2021); Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

²⁸ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, [2019] OJ L152/45.

²⁹ European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, COM(2022) 652 final (Brussels: European Commission, 2022).

³⁰ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023); Scott Sullivan and Iben Ricket, "Targeting in the Black Box" in Claire Kwan, Lauri Lindström, Davide Giovannelli, Kārlis Podiņš and Damjan Štrucl, eds, *CyCon 2024: Over the Horizon: 16th International Conference on Cyber Conflict* (Tallinn: NATO Cooperative Cyber Defence Centre of Excellence, 2024) 207–220.

aviation³¹. The effectiveness of future drone governance will therefore depend not only on the development of advanced regulatory frameworks but also on the ability of airports to function as resilient governance actors capable of balancing innovation, safety, and security within increasingly complex operational environments³².

The following section examines how the European legal framework has sought to address this challenge by simultaneously promoting UAS integration and strengthening measures aimed at protecting critical aviation infrastructure from drone-related threats.

3. THE EUROPEAN LEGAL FRAMEWORK FOR UAS INTEGRATION AND COUNTER-UAS SECURITY

The European Union's approach to unmanned aircraft governance has evolved considerably over the past decade. Initially, regulatory efforts focused primarily on facilitating the safe integration of drones into civil aviation through harmonised operational and technical requirements³³. More recently, however, growing concerns regarding airport disruptions, critical infrastructure protection, and malicious drone activities have prompted the emergence of a complementary security-oriented regulatory agenda³⁴. As a result, the contemporary European framework is increasingly characterised by the coexistence of two interconnected regulatory objectives: enabling UAS operations and protecting society against UAS-related threats³⁵.

From a legal perspective, this duality is reflected in the structure of the European regulatory framework itself. The rules governing drone integration were largely developed within the traditional domain of aviation safety³⁶, whereas counter-UAS measures emerged from broader security and

³¹ European Union Aviation Safety Agency, *Drone Strategy 2.0 Supporting Study: Mapping the Current Situation and Development of the Drone Market* (Cologne: EASA, 2022).

³² European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, COM(2022) 652 final (Brussels: European Commission, 2022); Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

³³ Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 and Council Regulation (EEC) No 3922/91, [2018] OJ L212/1; European Union Aviation Safety Agency, *Easy Access Rules for Unmanned Aircraft Systems (Regulations (EU) 2019/947 and 2019/945): Revision from July 2024* (Cologne: EASA, 2024).

³⁴ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

³⁵ European Commission, *Commission Staff Working Document Accompanying the Communication "A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe"*, SWD(2022) 366 final (Brussels: European Commission, 2022).

³⁶ Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, [2019] OJ L152/1.

critical infrastructure protection policies³⁷. Although these frameworks originated separately, their practical implementation increasingly converges at airport level.

3.1 UAS Integration as a Regulatory Objective

The foundation of the European drone regime was established through Regulation (EU) 2018/1139, commonly referred to as the Basic Regulation³⁸. By extending the competence of the EASA to unmanned aircraft systems, the Regulation created the legal basis for a harmonised European approach to drone operations³⁹. The underlying regulatory philosophy was clear: drones should become an integrated component of the European aviation system rather than remain subject to fragmented national regulation.

This objective was further developed through Commission Implementing Regulation (EU) 2019/947 and Commission Delegated Regulation (EU) 2019/945⁴⁰. Together, these instruments introduced a risk-based regulatory model⁴¹ that departed from traditional aircraft certification approaches. Instead of regulating unmanned aircraft solely according to their technical characteristics, the European framework primarily focuses on operational risk, distinguishing between the Open, Specific and Certified categories⁴².

From the perspective of airport governance, the significance of this approach extends beyond technical compliance. The risk-based model reflects a broader policy assumption that unmanned aviation should coexist with conventional aviation within a common regulatory environment⁴³. Airports are therefore no longer merely locations where drone operations must be restricted; they increasingly constitute environments in which lawful UAS activities may be accommodated under defined operational conditions⁴⁴.

The development of the U-space framework further illustrates this transition. Regulation (EU) 2021/664⁴⁵ and its associated implementing measures seek to establish a digital environment capable

³⁷ Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC, [2022] OJ L333/164; Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

³⁸ Regulation (EU) 2018/1139, *supra* note 1.

³⁹ European Union Aviation Safety Agency, *Easy Access Rules for Unmanned Aircraft Systems (Regulations (EU) 2019/947 and 2019/945): Revision from July 2024* (Cologne: EASA, 2024).

