COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

'A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe'

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Context

1. The European Union has the ambition to lead the transition to a healthy planet and a new digital world. Indeed, the objective of the European Green Deal[1] is to achieve climate neutrality by 2050[2]. The digitalisation of the economy should strengthen the Union's competitiveness and empower people with a new generation of technologies, leaving no one behind, in line with the European Pillar of Social Rights. Based on two strategic communications, namely, shaping Europe's digital future[3] and Europe's digital decade[4], the Commission set out the specific actions it will undertake to aid the creation of safe and secure digital services and markets.

2. The transport sector, including the emerging drone[5] sector and manned eVTOLs[6], should help in achieving this twin green and digital transition. The Commission's Sustainable and Smart Mobility Strategy[7] (SSMS) adopted in December 2020 provides an ambitious roadmap aimed at putting the European transport firmly on track for a sustainable, smart and resilient future. The Zero Pollution Action Plan[8] is linked within the SSMS with targets and actions on how clean the new EU transport policies should be, for instance on noise and air pollutants.

3. Among the actions set out in the SSMS, the Commission announced the preparation of 'A Drone Strategy 2.0 for a smart and sustainable unmanned aircraft eco-system in Europe' to be adopted by the end of 2022, setting out possible ways to guide the further development of this technology and its regulatory and commercial environment. This Communication is a reflection of that announcement.

4. The Commission has worked intensively since 2014 on building the foundations of a comprehensive EU policy in the field of drones. A first Communication setting out the foundations of this policy was adopted in 2014[9], followed by several major steps, such as

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[1]   https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

[2]   COM (2019) 640 final

[3]   https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en

[4]   https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

[5]   The term "drone" is the layman term for "Unmanned Aircraft Systems" which means an unmanned aircraft and the equipment to control it remotely.

[6]   'electric Vertical Take Off and Landing' aircraft (eVTOL) are used for the transport of people and cargo initially with a pilot on board controlling the flight, in the future, they will have the ability to fly autonomously using the latest technologies when regulations allow.

[7]   COM(2020) 789 final.

[8]   Communication on an EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'.

[9]   COM(2014) 207 final, "A new era for aviation - Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner"

the 'Aviation strategy for Europe' of 2015[10] and several landmark Declarations endorsed at High Level drone conferences held in Riga, Warsaw, Helsinki, and Amsterdam[11].

5. The Union has played a key role in developing a comprehensive drone regulatory framework for its 27 Member States, which is successfully contributing to the development of this promising sector. Under the new Basic Regulation[12] adopted in 2018, all drones, irrespective of their weight are subject to the Union harmonised safety rules. Based on those safety essential requirements and following the risk-based operation-centric approach embedded in the Basic Regulation, the Commission adopted in 2019 a series of rules regulating operations with drones (i.e. Commission Implementing Regulation (EU) 2019/947 on the rules and procedures for the operation of unmanned aircraft[13] and Commission Delegated Regulation (EU) 2019/945 on operators of unmanned aircraft systems[14]). In addition, to ensure the safety of drone operations in airspace, the Commission adopted in 2020 three Implementing Regulations on U-space[15], which provide the air traffic management system for drones. Those rules are the corner stone of the new Union drone regulatory framework, facilitating the development of the drone industry and the drone services market.

6. Developing Union rules for drones has been all the more important as there were very few regulatory national frameworks in place in the EU Member States, or at the global level. Unlike in other sectors, where the EU regulatory harmonisation process started after the adoption at national level of sometimes diverging regulation, here, it has been possible to start from the outset with a truly common set of rules. This continues to present a unique opportunity not to be missed.

7. Today, the actions announced in the 2015 Aviation Strategy have been largely completed and it is now time for an updated Union policy on drones, building on the achievements to date and taking into consideration the new policy priorities and new challenges, as well as recent technological, regulatory and commercial developments.

8. On the military side, drones have been used in the defence sector for the last 30 years, but the European military drone capabilities remain less mature than in other regions of the

[10]   COM(2015) 598 final, "An Aviation Strategy for Europe"

[11]   High Level Drone Conferences in Riga (2015), Warsaw (2016), Helsinki (2017), Amsterdam (2018, 2019)

[12]   Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91, JO L 212 du 22.8.2018, p. 1.

[13]   Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, O L 152, 11.6.2019, p.1.

[14]   Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, OJ L 152, 11.6.2019, p.1.

[15]   Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space, OJL 139, 23.4.2021, p. 161; Commission Implementing Regulation (EU) 2021/665 of 22 April 2021 amending Implementing Regulation (EU) 2017/373 as regards requirements for providers of air traffic management/air navigation services and other air traffic management network functions in the U-space airspace designated in controlled airspace, OJ L 139, 23.4.2021, p. 184; Commission Implementing Regulation (EU) 2021/666 of 22 April 2021 amending Regulation (EU) No 923/2012 as regards requirements for manned aviation operating in U-space airspace, OJ L 139, 23.4.2021, p. 187.

world, whilst the potential contribution of military drones to future European Strategic autonomy is widely recognised. The European Commission[16] has shown its willingness together with the High Representative[17] to reinforce the EU's role as a geopolitical actor, a position recognised by the European Council[18] in its endorsement of the Strategic Compass[19] approved by the Council on 21 March 2022, with a clear objective to build a stronger and more capable EU in security and defence.

9. This Drone Strategy[20] should therefore contribute not only to the objectives set out in the SSMS, but also to the objectives of the 'Action plan on synergies between civil, defence and space industries'[21] adopted in February 2020, and which includes an EU Drone Technologies flagship project. That Action plan identified several areas of possible cross-fertilisation whereby defence projects may benefit from innovative developments of SMEs for civilian drones and civil aeronautics may benefit from developments in the field of defence.

10. In 2020, the Commission adopted two Communications, which both introduced new policy actions to counter possible threats that drones could pose. The EU Security Union Strategy[22] and the Counter-Terrorism Agenda[23] stated that the threat of non-cooperative drones is a serious concern in Europe that needs to be addressed. Moreover, the proposed Directive on the resilience of critical entities (CER Directive)[24] will introduce obligations on Member States and critical entities to conduct risk assessments, and on critical entities to take technical, security and organisational measures to ensure their resilience against identified risks. This security dimension therefore also needs to be addressed in this Drone Strategy.

11. A Staff Working Document setting out the assessment of the challenges that the drone sector faces, as well as the analysis and data underpinning the new Drone Strategy 2.0., which has been conducted by the Commission with the support of an external consultant, accompanies this Communication[25].

Unleashing the growth potential of drones

12. Drones are already used as daily tools in ever broadening array of data intensive-demanding economic sectors, such as agriculture, construction, surveillance, film-making, healthcare,

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[16]   COM(2022) 60, Communication on Commission contribution to European defence, 15.2.2022.

[17]   JOIN(2022) 24, Communication on the Defence Investment Gaps Analysis and Way Forward, 18.5.2022

[18]   EUCO 1/22, European Council conclusions 24-25 March 2022, 29.3.2022 - EUCO 21/22 European Council conclusions 30-31 May 2022, 31.5.2022

[19]   A Strategic Compass for Security and Defence "For a European Union that protects its citizens, values and interests and contributes to international peace and security", 21.03.2022.

[20]   While recognising the differences and commonalities between the different use cases and the need to avoid taking a one-size fits all approach to all issues, for further reference in the following text, the term 'drones' will be used to cover all vehicles involved in Innovative Aerial Services, including manned eVTOL (electrically powered vehicles capable of vertical take-off and landing), as well as Unmanned Aircraft Systems used in the defence sector.

