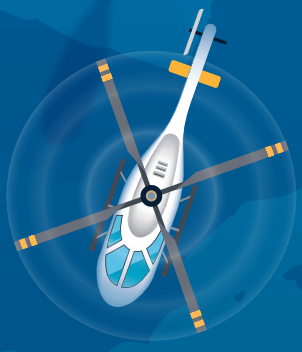
EASA
European Union Aviation Safety Agency

THE EUROPEAN PLAN FOR AVIATION SAFETY

(EPAS 2021-2025)



VOLUME I
Introduction & Strategy

Foreword by the Executive Director

The publication of the 10th Edition of the *European Plan for Aviation Safety* (EPAS) comes at a time when the entire industry is focused on the near-term problem of survival in the face of COVID-19. While safety can never be compromised, even in the face of extreme adversity, we must at the same time recognise that less urgent safety optimisations will hold a lower priority in such circumstances.

This edition therefore continues our quest for a steady growth in the maturity of the European safety management system. But it adjusts the priority of the timelines and output of the rulemaking programme to alleviate the burden on stakeholders in this difficult period, while safeguarding established consultation mechanisms.

Since spring 2020, EASA has invested significant efforts in the completely unscheduled activity of returning aviation to normal operations after the unprecedented collapse of activity in the second quarter of the year. Quite apart from the financial imperative to create conditions for passengers to fly safely despite the pandemic, our 'Return to Normal Operations' (RNO) project was needed to tackle the potentially unsafe conditions created by the parking of so many aircraft for an extended period.

Although air traffic picked up slightly over the summer months in Europe, at the time of writing it is still significantly reduced with more than 5,6 million flights lost since 1st of January 2020. The consequences of this drastic downturn in airline operations are visible in all value chains, affecting the entire aviation industry and creating many variables and uncertainties for the sector.

These level of uncertainty and the severe economic impact on the aviation industry bears a high-risk potential for trade-offs between profitability and safety. Throughout 2020, as part of the RNO project, the Agency has been working closely with Member States and industry partners to assess new safety issues emerging from the COVID-19 pandemic. This resulted in the identification of many different safety issues across a wide range of operational activities, with a significant safety management and human factors component. The resulting COVID-19 risk portfolio[1] is being closely monitored and will become an integral part of the European Safety Risk Management process that will feed future EPAS editions.

As the contours of the post-crisis aviation system become clearer, the process to define new EPAS strategic priorities and enablers will be initiated around four pillars: safety, sustainability, resilience and competitiveness. These will require a much more integrated approach to risk management.

Safety is fundamental to the success of the aviation industry. And as the industry innovates – with greener aircraft, drones and other new technologies, it will be important to ensure that safety remains front and centre in everything we do. This longer-term objective is the underlying goal of the multi-year safety planning of our EPAS.

Patrick Ky
Executive Director

[1] https://www.easa.europa.eu/sites/default/files/dfu/review_of_aviation_safety_issues_from_covid-19_final_0.pdf

European Plan for Aviation Safety (EPAS) 2021-2025

European Union Aviation Safety Agency, 23/12/2020

Volume I

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1. Executive Summary

COVID-19 is highlighting the importance of taking a coordinated approach to identifying and mitigating risks at European level and worldwide. This is at the core of this 10th EPAS edition. While the pandemic is significantly disrupting our economies, it is also shaping societal demands and expectations these days. Ensuring that aviation is a safe, secure and environmentally friendly form of transport for EU citizens is paramount for the recovery.

Research, innovation and digitalisation are important pillars in this new reality. EPAS proposes a series of actions in the area of innovative air mobility solutions to create a cleaner, quieter and more sustainable aviation system. Initiatives include actions to increase CO_2 efficiency, prepare for electric and hybrid propulsion technology, sustainable aviation fuels, carbon offsetting, as well as for the development of an environmental label. New research actions on the use of iConspicuity[2] systems as well as to enhance aviation resilience to GNSS jamming and spoofing have also been added.

The safe integration of drones remains a high priority. A comprehensive NPA proposing requirements in the certified category in several aviation domains will be issued next year. A new RMT is proposed to provide flexibility by allowing a single Continuing Airworthiness Management Organisation to manage aircraft for various AOC holders within a business group, creating regulatory alleviations much needed in the current context. In 2021 work will also start to develop noise and emission standards for supersonic transport aircraft.

