DRONE FUTURES:
ROAD TO 2040

Foresight from Central Europe

Adapt Institute

Editorial

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Introduction: The Future of Drones - From Innovation to Integration

The future is always in the making, shaped as much by our actions as by our inactions. One of core tenets of strategic foresight is that there is no single future; rather, multiple possible futures exist, and the choices we make today influence which of them will unfold. This report is aimed to help those who believe in agency and wish to identify opportunities and risks before they fully emerge. Strategic foresight is not about predicting the future — it is about exploring alternatives. It does not provide simple or definitive answers. Instead, it invites readers to engage in a practical exploration of the forces shaping the future of drones.

"But the single, predictable, fixed future that the trend modelling proposes does not actually exist.
Instead, what is out there is a multitude of possible futures."[1]

Jennifer M. Gidley

Central Europe faces many serious challenges — security, economic competitiveness and demography being just the most obvious. Harnessing drone technology may become part of the solutions.

The war in Ukraine, unfolding in our immediate neighbourhood, has already demonstrated the transformative power of drones on the battlefield. Militaries worldwide are in the midst of a "drone rush", considering both the operational and doctrinal consequences of integrating drones into modern warfare.

Ukraine's domestic drone production has expanded rapidly — from a handful of pioneers to an industrial base capable of mass manufacturing, scaling from 1,200 units in 2022 to 1.7 million in 2024.[2]

However, drones are equally transformative beyond the military domain. Europe counts more than two million registered drone operators, including 385,000 in the V4 region.[3] Commercial applications already span entertainment, agriculture, forestry, construction, real-estate, and infrastructure mapping and inspection. Drones are increasingly visible in the public domain as well, supporting healthcare, search and rescue, crowd monitoring, law enforcement and disaster response. Logistics, delivery, e-commerce and urban mobility are emerging frontiers. Balancing benefits with ethics and security is essential to seizing these opportunities while mitigating the risks of integrating drones into everyday life.

Drones deliver competitive advantages across industries and services: speed, agility, cost-efficiency, real-time data collection, precision and reduced human risk. Economic gravity has shifted from prototypes to scalable platforms, with the industry's growth trajectory stable in the short to medium term.

Market estimates vary, but the growth potential is clear. Mordor Intelligence values the European commercial drone market at USD 7.58 billion in 2025, projecting an expansion to USD 13.69 billion by 2030 (CAGR - 12.55%).[4]

Research and Markets reports a base of USD 5.9 billion in 2023, with a forecast of USD 13.56 billion by 2030 (CAGR - 12.6%).[5]

The defence sector mirrors this momentum: Grand View Research estimates the European military drone market at USD 9.4 billion in 2024, expected to rise to USD 19.5 billion in 2030 (CAGR - 13%).[6]

However, long-term stability depends critically on regulatory developments, public acceptance, and geopolitical uncertainties. Key challenges and opportunities lie in scaling Beyond Visual Line of Sight (BVLOS) operations, ensuring security and safety of drone applications, addressing the ethical implications of autonomous capabilities, and strengthening a robust ecosystem anchored in Unmanned Traffic Management (UTM). Resilient supply chains, fit-for-purpose regulation, and a balanced approach to benefits, ethics and security will ultimately determine who captures the full strategic value of drones in the region.

Current debates often swing between narrow, country-specific considerations and broad global market surveys. This leaves Central European decision-makers without an integrated perspective linking local industrial realities to wider geopolitical currents. Without a forward-looking map of how technology, policy, and market forces interact, governments risk mis-sequencing investments, businesses may misjudge demand, and societies could inherit outdated rules that solve yesterday's problems while amplifying tomorrow's risks.

This report examines how drone technologies are transforming - and will continue to transform - the world over the next fifteen years, with a focus on Czechia, Hungary, Poland, Slovakia, and Ukraine. While regionally grounded, its findings have broader relevance. Designed as a practical guide primarily for business leaders and policymakers, it provides insights into the profound shifts driven by drone integration. The goal is to help readers ask the right questions and focus on the key issues that inform investments, regulation, infrastructure development, and strategic planning — maximising benefits while minimising risks.

By testing assumptions, examining critical uncertainties, and identifying drivers of change, the report highlights how drones could reshape competitiveness, security, and societal well-being. It presents four alternative scenarios for future development, outlines major risks and opportunities, and offers actionable recommendations to help businesses and policymakers proactively shape a drone-integrated future.

Executive Summary

DRONE FUTURES: ROAD TO 2040 offers a Central European foresight into emerging drone technologies and their social and economic impacts across both public and commercial spheres. In terms of scope and methodology, it is a unique product in the region. As a result of strategic foresight exercise, the report presents alternative visions of the future as a baseline for further strategic and conceptual work. It does not provide predictions but instead invites readers to explore the forces shaping the future of drone technologies and their implications across political, economic, social, regulatory, and environmental domains.

Although regionally anchored, the report also assesses global dynamics in the drone sector. Its insights and conclusions therefore extend beyond Central Europe. Designed as a practical tool for policy planning and decision-making, the report formulates recommendations for both policymakers and businesses, based on the analysis of the four scenarios and the identified drivers of change.

THE KNOWNS AND UNKNOWNS OF DRONE FUTURES

The coming decade is likely to bring rapid growth in unmanned systems, transforming sectors ranging from defence and public safety to a wide array of industries and services. This growth will give rise to the low-altitude economy, unlocking extensive commercial and non-commercial opportunities. Its transformative impact on social and economic life has the potential to significantly advance the development of smart economies and societies.

> ***LOW-ALTITUDE ECONOMY: The low-altitude economy refers to the emerging economic sector centred around activities, businesses, and services conducted in the airspace below 1000 metres (3,280 feet) above the ground.***[7]

Breakthroughs in AI will drive autonomy and swarming capabilities, while advances in sensorics, propulsion, and connectivity will accelerate drone adoption, opening new opportunities for the low altitude economy.

At the same time, uncertainties around regulation, UTM, funding, and public acceptance of drones present major challenges and could disrupt expected development. Geopolitical tensions and technological dependencies add complexity, making resilient supply chains, effective regulation, and state support vital. Cyber risks, counter-drone advances, and potential misuse of drones represent critical vulnerabilities positioning drones as both a transformative opportunity and a strategic risk. Moreover, the prospect of drones becoming ubiquitous in daily life may result in a “black jellyfish effect” that could further amplify the societal impacts of widespread drone use.

> ***BLACK JELLYFISH EFFECT: Describes how ordinary events or routine trends can acquire disproportionate impact, potentially leading to systemic instability. It represents phenomena that we know, yet we do not appreciate their complexity or potential impact, especially if they grow exponentially.***
> ***The metaphor draws on the example of jellyfish whose mass proliferation has disrupted coastal power plants and maritime navigation.***

The drone sector's future will ultimately hinge on balancing innovation with safety, ethics, and trust.

THE DRIVERS OF CHANGE

The report identifies *eight drivers of change* (see chapter II) that can significantly accelerate or disrupt the future development and specifies their strategic consequences.

1. Security and Safety — encompasses three dimensions: security provided by drones, threats originating from drones, and inherent vulnerabilities of drones.

2. Public Perception — a volatile factor with profound influence over regulatory developments, market dynamics and decision-making by both policymakers and the private sector.

3. Legislative Complexity — a significant source of uncertainty resulting from the need to balance safety, security, and privacy with the vast potential of the drone sector.

4. Climate Change Response — drones as strategic tools for addressing climate change by supporting crisis response, enabling environmental monitoring, and advancing resilience.

5. Technological advancement — central aspect for drones' future with possible breakthroughs in AI integration, propulsion, advanced materials, sensors, and connectivity.

6. Geopolitical Realignment — drones as instruments of power projection in modern warfare and geopolitics, amid fragmented supply chains and rising tensions.

7. Demographic Dynamics — evolving demography and skill requirements shaping both demand for drone adoption and the workforce that operates them.

8. Administrative and Infrastructure Capacity — the backbone of a comprehensive ecosystem, translating regulations into practice.

Drone Futures

DRONE BONANZA

FRAGMENTED SKY

AUTHORITARIAN TURN

REGULATORY NIGHTMARE

Security First
- Ethical and political risks
- Rise of counter-drone tech
- Securitisation spiral

Public Perception
- Politicisation
- Fragmented societies
- Inherent volatility

Legislative Complexity
- Market consolidation
- Law enforcement challenge
- Global fragmentation

Climate Crisis Response
- New skills
- Positive use cases
- Shift to heavy-duty drones

Technological advancement
- New business models
- Low-tech vs high-tech dilemma
- Evolution of the human role

Geopolitical Realignment
- Formation of geopolitical clusters
- Search for alternative resources
- Europe lagging behind

Demographic Dynamics
- Changing labour market
- Reskilling acceleration
- Customisation of services

Administrative & infrastructure capacity
- Public-private partnerships
- Critical infrastructure integration
- New role for local municipalities

FOUR DRONE-INTEGRATED WORLDS

To illustrate possible futures, the report develops *four scenarios* of drone sector development and its wider impacts over the next 15 years (see chapter III):

DRONE BONANZA — An optimistic vision where technological advancement fosters integrated, smart societies. Drones become ubiquitous, seamlessly embedded in both urban and rural environments as essential tools across commercial sectors and public services.

FRAGMENTED SKY — Uneven development produces regional and international disparities driven by asymmetrical development, infrastructure gaps, regulatory inconsistencies, economic inequality, and intensifying geopolitical competition.

REGULATORY NIGHTMARE — A drone ecosystem shaped by strict regulatory measures introduced in response to high-profile incidents, "drone fatigue," and geopolitical tensions, leading to the formation of exclusive regulatory clusters.

AUTHORITARIAN TURN — Drone integration into daily life is strictly controlled. They primarily serve state functions and the interests of state-aligned enterprises, resulting in a highly regulated society and extensive surveillance apparatus.

These scenarios are neither predictions of the future nor are they mutually exclusive. Instead, they provide frameworks to stress-test strategies of various stakeholders, whether in governance or the corporate sector.

The scenarios served also as a framework for answering the *two key research questions*:

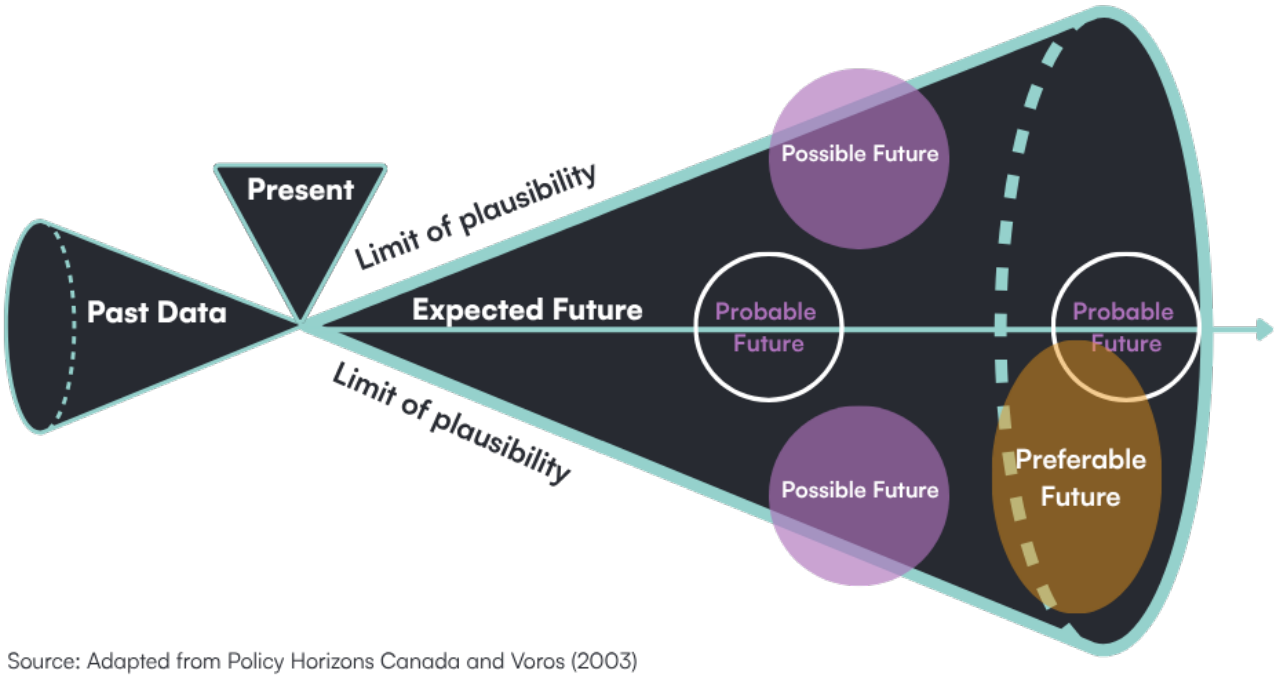
- What needs to be done to unlock the full potential of drone technology in Central Europe?
- How will the development of drone technologies influence the drone industry in the next decade?