[21]   Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "Action Plan on synergies between civil, defence and space industries", COM(2021) 70 final, 22.02.2021.

[22]   COM(2020) 605 final of 24 July 2020

[23]   COM (2020) 795 final of 9 December 2020

[24]   COM(2020) 829 final The European Parliament and the Council reached political agreement on the proposed Directive on 28 June 2022 (Security Union (europa.eu)

[25]   Fact finding study preparing a "Drone Strategy 2.0", Final report, Ecorys, 2022

medical emergency, energy, environment, public safety and security. Drones could be used in the future also, for example, as platforms for communication hubs or for weather and pollution monitoring, and for maintenance of renewable energy installations, especially for offshore wind.

13. In the transport sector, the use of drones for deliveries is already being tested in many countries. First pilot trials in passenger transport are expected to take place in the European Union within the coming years. It is important that the Union safeguards its open strategic autonomy in this area.

14. The drone eco-system also includes the defence/military dimension for the purpose of achieving technological synergies between civil, security and defence sectors. Reaping synergies between the civil and the military use of drones, including counter-drone technologies, is an important success factor for the competitiveness of the European drone eco-system as well as the Union's defence capabilities.

15. On the civil side, the drone services market includes three segments which are interlinked: the new Innovative Aerial Services (IAS)[26], including two segments: "Aerial Operations" (surveillance, inspection, mapping, imaging, …), and "Innovative Air Mobility" (IAM)[27], covering international, regional and Urban Air Mobility (UAM) and thirdly, "U-space". Although first IAM operations are expected to be conducted with manned eVTOL aircraft, such operations will likely be in the future performed on similar platforms but remotely piloted and then fully autonomous.

16. With the right framework in place, the drone services market in Europe could by 2030 reach a value of €14.5 billion, with a compound annual growth rate of 12.3%, and create 145,000 jobs in the EU[28]. The different segments of this market are constantly growing in terms of companies and volume of operations.

17. Against this background, the existing strategy from 2015 has been overtaken by these new developments and a new strategy is needed at EU level to provide a forward-looking vision for the future holistic development of the sector.

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[26]   Due to the lack of a definition and in line with the regulatory operation centric approach, EASA has developed the notion of Innovative Aerial Services (IAS) which corresponds to the set of operations and/or services enabled by the new airborne technologies – the operations and/or services include both the transportation of passengers and/or cargo and aerial operations (e.g. surveillance, inspections, mapping, telecommunication networking).

[27]   The concept of Innovative Air Mobility ('IAM') is to accommodate operations with novel aircraft designs (that do not automatically fall under one of the known categories, but which have vertical take-off and landing (VTOL) capabilities for take-off and landing, specific (distributed) propulsion features, can be operated in unmanned configuration, etc.), that are conceived to offer a new air mobility of people and cargo, in particular in congested (urban) areas, based on an integrated air and ground-based infrastructure. IAM describes a diverse array of aircraft types (such as manned and unmanned), whose designs are enabled by ongoing innovations particularly in the areas of hybrid and electrification of propulsion systems, energy storage, lightweight materials, digitalisation and automation. These innovations have made possible an array of novel designs spanning multi-rotor, tilt wing, tilt-rotor, powered wing, offering short take-off and landing (STOL) through to VTOL capabilities.

[28]   Fact finding study preparing a "Drone Strategy 2.0", Final report, Ecorys, 2022.

The Commission's vision

18. Setting out a clear vision for the development of the drone sector will provide the foundation for the next steps at EU level to develop a thriving viable drone eco-system in the Union. This vision for 2030, which has been developed with the support of the Drone Leaders' Group[29], can be formulated as follows:

    - By 2030 drones and their required eco-system will have become an accepted part of the life of EU citizens.

    - Drones will be used to provide numerous services to the benefit of diversified civilian and defence end-users, including EU citizens, organisations, Member States and industry. Drones' aerial operations will include emergency services, inspections and surveillance using drones to gather data, as well as for the delivery of goods.

    - IAM services will start providing regular transport services of passengers, initially using aircraft with a pilot on board but with the ultimate aim to fully automate their operations. Drone services will effectively integrate or complement existing transportation systems and contribute to the decarbonisation of the transport system by providing an alternative to carbon intensive modes of transport, while minimising their impact on the environment throughout their life cycle. UAM will become a part of the future urban multimodal intelligent mobility ecosystem and the ground and air infrastructures enabling these transport services will be widely deployed and integrated.

    - An increased spectrum of distinct types of drones and use cases will coexist. The Union legislator, the Commission, the European Union Aviation Safety Agency (EASA) and the Member States all have an institutional responsibility to safeguard the safety, security and efficiency of their operations. They ensure that all drone services are provided in a manner that ensures safety, security, sustainability, privacy, and affordability, in line with citizens' expectations and addressing their concerns. Drones used for the transport of people and goods will be particularly oriented to the achievement of publicly accessible services, thus creating benefits for citizens and local communities.

    - The current U-space regulatory framework will have been completely rolled out in the EU. Additional advanced U-space services will support large scale highly automated and digitally connected affordable, safe, secure, and environmentally friendly unmanned aircraft operations in several Member States. The integration between manned and unmanned traffic in the same airspace will be initiated, inside and outside U-space airspace.

    - The EU drone industry will have become viable and accessible to EU citizens and businesses with an active participation of actors of all sizes, including a variety of diversified SME's, fostering collaboration between all actors, and broadening the spectrum significantly beyond the limited number of global multinational stakeholders.

    - Civil-defence industry synergies will be systematically identified and exploited. They will benefit both sectors. They will improve the competitiveness of European

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[29] Drone Leaders' Group Report: https://transport.ec.europa.eu/news/drone-leaders-group-supports-preparation-drone-strategy-20-2022-05-02_en

industry and strengthen Europe's strategic autonomy, by allowing Member States to rely on competitive drone technology of European origin.

- The drone eco-system will provide jobs, promote and protect European technological know-how and allow for growth opportunities for the EU economy as a whole, enabling European companies, including new SMEs to grow and flourish as global leaders.

Making the vision a reality

19. This strategy covers ten areas which should unfold the development of the drone eco-system and help to achieve the above vision. They were identified on the basis of the input received during wide-ranging consultations which are described in the accompanying Staff Working Document. Those areas are grouped under two main objectives. The first one is *to build the Union drone service market*, and the second one is *to strengthen the Union's civil, security and defence industry capabilities and synergies*. Each area aims to reinforce the efficiency of the different segments of the overall drone value chain, ranging from drone operators, drone manufacturers, the defence sector, counter drones to the U-space.

A. Building the Union drone services market

1. Improving airspace capabilities (U-space development and integration with Air Traffic Management)

20. One of the major objectives of the existing Air Traffic Management (ATM) and Standardised European Rules of the Air (SERA)[30] is to avoid collisions between aircraft. The SERA are built on the principle of "see and avoid" which is used by the pilot to avoid mid-air collision. Considering that, in drone operations, the intention is for the pilot not to be on-board, a strict adherence to this principle cannot be applied and hence collision risks need to be mitigated with adequate alternative means.