⁴⁰ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, [2019] OJ L152/45; Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, [2019] OJ L152/1.

⁴¹ Mariana Freitas and Ruwantissa Abeyratne, *Unmanned Aircraft Systems (UAS): Regulation, Risk and Liability* (Cham: Springer, 2020).

⁴² European Union Aviation Safety Agency, *Easy Access Rules for Unmanned Aircraft Systems (Regulations (EU) 2019/947 and 2019/945): Revision from July 2024* (Cologne: EASA, 2024).

⁴³ European Union Aviation Safety Agency, *Drone Strategy 2.0 Supporting Study: Mapping the Current Situation and Development of the Drone Market* (Cologne: EASA, 2022).

⁴⁴ European Union Aviation Safety Agency, *Drone Incident Management at Aerodromes: Part 1 – The Challenge of Unauthorised Drones in the Surroundings of Aerodromes* (Cologne: EASA, 2021).

⁴⁵ Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space, [2021] OJ L139/161.

of supporting large-scale UAS operations through services such as network identification, traffic information, strategic deconfliction and dynamic airspace management⁴⁶. The regulatory objective is not simply to permit drone operations but to create the institutional and technological conditions necessary for their routine integration into European airspace.

Importantly, U-space also represents a significant shift in the legal understanding of airport operations. Traditional airport governance developed around relatively predictable interactions between identifiable aviation actors⁴⁷. By contrast, U-space anticipates an operational environment characterised by a substantially larger number of users, increased automation, and continuous data exchange among multiple stakeholders⁴⁸. Consequently, airports must adapt not only their infrastructure but also their governance structures to accommodate these emerging realities.

3.2 The Emergence of Counter-UAS Security Regulation

While integration remains a central objective of European drone policy, recent developments demonstrate that safety considerations alone are insufficient to address the full spectrum of risks associated with unmanned aviation⁴⁹.

The Gatwick incident of 2018⁵⁰ exposed the vulnerability of airport operations to unauthorised drone activity and revealed significant uncertainties regarding institutional responsibilities, response procedures and operational resilience⁵¹. Although the incident did not involve a deliberate attack against aviation infrastructure, it demonstrated that relatively simple drone-related events could generate substantial economic and operational consequences⁵².

Subsequent policy developments increasingly reflected concerns extending beyond aviation safety. The European Commission's Drone Strategy 2.0⁵³ expressly acknowledges the need to balance innovation with security considerations⁵⁴. Similarly, the Council of the European Union's Strategy on Countering Threats Posed by Unmanned Aircraft Systems recognises drones as potential instruments of criminal activity, terrorism, espionage and hybrid threats⁵⁵.

⁴⁶ SESAR Joint Undertaking, *CORUS U-space Concept of Operations (ConOps)* (Brussels: SESAR Joint Undertaking, 2019); International Civil Aviation Organization, *Unmanned Aircraft Systems (UAS) Concept of Operations (CONOPS)*, 1st ed (Montréal: ICAO, March 2023).

⁴⁷ International Civil Aviation Organization, *Manual on Remotely Piloted Aircraft Systems (RPAS)*, Doc 10019, 1st ed (Montréal: ICAO, 2015).

⁴⁸ SESAR Joint Undertaking, *U-space Blueprint* (Luxembourg: Publications Office of the European Union, 2020).

⁴⁹ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

⁵⁰ UK Airprox Board, *Reports concerning the Gatwick Airport Drone Disruption* (December 2018).

⁵¹ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁵² European Union Aviation Safety Agency, *Drone Incident Management at Aerodromes* (Cologne: EASA, 2021).

⁵³ European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, COM(2022) 652 final (Brussels: European Commission, 2022).

⁵⁴ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

⁵⁵ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

The emergence of this security-oriented framework is particularly significant because it introduces actors and regulatory considerations traditionally located outside aviation law. Law enforcement agencies, defence authorities, intelligence services and critical infrastructure operators have become increasingly involved in drone governance⁵⁶. As a result, the governance landscape surrounding airports has become substantially more complex⁵⁷.

Unlike the aviation safety framework, which is largely harmonised at European level, counter-UAS regulation remains characterised by considerable national variation⁵⁸. Member States differ with regard to the authorities empowered to deploy counter-drone technologies, the legal thresholds for intervention, and the permissible use of mitigation measures⁵⁹. This fragmentation creates challenges for airports operating within an increasingly integrated European aviation system⁶⁰.

3.3 Regulatory Convergence at Airport Level

Although UAS integration and counter-UAS security emerged from distinct regulatory traditions, their practical implementation converges within the airport environment. Airports simultaneously function as operational gateways for legitimate drone activities and as potential targets of unlawful or malicious drone use⁶¹.