Drawing on the findings of the foresight research and their assessment against the developed scenarios, this report sets forth the following *recommendations* (see chapter IV):

FOR POLICY-MAKERS	FOR BUSINESSES
PROVIDE LEGAL CERTAINTY	PURSUE AN ACTIVE ENGAGEMENT AND ADVOCACY STRATEGY
ENSURE THE SAFETY OF SKIES	ACTIVELY SHAPE PARTNERSHIPS WITH PUBLIC AGENCIES
PROMOTE TRAINING, EDUCATION AND INVESTMENTS IN HUMAN RESOURCES	EMBED SECURITY ACROSS THE ENTIRE DRONE LIFECYCLE
INTEGRATE DRONE SECTOR TO ECONOMIC DIPLOMACY	PREPARE FOR MARKET CONSOLIDATION
PREPARE A COMPREHENSIVE STRATEGY FOR LOW-ALTITUDE ECONOMY	EXPAND INTO THE DRONE SERVICES VALUE CHAIN

Methodology

Traditional data analysis and forecasting are usually rooted in the past, extrapolating trends from historical or current data. Such projections assume linear development — and therein lies their risk. Reality, however, is rarely linear. Strategic foresight responds to this challenge by *embracing a plurality of futures*. Its purpose is not to predict a single outcome, but to identify potential accelerators and disruptors that may speed up, slow down, or fundamentally alter expected trajectories. On this basis, foresight develops alternative scenarios that help decision-makers in both public and private sectors anticipate risks and recognize opportunities.



Source: Adapted from Policy Horizons Canada and Voros (2003)

The future is not pre-determined; it is continuously shaped by multiple, overlapping trends and our own decisions. Under conditions of high uncertainty, forecasting alone has limited value, making engagement with multiple alternative futures essential. Today exemplifies such a moment: a geopolitical and geo-economic turbulence is compounded by climate change, technological disruption, the rise of AI, and the twin energy and digital transitions. In such an environment, precise predictions are virtually impossible. Too often, governments and organizations retreat into short-termism, focusing narrowly on immediate challenges. This crisis-driven approach risks reactive policymaking and flawed decisions made under pressure.

> *"While data-rich, model-based forecasting is the foundation of evidence-based policy, it cannot be relied on for decision-making in situations characterised by „TUNA" conditions — Turbulence, unpredictable Uncertainty, Novelty and Ambiguity."*[8]
>
> *Angela Wilkinson*

The essence of strategic foresight is *not to predict the future, but to prepare for it*. By seeking to understand a range of plausible developments, foresight helps identify risks and opportunities. Strategies and plans can thus be anchored not in linear projections of past data, but in a deeper appreciation of what may lie ahead.

This report applies a *generic foresight framework*[9] and should be read as a contribution to drone-related strategic thinking.

The *inputs* phase included a combination of scoping interviews and an extensive horizon scanning using the PESTLE framework, collecting and analysing signals of potential change across political, economic, social, technological, legal and environmental domains.

The core of *foresight* work drew inspiration from the Horizon Foresight Method.[10]

The inputs collected in the initial phase were analysed through cascading, cross-impact analysis and futures wheel.[11] They were further refined through brainstorming in three participatory workshop:

- Prague, 24 April 2025 — Regulation
- Bratislava, 29 May 2025 — Security
- Warsaw, 13 June 2025 — Business and development

Throughout the process, a set of key assumptions and critical uncertainties was identified and tested (see Chapter I). These findings were synthesized into eight change drivers, representing the primary factors likely to significantly shape the drone ecosystem in the coming years (see Chapter II). Building on these elements, the foresight work developed four prospective scenarios, outlining plausible pathways for the drone sector and their implications for industry, economy and society (see Chapter III). These scenarios then served as benchmarks for identifying risks, opportunities, and recommendations (see Chapters IV and V).

The main *outputs* of the report include the identification of risks and opportunities through a SWOT analysis and a set of actionable recommendations for policymakers and businesses.

This report does not represent a *strategy* — strategy development and strategic planning must be tailored by governments and businesses to their specific interests and conditions. Rather, it provides strategic insights and recommendations for consideration of decision makers.

The foresight research adopted a *15-year time horizon*, projecting forward to 2040. This long-term perspective allowed the analysis to move beyond present-day assumptions, explore broader possibilities, and provided a benchmark for assessing the plausibility of the outcomes.

The primary geographic focus was the *Visegrad Four countries and Ukraine*, with the aim of identifying opportunities, risks, and recommendations for these countries. However, the analysis of data, change drivers, and scenarios has broader applicability, contributing to the understanding of global dynamics in the drone sector.

EU legislation defines *unmanned aircraft* as "any aircraft operating or designed to operate autonomously or to be piloted remotely without a pilot on board"[12] and an *unmanned aircraft system* (UAS) "an unmanned aircraft and the equipment to control it remotely."[13] This report uses these terms interchangeably with "*drone*". The broader term "*drone sector*" is used when referring to the wider ecosystem surrounding (UAS) technology.

Chapter I: The Knowns and Unknowns of Drone Futures

Assumptions form the building blocks of our mental models, analyses, and decisions. Yet mistaken assumptions can themselves become major sources of surprise and uncertainty. For this reason, strategic foresight systematically examines and tests underlying assumptions. The foresight research conducted for this report identified the following *key assumptions*:

- *The coming decade will see the large-scale development of unmanned systems*. While UAS are widely expected to shape the future of warfare, they also have the potential to transform a broad spectrum of commercial sectors and public services, including entertainment, agriculture, construction, mapping and inspection, logistics, e-commerce, law enforcement, and crisis management.

- *The public sector is poised to become a major client for drone-enabled services*. Attention and resources are likely to focus on security and defence applications. Beyond the military use, emergency services — including crisis management, healthcare, and policing — will increasingly rely on drones. Climate-related disasters will further accelerate drone deployment, both for rapid response and as tools for data-driven adaptation.

- *UAS will continue to offer extensive innovation opportunities* to advance range, flight time, precision, payload capacity, security, safety, and drone capabilities, creating wide-ranging opportunities for business and R&D not only in drone sector but also in adjacent fields such as sensors, advanced materials, communications, and propulsion systems.

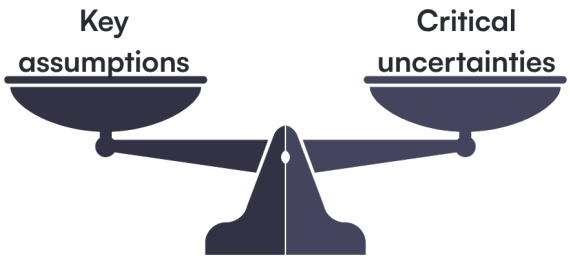
- *Integrating advanced AI in drone operations is a game-changer* that will enable greater efficiency, autonomy, enhanced navigation, faster data processing, real-time decision-making, and autonomous swarming.

- *The emphasis on technology often overshadows societal challenges* of drone adoption. Education, training, workforce reskilling, and broader public awareness efforts will be critical as drones become more embedded in daily life.

- Amid geopolitical tensions, *the drone sector's future will depend on robust supply chains*. Nearshoring and reshoring will gain importance, especially in the EU, as non-EU states maintain an edge in drone technology and manufacturing.

- *State support and strong public-private cooperation will be key enablers*. Transparent and stable regulation, well-functioning Unmanned Traffic Management (UTM), and robust infrastructure will be decisive for unlocking the drone sector's full potential.

Besides these assumptions, strategic foresight also accounts for *critical uncertainties* — the most impactful "known unknowns" that can accelerate, disrupt, or reverse expected developments. For the drone sector, the most significant uncertainties include:



- *Regulatory frameworks* — The future of regulation is often considered the most critical uncertainty. Overregulation could stifle commercial drone applications, while under-regulation may undermine public trust and legal certainty.

- *Administration and UTM integration* — Effective Unmanned Traffic Management (UTM) is essential. Its quality and integration with Air Traffic Management (ATM) forms the backbone of a comprehensive Unmanned Aircraft Systems (UAS) ecosystem. Its performance will determine whether the ecosystem accelerates or stalls.

- *Funding and infrastructure* — Availability of financing, robust infrastructure and support systems will be key for the drone ecosystem´s resilience. Targeted state support, investment incentives, and public—private partnerships will shape the drone sector's scalability. Paradoxically, a surge in military drone priorities could divert resources from commercial and recreational applications.

- *Public perception* — Balancing security, safety and ethics with the opportunities offered by drones will heavily influence their social acceptance. The fragility of public attitudes, combined with the complexity of underlying factors, makes social acceptance one of the most unpredictable and vulnerable aspects of drone integration — demanding proactive engagement from all stakeholders.

- *Technological convergence* — Drone capabilities depend on interdependent advances across multiple technological domains, which can be under- or overestimated. Breakthroughs in areas such as AI, quantum computing, automation, or propulsion could drive rapid progress, but their integration may face significant technical, ethical, or security barriers.

- *Geopolitical and geo-economic tensions* — Drones have already become instruments of power projection and global technological competition. Rivalries risk triggering supply chain disruptions, export restrictions, or trade wars, jeopardizing access to critical raw materials and key components.

Moreover, beyond the known-unknowns, there are also *wild card events*, such as large-scale cyberattacks, advanced counter-drone systems, or the use of drones in terrorism or organized crime, which could abruptly derail growth trajectories.

These assumptions and uncertainties, together with the drivers of change (see Chapter II) map the contours of plausible drone futures — highlighting both opportunities and vulnerabilities that demand close attention from policymakers, businesses, and society.