21. The integration of drones in the airspace therefore calls either for the revision of the existing aviation safety rules to take account of those differences, or for the development of entirely new rules designed specifically for those new entrants. The Union's strategy so far has been to progress on both fronts. In the first stage, the airspace for drones is separated from the airspace used for manned operations to then achieve in a second stage a full integration of both, allowing all airspace users (manned and unmanned, as well as IAM and regular air traffic, but also operators of State, including military, manned and unmanned aircraft) to safely and freely operate within the same airspace or transit between airspaces.

> **Flagship action 1: The Commission intends to adopt amendments to the Standardised European Rules of the Air and the Air Traffic Management/Air Navigation Services Regulation to safely integrate drone and piloted eVTOL operations.**

22. In terms of adapting airspace capabilities, in 2016 the Commission launched an initiative aimed at ensuring the safe and secure integration of drones into the airspace: the so-called U-Space, a bespoke, fully digital, and automated traffic management system that has been designed to enable the efficient and affordable scaling up of drone services. The U-Space

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[30] Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010 , OJ L 281, 13.10.2012, p. 1

should be as cost-effective as possible, while providing equitable access to airspace for a diversity of drone operators from across the EU and enabling military and State manned and unmanned aircraft operations in a safe and efficient manner.

23. U-space development was subsequently initiated in 2017 in the context of the Single European Sky ATM Research (SESAR) programme and is still the subject of ongoing research and innovation, in particular as regards more advanced U-space services.

24. An initial regulatory framework, the U-space regulatory package[31], was adopted by the Commission in 2021 to establish common U-space foundations and ensure the convergence of the pioneer implementation projects blossoming across the Union.

25. In the short to medium term, it is necessary to facilitate the roll-out of this initial regulatory framework. To that end, EASA, Air Navigation Service Providers and U-space service providers should agree on the necessary protocols to exchange information with Common Information Service provider, and better define navigation performance requirements. Accordingly, they should also prioritise the development of the related standards.

26. U-space service providers should also be able to capitalise on the existing mobile telecommunication technologies and standards, such as those resulting from the Aerial Connectivity Joint Activity[32] which is a collaboration by Unmanned Traffic Management and mobile communication entities aimed to promote interchange and understanding between the aviation and cellular communities, the purpose being to enhance information sharing and avoid incompatibilities between those groups. The use of U-space solutions and operational concepts for a more automated ATM should also be considered.

27. There also is a continuing need to support large scale demonstration and validation activities and harmonise efforts by pioneer projects to validate prototyping implementations and draft standards used during real life tests. To this end, EU stakeholders can take advantage of the Living Labs for Future Urban Ecosystems recently set up by the European Commission's Joint Research Centre (JRC)[33].

28. The Commission intends to continue to support research and development in order to build on the initial regulatory framework and enhance U-space deployment to support more advanced services and Innovative Air Mobility (IAM), in accordance with the European ATM Master Plan (MP) vision[34], and the Roadmaps to achieve this, as described in the Strategic Research and Innovation Agenda (SRIA) for the Digital European Sky[35].

29. This research and development should be designed to increasingly consider ATM and U-space together so that, by the time the full U-space is deployed, the two environments will have become one, fully integrated airspace, seamlessly encompassing small drones, IAM, manned aviation, and Higher Airspace Operations (HAO). As research continues in each thread, lessons from one environment should be applied to each of the others, so that the final air traffic management system is safe, economically viable and environmentally sustainable.

30. The Strategic Research and Innovation Agenda clearly describes the transformation from three separate Communication, Navigation and Surveillance (CNS) domains into one

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[31] Commission Implementing Regulations (EU) 2021/664, (EU) 2021/665 and (EU) 2021/666.
[32] https://www.gsma.com/iot/aerial-connectivity-joint-activity/
[33] https://ec.europa.eu/jrc/en/research-facility/living-labs-at-the-jrc
[34] European ATM Master Plan, Digitalising Europe's Aviation Infrastructure, Edition 2020, https://www.atmmasterplan.eu
[35] Strategic research and innovation agenda for the Digital European sky, Single European Sky ATM Research Joint Undertaking, 12 October 2020.

integrated CNS (ICNS) environment. This includes all current CNS technologies used for ATM, but also those needed to support U-space, Innovative Air Mobility, drone integration and Higher Airspace Operations. The SESAR programme, as envisaged in the SRIA, should look to ICNS as the mechanism by which all airspace users can inter-operate safely, while reducing costs and environmental impact through rationalisation and multi-use of existing and developmental technologies. This integration should include technologies from other domains, such as the telecommunications and the space industries, leveraging services and data of the EU Space programmes (EGNOS, Galileo, Copernicus and Secure Connectivity), and should address increased connectivity through digital communications as well as the more conventional elements. In this regard, synergies with the EU Space Programme will be further explored and the coordination strengthened to support resilient and robust drone navigation, as well as development of U-Space services, as enabler of Innovative Air Mobility. Research and demonstration under this Action should address both technological issues and the specific performance and certification requirements of all relevant technologies that arise from the evolving U-space and IAM domains.

> **Flagship action 2: The Commission will continue to promote coordinated research on integrated Communication, Navigation and Surveillance technologies to ensure the convergence between ATM and U-space environments.**

31. A key element for the fair and harmonised implementation of U-space across the Union, and the development of a competitive European market for drone services, is the pricing (and related oversight) of the Common Information Services (CIS), as well as the pricing of access to data necessary for such services. The SES2+ recast proposal of the Commission[36] proposes to establish clear pricing and data sharing rules necessary for the development of the U-Space market, thus its adoption by the Union legislator should take place without undue delay.

32. Whenever possible, the EU regulatory framework, including the U-space regulations, should be promoted with trading partners outside of the EU, and at the level of ICAO, as a basis for a future global drone regulatory framework to ensure consistent approaches with other Regions and at the global level. Such cooperation should also cover the review of ICAO Annex 2 (rules of the air) to cover drone operations' specificities.

2. Facilitating Aerial Operations

33. Drone operators performing Aerial Operations are an essential part of the drone value chain and one of the driving forces of the drone services market. They contribute to achieving competitive advantages in a wide spectrum of economic activities, ranging from surveillance, monitoring, mapping or filming, as well as medical and emergency services. Business models associated to Aerial Operations are more advanced than those pertaining to Innovative Air Mobility. However, they have not yet been fully implemented and to a large extent are still to be rolled out as external services. In fact, most Aerial Operations are currently taking place as internal services within companies, based on a clear business perspective.

34. The risk-based operation-centric approach that has underpinned the development of the EU regulatory framework for drones until now provides operators with more flexibility in operations compared to the previous national regulations applicable for unmanned aviation.

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[36] Commission amended proposal for a Regulation on the implementation of the Single European Sky, COM(2020) 579 final, 22.9.2020.

However, the markets for those services still remain relatively immature and mainly focused on research, innovation and testing activities. While this partly reflects the fact that the EU regulatory framework is relatively recent, the public consultations and workshops in preparation of this strategy highlighted two important elements. First, while safety is the first priority, the operation-centric policy should keep the safety requirements proportionate to the risk of operations, and secondly, in line with the principle of safety first and this operation-centric policy, there is a need to improve some regulatory aspects already in place to ensure a more harmonised application and legal certainty.

35. According to the feedback received during the consultation process, some industry stakeholders consider that in some cases, requirements to permit operational authorisations are disproportionate to address the level of risks from both an operational and financial point of view. The same also applies to real world testing and demonstration of new types of aerial operations for which the requirements are considered as too cumbersome. One of the risks for the drone operator is that the competent authority may reach the conclusion that the operation should be performed under the conditions of the 'certified' category[37], instead of the 'specific' category[38], the former requiring the certification of the aircraft, the operators and the remote pilot, as applicable.