This convergence exposes a fundamental limitation of analysing integration and security as separate regulatory domains. Measures designed to facilitate greater access to airspace may increase the complexity of threat detection and risk assessment⁶². Conversely, overly restrictive security measures may undermine the policy objective of fostering innovation and supporting the development of new aviation services⁶³.

The challenge facing airports is therefore not merely compliance with individual legal instruments. Rather, it involves navigating the interaction between two regulatory systems pursuing potentially competing objectives⁶⁴. In this context, the effectiveness of airport governance

⁵⁶ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁵⁷ Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC, [2022] OJ L333/164.

⁵⁸ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

⁵⁹ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁶⁰ European Union Aviation Safety Agency, *Drone Incident Management at Aerodromes: Part 1 – The Challenge of Unauthorised Drones in the Surroundings of Aerodromes* (Cologne: EASA, 2021).

⁶¹ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁶² SESAR Joint Undertaking, *CORUS U-space Concept of Operations (ConOps)* (Brussels: SESAR Joint Undertaking, 2019).

⁶³ European Commission, *Commission Staff Working Document Accompanying the Communication "A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe"*, SWD(2022) 366 final (Brussels: European Commission, 2022).

⁶⁴ Directive (EU) 2022/2557, [2022] OJ L333/164; Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

increasingly depends upon the ability to reconcile operational integration with infrastructure protection⁶⁵.

The European legal framework provides important foundations for both objectives, yet it does not fully resolve the institutional tensions arising from their coexistence. Consequently, airports occupy a unique position within the evolving drone governance architecture. They are not passive recipients of regulatory obligations but active participants in the implementation and balancing of European drone policy⁶⁶.

This observation provides the basis for the argument advanced in the following section: that airports should be understood as dual governance actors performing both integration and protection functions within the contemporary European aviation framework.

4. AIRPORTS AS DUAL GOVERNANCE ACTORS

The evolution of European drone regulation demonstrates that airports can no longer be regarded merely as passive infrastructure providers or operational environments subject to external regulation. As the coexistence of manned and unmanned aviation becomes an increasingly permanent feature of the aviation ecosystem, airports assume a more complex role⁶⁷. They are expected not only to accommodate lawful UAS operations and support emerging traffic management systems but also to protect aviation infrastructure against unsafe, unlawful, or malicious drone activities⁶⁸. These functions, although interconnected, originate from different regulatory logics and involve distinct institutional actors.

Traditionally, airport governance focused on ensuring the safe and efficient movement of passengers, cargo, and aircraft⁶⁹. The emergence of unmanned aviation has altered this paradigm by introducing new technological, operational, and security dimensions extending beyond conventional airport management. Airports are increasingly required to participate in digital traffic management, maintain situational awareness regarding drone activities, and cooperate with aviation authorities, law

⁶⁵ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁶⁶ European Union Aviation Safety Agency, *Drone Strategy 2.0 Supporting Study: Mapping the Current Situation and Development of the Drone Market* (Cologne: EASA, 2022).

⁶⁷ European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, COM(2022) 652 final (Brussels: European Commission, 2022).

⁶⁸ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

⁶⁹ Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 and Council Regulation (EEC) No 3922/91, [2018] OJ L212/1.

enforcement bodies, security agencies, and U-space service providers⁷⁰. Consequently, airports have become central nodes within the broader architecture of European drone governance.

This paper argues that airports should be understood as dual governance actors. Their role encompasses two complementary functions. First, airports perform an integration function by facilitating the incorporation of unmanned aircraft into the aviation ecosystem and supporting the development of mixed-traffic operations⁷¹. Secondly, airports perform a protection function aimed at preserving safety, operational continuity, and the resilience of critical aviation infrastructure against drone-related threats⁷². Effective performance of these functions requires legal certainty, institutional coordination, and clearly allocated responsibilities⁷³. However, the simultaneous pursuit of integration and protection objectives generates significant governance challenges that remain only partially addressed within the current European framework⁷⁴.

4.1. Airports as Facilitators of UAS Integration

From the perspective of European aviation policy, airports represent one of the principal interfaces between conventional aviation and the emerging unmanned ecosystem. The successful integration of UAS operations depends not only on harmonised regulations and technological standards but also on the ability of airports to adapt their infrastructure, operational procedures, and governance arrangements to accommodate new categories of airspace users⁷⁵.