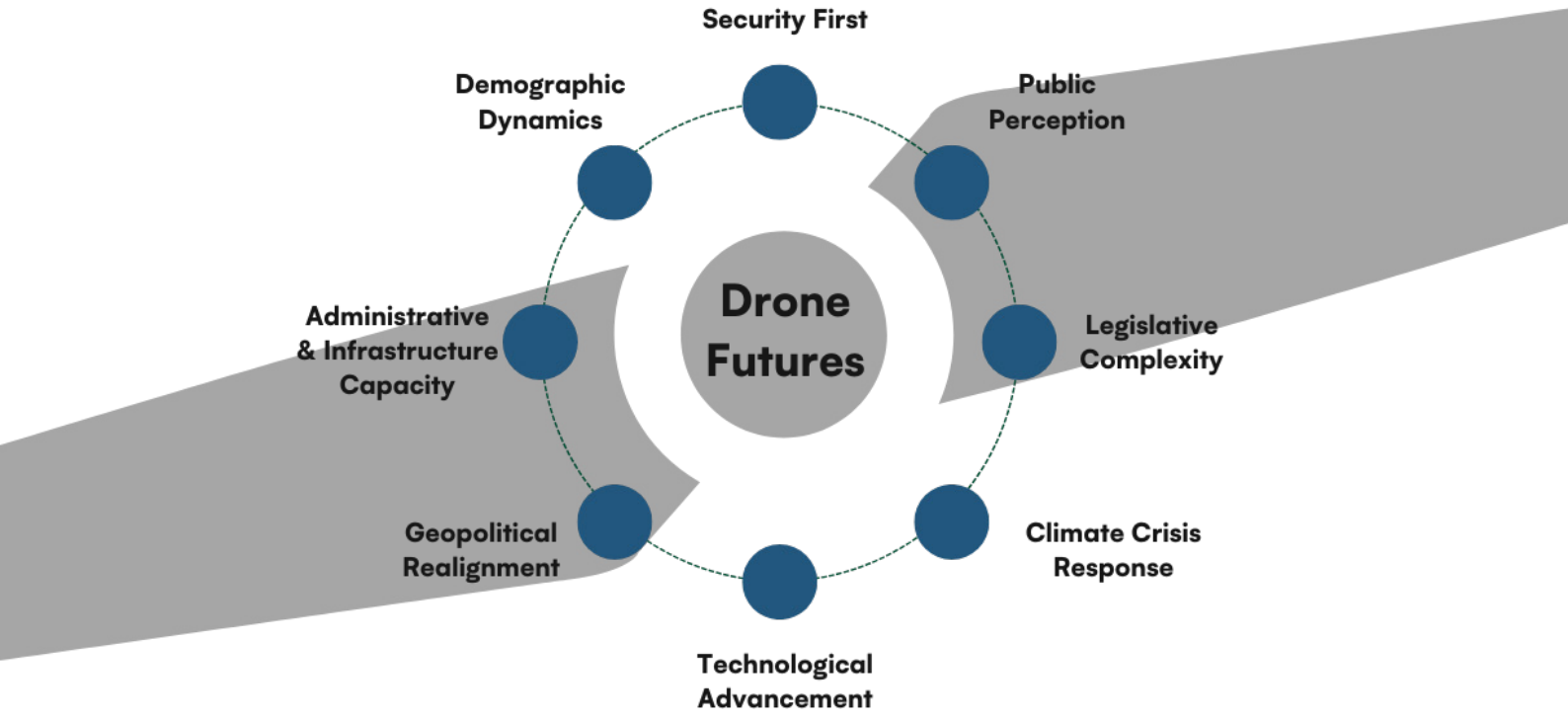
Chapter II: What Will Shape The Drone Sector's Futures?

Since there is no single predetermined future, understanding the *drivers of change* is essential to assess potential risks and opportunities. Change drivers are the forces — whether physical or societal — that cause significant shifts in a system, in this case the drone sector. They propel change in predictable or unpredictable ways, shaping the system dynamics and, at times, fundamentally altering how it functions.

Because we cannot predict the future, the best we can do is to prepare for it. Identifying and understanding drivers of change is therefore essential.

> *"As individuals, or even companies, we have little control over driving forces. Our leverage for dealing with them comes from recognising them, and understanding their effect."*[14]
>
> *Peter Schwartz*

This report identifies eight change drivers that could significantly influence the drone sector's trajectory. They do not operate in isolation; rather, they interact—often in non-linear and unexpected ways — creating cascading effects. Together they form the building blocks for developing alternative scenarios and provide a foundation for a holistic understanding of the system and its possible futures.



1. SECURITY AND SAFETY

In an era of escalating domestic and international conflicts, terrorism, and hybrid warfare, security has become a primary societal and governmental priority. Increasingly unstable security environments are accelerating the adoption of drones as core components of defence, policing, and emergency response. At the same time, drones are also used by adversaries and malicious actors, who can exploit either their capabilities or their vulnerabilities. The "security-first" lens therefore includes security provided *by* drones, security *from* drones, and security *of* drones.

The *expansion of the military drone sector* has become a defence necessity and a business opportunity. Drones are being deployed for emergency response, crisis management, critical infrastructure, and border protection, underlining their utility in humanitarian and law enforcement contexts. This trend supports the development of dual-use drone technologies, blurs the lines between civilian and military systems, and enables capability transfers between sectors. However, it may also divert resources away from civilian applications, limiting commercial and recreational development. Societies may also witness a securitization of public life, where drones are increasingly used for policing, surveillance, or population control.

Projections for the global military drone market vary. Conservative estimates forecast growth from USD 15.80 billion in 2025 to USD 22.81 billion by 2030, reflecting a compound annual growth rate (CAGR) of 7.6%.[15]

More optimistic scenarios suggest much faster expansion — for example, from USD 16.07 billion in 2024 to USD 47.16 billion by 2032 at a CAGR of 13.15%[16]***, or from USD 40.53 billion in 2024 to USD 87.63 billion by 2030 at a CAGR of 13.9%.***[17]

The proliferation of drones will also drive a corresponding increase in *counter-drone measures*, which will rapidly become essential. As drone technology spreads, counter-drone capabilities will become a fundamental security tool for governments, critical-infrastructure protection, public order, and safety of private and commercial facilities.

Growing reliance on drones for national security also introduces new *vulnerabilities*. As drones become embedded in security infrastructure and integrated into air-traffic systems, resilient drone hardware and software protections will be critical. Both kinetic and cyberattacks are likely to increase, and expanded use of drones raises the risk of safety incidents. Whether caused by intentional attacks or accidental failures, disruptions could cripple parts of the economy or state apparatus that will depend on drones.

In 2018, the EU's Frontex agency first deployed drones for surveillance, detecting nearly 5,000 people at sea that year. Frontex tenders from summer 2024 included a €184 million call for drones and related services for maritime surveillance, as well as a €3 million pilot project for drones on land borders, for joint operations with Bulgaria.

In 2020, Frontex awarded two €50 million contracts to France's Airbus and Israel's defence and airspace company IAI to deploy Heron drones capable of more than 30-hour-long flights.[18]

This evolving landscape will incentivise security and safety focused regulation. Some states may even seek to monopolize the sector, heavily limiting civilian and private use. Balancing innovation with safety and public trust will be a key challenge.

The 2024 EU Defence Industrial Strategy (EDIS) calls for increasing innovation and production of affordable unmanned systems as a "key requirement for EU defence preparedness in high-intensity conflicts." Joint procurement of drones and counter-drone systems may also be supported under the European Defence Industry Reinforcement through Common Procurement Act (EDIRPA).[19]

Drones and counter-drone systems are among the seven priority capability areas identified in the White Paper for European Defence — Readiness 2030.[20]

STRATEGIC IMPLICATIONS:

- *Securitization spiral* — As drones become central to national security, funding, talent, and innovation will likely shift from civilian to security and defence applications. This may fuel rapid advancement in drone capabilities but risks constraining purely commercial and recreational applications. This dynamic could pose challenges for commercial entities that lack government partnerships or backing.

- *Rise of counter-drone technologies* — The proliferation of drones creates a parallel boom in counter-drone technologies, from analogue to high-tech solutions. This sector is likely to experience strong growth, becoming a core component of critical infrastructure protection, border control, and law enforcement. However, this can also introduce a new arms race dynamic, as drone innovations will be matched by counter-drone advancement and vice-versa.

- *Ethical and political risks* — As drones spread across both commercial and security domains, surveillance may intensify in daily life. This poses challenges for democracy, human rights, public trust, and the openness and fairness of economic and innovation ecosystems. Widespread drone deployment may also intensify public concerns about the erosion of safety and privacy. In democracies, it may prompt stronger oversight, transparency and regulatory frameworks, whereas in authoritarian regimes, it could legitimize tighter social control. Ultimately, how ethically drones are used will shape public acceptance and the direction of national and international regulation.

2. PUBLIC PERCEPTION

Debates around drones increasingly focus on balancing risks — such as privacy, human rights, or accidents — against the substantial commercial and public-service opportunities they provide. Their outcome can profoundly influence the direction of regulatory and market trajectories. Public perception is a powerful, volatile element impacting both policymakers and the private sector. At times, companies, governments, and the media may actively shape them but may also remain passive and disengaged otherwise.

Study by Miron et al (2023)[21] found that technology acceptance and privacy concerns came to be overall statistically significant predictors of positive drone perception, along with age category, education level and drone exposure.

Key drivers of public perception include demographic factors (e.g., different attitudes across generations), socio-economic factors (urban vs. rural, wealthy vs. poor), drone and drone-related accidents, conflicts and malicious activities (wars, crime, terrorism), or proximity of drone activity to place of residence, versus positive experience with drone applications such as rescue operations or crisis management.

MODE OF DRONE OPERATION	NON-USERS	USERS
RESCUE OPERATIONS	90%	98%
TRAFFIC MONITORING TO ENSURE EFFICIENT MANAGEMENT	82%	89%
TRAFFIC MONITORING TO ENSURE COMPLIANCE WITH TRAFFIC REGULATIONS	70%	64%
MONITORING OF PEOPLE TO ENSURE STATE SECURITY	56%	57%
COMMERCIAL USE OF DRONES (EXTENSIVE, E.G., DELIVERY OF GOODS)	52%	61%
DRONE USE IN PROTECTED AREAS (PARKS, RESERVATIONS, NATURAL LANDMARKS)	52%	44%
DRONE OPERATION WITHIN SIGHT OF MY PROPERTY	35%	35%

Approval rates of different modes of drone operation in Czech society (ratio of respondents who strongly agree or agree with the given mode of use).[22]

Consequences range from growing acceptance among younger, tech-savvy generations to reluctance or opposition among groups such as women or the elderly[23] — trends that can influence politics and regulation. However, drones can affect social acceptance also counterintuitively: they can assist older people and potentially lead to more positive attitudes, while the environmental impact of drone proliferation could lead to more negative perceptions among younger generations. Perceptions shaped by media coverage of military drone strikes, terrorist attacks, privacy intrusions or accidents can accelerate calls for stricter controls, while positive narratives around medical or disaster-response drones can boost support.

A dual-track outlook envisions one track defined by positive or neutral public sentiment, leading to growth in support, investment, and market expansion. The other track sees negative sentiment,

triggering tighter controls, restrictions, or bans. Perception may not affect all drone applications equally. For instance, last-mile delivery drones could face resistance due to concerns over privacy, while uses in agriculture, traffic monitoring, and emergency response might receive broader acceptance.

> ***Results of a study by Wang et al (2025)[24] indicate that the need for dedicated awareness and education efforts to inform public understanding is an emergent theme. Findings point to a wide set of factors impacting public perception of drones, from safety and regulation to privacy, underscoring the need for a more holistic approach.***

> ***Results of another study by Stolz et al (2024)[25] indicate that "public and civil applications, such as disaster management or research, receive higher approval compared to private and commercial ones, like passenger transport or recreational use [...] suggesting that public acceptance of drones is closely linked to the specific use case." The findings further show that "people's most significant concerns relate to the violation of privacy followed by the use of drones for criminal purposes. Concerns are lowest in terms of noise pollution."***

STRATEGIC IMPLICATIONS:

- *Politicisation* — The public perception of drones is a strategic variable that can either accelerate or constrain drone industry expansion. It can be used or misused by certain political actors and movements. As a result, the entire industry can become a victim of politicisation or intended polarisation. Still, if public actors adopt the topic as a positive case, aiming to elevate the sector, it can unlock greater social support, funding, and regulatory leniency.

- *Fragmented societies* — Generational attitudes, socio-economic factors, and urban versus rural differences can play a major role in how drone technologies are perceived and what kinds or areas of drone usage are perceived positively and which negatively. These divides can create divergent expectations and can lead to a fragmented market, presenting a strategic dilemma for both policymakers and businesses.