36. As a large part of Aerial Operations present a low to a medium risk, more efforts could be made by the regulators to facilitate use-cases in the 'specific' category of drone operations. At this stage, the Commission adopted only two European Standard Scenarios targeting low risk operations in the 'specific' category. For those, drone operators are allowed to just send a declaration to the respective authority instead of applying and waiting for an authorisation. However, drones used in operations classified as medium risk of the specific category for which there is no possibility to declare, they may have to undergo a prior design verification by EASA leading to a 'design verification report'[39].

37. The Commission intends to review this situation to take account of the difficulties experienced in the initial implementation of the related procedure. To facilitate this process, EASA and the Member States should continue to develop adequate Accepted Means of Compliance and Guidance Materials for drone operations in the specific category in support of the specific operational risk assessment (SORA) methodology implementation and to support the further development of industry standards required for implementation of the drone regulations by industry. These standards should, where possible, be performance-based setting minimum requirements and not be descriptive so as to avoid that they become outdated.

38. In addition, the administrative burden related to the operational authorisation process could be alleviated by developing further European Standard Scenarios and pre-defined risk assessments[40]. Further developing this regulatory approach could also help to address some

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[37] 'certified' category means a category of UAS operation that is defined in Article 6 of Implementing Regulation (EU) 2019/947.

[38] 'specific' category means a category of UAS operations that is defined in Article 5 of Implementing Regulation (EU) 2019/947.

[39] EASA Guidelines on Design verification of UAS operated in the 'specific' category and classified in SAIL III and IV, Issue 1, 31.03.2021.

[40] European standard scenario (STS) and the pre-defined risk assessment (PDRA) aims to facilitate respectively the declarative and the permit application process by drone operators by ensuring that the risk assessment has already been performed in accordance with the SORA methodology for some low to medium risk operations performed in the 'Specific category'.

existing business uncertainty and support the inclusion of small and medium-sized enterprises in the drone operations market.

39. Finally, new European Standard Scenarios could also address specific needs related to State or military operations and maritime surveillance activities.

> **Flagship action 3: The Commission intends to adopt new European standard scenarios for low to medium risk aerial operations[41].**

40. The current regulatory flexibility, for example in the definition of 'UAS geographical zones'[42] or approval of cross-border operations, provided for in the EU drone regulatory framework could lead to different interpretations and implementation approaches by Member States, ultimately affecting market conditions. Therefore, the Commission will closely examine how regulations are implemented by the competent authorities. Ensuring harmonised implementation practices should also contribute to ensure a level playing field between Member States/regions, for example in case of cross border operations. More coordination between competent authorities should help to avoid the risk of de-harmonised national implementations of EU rules.

41. Member States should support further pilot projects which aim to increase awareness of drone operators in the 'open' and 'specific' categories in order to facilitate the development of applications and tools that enable automatic reporting of drone incidents and occurrences. Such data would enable validation of assumptions made when developing the 'specific' operational risk assessment required under Regulation (EU) 2019/947.

3. Developing Innovative Air Mobility

42. Innovative Air Mobility (IAM) consists of vehicles ranging from small drones used for cargo delivery operations to eVTOL aircraft, i.e. electrically powered aircraft capable of vertical take-off and landing for the transport of both goods and people. Indeed, multiple eVTOL developers are targeting passenger operations, built on economic efficiencies of electric power, nodal networks, and scalability to achieve competitive pricing and provide sustainable alternatives to existing travel services.

43. These technologies are attracting the attention of mobility actors and local authorities as a means of contributing to sustainable and integrated mobility across cities and regions by providing less polluting, less congesting and safer mobility solutions to local communities in urban, sub-urban and rural areas.

44. Innovative Air Mobility and Urban Air Mobility (UAM) include manned VTOL as well as drone operations falling under the 'certified' category which caters for those operations with the highest level of risk. Like manned aviation, drone operators, remote pilots, drones and manned VTOL aircraft should be subject to uniform rules and procedures so that drone operations are as safe as those in manned aviation. Today, there is a significant technical and safety regulatory gap which prevents such 'certified' operations from being performed. These should be addressed by new rules addressing the certification of aircraft, as well as the approval of the drone operator and the remote pilot licence by the competent authority.

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[41] Amending the Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft.

[42] Definitions for the terms given in the Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft.

> **Flagship action 4: The Commission intends to adopt rules for the 'certified' category of drone operations, addressing the initial and continued airworthiness of drones subject to certification; and the operational requirements applicable to manned VTOL-capable aircraft[43].**

45. In addition, the Commission intends to develop a regulatory framework for the certification of vertiports and other ground infrastructure. Such framework should appropriately take account of interfaces with aerodromes, interoperability and ensure an open access of equipment to ground infrastructures by drone operators. In this regard, the regulatory framework should ensure that those ground infrastructures do not become proprietary and follow the same open model as airports and heliports, where justified.

> **Flagship action 5: The Commission intends to adopt rules for the design and operations of vertiports under the scope of the EASA Basic Regulation[44].**

46. Although first Innovative Air Mobility operations are expected to be conducted with manned eVTOL aircraft, such operations will likely be in the future performed on similar platforms but remotely piloted and then fully autonomous. Therefore, it is necessary to support the transitioning phase and ensure a smooth integration of these new operational concepts in the current aviation domain, as well as the future multimodal transport system. The U-space system is expected to provide the means to safely and efficiently manage high-density traffic at low altitudes involving heterogeneous vehicles (small unmanned aircraft, eVTOL aircraft and conventional manned aircraft), including operations over populated areas and within controlled airspace. U-space will have to integrate seamlessly with the ATM system to ensure safe and fair access to airspace for all airspace users, including Urban Air Mobility flights departing from airports.

47. When designing future global technology solutions, the needs and specificities of all airspace users should be considered. Also, from a cost point of view, these solutions should be affordable. Airspace users such as recreational (gliders, paragliders, etc.) or ultra-light aircraft could benefit from 'light' electronic conspicuity solutions along with other airspace users and allow their free movement in the EU airspace.

48. The question of market access should also be addressed with due regard to the situation of the drone sector. Currently, the economic and financial conditions to obtain a Community

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[43] Amending the Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations; the Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems; the Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft; the Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council; and the Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010.

[44] Amending the Commission Regulation (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council Text with EEA relevance

Air Carrier operating licence are set out in Regulation (EC) 1008/2008[45]. This Regulation covers the transport of passengers, cargo and mail and after the adoption of the new Basic Regulation, which enlarged the application of Union rules to unmanned aircraft, is also applicable to drone operators. However, the existing air carrier licencing rules, which were originally designed to cover large Commercial Air Transport undertakings, might be disproportionate for drone operators. The Commission therefore intends to review this Regulation in order to ensure a fair market access based on common requirements, which better reflect the economic and financial situation of drone undertakings, for example on financial conditions or "Ownership and Control".

> **Flagship action 6: The Commission intends to develop balanced economic and financial requirements for licensing of drone operators.**

4. Ensuring sustainability and societal acceptance

49. The societal and environmental impact of Innovative Air Mobility operations must be recognised and should be tackled upfront with a set of Union instruments as social acceptance is key for the success of Innovative Aerial Services. Drone services should be promoted on the basis of inclusivity, affordable access and sustainability, and not be restricted to the "wealthy few".