The implementation of U-space services illustrates this evolving role. Airports increasingly participate in digital traffic management environments designed to ensure the safe coexistence of manned and unmanned aircraft. Their responsibilities extend beyond the traditional coordination of aircraft movements and include interaction with U-space service providers, air navigation service providers, competent authorities, and UAS operators. In mixed-traffic environments, airports function as operational coordinators responsible for ensuring that drone activities do not adversely affect conventional aviation operations.

At the same time, airports are expected to facilitate the deployment of drone-enabled services. Unmanned aircraft may support infrastructure inspections, wildlife control, emergency response, perimeter surveillance, cargo transport, and eventually advanced air mobility operations⁷⁶. These

⁷⁰ Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space, [2021] OJ L139/161.

⁷¹ SESAR Joint Undertaking, *U-space Blueprint* (Luxembourg: Publications Office of the European Union, 2020).

⁷² Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC, [2022] OJ L333/164.

⁷³ European Commission, *Commission Staff Working Document Accompanying the Communication "A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe"*, SWD(2022) 366 final (Brussels: European Commission, 2022).

⁷⁴ European Union Aviation Safety Agency, *Drone Strategy 2.0 Supporting Study: Mapping the Current Situation and Development of the Drone Market* (Cologne: EASA, 2022).

⁷⁵ SESAR Joint Undertaking, *U-space Blueprint* (Luxembourg: Publications Office of the European Union, 2020).

⁷⁶ European Union Aviation Safety Agency, *Study on the Societal Acceptance of Urban Air Mobility in Europe* (Cologne: EASA, 2021).

activities require airports to provide not only physical infrastructure but also institutional arrangements capable of supporting safe and efficient UAS operations.

The concept of airport UAS-readiness reflects this transformation. Legal readiness ensures that airports operate within coherent regulatory frameworks. Institutional readiness enables cooperation among multiple stakeholders, while operational readiness provides the practical capabilities necessary to manage mixed-traffic environments. Together, these dimensions position airports as active enablers of innovation rather than merely subject of regulation⁷⁷.

The integration function therefore extends beyond traditional airport management. Airports increasingly participate in shaping the conditions under which unmanned aviation develops. Their role resembles that of governance platforms through which various actors coordinate operational, technological, and regulatory activities. In this sense, airports become facilitators of the broader transition towards a digitally interconnected aviation ecosystem⁷⁸.

4.2. Airports as Protectors of Critical Aviation Infrastructure

Alongside their integration function, airports perform an equally important protective role. The growing accessibility of drone technologies has transformed unmanned aircraft into potential sources of safety hazards, operational disruptions, criminal activities, and hybrid threats. Airports, as critical infrastructure, occupy a particularly vulnerable position within this risk landscape⁷⁹.

The Gatwick disruption in 2018⁸⁰ demonstrated how unauthorised drone activity can paralyse airport operations and generate significant economic losses despite the absence of physical damage. More recent geopolitical developments, particularly the experience of Ukraine, have revealed that drones may also be employed deliberately against aviation infrastructure⁸¹. Consequently, airport resilience has become inseparable from drone governance.

Within this context, airport operators increasingly act as the first line of defence against drone-related threats. Their responsibilities include maintaining situational awareness, identifying suspicious activities, coordinating emergency procedures, and ensuring operational continuity. Yet, unlike law enforcement agencies or military authorities, airports often possess limited legal powers

⁷⁷ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, [2019] OJ L152/45; Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, [2019] OJ L152/1.

⁷⁸ European Union Aviation Safety Agency, *Easy Access Rules for Unmanned Aircraft Systems (Regulations (EU) 2019/947 and 2019/945): Revision from July 2024* (Cologne: EASA, 2024).

⁷⁹ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁸⁰ UK Airprox Board, *Reports concerning the Gatwick Airport Drone Disruption* (December 2018).

⁸¹ Scott Sullivan and Iben Ricket, "Targeting in the Black Box" in Claire Kwan, Lauri Lindström, Davide Giovannelli, Kārlis Podiņš and Damjan Štrucl, eds, *CyCon 2024: Over the Horizon: 16th International Conference on Cyber Conflict* (Tallinn: NATO Cooperative Cyber Defence Centre of Excellence, 2024) 207–220.

to neutralise hostile drones. This creates a paradox: airport operators bear substantial responsibility for maintaining safety and continuity while lacking corresponding enforcement competences⁸².

Protection against drone threats requires cooperation among multiple actors. Civil aviation authorities, police forces, intelligence services, military authorities, and private security providers may all participate in counter-UAS activities. Airports thus become centres of coordination where operational decisions must be taken under conditions of uncertainty and time pressure⁸³.