- *Inherent volatility* — Given that drone-related sentiment can pivot quickly due to accidents, misuse or negative media coverage, the industry will face continuous risks. Public backlash can be disproportionate and sector-wide, even when triggered by isolated events, thereby harming even benign or beneficial applications. In this light, proactive communication becomes a strategic imperative.

3. LEGISLATIVE COMPLEXITY

Legislative complexity is frequently identified as a major *source of uncertainty* for the future development and deployment of drone-enabled services, especially commercial ones. At the heart of the issue lies a fundamental tension: on one hand, the imperative to ensure safety, security, and privacy; on the other, the desire to unlock the vast potential of the drone sector across industry, security, crisis management, innovative transportation and logistics.

Several factors intensify the *pressure for more stringent regulation* in this still relatively nascent domain. These include the securitization of the drone sector, growing public awareness and varying perceptions, rapid technological advancements, intensifying geopolitical competition, and the expanding range of drone applications.

To date, regulatory efforts have primarily *focused on airspace safety*, emphasizing the integration of drones into established air traffic management (ATM) systems. Accordingly, drone regulation has revolved around operational requirements, procedures, certification processes, and select security measures. Other areas — such as data protection — remain governed indirectly through existing legal frameworks.

REGULATION (EU) 2018/1139 - EASA BASIC REGULATION	a key piece of EU legislation that establishes common rules in the field of civil aviation, including a comprehensive framework for the regulation of drones, with a focus on safety, risk-based regulation, and coordination between the EU and Member States' National Aviation Authorities (NAAs)
REGULATION (EU) 2019/947	focuses on operational requirements and procedures (operator registration, remote pilot´s certificate, etc)
REGULATION (EU) 2019/945	addresses technical certification requirements (e.g. design, manufacturing, maintenance) and third-country operations

Further regulatory intervention may be required in areas such as scaling beyond visual line of sight (BVLOS) operation, specifying privacy and data protection, questions concerning authorisation and realisation of counter-drone operations, security of drone operations including cybersecurity and the security of supply and value chains, UTM rollout and interoperability or environmental impact of increased drone usage.

Advances in drone technology present additional regulatory challenges. New regulatory demands will arise with the increasing AI integration, adoption of autonomous systems and rise in drone swarming capabilities.

Moreover, the prospect of *drones becoming ubiquitous* in daily life, could significantly accelerate these trends, amplifying both the societal and regulatory impacts of widespread drone use.

NANODRONE DILEMMA — Drone regulation typically begins with "microdrones" (EASA C0 category: less than 250 g). However, operational nanodrones, comparable in size to insects and weighing only a few grams, already exist. While these pose minimal risk to physical safety, they can present a significant threat to privacy and facility security. The challenge lies in the limited enforcement options — detecting, tracking, or intercepting such small drones will be extremely difficult.

These developments cut both ways. On one hand, regulation provides legal certainty essential for business development and public reassurance. On the other, excessive or poorly calibrated regulation risks undermining the competitiveness of local industries in the global competition and could potentially stifle innovation or undermine certain business models within the drone sector. A balanced, dynamic, and risk-informed regulatory approach will be critical to enable both innovation and public trust, while safeguarding competitiveness in a globalized and technologically advanced drone ecosystem.

STRATEGIC IMPLICATIONS:

Market consolidation — The increasing complexity of regulatory requirements and the growing burden of legal compliance are likely to favour larger, well-resourced industry players. These companies are better equipped to navigate stringent regulations, maintain compliance frameworks, and absorb associated costs. As a result, the drone market can undergo a phase of consolidation, marked by the emergence of regional champions through mergers, acquisitions, and market exits of smaller competitors. New entrants will face heightened barriers of entry, further reinforcing the dominance of established operators.

Law enforcement challenge — While traditional law enforcement mechanisms (investigations, fines, or prosecution) may be effective under normal circumstances, the integration of drones into daily life will demand a more proactive stance. Law enforcement agencies will need the ability to act in real time or pre-emptively, particularly when countering malicious activities such as terrorism, cyberattacks, or organized crime. Counter-drone measures in densely populated urban environments pose significant operational, legal, and ethical challenges. Addressing these issues effectively and proportionately will necessitate cross-agency collaboration among law enforcement, aviation authorities, cybersecurity agencies, and other bodies to ensure an adequate response.

Global fragmentation — Drones and associated technologies possess a highly disruptive potential, positioning them as central elements in ongoing geopolitical competition. Regulatory landscapes are already fragmented, hindering cross-border operations. The risk of further geopoliticization of drone technologies may exacerbate this fragmentation, leading to the formation of regional regulatory clusters governed by divergent standards. Such divergence would complicate regulatory compliance, increase the cost and complexity of market access, and potentially stifle innovation and global market integration. Navigating this environment will require international regulatory dialogues and cooperation.

4. CLIMATE CHANGE RESPONSE

Climate change — characterized by rising temperatures, extreme weather events, and altered precipitation patterns — is often described as a "threat multiplier", as its net effects exacerbate existing challenges.[26] In the Central European context, this translates into increased likelihood and intensity of extreme rainfalls.[27] At the same time, prolonged periods of severe heatwaves and drought create conditions conducive to frequent wildfires across Southern Europe.[28] Beyond sudden natural disasters, climate change accelerates soil degradation, lowers crop yields, reduces water availability and quality, and facilitates the spread of pests and disease outbreaks. Forestry, agriculture, and hydropower production sectors are primarily affected by these impacts. *Drones hold significant potential as strategic resilience tools for climate change response* in three distinctive roles.

Firstly, drones already serve as indispensable *tools for crisis response and disaster mitigation*. Firefighters, health and rescue services, and law enforcement increasingly rely on unmanned systems as cost-effective and life-saving solutions during natural or man-made disasters. The growing frequency and severity of these events drive the increased deployment of drones in emergencies. However, drones can save lives, even beyond large-scale emergencies.

> ***In a 2020 pilot study covering 80,000 residents in suburban Sweden, AED-equipped drones were dispatched to 12 real emergency alerts. In 92% of cases, the drone successfully delivered the AED, and in 64% of those, it arrived before the ambulance — saving a median of nearly two minutes, which can be life-saving in out-of-hospital cardiac arrest (OHCA) scenarios. The system was shown to be safe, reliable, and easy to integrate with existing emergency dispatch operations.[29]***

Secondly, drones are ideal for *long-term, systematic environmental monitoring*. Few alternatives provide effective means for regular, large-scale data collection. From urban heat mapping to power grid monitoring, drought and pests' infestation assessment, drones are poised to be a backbone for data collection. Data-centric adaptation strategies are an inevitable part of effective climate change response. Demand for drones in this role will only expand with growing severity of both direct and indirect impacts on environment and critical infrastructure.

Thirdly, increased pressures on forestry, farming, and agriculture due to changing climate will drive significant demand for *adaptability, resilience, and sustainability*. State enterprise Forests of the Slovak Republic already operates a fleet of over 40 drones for surveillance and advanced 3D mapping.[30] Drone-enabled precision agriculture is able to cut the consumption of fertilizers, pesticides and herbicides by tens of percent, while still improving crop yields.[31]

The future adoption of drones as climate resilience tools should be supported by the existing scientific consensus, clearly observed climate shifts, defined EU and national policy priorities regarding climate change, green tech and sustainability. Conversely, underdeveloped or overly restrictive regulatory frameworks, as well as negative public perceptions, may slow this adoption.

> ***Energy Efficiency and Carbon Emissions: Drones demonstrate significant energy efficiency advantages, with up to 70% lower energy consumption and a 38% reduction in carbon emissions compared to traditional delivery vehicles, particularly for last-mile, small-package deliveries.***
>
> ***However, these benefits diminish for larger payloads and longer distances, and the environmental impact varies depending on the source of electricity used for drone charging.[32]***

STRATEGIC IMPLICATIONS:

Shift towards heavy-duty drones — Demand will rise for heavy-duty unmanned technologies capable of operating reliably for hours in harsh environmental conditions such as severe heat, strong winds, freezing fog or heavy rain. Increased payload capacities, overall durability, and improvements in propulsion systems are areas where further R&D and investment could deliver rapid returns.

New skills — Drones enable massive data collection, but turning that data into value requires advanced software solutions and a skilled workforce. Emphasis should be put on education and training, developing functional data literacy skills for a new generation of talent for agriculture, forestry, and farming. This implication applies much more broadly — a similar trajectory is to be expected in construction, logistics and other data hungry fields.

Positive use case — Deploying drones in the life-saving hands of first responders offers a powerful opportunity to win public trust. Proactive communication aimed towards building trust and awareness about drones, highlighting safety, privacy protection, and a clear demonstration of societal benefits, should be a joint strategic goal for stakeholders from the public and private sectors.

5. TECHNOLOGICAL ADVANCEMENT

As drones continue to evolve as a disruptive technology, technological advancements lie at the heart of their future development trajectory.

A game-changing factor is the integration of *Artificial Intelligence* (AI). AI will enhance autonomous capabilities, navigation, real-time decision-making, enhanced perception, and swarm coordination. Although AI integration still faces challenges in terms of regulatory readiness, computational power, and model maturity, the shift toward implementation is already underway. Looking further ahead, the convergence of AI and quantum technologies could reshape the next generation of drones by enhancing navigation, decision-making, sensors, and communication with greater speed, precision, and security, though these synergies remain largely experimental. At the same time, a broad range of other emerging technologies also promises significant advances in drone capabilities.

Propulsion is another key area for improvement. As *electric* propulsion dominates drone systems, innovation is primarily focused on batteries: improving energy density, weight, and recharge times. *Hydrogen* fuel cells are an emerging alternative, combining the advantages of electric and combustion systems—long endurance, low noise, and zero emissions — though cost and infrastructure remain constraints.

The Boeing/Aurora Skiron-XLE (fixed-wing VTOL) using hydrogen fuel cells flew 7 hours in 2024 - double the ~3.5-hour endurance of its purely battery-powered sibling.[33]

Likewise, Ukraine's Skyeton Raybird H_2 drone has begun test flights and is designed for 15+ hour endurance.[34]

Solar propulsion, as another alternative, can support niche roles such as ultra-long endurance surveillance missions due to their self-sufficiency and extended flight duration.

A stratospheric solar-powered UAS capable of carrying up to 68 kg of payload was successfully flight-tested in October 2024.[35] In 2022, a solar-powered drone broke a record for a UAV by staying in the air for 64 days and 18 hours.[36]

Researchers at Beihang University in Beijing built an ultralightweight (4 grams) solar-powered drone, which managed to fly untethered for 1 hour, but ultimately it should be capable of unlimited flights during the daytime using solar power.[37]

A prospective field of innovation is *silent* propulsion systems with low-noise rotors and propulsion units. This could help overcome one of the drone limitations — noise pollution, especially in urban and defence applications.

Material innovation is also transforming performance. Ultra-lightweight, high-strength, temperature-resistant, and eco-friendly materials — along with emerging smart and adaptive materials — can improve endurance, range and payload, resilience, stealth, and sustainability, and enable operations in harsher environments. These material innovations will broaden the use of drones, opening new opportunities across both civilian and military sectors.

Sensors remain at the core of drone functionality, and their transformative capability, playing a pivotal role in enabling new applications and expansion of drones to a wide area of fields.[38] Key trends, such as sensor miniaturisation, sensor fusion, and edge AI processing, can drive the adoption of multi-role drones, extend drone operations, transform industries and services and accelerate data inputs from drone missions. However, the rise of high-resolution and AI-enhanced sensing introduces critical challenges and ethical dilemmas concerning privacy and surveillance. These tensions will shape the

public acceptance of drones, may result in demands for new regulation and lead to the introduction of new privacy-preserving concepts.