50. As part of the preparation of an adequate regulatory framework for Innovative Air Mobility, EASA has conducted a comprehensive study on the societal acceptance of Urban Air Mobility operations across the European Union[46]. According to the results of the survey conducted by EASA, 83% of respondents have a positive initial attitude towards Urban Air Mobility, with 71% ready to try out such services. Cases in the common interest, such as emergency services or medical transportation received strong support. Furthermore, the results were homogeneous across the various cities which were covered in the survey.

51. Nonetheless, some important concerns associated with societal acceptance of Urban Air Mobility were found in the study, with noise and safety concerns ranking first, privacy, environmental issues and security following. Hence, more in-depth follow-up studies on environmental and societal acceptance, including on the environmental impact of drones should be conducted at European and national levels, broadening the effort already made by EASA, followed by a Working Group with participants from all countries to jointly evaluate possible solutions.

52. Local communities, cities, regions have a deciding role for ensuring the alignment of Innovative Aerial Services with the needs and preferences of their citizens. They have a key role in deciding to what extent drone operations can be conducted in their territories. For example, they are in a good position to assess which critical infrastructure should be protected, whether operations should be allowed in day or night-time, what should the measures in place be in terms of noise and visual abatements. Many European cities are already global frontrunners when it comes to transport innovation involving drones and the implementation of ambitious climate and mobility targets. Tools such as the Sustainable Urban Mobility Plans (SUMPS)[47] should be leveraged by Member States as a mechanism to integrate alternative delivery solutions offered by Urban Air Mobility in urban mobility

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[45] Regulation (EC) No 1008/2008 of the European Parliament and of the Council of 24 September 2008 on common rules for the operation of air services in the Community, OJ L 293, 31.10.2008, p.3.
[46] https://www.easa.europa.eu/sites/default/files/dfu/uam-full-report.pdf
[47] COM(2013) 913 final (ANNEX 1) of 17.12.2013

planning and help to address mobility challenges for the entire functional urban area, including synergies with spatial, energy and climate plans.

53. The role of municipalities is also pivotal in terms of regional planning in urban and rural areas and creation of dedicated infrastructure to accommodating vertiports or take-off and landing sites. Local administrations should be involved and be able to convey a message of certainty and transparency to society about what, how, when and where Innovative Air Mobility will be deployed. Citizens' participation in regulatory sandboxes, living labs and demonstrations should be encouraged to include local/regional aspects in the final decision regarding Innovative Air Mobility deployment.

54. The location of the required new enabling infrastructure (e.g., vertiports, telecommunication and energy distribution equipment, including for new energy supplies such hydrogen) in the urban environment should be systematically analysed, finding a balance between location requirements, affordability and other aspects, such as nuisance to neighbours and visual pollution to avoid jeopardising social acceptance. Some vertiports could reuse existing helipads or airports (including small aerodromes). Connectivity to local airports and other modal hubs, including with public means of transport, should be prioritised.

55. Noise mitigation measures to avoid or limit the impact on over-flown citizens, houses, quiet and natural areas should be fully taken into consideration by drone operators and local authorities when designing routes, procedures, and other operational practices.

56. EASA should also continue the development of suitable drone and eVTOL noise modelling methodologies, which should be taken into account by the Commission for the next amendment of Annex II of the Environment Noise Directive[48] for the purposes of adapting common noise assessment methods to scientific and technical progress.

57. There is a need to better define and communicate on Innovative Air Mobility opportunities, and create a *modus operandi* to ensure collaboration between European, national, and local authorities to manage societal and environmental impacts. To ensure broader acceptance, comprehensive and transparent information about the technology and the type of operations involved and about the environmental impact should be provided to the people concerned, and competent authorities should seek to involve them in the planned implementation process through the utilisation of local participatory consultation mechanisms. To achieve this, the Commission[49], on the basis of the European Parliament initiative, will fund the development by EASA of an online platform as a "pilot project Sustainable IAM Hub" that would provide support to the authorities, cities, industry and other stakeholders for Innovative Air Mobility implementation. This European cross-sectorial governance platform for Innovative Air Mobility should enable engagement, alignment, and coordination between the different stakeholders. This platform should also contribute to increasing public knowledge on the environmental impact of drones.

Flagship action 7: The Commission will fund the creation of an online platform to support a sustainable IAM implementation by authorities, communities, municipalities, industry and stakeholders.

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[48] Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise, OJ L 189, 18.7.2002, p. 12–25

[49] Commission Decision of 4.7.2022 on the financing of pilot projects and preparatory actions in the field of transport for 2022, C(2022) 4509 final.

58. Finally, the drone sector is expected to increase at a fast pace and the end-of-life stage of these aircraft also raises important environmental challenges. In line with the Circular Economy Action Plan adopted by the Commission[50] and the Sustainable and Smart Mobility Strategy, the drone sector should move towards Circular Economy models covering notably the production of the aircraft, batteries and other electronic components to ensure their recycling and ensure that scope 2 and scope 3 emissions are reduced to a minimum. This is all the more important as improved circular use of materials, also offer the opportunity to create new supply chains, jobs and to increase the resilience, competitiveness and innovation of European manufacturers.

5. Promoting the human dimension (knowledge, training, skills, competences)

59. Guaranteeing the safety of recreational and professional drone operations means remote pilots must have received an adequate theoretical and practical training, according to the risk level of the operations. To ensure that remote pilots have the requisite level of knowledge and skills in line with continuous advancing technological development, new skills and competences such as those of drone specialists are needed. Initially, the 'certified' category will involve two different types of pilot licences. One for flying a 'VTOL aircraft' with an on-board pilot and one for flying an 'unmanned aircraft' as a remote pilot who may control one drone at a time, or control several drones simultaneously, also of different types and from different operators. Training should also be given as a priority to Innovative Air Mobility operators' personnel in view of future autonomous operations.

> **Flagship action 8: The Commission intends to adopt new training and competences requirements for remote pilots and pilots of VTOL aircraft[51].**

60. Maintaining European leadership in the different drone sector segments i.e. aerial services, Innovative Air Mobility, U-space, also requires a highly educated, qualified and experienced workforce. Education and training programmes specific to drone technologies, the regulatory framework and the development of SUMPs should be set up in all Member States. Such academic and vocational programmes for both young learners and workers across Europe would foster the competences and technological progress but also increase the public awareness and acceptance of drone utility. The involvement of social partners could also contribute to this development.

61. Partnerships between research, universities and industry on education should facilitate the movement of experts between these sectors, which at the end would be very beneficial for the development of the European drone sector. This should also include skills development via the Large Scale Partnership on Aerospace and Defence[52] in the framework of the Pact for Skills.

62. To overcome the risk of shortage of regulatory experts in drones and drone operations at both local and national authorities' level, Member States should support National Aviation Authorities (NAAs) to gain the competences that reflect the highly digital and automated nature of the technologies underpinning drone operations and U-space services provision. Beyond these technical competences, NAAs should adapt to the changing environment and

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[50] https://op.europa.eu/en/publication-detail/-/publication/45cc30f6-cd57-11ea-adf7-01aa75ed71a1

[51] Amending the Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council.

[52] Pact for Skills Aerospace and Defence (https://ec.europa.eu/social/BlobServlet?docId=23158&langId=en)

should be put in the position to smoothly manage SORA approvals, U-space airspace establishment and certification & compliance monitoring of UAS operators, Common Information Services and U-space service providers.

63. Member States should ensure sufficient training for relevant personnel, including local authorities, to increase their preparedness to identify and respond to non-cooperative drone threats.