Moreover, the protective function extends beyond immediate response measures. Airports are increasingly expected to incorporate resilience considerations into infrastructure planning, risk management, cybersecurity, and emergency preparedness. In this sense, drone governance becomes part of a broader framework of critical infrastructure protection rather than a narrowly defined aviation safety issue⁸⁴.

Consequently, airports should not be viewed merely as potential victims of drone incidents. They are active participants in the security architecture responsible for ensuring the resilience of aviation systems against both accidental and intentional threats.

4.3. Coordination Challenges in Multi-Level Drone Governance

The coexistence of integration and protection functions generates significant coordination challenges. Drone governance involves a complex network of actors operating at international, European, national, and local levels. Responsibilities are dispersed among civil aviation authorities, airport operators⁸⁵, U-space service providers, air navigation service providers, law enforcement agencies, military authorities, and private operators.

Although the European Union has established harmonised rules for UAS operations, counter-UAS powers remain largely within the competence of Member States. As a result, considerable differences persist regarding the authorities empowered to intervene against unlawful drones, the technologies that may be employed, and the conditions under which mitigation measures can be implemented.

This fragmentation creates uncertainty for airport operators. In emergency situations, rapid decisions are required, yet institutional responsibilities may overlap or remain insufficiently defined. The absence of harmonised allocation of competences may delay responses and compromise operational continuity.

⁸² European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁸³ International Civil Aviation Organization, *Manual on Remotely Piloted Aircraft Systems (RPAS)*, Doc 10019, 1st ed (Montréal: ICAO, 2015).

⁸⁴ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

⁸⁵ European Union Aviation Safety Agency, *Drone Incident Management at Aerodromes: Part 1 – The Challenge of Unauthorised Drones in the Surroundings of Aerodromes* (Cologne: EASA, 2021), online: https://www.easa.europa.eu/sites/default/files/dfu/drone_incident_management_at_aerodromes_part1_website_sui_table.pdf

Another challenge concerns information sharing. Effective drone governance depends on timely access to data and close cooperation between civilian and security actors. However, information relevant to threat assessments may involve classified intelligence, cybersecurity considerations, or law enforcement investigations. Balancing confidentiality requirements with the need for operational awareness remains a significant governance problem⁸⁶.

Coordination difficulties also arise because integration and protection are based on different regulatory philosophies. Integration policies emphasise openness, innovation, and access to airspace, whereas security policies prioritise control, restrictions, and risk mitigation⁸⁷. Airports occupy the intersection of these competing paradigms and are expected to reconcile them in practice.

Therefore, the effectiveness of airport governance depends less on the existence of individual legal instruments than on the establishment of mechanisms capable of ensuring institutional cooperation and coherent decision-making. Multi-level coordination should be regarded as an essential component of airport UAS-readiness.

4.4. Liability and Accountability in the Context of Dual Functions

The dual role of airports also raises important questions concerning liability and accountability. Traditional aviation law developed within an environment characterised by clearly identifiable actors and relatively stable allocations of responsibility⁸⁸. Drone governance, by contrast, introduces new stakeholders and more fragmented institutional arrangements.

From the perspective of integration, questions arise concerning liability for accidents involving UAS operations conducted in or around airports. Responsibility may potentially be shared among UAS operators, manufacturers, software providers, U-space service providers, air navigation service providers, and airport operators. The increasing automation of drone operations further complicates the attribution of responsibility⁸⁹.

Protection functions create additional challenges. Airport operators are responsible for maintaining safety and operational continuity, yet they often lack authority to deploy counter-UAS measures independently. If operational disruptions occur because competent authorities fail to intervene in time, questions emerge regarding the allocation of responsibility between airports and public authorities⁹⁰.

⁸⁶ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁸⁷ European Commission, *Commission Staff Working Document Accompanying the Communication "A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe"*, SWD(2022) 366 final (Brussels: European Commission, 2022).

⁸⁸ Pablo Mendes de Leon and Niels van der Bueren, "Liability and Insurance Issues in the Operation of Unmanned Aircraft Systems" (2016) 41:2 *Air and Space Law* 125.

⁸⁹ European Parliament, *Civil Liability Regime for Artificial Intelligence and Emerging Digital Technologies* (Brussels: European Parliament, 2020).

⁹⁰ Mariana Freitas and Ruwantissa Abeyratne, *Unmanned Aircraft Systems (UAS): Regulation, Risk and Liability* (Cham: Springer, 2020).