Connectivity underpins the potential of next-generation drone operations — from autonomous swarm coordination and real-time data streaming to BVLOS missions. 5G/6G, peer-to-peer mesh networks, and satellite communication may become the backbone of intelligent airspace integration and data-driven drone ecosystems. Yet connectivity also creates critical vulnerabilities. Risks include cyberattacks, signal jamming and spoofing, data interception and manipulation, infrastructure dependency and geopolitical fragmentation. Progress will require robust cybersecurity, resilient communication protocols, partnerships with telecom providers and satellite operators, policy frameworks for secure spectrum use, drone identification, and cross-border data governance.

STRATEGIC IMPLICATIONS:

Evolution of the human role — Autonomous operations will raise numerous legal and ethical challenges, as they will reduce the need for human-in-the-loop control. This shift may lead to workforce reskilling with greater emphasis on supervision and ethical oversight. To ensure safe and effective collaboration, human-drone teaming doctrines will need to be developed. As decision-making accelerates, new forms of human-machine interaction — such as voice and gesture-based controls — may become necessary. Use of augmented and virtual reality could lead to even more immersive control, training, and mission planning.

New business models may gain traction as the data collected by drones become more valuable than the drone applications themselves. This could position data and software as the primary revenue stream. Automation, integration of drone functions and expansion to new areas can further expand the growing Drone-as-a-Service (DaaS) platforms — offering clients on-demand access to drone capabilities without requiring them to own or operate drone systems.

Low-tech vs high-tech dilemma — Future manufacturing may face a choice between the mass production of low-cost drones and the development of more sophisticated, higher-value systems. Rising expectations for performance, security, and multi-functionality may ultimately drive the demand towards more advanced solutions. As seen in other tech-dominant domains — such as smartphones or software-defined vehicles — a transformative leap could occur through highly integrated, modular, and reconfigurable drone designs. These developments could shift drones from niche applications to mainstream, everyday utilities.

6. GEOPOLITICAL REALIGNMENT

Drones have rapidly become a wide-spread tool of modern power projection, transforming warfare, surveillance, and geopolitical influence. Recent conflicts in Ukraine and the Middle East have accelerated adoption of drones and exposed Europe's deep dependence on external actors, particularly China, for drone hardware and critical components. As the global centre of drone innovation shifts away from Europe, fragmented supply chains and rising geopolitical tensions leave the EU increasingly vulnerable in both manufacturing capacity and in the competitiveness of its own commercial-drone service providers.

The global contest to scale unmanned systems is now propelled as much by battlefield learning as by industrial capacity. US dominance in drone technology, once uncontested, is increasingly being challenged not only by China, but also by rising players, such as Türkiye (the world's leading military drone exporter)[39], Iran, Russia, Israel, and others. In 2024, Ukraine produced 2.2 million drones and intends to field 4.5 million FPV platforms in 2025.[40] Russia, meanwhile, plans to recruit 210 000 personnel for dedicated drone units till 2030[41] and ramp output to 500 airframes per day[42] by the end of next year (according to Ukrainian sources). It also expects that the demand for personnel in the unmanned aviation industry may reach one million specialists[43], while for instance Slovakia expects to train one thousand drone operators.[44]

Ukraine is transitioning from a drone consumer to an innovation hub. Over 500 companies are involved in drone production in Ukraine[45], and many are pursuing co-production agreements with EU partners.

For Europe, this development carries a dual message: it demonstrates that urgency, flexible regulations, and venture capital can quickly revitalise capacity, but also underscores how far EU´s defence sector lags in achieving rapid, low-cost production. The competition is no longer defined by fleet size, rather it is about who can react most quickly and embed drone thinking into doctrine, and integrate strategy into policies.

China currently dominates the civil-commercial drone industry,[46] producing 70-80% of the world's commercial drones[47] and supplying 90% of the world's rare earth magnets[48] essential for UAV propulsion and sensors. In 2024, China accounted for 79% of all-drone related patents granted.[49] Moreover, in recent years, Beijing has tightened export control over drone parts, batteries, motors, and flight controllers. Europe's dependence on Chinese airframes and batteries means that, without rapid growth in alternative suppliers, it could face serious constraints as drone demand keeps rising.

Drone competition now extends far beyond armed military UAVs. The *next race concerns control of the infrastructure, regulation, and technology for low-altitude airspace*. Countries are actively integrating drones into logistics, including urban drone deliveries, and are using these operations to feed flight data into unmanned traffic management (UTM), laying the groundwork for broader systems that could eventually integrate payments, advertising, and other value-added data services in the emerging *"low-altitude economy."*[50] Leading operators from the US or China are contributing to the formation of technical standards, which others may later need to adopt or compete against. Europe may find itself aligning with standards shaped elsewhere, with potential frictions arising around data-sharing norms, privacy protections or environmental standards.

Drone supply chains may ultimately break into exclusive groups or ad-hoc coalitions of like-minded countries, such as supplies of Iran´s Shahed drones to Russia, alleged China and Russia covert supplies[51] and rising cooperation between Russia and North Korea.[52] On the other side, Western allies are taking unilateral and joint measures to mitigate the risks posed by the securitisation of supply chains. The US considers restriction or ban of drones[53] over national security concerns while aiming to boost[54] its own

production and considering purchasing Ukraine's combat-tested drones to address capability gaps.[55] Meanwhile, Europe is moving to diversify: Poland is now purchasing drones from Taiwan[56] and leading German defence firms are seeking to diversify their supply of drones beyond China.[57]

> ***South Korea might become a suitable partner for drone industry cooperation. Democratic, high-tech partner that funds "in-region-for-region" ventures across Europe. Seoul is acquiring NATO-compliant Warmate loitering munitions from Poland's WB Electronics[58] and, in parallel, is pursuing other joint-production deals. Established South Korean plants, operated by major companies, provide the country with a strong industrial presence across the V4. While there are no indications that this infrastructure is retooled for drone production, the existing supplier network could, in principle, be adapted in the future to form the foundation of a regional drone manufacturing hub.[59]***

STRATEGIC IMPLICATIONS:

Formation of geopolitical clusters — The global drone market may split into bloc-based "clusters." Geopolitical alliances are increasingly concentrating know-how, production, and standards within networks of trusted partners. This trend would reduce technology flows between rival blocs and break up the global market into regional ecosystems shaped by strategic alignment rather than pure economic efficiency.

Search for alternative resources — Growing dependence on Chinese critical raw materials is triggering a push for alternative sources. The security and resilience of supply chains for critical drone components such as batteries, advanced motors, semiconductors, and specialised sensors represent a significant uncertainty. This pursuit of new sources could reshape supply chains and shift global power dynamics over access to critical materials and components.[60]

Europe lagging behind — Europe risks losing competitiveness in the rapidly expanding civil drone services segment to established US and Chinese platforms. Late European entrants could encounter markets where key standards have already been set by foreign actors.

7. DEMOGRAPHIC DYNAMICS

Shifting age demographics, population density patterns, and workforce skills are reshaping both the demand for drones and the labour force that supports them. These trends influence where and how unmanned systems take root, the types of services citizens will expect, and the new competencies, ranging from remote piloting to AI-enabled fleet management, that need to be developed at scale.

The fast-growing drone sector is *reshaping labour demand*. New roles like remote pilot, AI specialists, or drone flight planners[61] are emerging fast and traditional curricula must adapt quickly. Schools and universities are expanding programmes to prepare students for careers in the drone industry[62] demonstrating targeted human-capital investments to rapidly qualify new workers. Another approach leverages the experience of older generations through structured military-to-civilian pathways, redirecting skilled veterans into roles in logistics, inspection, and emergency response jobs.[63] In Central European context Ukraine's surge to around 500 drone companies[64] shows how battlefield necessity can rapidly develop specialized technical engineers — a talent reservoir that neighbouring V4 countries could potentially actively engage with.

Drone Potential to Bridge Divides: V4 countries rank among the top in terms of regional GDP disparities in the EU[65] and Slovakia even in the OECD.[66] Drones could enable smart agriculture, infrastructure inspection, or emergency services in remote or less-developed regions and thus accelerate socio-economic growth.

Risk of Deepening Gaps: However, if drone R&D, training, and investment are concentrated only in tech-savvy urban regions, tech-driven inequality could worsen.

Europe's *ageing workforce* could slow its ability to keep up with the rapid pace of drone technology development — the shrinking pool of young technological talents might become EU´s competitive disadvantage. On the other hand, as the working-age population declines, robots and drones may become part of the solution, as they could take over roles in sectors like logistics, transportation, and agriculture. Europe could respond with digital academies, scholarships, and opening military-to-civil rotation schemes. Lithuania may be an example — it plans to open nine drone training centres over the next three years to teach thousands how to build and pilot drones, helping public's abilities in drone control and cultivate and expand civil resistance training.[67]

Public attitudes toward drones may *split also along generational lines*. Older generation and less educated demographic groups may view them as a threat to their jobs, while tech-skilled youth see them as a promising career opportunity. For older citizens, drones could nonetheless deliver medicines, provide remote monitoring and strengthen emergency response where care personnel are reducing, thereby fostering a new sector of services dedicated to supporting the elderly.[68]

Population Decline in Central Europe[69]: Czechia and Poland peaked demographically in 2023, Slovakia in 2024. Hungary´s population has been shrinking since 1980.

By 2040, V4 countries could lose up to 5-7 % of their populations. Median age may reach up from 45,9 years (Hungary) to 49,34 years (Poland).

By 2100, Poland could lose up to 50% and Slovakia over 30% of their populations.

Median age may reach up to 55—67 years by century's end, posing major challenges for defence, healthcare, and tech adoption.

STRATEGIC IMPLICATIONS:

Reskilling acceleration — As the need for drone-skilled professionals accelerates beyond the available talent pool, training platforms will become a priority. If governments fail to embed UAV content across school, vocational and defence curricula, talent shortages will delay fleet deployment and raise service costs. Military-to-civilian pathways can quickly move experienced veterans and technicians into civilian drone roles, if licensing and skill standards are aligned. Countries that treat human-capital investment strategically will capture the lion's share of high-value drone jobs and associated R&D.

Changing labour market — Ageing and shrinking populations (particularly in Central Europe) will make drones essential for filling labour gaps in various field like logistics, agriculture, infrastructure inspection, emergency response, and public safety. Their adoption will create new roles, whereas it will render others obsolete.
Customisation of services — Demographic splits will shape how drone products and services are designed. Firms will need to tailor features to different user groups. Retirees who rely on drones for medical deliveries and Gen Z hobbyists seeking customization will each bring distinct expectations for functionality, accessibility, and personalization.

8. ADMINISTRATIVE AND INFRASTRUCTURE CAPACITY

The development of drone-enabling administration and infrastructure forms the backbone of a *comprehensive ecosystem* that translates regulations into practical, operational frameworks. This ecosystem serves as a critical enabler, essential for unlocking the full potential of drone services both in the commercial and the public sectors.

At its core lies *Unmanned Traffic Management* (UTM), a key component that, ideally, will progressively integrate with existing Air Traffic Management (ATM) systems. Achieving this requires a concerted and coordinated effort among regulators, policy planners, and policymakers. Furthermore, it will necessitate sustainable financing and adequate administrative capacities within public authorities.

> ***PWC expects that the number of drone operations will double by 2029 and over 95% of drone traffic will likely be for drone delivery services. The successful scaling of drone operations depends on the deployment of effective UTM systems.***[70]

Besides the UTM, a robust, secure, and resilient *communication infrastructure* is paramount. This includes ensuring reliable coverage — even in remote areas — with high-speed, low-latency connections. A critical aspect of this effort must be a strong emphasis on cybersecurity, data protection, and the provision of interference-free communication networks capable of supporting complex drone operations.