B. Strengthening European civil, security and defence industry capabilities and synergies

64. Given drone technology's potential for developing both innovative civilian as well as defence and security use cases, the drone sector can make an important contribution to Europe's open strategic autonomy. It is therefore of utmost importance that European companies maintain and enhance their competitiveness, both as regards the production of drones and the provision of services using them.

65. This requires having in place the right enabling framework throughout the innovation cycle, from research, to testing and demonstration activities, as well as retaining European leadership when it comes to setting standards for rapidly evolving drone technologies.

66. In addition, reaping synergies between the civil and military use of drones and drone-related technologies, including counter-drone solutions to detect and mitigate threats posed by drone operations, can be an important success factor. Already today, many critical drone technologies for security and defence increasingly originate in the civilian domain and use critical components of a dual-use nature. To accelerate innovation across domains and foster technological sovereignty, better exchange between civilian and defence research and innovation communities is needed. This will require a more efficient use of resources and a readiness to explore the opportunities of dual-use. It also means reducing strategic dependencies and vulnerabilities of the value and supply chains associated with these technologies.

1. Providing funding and financing

67. The Commission has funded various drones-related research and innovation projects through successive EU Research & Innovation (R&I) framework programmes. The support for research in the drone sector has been substantial in the past and critical for an early deployment.

68. From 2003 onwards, the Union invested a total budget of almost € 980 million in the development or use of drones for innovative applications. It funded 320 projects relating to the drone sector under the R&I.

69. The effort will continue under the current Horizon Europe R&I framework programme[53] that includes the co-funded SESAR 3 Joint Undertaking[54] initiative which aims to develop a research and innovation ecosystem covering the entire ATM and U-space airspace value chains, enabling the collaboration and coordination needed between air navigation services providers and airspace users to ensure a single harmonised Union ATM system for both manned and unmanned operations. Horizon Europe also includes specific research and

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[53] https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

[54] SESAR Joint Undertaking is co-funded by the European Union through the Horizon Europe research and innovation programme and industry.

innovation funding on drone and counter-drone capabilities, including for civil security (law enforcement, border management and civil protection)[55]. Moreover, across Horizon Europe work programmes the development of sector and use-case specific drone applications is supported.[56]

70. The European Defence Fund (EDF)[57] and its precursor programmes incentivises and supports collaborative, cross-border research and development in the area of defence. Complementing and amplifying Member States' efforts, EDF promotes cooperation among companies and research actors of all sizes and geographic origin in the EU. The EDF precursor programmes have already funded nine drone-related projects in the framework of defence research and development projects with total budget of close to EUR 200 million.

71. A budget of close to € 8 billion for 2021-2027 is dedicated to the European Defence Fund: € 2,7 billion to fund collaborative defence research and € 5.3 billion to fund collaborative capability development projects complementing national contributions. This is implemented through annual work programmes that are developed in close cooperation with the Member States. The indicative multiannual perspective for 2021-2027 identifies e.g. development of a MALE (medium altitude long endurance), RPAS (remotely piloted aircraft system) prototype, a HAPS (high altitude platform systems) prototype, a tactical RPAS prototype and Detect and Avoid[58] capabilities for extensive integration in platforms.

> **Flagship action 9: The Commission intends to continue to provide funding for R&I on drones and their integration into the airspace under the Horizon Europe programme and the European Defence Fund.**

72. The European Investment Bank (EIB) finances drone projects by using a wide range of adapted financial products such as loans or venture debt. Funding can be used for research and development, or/and to ramp-up drone production and operations. The joint Commission and EIB initiative, the Drone Investment Advisory Platform[59], facilitates the access to the EIB, its advisory services and funding mechanisms.

73. In 2022, EIB launched the Strategic European Security Initiative which aims to mobilise investment in support of Europe's dual-use security and defence systems by backing Europe's technology industry and civilian security infrastructure with focus on cybersecurity and disruptive emerging technologies.

74. The InvestEU Advisory Hub, which complements the InvestEU Fund[60], is supporting the identification, preparation and development of investment projects, including drones, across the European Union.

75. While there is already a substantial EU funding available through Horizon Europe, EDF, EIB and other funding programmes, these funds often target a specific development phase

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[55] In Pillar II "Global Challenges and European Industrial Competitiveness", Cluster 3 "Civil Security for Society".

[56] For instance, under the Horizon Europe Work Programme for Cluster 6 "Food, Bioeconomy, Natural Resources, Agriculture and Environment" the development of drone applications for sustainable agricultural production, forestry, environmental monitoring and rural communities is supported.

[57] https://defence-industry-space.ec.europa.eu/eu-defence-industry/european-defence-fund-edf_en

[58] Detect and Avoid (DAA) systems are technologies that allow drones to integrate safely into civilian airspace, avoiding collisions with other aircraft and obstacles.

[59] https://www.eib.org/en/press/news/commission-and-eib-announce-launch-of-european-drone-investment-advisory-platform

[60] https://investeu.europa.eu/what-investeu-programme_en

of the value chain or are specific to the civil or military sector. This can lead to the lack of financing at some technology readiness levels or a fragmented research efforts taking place in silos. To address this problem, a coordinated series of calls of existing EU instruments and EIB loans should support a new flagship project on 'drone technologies', for example a cargo drone, that would prove the concept of synergies along the pathway from R&D to deployment through public procurement.[61].

> **Flagship action 10: The Commission intends to set up a coordinated series of calls under the existing EU instruments and EIB loans to support a new flagship project on 'drone technologies'.**

76. Experience during the first year of the new Multiannual Financing Framework, in the context of civil, defence and space industries, identified points of blockage in the application of the relevant common provisions in the programmes' basic acts. Removing obstacles (while still respecting provisions of basic acts) may allow to better exploit possible synergies: horizontally between R&I programmes (e.g. the Horizon Europe specific programme and the European Institute of Innovation and Technology with the European Defence Fund), vertically (between R&I and deployment programmes such as Digital Europe Programme or Internal Security Fund), as well as with projects funded under shared management (such as the European Structural and Investment Funds) or with the Recovery and Resilience Facility. Furthermore, there is no framework for direct support for dual-use research. Similarly, the European Investment Bank's lending policy still has restrictions for the defence sector. This can lead to fragmented and inefficient EU funding services for dual use projects which in the EU often start as civil research projects and later develop to dual-use civil and military products.

77. In order to facilitate exchanges between civilian and defence sectors, especially in the area of critical technologies, there is thus a need to explore the efficiency of the funding possibilities under the existing legal framework and to consider the appropriateness to develop more flexible EU funding programmes and financing instruments for dual-use drone projects.

> **Flagship action 11: The Commission will consider possible amendments to the existing financing/funding framework[62] to ensure a consistent approach in support of dual-use research and innovation to improve synergies between civil and defence instruments.**

2. Identifying strategic technology building blocks and technology enablers

78. Drones, drone operations and drone traffic management are a complex ecosystem of technology components and information exchange platforms, requiring highly optimised,

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[61] Such a flagship would be an implementation of an action in the recent Commission Communication 'Analysis of Defence Investment Gaps and way forward': 'The Commission will work on further measures (such as coordinated calls among existing EU instruments and EIB loans) to support critical technologies and industrial capacities by developing strategic projects, as well as an implementation of Action 9 in the Synergies Action Plan ('Drones Technologies') coherent with the findings of Action 2 of the Synergies Action Plan (synergies of financing instruments): 'The Commission should support new forms of integrated programming and planning [...]. To this end, it should select and launch new flagship projects that can prove the concept of synergies along the pathway from R&D to deployment through market update or public procurement'.