Similarly, the use of counter-UAS technologies may itself create liability risks. Signal jamming, interception, or kinetic mitigation measures may affect communications systems, interfere with lawful operations, or cause physical damage. Determining who bears responsibility for such consequences remains legally uncertain in many jurisdictions⁹¹.

These issues reveal a broader governance problem. Airports increasingly bear responsibilities extending beyond their traditional functions, while legal frameworks do not always provide corresponding powers or clarify the distribution of accountability. The imbalance between responsibilities and competences may create legal uncertainty and undermine effective risk management⁹².

Accordingly, future European drone governance should address not only technical standards and operational requirements but also the allocation of legal responsibilities among relevant actors. Clear accountability mechanisms are indispensable for ensuring both legal certainty and institutional resilience⁹³.

The analysis demonstrates that airports occupy a unique position within the evolving European drone ecosystem. They simultaneously facilitate innovation and safeguard critical infrastructure, thereby performing functions traditionally associated with different regulatory domains. Understanding airports as dual governance actors provides a conceptual framework capable of explaining the growing complexity of airport responsibilities and highlights the need for more integrated approaches to drone governance. This perspective also provides the foundation for assessing how recent security developments, particularly lessons emerging from the war in Ukraine, may influence the future evolution of airport governance in Europe.

5. LESSONS FROM UKRAINE AND THE FUTURE OF AIRPORT UAS GOVERNANCE

Recent developments associated with the large-scale use of unmanned aircraft in the war against Ukraine have fundamentally altered perceptions of drone-related risks. Whereas European drone governance has traditionally focused on safety concerns and the prevention of accidental disruptions, contemporary conflicts demonstrate that unmanned aircraft may also constitute instruments of deliberate attacks against critical infrastructure. These developments challenge existing assumptions underlying airport governance and require a broader understanding of resilience and preparedness within the European aviation framework.

5.1. The Transformation of Drone Risks in Modern Conflicts

⁹¹ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

⁹² Pablo Mendes de Leon and Niels van der Bueren, "Liability and Insurance Issues in the Operation of Unmanned Aircraft Systems" (2016) 41:2 *Air and Space Law* 125.

⁹³ European Parliament, *Civil Liability Regime for Artificial Intelligence and Emerging Digital Technologies* (Brussels: European Parliament, 2020).

Prior to recent geopolitical developments, most drone-related incidents affecting airports in Europe were associated with unauthorised operations, negligent conduct, or recreational misuse. The principal objective of regulators was therefore to minimise safety risks and prevent disruptions to aviation operations. Incidents such as the 2018 Gatwick disruption illustrated the operational consequences of drone activity but did not fundamentally challenge the prevailing perception of drones as primarily civilian technologies⁹⁴.

The war against Ukraine has transformed this understanding. Unmanned aircraft have become essential components of modern warfare, capable of performing reconnaissance, surveillance, electronic warfare, and strike missions⁹⁵. More importantly, they have demonstrated their ability to target critical infrastructure, including energy facilities, transportation networks, and logistics hubs. These developments reveal that drones should no longer be viewed exclusively through the traditional categories of aviation safety or security. Instead, they represent elements of hybrid threats⁹⁶ capable of affecting civilian infrastructure even far from active combat zones.

Although most European airports are not exposed to the same operational realities as Ukrainian infrastructure, the experience of Ukraine demonstrates that threats involving unmanned aircraft may evolve rapidly and unpredictably. Technologies initially developed for civilian applications may be adapted for malicious purposes, while commercially available systems may acquire strategic significance. Consequently, the distinction between safety risks and security threats becomes increasingly blurred⁹⁷.

This transformation necessitates a shift from reactive approaches focused on isolated incidents towards broader models of resilience capable of addressing low-probability but high-impact events⁹⁸.

5.2. Resilience and Preparedness as New Regulatory Priorities

The changing nature of drone threats requires airports to adopt a more comprehensive understanding of resilience. Traditionally, aviation regulation concentrated on safety management and accident prevention. However, contemporary challenges demonstrate that maintaining operational continuity in the face of intentional disruptions has become equally important⁹⁹.

⁹⁴ UK Airprox Board, *Reports concerning the Gatwick Airport Drone Disruption* (December 2018).

⁹⁵ Scott Sullivan and Iben Ricket, "Targeting in the Black Box" in Claire Kwan, Lauri Lindström, Davide Giovannelli, Kārlis Podiņš and Damjan Štrucl, eds, *CyCon 2024: Over the Horizon: 16th International Conference on Cyber Conflict* (Tallinn: NATO Cooperative Cyber Defence Centre of Excellence, 2024) 207–220.