A comprehensive range of *support infrastructure* will also be indispensable for the creation of a functional drone ecosystem. This includes physical assets such as vertiports, maintenance, repair, and recycling facilities, as well as innovation-enabling environments like test sites, sandboxes[71], and large-scale demonstrators.[72]

Building and operating this infrastructure presents both massive challenges and significant opportunities for the drone sector and society. The establishment of such an extensive ecosystem requires considerable *investments*. Especially in the nascent stages, achieving a breakthrough may call for well-planned, targeted initiatives supported by public funding and subsidies. To avoid inefficient trial-and-error strategies, the use of *regulatory sandboxes, large-scale demonstrators, and digital twin technologies* could provide a more systematic pathway for infrastructure development.

	REGISTERED DRONE OPERATORS	REGISTERED DRONE OPERATORS PER 1000 POPULATION	A1/A3 PILOT CERTIFICATE	A2 PILOT CERTIFICATE	STS REMOTE PILOT CERTIFICATE
CZECHIA	71 950	**6.60**	72 451	3 187	0
HUNGARY	6 127	**0.64**	2 963	1 601	10
POLAND	302 801	**8.30**	227 491	38 259	12 731
SLOVAKIA	4 225	**0.78**	909	178	89
EU	1 871 210	**4.15**	1 172 526	236,869	74 781
EASA MEMBER STATES	2 001 669	**4.30**	1 476 340	255 822	75 001

Source: EASA Drone Economy Dashboard - 20224 Data from EASA Member States

Finally, with the anticipated quantitative rise of drone operations the *automation of UTM processes* is likely to follow.[73] Addressing the complexity, speed, and scope of future drone traffic management would ultimately require the transition from manual administrative tasks to AI-driven automated decision-making, ensuring scalability and operational efficiency within the ecosystem.

STRATEGIC CONSEQUENCES:

- *Drones integrated to critical infrastructure* — The increasing deployment of drones across sectors such as military, medical deliveries, law enforcement, crisis management, and emergency response may position drone infrastructure itself as a component of national critical infrastructure. This shift carries significant implications for the resilience, protection, and security of drone-related systems, their reliability, and the integrity of associated supply chains. Ensuring the safety and availability of these services will demand heightened attention to physical and cybersecurity aspects of the infrastructure.

- *New role for local municipalities* — As drones expand their services in urban environments, local municipalities could emerge as key stakeholders within the UTM ecosystem. With their direct knowledge of local conditions, stakeholders, and community needs, local administrations are well-positioned to contribute actively to UTM planning. This evolution may elevate spatial planning to a three-dimensional level, incorporating the definition and management of geozones within the jurisdiction of respective local authorities.

- *Public-private partnerships* — Establishing a robust, secure, and sustainable drone ecosystem will require a comprehensive and collaborative approach involving both public institutions and private sector actors. Success depends on the seamless integration of regulation, urban and spatial planning, sustainable financing mechanisms, reliable connectivity, resilient supply chains, supporting services, and effective law enforcement frameworks. Achieving this will call for strategic partnerships, cross-sector cooperation, and a shared commitment to long-term ecosystem growth and resilience.

Chapter III: Four Drone Futures

Scenarios play a central role in strategic foresight. They synthesize intelligence gathered throughout the process and provide a foundation for identifying risks, opportunities, and recommendations. They are not predictions but plausible alternative pathways. In practice, the future will likely combine elements from multiple scenarios rather than unfold as a single trajectory.

The scenario is the archetypical product of futures studies because it embodies the central principles of the discipline:

- It is vitally important that we think deeply and creatively about the future, or else we run the risk of being surprised and unprepared;
- At the same time, the future is uncertain so we must prepare for multiple plausible futures, not just the one we expect to happen.[74]

Peter Bishop, Andy Hines and Terry Collins

The following scenarios are exploratory rather than normative. They do not favour a specific audience or promote one preferred outcome. Instead, they outline four alternative development trajectories, providing a framework to test the strategies of stakeholders in both governance and business. A robust policy, business plan, or strategy is one that enables an organization to survive — and ideally thrive — across most, if not all, scenarios. Effective strategies should therefore also include contingency measures for those scenarios in which they face significant challenges.

The four scenarios are not confined to the V4 countries and Ukraine. In today's interconnected world, powerful external factors — geopolitical competition, diverse regulatory frameworks, established production leaders such as China, and the ongoing Russian war in Ukraine — are impossible to ignore. These scenarios are intentionally archetypal, designed to encourage big-picture, context-driven thinking rather than narrow focus on detail.

Courtesy of UpVision, Czechoslovak Group a.s.

DRONE BONANZA

Development leads to integrated smart societies, where drones are ubiquitous and integrated into the functioning of both urban and rural life. Drones are no longer novelties but essential components of everyday life, utilised across commercial sectors and public services.

FRAGMENTED SKY

Uneven drone development leads to regional and international disparities, patchy adoption and inequality. Fragmented deployment of drones is not the result of outright rejection or authoritarian control, but takes place due to asymmetrical development, infrastructure gaps, regulatory inconsistency, and economic disparity.

REGULATORY NIGHTMARE

A series of high-profile incidents (collisions, terrorism, crime, mass surveillance), in combination with "drone fatigue" (noise, privacy, accidents) erode trust and trigger public outcry followed by strict regulatory responses. Geopolitical tensions and differing approaches to drone adoption in individual counties lead to a fragmented global market and creation of mutually exclusive regulation clusters.

AUTHORITARIAN TURN

Evolution of drone integration is highly controlled. Their ubiquity primarily serves centralized power, control surveillance, law enforcement and economic interests of state-aligned enterprises.

1. DRONE BONANZA

Autonomous drones are no longer novelties but vital arteries of everyday life. Streets buzz with drones performing essential tasks. Police surveillance drones equipped with advanced AI patrol urban spaces, reducing crime and improving emergency response times. Drones equipped with thermal imaging and night vision assist first responders and deliver life-saving supplies — such as defibrillators or blood packs — within minutes.

Drone-based commercial services thrive. First "drone highways" are emerging through dedicated air corridors managed by AI-driven cloud command centres and secured with blockchain identification. The city's digital twin receives constant streams of drone-generated data, enabling urban planning and predictive infrastructure maintenance.

Urban air mobility elements are being implemented in tech-savvy cities. Electric Vertical Take-off and Landing (eVTOL) vehicles ferry people between suburban vertiports and downtown landing pads. Concerns over safety, privacy, and noise are balanced against efficiency, economic, and environmental benefits of drone services. The drone boom spurs new industries in maintenance, upgrades, data analytics, software, and recycling. Advanced hydrogen fuel-cell propulsion extends endurance and enhanced operational efficiency.

In rural and remote areas, drones serve as lifelines. Precision agriculture optimizes irrigation and fertilization, boosting yields and strengthening food security under climate stress. In areas prone to extreme weather, drones equipped with solar-powered propulsion systems perform extended missions, monitoring environmental conditions, and providing real-time data critical for disaster prevention and mitigation. For marginalized communities, drones bridge vital infrastructure gaps.

Internationally, drone airspace regulations become increasingly harmonized, enabling efficient cross-border operations. Some countries previously lagging in infrastructure leapfrog traditional development hurdles by early adoption of drone-friendly systems, turning technological scarcity into a strategic advantage.

However, this ubiquity brings risks. Drone espionage and malicious use remain critical threats, necessitating advanced counter-drone technologies and robust legal frameworks that carefully balance benefits with safety, security and privacy. Advanced AI-driven drone swarms have raised both opportunities and new ethical challenges, necessitating stringent regulation and continual public dialogue about autonomy and oversight.

In these smart societies of tomorrow, drones empower rather than replace humans, taking on hazardous tasks, maintaining urban and rural infrastructure, and providing crucial humanitarian aid within clearly defined ethical, legal, and technological boundaries. Citizens recognize the benefits, from public safety to environmental sustainability, as clearly outweighing concerns, maintaining a balance between innovation, privacy, and security.

2. FRAGMENTED SKY

Uneven development of drone technologies, varying regulations, and diverse infrastructure create regional and international disparities. These factors result in patchy adoption patterns and growing inequality in access to benefits of drone technologies. The fragmented deployment of drones does not result from outright bans or authoritarian restrictions but rather stems from uneven technological progress, infrastructure gaps, inconsistent rules, economic divides, and differing social and political preferences.

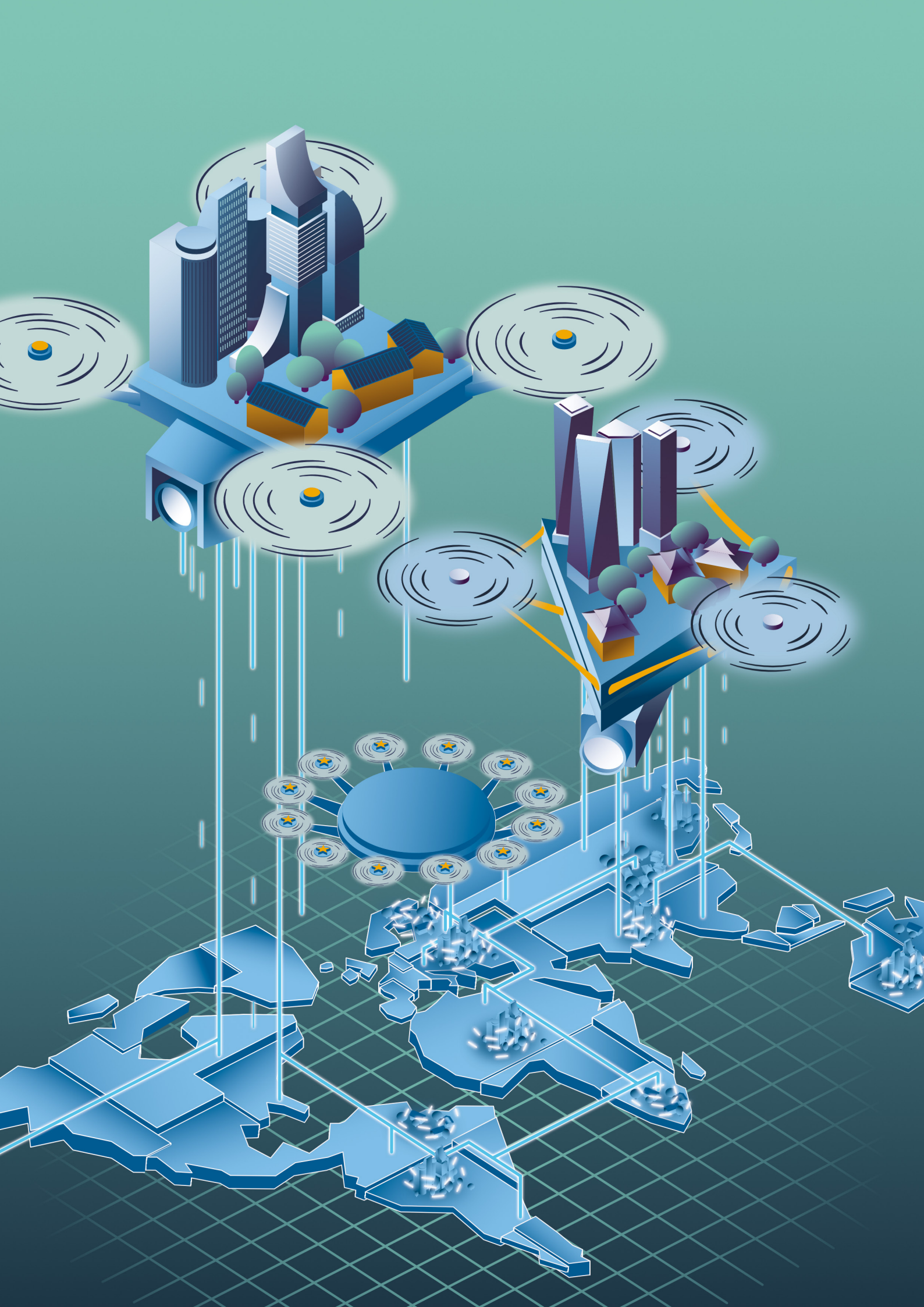
Approaches vary not only across countries but also within them. Regulatory powers are frequently decentralized, with local authorities controlling low-altitude airspace within their jurisdictions, shaping rules to reflect local political and public expectations. This creates tensions between tech-savvy urban centres and rural areas that struggle to keep pace due to limited technological capacity, infrastructure, human or financial resources. Approaches may differ due to political preferences. While some municipalities readily embrace drones, others impose extensive safety assurances.