[62] after taking into account the positions of the European Parliament and Member States expressed in the past in the course of the relevant inter-institutional negotiations

safe, and secure elements such as flight control systems, cyber-secure datalinks and connectivity, resilient navigation, Detect & Avoid systems, electrical and hybrid propulsion, batteries and power management, autonomous flight and mission management systems.

79. It is important to identify critical technology building blocks that contribute decisively to the innovative and competitive drone ecosystem. Lack of foresight on the increasing importance of remotely piloted systems is in part a reason for some of the EU's existing strategic dependencies on third countries in this sector. The EU needs more structured foresight and strategic reflection on critical drone technologies in order to identify priority areas to boost research and innovation, reduce existing strategic dependencies and avoid the emergence of new ones.

80. Similarly, it is important to identify key underlying technology enablers such as AI, robotics, semi-conductors, batteries, EU space services and mobile telecommunications. Drone operational and payload communication, as well as drone traffic management solutions, will benefit from the bandwidth and ultra-reliable low latency of 5G and future 6G cellular networks. To satisfy the high bandwidth demands of 5G and upcoming 6G systems, it is crucial to efficiently use the limited spectrum resources.

81. The Commission has already taken steps to ensure that the European knowhow and manufacturing capacity would be there to meet European industry needs. For example, the Commission has supported the setting up of a European Battery Alliance[63], which aims to ensure that the EU can rely on a domestic battery value chain. It is necessary to ensure that the needs of the European drone sector are well covered within this and similar initiatives at the European level and globally.

> **Flagship action 12: The Commission intends to develop a Strategic Drone Technology Roadmap in order to identify priority areas to boost research and innovation, reduce existing strategic dependencies and avoid the emergence of new ones.**
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> **Flagship action 13: The Commission intends to coordinate with other relevant EU actors a common approach with the aim of providing sufficient radio frequencies spectrum for drone operations.**

3. Enabling testing and demonstrations

82. Drones and drone operations at the EU and national level are subject to numerous legal requirements that are intended to ensure the safety of the products and the environment in which they operate. Flight testing and demonstration plays an important role for safe research and development of new drone prototypes when moving from concept to deployment or when demonstrating a new business case. Local sites could be used to demonstrate the technical capabilities of drones and their use cases and by doing so, help to secure the necessary support from local and national authorities.

83. Test and demonstration facilities are scarce and not always available, particularly in the more densely populated Member States. Furthermore, the local airspace characteristics and seasonal weather conditions might not be meeting the desired testing or demonstration requirements. Performing flight tests in sites located in a Member State other than the one of a state of registration, while possible, can become an administrative bottleneck due to different procedures in obtaining permissions, thus slowing down progress.

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[63]   https://www.eba250.com

84. Better availability and geographic distribution of test sites across the EU would be an enabling factor for unmanned technology development, both for the digital infrastructure and vehicle technology. It would also be useful to create a network of such test and demonstration sites across Europe.

Moreover, since airspace and airfield facilities are at a premium, maximum use should be made of military facilities to enable dual-use of defined airspace volumes as well as to promote harmonised testing between civil, military and operators.

> **Flagship action 14: The Commission intends to set up an EU network on civil-defence drone testing centres to facilitate exchanges between civilian and defence sectors.**

85. City authorities' efforts to speed up the adoption of Innovative Aerial Services should be supported, but not only from a financial point of view. ELTIS, the European urban mobility observatory[64], already facilitates the exchange of information, knowledge, and experience in the field of sustainable urban mobility. The UIC2 initiative[65] involves more than 40 cities or regions across the EU that are developing projects ranging from small scale projects (medical product deliveries) to larger Urban Air Mobility ecosystems with the goal of providing testbeds for Innovative Air Mobility across Europe.

86. As new drone technologies develop, testing and demonstrations tend to become more complex to organise. This is due in part to the required operational approval process which can be long and expensive, sometimes disproportionally so for short-lived trials with no immediate commercial application. In addition to working with industry stakeholder to facilitate aerial operations, EASA should therefore develop guidelines to support the operational approval of operations conducted for the purpose of test, experimentation, or demonstration.

4. Driving common standards

87. Drone technologies and their use cases are developing rapidly, with new products coming to the market with increasing speed. To stay competitive, the European drone industry needs to be able to meet the fast-paced development and production cycles. Standardisation and interoperability of the enabling technological building blocks are key enablers for faster product development.

88. Promotion and application of common standards across the European civil, security and defence drone sector can contribute to savings in cost and development times, reduce risks, increase productivity and facilitate access to new markets. It is necessary to encourage quicker standards development in the sector by all actors to ensure that the innovative pace of the drone industry can be upheld.

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[64]   https://www.eltis.org/
[65]   UIC2 - UAM Initiative Cities Community, https://civitas.eu/urban-air-mobility.

89. The development of 'hybrid standards'[66], i.e. standards that apply to civil, security and defence drone technologies should be actively pursued in areas where technologies are the same and application areas are very similar. This can be done by encouraging relevant actors such as EASA, EDA, EUROCAE and national military authorities to further align certification requirements for civil and military applications towards those set by EASA while considering military specificities and existing military certification standards. To the extent possible, this should be done within existing structures such as EUSCG and include defining and coordinating common standards, commonly agreed testing protocols and best practices to reduce costs, increasing interoperability, improving the potential for synergies and enhancing comprehensibility.

Flagship action 15: The Commission will encourage all relevant actors to further align certification requirements for civil and military applications towards those set by EASA while considering military specificities and existing military certification standards.

Flagship action 16: The Commission intends to adopt new standard scenarios for civil operations that could facilitate corresponding military use cases.[67]

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5. Increasing counter-drone capabilities and system resilience

90. Drones are a highly innovative tool that can be used for legitimate but also malicious purposes, including organised criminal activities (e.g. smuggling of goods and migrants) as well as attacks on public spaces, individuals and critical infrastructure (including energy, transport and border facilities). While the EU has regulated the legitimate use of drones, there are no specific EU rules and guidelines on countering their unauthorised or even criminal use. The rapid pace of innovation and the increasingly easy access to commercial drones and their components means that the threat is likely to grow.

91. Protecting from malicious and non-cooperative drones also requires access to affordable and reliable counter-measure technologies. Some Member States are however still facing challenges with liberating the necessary budgets, adapting or creating the necessary regulatory framework and identifying the right (technical) solutions to be able to cope with the threat of non-cooperating drones. The proposed Directive[68] on the resilience of critical entities will oblige Member States to perform risk assessments and use them for the identification of critical entities, including in the transport sector. These assessments should account for the relevant risks, including those of non-cooperative drones.

92. Through its civil security research and innovation programme (Horizon 2020), as well as the Internal Security Fund (Police) for the period 2014-2020, the EU co-funded the development of counter-drone tools, knowledge and technologies. This effort will continue in the current Horizon Europe, the Internal Security Fund (ISF) and the Border Management and Visa Instrument (BMVI). These programmes are complimentary as Horizon Europe strengthens research and innovation, while the ISF and BMVI focuses on a wide range of practical applications for law enforcement and border management, such as the acquisition of equipment, promoting and developing training schemes and ensuring administrative and operational coordination and cooperation.