⁹⁶ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

⁹⁷ Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

⁹⁸ Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC, [2022] OJ L333/164.

⁹⁹ Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC, [2022] OJ L333/164.

Resilience in the context of airport drone governance refers to the ability of airports to anticipate, withstand, respond to, and recover from drone-related incidents while maintaining essential operational functions¹⁰⁰. Such resilience extends beyond technological solutions and encompasses institutional preparedness, emergency planning, coordination mechanisms, and adaptive governance structures.

Preparedness therefore becomes a central element of airport UAS-readiness. Airports should possess not only the capability to detect unauthorised drones but also predefined procedures enabling rapid cooperation with aviation authorities, law enforcement agencies, military structures, and emergency services¹⁰¹. Crisis management frameworks should address both accidental incursions and deliberate attacks.

The experience of Ukraine demonstrates the importance of flexibility and institutional adaptability. Threat environments may evolve faster than formal regulatory processes, making it essential for governance structures to incorporate mechanisms allowing continuous reassessment of risks and operational responses. Consequently, legal preparedness should complement technological preparedness.

Furthermore, resilience should not be interpreted solely as the ability to prevent incidents. Complete elimination of risks may be unrealistic. Instead, resilient airports are characterised by their capacity to minimise disruptions, maintain critical functions, and restore operations efficiently following adverse events¹⁰².

These considerations suggest that resilience and preparedness should be recognised as autonomous objectives of airport governance rather than merely secondary components of aviation security.

5.3. Implications for European Airport Governance

The lessons emerging from Ukraine have important implications for the future development of European airport governance. First, they demonstrate that the traditional separation between UAS integration and counter-UAS security is becoming increasingly artificial. Airports must simultaneously promote innovation and prepare for evolving threats. Effective governance therefore requires integrated approaches capable of reconciling these objectives¹⁰³.

¹⁰⁰ European Union Agency for Cybersecurity, *Updated Good Practice Guide on National Cyber Security Strategies* (Heraklion: ENISA, 2016), online:

https://www.enisa.europa.eu/sites/default/files/publications/Updated%20Good%20Practice%20Guide%20on%20NCS_S.pdf

¹⁰¹ European Union Aviation Safety Agency, *Guidelines on Counter-Unmanned Aircraft Systems (C-UAS) for Aerodromes* (Cologne: EASA, 2023).

¹⁰² Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC, [2022] OJ L333/164.

¹⁰³ European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, COM(2022) 652 final (Brussels: European Commission, 2022).

Secondly, the growing complexity of drone risks highlights the need for stronger coordination mechanisms among civil aviation authorities, airport operators, law enforcement agencies, military structures, and U-space service providers¹⁰⁴. Fragmented institutional arrangements may prove inadequate in situations requiring rapid decision-making and coordinated responses.

Thirdly, future European policies should place greater emphasis on legal preparedness and resilience¹⁰⁵. Existing regulatory frameworks primarily focus on operational requirements and technological integration. However, the allocation of responsibilities, emergency powers, and accountability mechanisms deserves equal attention. Clear governance structures are indispensable for ensuring that airport operators possess both the responsibilities and the institutional support necessary to address emerging threats.

Finally, the Ukrainian experience demonstrates that airports should increasingly be viewed not merely as transportation infrastructure but as strategic assets whose resilience contributes to broader societal and economic stability. Their role within drone governance extends beyond facilitating air transport and encompasses the protection of critical infrastructure and the maintenance of public confidence in aviation systems.

These developments reinforce the argument advanced throughout this paper. Airports occupy a central position within the evolving European drone ecosystem and perform a dual governance function that combines the promotion of innovation with the preservation of resilience. Understanding this dual role is essential for designing future legal frameworks capable of ensuring both the safe integration of unmanned aviation and the protection of critical infrastructure in an increasingly uncertain security environment.

6. CONCLUSION

The rapid expansion of unmanned aircraft systems has transformed drone governance into one of the most dynamic areas of contemporary aviation law. While the European Union has made significant progress in establishing a harmonised framework for the safe integration of UAS operations, recent developments have demonstrated that integration alone is insufficient. Drone-related incidents, the growing vulnerability of critical infrastructure, and lessons emerging from the

¹⁰⁴ International Civil Aviation Organization, *Unmanned Aircraft Systems (UAS) Concept of Operations (CONOPS)*, 1st ed (Montréal: ICAO, March 2023), online:

https://www.icao.int/sites/default/files/SAM/eDocuments/UAS_CONOPS_2023_en.pdf.