“Islands of innovation” emerge: smart cities, affluent regions, and developed countries host thriving drone ecosystems, while others fall behind due to inadequate infrastructure, political reluctance, restrictive regulations, or economic constraints, widening regional inequalities. Uneven development leads to jurisdictional conflicts among municipal, regional, and national authorities. Overcoming these differences may require coordinated policy and targeted state support.

Drones become politicised. On one side, governments face demands from less developed regions seeking support for integration into the drone economy. On the other, resistance movements emerge, opposing drone deployment due to genuine or perceived concerns over impacts on security, privacy, and human rights.

Sectoral tensions persist. Governments often prioritize drone applications serving public interests — such as defence, law enforcement, crisis response, search and rescue, medical services, or environmental monitoring. Conversely, commercial and recreational applications receive lower regulatory priority and financial support, limiting their growth potential.

Globally, competing drone ecosystems take shape. Major powers build distinct drone ecosystems, characterized by divergent regulations, standards, and production hubs. This fragmentation complicates trade, compliance, and interoperability. Firms face significant barriers when scaling internationally. Consequently, global companies resort to market segmentation, offering tailored products and services to different jurisdictions, further fracturing innovation landscapes. Technologically advanced nations export drone technologies with political or economic conditions attached, while other countries advocate for “drone sovereignty” and technological independence. This dynamic intensifies global tensions, particularly concerning access to and control over critical raw materials essential for drone production, deepening economic and geopolitical divides.



3. REGULATORY NIGHTMARE

A series of high-profile incidents—collisions, terrorist attacks, illicit operations, smuggling, revelations of mass aerial surveillance, cyberattacks—collide with growing "drone fatigue" over noise and privacy, shredding public trust and fuelling anti-drone movements. Lawmakers, sensing electoral peril, reply with sweeping restrictions: freezing autonomous permissions, raising insurance requirements, and multiplying no-fly zones.

Rising geopolitical tensions and different national risk tolerances split the global market into separate regulatory clusters. A surge of tech nationalism drives regions to develop their own drone components, rules and standards, complicating cross-border trade and raising cost of operations, putting it out of reach for most start-ups. Global supply chains are disrupted while R&D hubs shift to more permissive jurisdictions, widening the technology gap and fuelling brain drain.

Public backlash sparks strong anti-drone movements that demand "quiet-sky" zones or outright bans in urban areas, pushing authorities at national, regional, and city levels to issue a maze of conflicting rules. This patchwork, different operational conditions, various certification requirements, or distinct data-storage demands, drive compliance costs sky-high. Unsettled ethical issues lead authorities to pause fully autonomous flights and tighten controls on drone-collected data, trapping the industry in a "fear-driven" state that limits how drones can be used.

Court cases multiply, creating a climate that is slowing innovation and pushing investors away. Investors pull money from drones, and start-ups pivot to alternatives, leaving only large firms able to navigate and comply with complex regulatory demands. These corporations consolidate power, offering "regulation-as-a-service" to smaller stakeholders, strengthening their market dominance and speeding up consolidation into a few wealthy industry giants.

High legal and investment barriers limit drone adoption to a few low-risk uses such as infrastructure inspection in remote regions or national security. Ambitious projects for urban mobility and logistics are delayed or abandoned. With legitimate opportunities shrinking, illicit operators thrive, employing spoofed IDs and modular components to bypass geofences. Illegal activities expand into a thriving black market.

The result is a self-reinforcing cycle: public fear prompts fragmented rules, fragmentation raise costs, high costs push talent away and shrink the field mostly to the big players, who are interested in keeping strict rules, since the heavy compliance burden shuts out smaller rivals — thus keeping the market tightly controlled and stuck in a long-term "regulatory nightmare."


NIMBY
SECURITY
RIVACY

4. AUTHORITARIAN TURN

Drones become central to state control over society. In this world, drones emerge as both the enablers and symbols of a new era of state power.

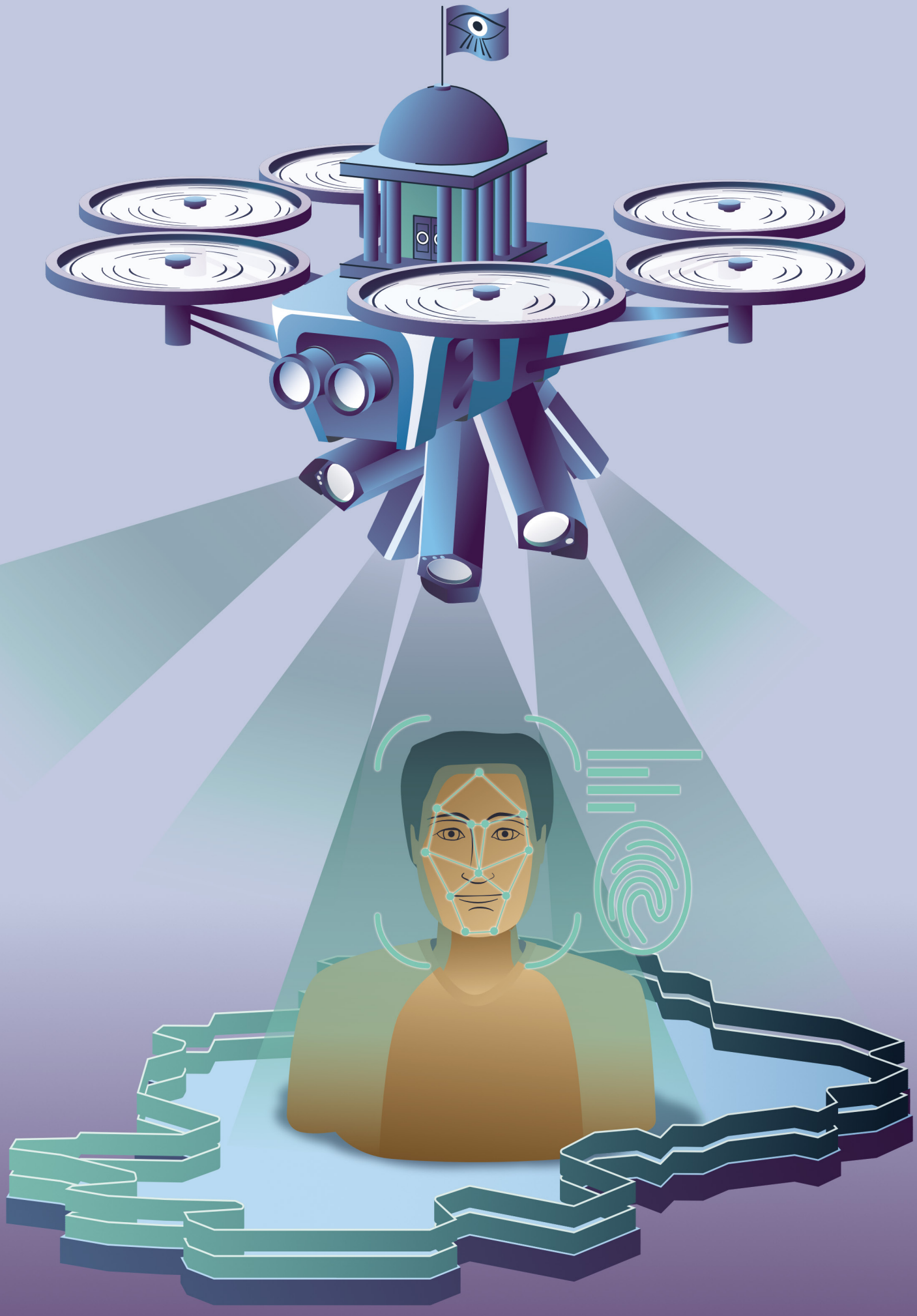
Both domestic and international political landscapes — whether nominally democratic or authoritarian — shape and amplify state use of drones as powerful tools for control. Even states with democratic façades may gradually enforce strict drone regulations, reserving extensive drone use primarily for government purposes such as surveillance, border control, policing, and intelligence. The state defence sector thrives, amplified by global volatility and "drone races" between the powers. Commercial drone activities are confined to narrow, state-licensed applications, centralizing aerial capabilities in the hands of state. This limited scope of activities permitted for the private sector (e.g. in closed factories) requires state certification. Security justifies all restrictions.

A growing state surveillance apparatus emerges. Drones are strategic assets justified as essential for preventing misuse by various malicious actors, but their widespread state deployment risks transforming governance into a surveillance state. Counter-drone technologies are also monopolized by the state, outlawing private efforts to establish drone-free zones, which reinforces government dominance over both the skies and citizens. Geo-fenced areas are enforced by automated counter-drone response.

While private companies may profit, their primary or exclusive customer is the state. This dependency cultivates tight alliances between large technology firms and government agencies, granting these conglomerates privileged access to state funding and massive troves of data. Such data collection and analysis become critical tools for maintaining state control, eroding individual rights and freedoms in the process. Large defence and tech companies quickly consolidate the market.

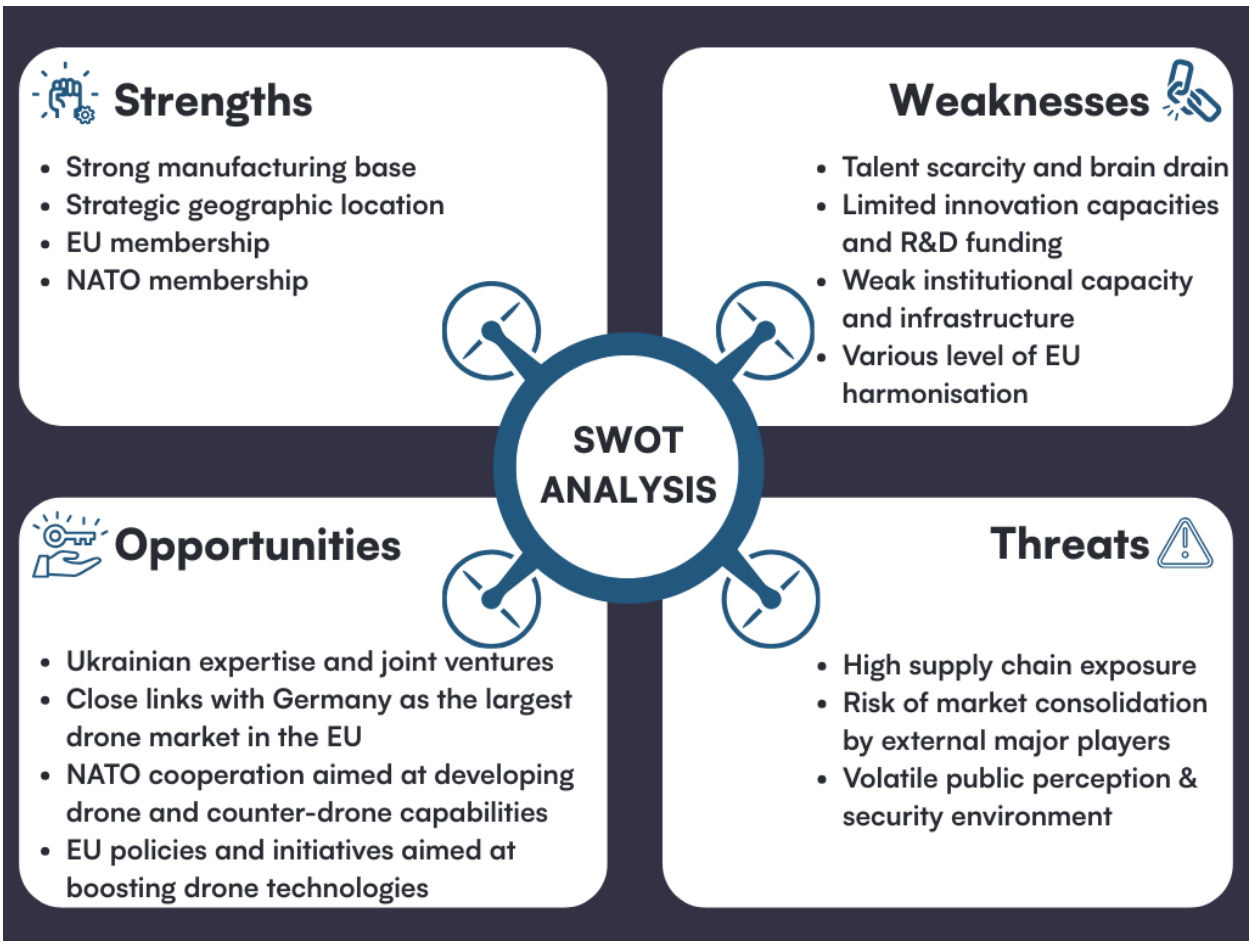
Benefits exist — improved public safety, stronger border control, more effective crisis response, wildlife management, climate adaptation — but at the cost of pervasive monitoring that can be exploited to entrench authoritarian practices and suppress dissent, transforming the state into an all-seeing monopoly.