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[66] COM(2012) 417 "Security Industrial Policy" and COM(2021) 70 final "Action Plan on synergies between civil, defence and space industries"

[67] Amending the Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft

[68] COM(2020) 829 final of 16 December 2020

93. Also here, civil, security and defence industry synergies should be identified and exploited as they will benefit all relevant sectors. This will improve the competitiveness of European industry and strengthen Europe's strategic autonomy, by allowing Member States to rely on competitive counter-drone technology of EU origin.

94. Both the 2020 EU Security Union Strategy[69] and the Counter-Terrorism Agenda[70] state that the threat from non-cooperative drones is a serious concern in Europe and needs to be addressed. In the Counter-Terrorism Agenda in particular, the Commission committed to look into the possibility of releasing guidance on how to secure cities from non-cooperative drones.

95. To tie together all the different counter-drone initiatives in the EU, the Commission will adopt a counter-drone (C-UAS) package outlining the EU's future policy in this field. In addition of continuing the dedicated actions on operational, technical and financial support to Member States, the package will announce, among other things, work towards EU counter-drone guidelines and examine the need for legislative measures. Support activities will include two handbooks on protection against drones: a 'Handbook on Counter Unmanned Aircraft Systems for Critical Infrastructure and Public Spaces' and a 'Handbook on Principles for Physical Hardening of Buildings and Sites'. Furthermore, it will establish an enlarged technical expert group on voluntary standards to cover counter-drone solutions.

> **Flagship action 17: The Commission intends to adopt a counter-drone (C-UAS) package**

96. Unauthorised drones can significantly disrupt airport operations. In the worst case, they can also endanger aircrafts and their occupants. Following the incidents that took place at London Gatwick airport in December 2018, the Commission supported EASA in developing non-binding guidelines helping authorities and airports to prepare, respond and recover from drone incidents[71]. While these guidelines were favourably received by the sector, their advisory nature makes them insufficient to mitigate a threat that is likely to grow as drones become more ubiquitous and capable.

> **Flagship action 18: The Commission intends to adopt an amendment to the aviation security rules aiming to ensure that aviation authorities and airports increase their resilience when faced with the risks posed by drones[72].**

97. Developing state-of-the-art drones with higher cybersecurity requirements, particularly in the 'open' and 'specific' categories of operations, could provide a competitive edge for the EU industry. Such cyber-resilient drones would not only benefit drone operators but also all entities responsible for monitoring the use of airspace. Drones with a higher level of cybersecurity could be required for operations in some airspace, helping to separate legally operated drones from the illegal ones. Drones manufactured to comply with specific requirements, for example, with the requirement for a secured communication link, secure identification, or use of open-source code and, leveraging resilient navigation enabled by

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[69] COM(2020) 605 final of 24 July 2020
[70] COM (2020) 795 final of 9 December 2020
[71]

https://www.easa.europa.eu/sites/default/files/dfu/drone_incident_management_at_aerodromes_part1_web site_suitable.pdf

[72] Proposing secondary legislation to Regulation (EC) No 300/2008 of the European Parliament and of the Council of 11 March 2008 on common rules in the field of civil aviation security and repealing Regulation (EC) No 2320/2002

EU space services, could be eligible for a voluntary "European Trusted Drone" label. Such label would provide assurance to users that the corresponding drones have been vetted and found sufficiently secure to be used for more critical or sensitive operations, thereby increasing the overall resilience of the system to cybercrime.

> **Flagship action 19: The Commission intends to define criteria for a voluntary "European Trusted Drone" label.**

Conclusion

98. The twin green and digital agenda gave a call to leverage new actions for more sustainable mobility and innovation to improve the efficiency of the overall economy. Through a multitude of civil, industrial, security and defence use-cases, drones may contribute to accelerating the decarbonisation and digitalisation of the entire transport and mobility system, reducing its negative impact on the environment and improving the safety and health of our citizens.

99. The drone sector that the EU is striving for must be mindful of its environmental impact in terms of noise, energy consumption and visual nuisances in particular. The Commission acknowledges that drones will need to be socially accepted in order to play their full role for the benefit of businesses and local communities. This will require the full upfront involvement of all parties concerned at local, regional, and national levels to make sure that safe and secure drone operations can be deployed, both in urban and rural areas, in a fair and sustainable manner.

100.   A growing number of sectors are already engaging with drone technologies. To encourage private investments and the development of new innovative services for different sectors, legal and technical certainty based on a harmonised EU approach should be ensured. Key in the Drone Strategy 2.0 are two related drivers: building the Union drone services market and strengthening European civil, security and defence industry capabilities and synergies. Reaping synergies between the civil, security and military use of drones and related technologies, including counter-drone solutions, will contribute to foster the uptake of innovative technologies and contribute to the overall development of the sector in Europe.

101.   A viable drone eco-system will contribute to leverage European research, innovation, and entrepreneurship to achieve the objectives of the European Green Deal and Digital Europe, fully in line with our new growth strategy for Europe. The Commission is putting forward a comprehensive set of measures aimed at reinforcing the entire Drone eco-system by 2030 by proposing actions which will facilitate the move from demonstrations to large scale commercial operations. These efforts can only be successful if there is sufficient buy-in from all those concerned, namely European institutions, Member States and their authorities at all levels of government, stakeholders, businesses as well as citizens' engagement.

List of Flagship Actions to be implemented by the European Commission to further build the European drone services market

The Commission intends to:
- adopt amendments to the Standardised European Rules of the Air and the Air Traffic Management/Air Navigation Services Regulation to safely integrate drone and piloted eVTOL operations;

- promote coordinated research on integrated Communication, Navigation and Surveillance technologies;

- adopt new European standard scenarios for low to medium risk aerial operations;

- adopt rules for the 'certified' category of drone operations, addressing the initial and continued airworthiness of drones subject to certification; and the operational requirements applicable to manned VTOL-capable aircraft;

- adopt rules for the design and operations of vertiports under the scope of EASA Basic Regulation;

- develop balanced economic and financial requirements for licensing of drone operators.

- fund the creation of an online platform to support a sustainable IAM implementation by authorities, cities, industry and stakeholders;

- adopt training and competences requirements for remote pilots and pilots of VTOL aircraft.

List of Actions to be implemented by the European Commission to strengthen the European drone civil, security and defence industry capabilities and synergies

The Commission intends to:
- continue to provide funding for R&I on drones and their integration into the airspace under the Horizon Europe programme and the European Defence Fund;

- set up a coordinated series of calls under the existing EU instruments and EIB loans to support a new flagship project on 'drone technologies';

- consider possible amendments to the existing financing/funding framework to ensure a consistent approach in support of dual-use research and innovation to improve synergies between civil and defence instruments;

- develop a Strategic Drone Technology Roadmap in order to identify priority areas to boost research and innovation, reduce existing strategic dependencies and avoid the emergence of new ones;

- coordinate with other relevant EU actors a common approach with the aim of providing sufficient radio frequencies spectrum for drone operations;

- set up an EU network on civil-defence drone testing centres to facilitate exchanges between civilian and defence sectors;

- encourage all relevant actors to further align certification requirements for civil and military applications towards those set by EASA while considering military specificities and existing military certification standards;

- adopt new standard scenarios for civil operations that could facilitate corresponding military use cases;

- adopt a counter-drone package;

- adopt an amendment to the aviation security rules aiming to ensure that aviation authorities and airports increase their resilience when faced with the risks posed by drones;
- define criteria for a voluntary "European Trusted Drone" label.