¹⁰⁵ European Union Agency for Cybersecurity, *Updated Good Practice Guide on National Cyber Security Strategies* (Heraklion: ENISA, 2016), online:

https://www.enisa.europa.eu/sites/default/files/publications/Updated%20Good%20Practice%20Guide%20on%20NCS_S.pdf.

war against Ukraine reveal that the governance of unmanned aviation must simultaneously address both opportunities and threats¹⁰⁶.

This paper has argued that airports occupy a central position within this evolving regulatory environment. Traditionally perceived as infrastructure providers serving conventional aviation, airports are increasingly required to perform a broader governance role. They facilitate the integration of unmanned aircraft through infrastructure adaptation, operational coordination, and participation in emerging digital traffic management systems, while at the same time contributing to the protection of aviation infrastructure against accidental, unlawful, and malicious drone activities. Accordingly, airports should be understood as dual governance actors operating at the intersection of innovation and security.

The analysis demonstrates that the European legal framework has developed along two complementary trajectories. On the one hand, the Basic Regulation¹⁰⁷, Regulations (EU) 2019/947¹⁰⁸ and 2019/945¹⁰⁹, and the U-space framework¹¹⁰ seek to enable the integration of unmanned aviation into the European airspace system. On the other hand, Drone Strategy 2.0¹¹¹, the EU Counter-UAS Strategy¹¹², and recent security initiatives increasingly emphasise resilience and the protection of critical infrastructure. Although these regulatory developments pursue interconnected objectives, their practical implementation converges at airport level, where operators are expected to reconcile competing priorities and cooperate with a wide range of public and private actors¹¹³.

The paper has further shown that this dual role generates significant legal and institutional challenges. Airports increasingly bear responsibility for maintaining operational continuity and responding to drone-related threats, yet the allocation of competences and accountability remains fragmented. In particular, an imbalance frequently exists between the responsibilities imposed upon airport operators and the powers available to them, especially in relation to counter-UAS measures.

¹⁰⁶ European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, COM(2022) 652 final (Brussels: European Commission, 2022).

¹⁰⁷ Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 and Council Regulation (EEC) No 3922/91, [2018] OJ L212/1.

¹⁰⁸ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, [2019] OJ L152/45.

¹⁰⁹ Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, [2019] OJ L152/1.

¹¹⁰ Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space, [2021] OJ L139/161.

¹¹¹ European Commission, *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Ecosystem in Europe*, COM(2022) 652 final (Brussels: European Commission, 2022).

¹¹² Council of the European Union, *Countering Threats Posed by Unmanned Aircraft Systems (Counter-UAS Strategy at EU Level)* (Brussels: Council of the European Union, 2023).

¹¹³ International Civil Aviation Organization, *Unmanned Aircraft Systems (UAS) Concept of Operations (CONOPS)*, 1st ed (Montréal: ICAO, March 2023), online: https://www.icao.int/sites/default/files/SAM/eDocuments/UAS_CONOPS_2023_en.pdf.

Effective governance therefore depends not only on technological capabilities but also on clear institutional arrangements and coherent legal frameworks.

The experience of Ukraine highlights the importance of resilience and preparedness as essential components of future airport governance. Contemporary drone threats extend beyond traditional aviation safety concerns and increasingly encompass hybrid risks affecting critical infrastructure. Consequently, airport preparedness should not be limited to the accommodation of new technologies but should also include mechanisms capable of ensuring continuity and rapid adaptation in the face of evolving threats.

Against this background, the paper proposes that future European drone governance should move beyond a narrow focus on UAS integration and embrace a broader concept of resilient airport governance. Such an approach recognises airports as strategic nodes within the aviation ecosystem and emphasises the need to balance innovation with security, efficiency with resilience, and operational development with the protection of critical infrastructure.

Ultimately, the success of unmanned aviation in Europe will depend not only on technological progress or regulatory harmonisation but also on the capacity of airports to perform their dual role effectively. Understanding airports as dual governance actors provides a conceptual framework capable of supporting this transition and offers a basis for further scholarly research and future policy development within the European aviation framework.

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Scott Sullivan and Iben Ricket, "Targeting in the Black Box" in Claire Kwan, Lauri Lindström, Davide Giovannelli, Kārlis Podiņš and Damjan Štruel, eds, *CyCon 2024: Over the Horizon: 16th International Conference on Cyber Conflict* (Tallinn: NATO Cooperative Cyber Defence Centre of Excellence, 2024) 207–220.

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