Public opinion on this drone-enabled order varies. Many citizens accept or even welcome heightened surveillance in exchange for safety and security, public order, and good quality of state-delivered services. It can be further incentivised by the state through social credit systems, linking individuals' behaviour with social benefits. Others resist, attempting to carve out drone-free zones, to gain individual anti-drone protection or provide legally unavailable drone services through illicit means, deepening societal divides along economic, geographic, and ideological lines.



Chapter IV: Risks and Opportunities

The SWOT analysis highlights the key strengths, weaknesses, opportunities, and threats shaping drone sector development in the V4 countries. Situated at the heart of Europe, with strong industrial foundations and EU and NATO membership, the region holds significant potential. At the same time, structural weaknesses, external dependencies, and global market risks underscore the need to address vulnerabilities if the V4 is to realize its full potential in this emerging field.



STRENGTHS

Central Europe's strong manufacturing base positions it as a potential competitive hub for drone production. The robust industry sector, largely driven by automotive production, contributes 24—30% of GDP[75] across the region. The region also has capabilities in the aerospace sector.[76] This could provide a potential foundation for transformation towards drone sector, a shift taken by a leading player in drone production[77], and one that some automotive brands are already beginning to pursue.[78] The V4's strategic location, bordering Ukraine — a current leader in military drone adaptation, development and innovation — further strengthens the region's potential for drone development and cross-border synergies. EU membership offers free access to a 450 million-strong market, harmonized regulations, export credibility, and trade power through existing free trade agreements.[79] NATO membership adds stability and security guarantees, alongside opportunities for cooperation with Allies in joint procurement, R&D, and expertise-sharing.

WEAKNESSES

The region struggles with brain drain and a shortage of specialized high-tech talent, which increases labour costs and limits innovation capacity compared to global leaders.[80] R&D investment remains below the EU average, restricting domestic funding for drone development, though Polish investments into the U-Space being

a positive exception in the region.[81] Gaps in 5G coverage outside urban centres further constrain integration. In addition, uneven levels of EU harmonisation within the V4 and across the Union create regulatory and operational inconsistencies that may slow down cross-border cooperation.

	THE HUMAN FLIGHT AND BRAIN DRAIN INDICATOR 2023*	GLOBAL INNOVATIO N INDEX 2024**	PATENTS PER MILLION INHABITANTS 2023***
CZECHIA	41 (14)	30 (16)	35 (18)
HUNGARY	49 (17)	36 (20)	41 (22)
POLAND	66 (20)	40 (22)	23 (12)
SLOVAKIA	52 (19)	46 (26)	40 (21)
	* OUT OF 179 STATES	** OUT OF 133 STATES	*** OUT OF 118 STATES

Ranking of states globally and within the EU (in brackets).[82]

OPPORTUNITIES

The V4 region may strategically leverage not only its geographic position but also its linguistic and cultural proximity to Ukraine, enabling it to attract specialized expertise, technological know-how, and skilled talent in the drone sector. Close economic ties with Germany — the EU's largest market, with 680,000 registered drone operators (36% of the EU total)[83] — further strengthen this potential, given strong trade and investment relations[84] and the number of interconnected companies.[85] These factors create a foundation for joint ventures[86], new investment and innovation opportunities, while also supporting regional cooperation and positioning the V4 as both a competitive industrial hub and a reliable partner in drone development and deployment.

The importance of drones and counter-drone capabilities is recognized not only by individual states[87] but also in EU strategic documents, such as the White Paper for European Defence — Readiness 2030[88], the European Defence Industrial Strategy[89], the EU Strategic Compass[90] and the Capability Development Plan, creating opportunities for EU wide projects and partnerships, and participation in EU policies and funds supporting development of key drone and counter-drone technologies. Likewise, NATO membership offers opportunities to participate in activities of Defence Innovation Accelerator for the North Atlantic (DIANA) and NATO Innovation Fund, which promote progress in AI, autonomy, and unmanned systems. In addition, NATO Support and Procurement Agency has established a framework agreement for the supply and support of nano-class drones[91], while more broadly NATO promotes multinational capability cooperation through High Visibility Projects in key defence domains, including unmanned systems.[92]

THREATS

The V4 drone sector faces threats from volatile public perception, cybersecurity risks, and geopolitical tensions, which could trigger government interventions limiting adoption and development of drones. Global market turbulence, trade wars, and export restrictions[93], amplified by China's dominance in critical raw materials and components, create vulnerabilities, particularly for highly trade-dependent Central European economies.[94] Reliance on external supply chains and relatively small domestic markets makes the region especially exposed to global shocks. Furthermore, growing market consolidation risks marginalizing local and regional SMEs, as global players strengthen their dominance[95] and new major entrants are drawn to the growing drone market.

Chapter V: Recommendations

FOR POLICY-MAKERS

- Provide legal certainty
- Ensure the safety of skies
- Promote training, education and investments in human resources
- Integrate drone sector to economic diplomacy
- Prepare a comprehensive strategy for low-altitude economy

FOR BUSINESSES

- Pursue an active engagement and advocacy strategy
- Actively shape partnerships with public agencies
- Embed security across the entire drone lifecycle
- Prepare for market consolidation
- Expand into the drone services value chain

RECOMMENDATIONS FOR POLICY-MAKERS

What needs to be done to unlock the full potential of drone technology in Central Europe?

1) *Provide legal certainty* — A stable, transparent, and predictable regulatory environment must form the cornerstone of drone governance. Both over-regulation and regulatory vacuums risk undermining progress. To unlock the full potential of the drone economy, rules should balance innovation with security, safety and business flexibility. Legal certainty should remain the central objective, supported by regular dialogue with industry and cross-departmental coordination. Regulatory sandboxes should serve as testing grounds before new frameworks are introduced. While national approaches differ, V4 countries could strive to form a vanguard in the EU by aligning their UTM systems, ensuring interoperability, and enabling seamless cross-border drone operations.

2) *Ensure the safety of skies* — As drones become embedded in critical infrastructure related operations, and as public and commercial services saturate the low altitude airspace, all three security dimensions — drones as security enablers, threats and vulnerabilities — will come to the forefront. In addition to clear regulation and robust UTM, reliable counter-drone capabilities will be essential, covering detection, identification, and mitigation. Tiered responses should range from passive monitoring to active neutralisation, supported by agreed tactics, techniques and procedures with clear rules of engagement to ensure responsible use of both drones and counter-drone measures.

3) *Promote training, education and invest in human resources* — Human roles in drone-affected industries will evolve rather than disappear. Governments should support training and education programmes, anticipating how drone generated automation and robotization will reshape labour markets. Preparing the workforce and economy in advance is essential to fully harness the benefits of low altitude economy and mitigate related risks. This requires investment in human capital as well as maintaining and attracting talent in an increasingly competitive international environment.

4) *Integrate drone sector to economic diplomacy* — Governments should include drone sector in their economic diplomacy to secure bilateral and multilateral partnerships and resilient supply chains for key drone components and critical raw materials. This may include V4 coordination to advocate for harmonisation of international norms and to represent Central European interests in EU programmes and strategies. Outreach towards Ukraine could create major opportunities for talent acquisition, the exchange of best practices, and potential future joint ventures.

5) *Prepare a comprehensive strategy for low-altitude economy* — To leverage the full potential of the drone sector, a comprehensive low-altitude economy strategy is needed. A clear vision with measurable objectives should encompass the regulatory and policy framework, robust and reliable infrastructure development, investment, innovation and R&D incentives. The strategy should be a product of a participatory multi-stakeholder process on the national level and come with a clear roadmap for implementation.

RECOMMENDATIONS FOR BUSINESSES

How will the development of drone technologies influence drone industry in the next decade?

1) *Pursue an active engagement and advocacy strategy* — Public perception of drones will remain volatile and politically sensitive. As the drone sector continues to grow, companies should invest in sectoral organization to strengthen participation in legislative and decision-making processes and communicate positive use cases of drone applications across socio-economic, generational, and geographic lines. By proactively shaping public policies and narratives, the industry can strengthen long-term trust and counter misinformation about drones and their applications.

2) *Actively shape partnerships with public agencies* — Demand in areas such as security, defence, law enforcement, crisis management or healthcare is likely to expand and receive preferential treatment from governments. Businesses should consider dedicating part of their operations to state-oriented functions, making their strategies more resilient under shifting market and political conditions.

3) *Embed security across the entire drone lifecycle* — Physical, cyber and data security should be embedded across the entire drone lifecycle — from initial design and development through manufacturing to infrastructure, training and customer instructions. Security concerns represent a key variable for drone acceptance. Integrating resilience and adherence to stringent EU data protection and transparency standards from the outset, will be essential for drone sector credibility.

4) *Prepare for market consolidation* — Market consolidation in the drone sector is highly likely due to rising legislative compliance demands, growing drone complexity and sophistication, constant need for innovation, limited funding, entry of major players, and political incentives to support regional champions. Firms should seek strategic partnerships and regional cooperation to remain competitive. While start-ups will continue to find niche opportunities, most growth will likely concentrate among larger players.

5) *Expand into the drone services value chain* — Businesses should take a holistic view of the emerging drone ecosystem. Beyond manufacturing and direct use cases, major opportunities could arise in drone-related support — maintenance, insurance, infrastructure, connectivity, or recycling. In addition, drone as a service (DaaS) is becoming a new business model with a promising potential. By positioning themselves within this broader service-and-support landscape, companies can capture value across the entire drone economy.

List of Abbreviations

AI — Artificial Intelligence

BVLOS — Beyond Visual Line of Sight

DaaS — Drone-as-a-Service

EASA — European Union Aviation Safety Agency

eVTOL — Electric Vertical Take-off and Landing

NAA — National Aviation Authority

OECD — Organization for Economic Cooperation and Development

UAS — Unmanned Aircraft System

UAV — Unnamed Aircraft Vehicle

UTM — Unmanned Traffic Management

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