Our planned actions to promote flight data monitoring analysis techniques, the availability of meteorological information as well as to provide Member States with a basis for training their staff in Human Factors will make our aviation system even safer. The Rotorcraft Safety Roadmap and General Aviation Roadmap 2.0, to make general aviation safer and cheaper, continue to play an important role. The Agency is launching several related safety promotion initiatives and has recently created the new '[Together4Safety]' community websites. A key achievement will be the publication of the Part 21 'Light' Opinion in early 2021 that will propose design and production rules that are more proportionate to the risks.

Finally, this edition includes a new Volume III with domain safety risk portfolios established through the European Safety Risk Management process, providing full visibility of the key risk areas and underlying safety issues affecting the European aviation system, including specific risks identified in the COVID-19 risk portfolio. This will support safety management at Global, European and State level.

[2] iConspicuity (or in-flight electronic conspicuity plus) means in-flight capability to transmit position of aircraft and/or to receive, process and display positions of other aircraft in a real time with the objective to enhance pilots' situational awareness about surrounding traffic. It is an umbrella term for a range of technologies and solutions, whether airborne or on the ground, that can help airspace users and other affected stakeholders to be more aware of other aircraft in their vicinity or in a given airspace.

2. Introduction

EPAS constitutes the regional aviation safety plan (RASP) for EASA Member States, setting out the strategic priorities, strategic enablers, main risks affecting the European aviation system and the necessary actions to mitigate those risks to further improve aviation safety. EPAS sets an aspirational safety goal to achieve constant safety improvement with a growing aviation industry (refer to **Section 4.2**). Considering the significant reduction in flights as a result of the COVID-19 pandemic, the aspiration to constantly improve the level of safety remains entirely adequate, as the recession affecting the economy globally and the return to operations bear significant risks for aviation safety. Effective risk management capability is more important than ever to cope with the multiple effects of the crisis.

From the onset of the COVID-19 outbreak in Europe, realising that the impact on industry was closely linked to the level of coordination and harmonisation within Europe, the Agency initiated the project called 'Return to Normal Operations' (RNO). This entails intense cooperation with the European Member States, the aviation industry and international partners, and resulted in a set of immediate measures to address the most acute phase of the crisis and support a safe return to operations while reducing the risk of infection for passengers and crews. The aviation safety risks entailed by the COVID-19 pandemic are being assessed as part of a dedicated work stream within the RNO project which led to the compilation of a dedicated COVID-19 Safety Risk Portfolio over the summer (refer to **Volume III Chapter 18**). The results of the in-depth analysis of the underlying safety issues may result in short-term mitigation actions not qualifying for inclusion in EPAS. More systemic issues or issues that are expected to remain in the medium to long term will be addressed as part of the regular European safety risk management (SRM) cycle and may thus feed future EPAS editions. **Sections 3.1.1.1** and **3.1.1.2** provide further details on related systemic safety issues.

There is currently little certainty regarding the path to recovery, and insufficient visibility on what the 'new normal' may look like for the aviation industry. However, there is a general consensus that it will take much longer for the industry to return to pre-pandemic levels of traffic than initially projected. In these circumstances, engaging in discussions with stakeholders on strategic priorities to adapt them to the 'new normal' would not have been appropriate. The strategic priorities thus remain unchanged in this edition. The main safety risks feeding the operational priorities continue to be determined through the European SRM process, in close coordination with Member States and industry.

This EPAS edition constitutes the 10th edition of the European Safety Action Plan[3]. Since its 5th edition (covering 2016-2020), EPAS incorporates the EASA Rulemaking Programme, thus creating a single source for all programmed actions, supported by a single programming process. The main objective of EPAS is to further improve aviation safety and environmental protection throughout Europe, while ensuring a level playing field, as well as fostering efficiency/proportionality in regulatory processes. EPAS is a key component of the safety management system (SMS) at European level, which is described in the European Aviation Safety Programme[4] (EASP). The regional approach complements national approaches offering a more efficient means of discharging State obligations for safety management in the EU aviation system.

The European Aviation Safety Programme (EASP) defines the aviation safety framework at European level. The objective of EASP is to ensure that the system for the management of aviation safety in the EU delivers the highest level of safety performance, uniformly enjoyed across the whole Union, and continuing to improve over time, while taking into account other important objectives such as environmental protection.

[3] This plan was initially termed 'European Aviation Safety Plan' (EASp)

[4] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0670:FIN:EN:PDF

It explains the functioning of the European aviation system to manage the safety of civil aviation in the EU in accordance with Regulation (EU) 2018/1139[5] (the 'Basic Regulation'). It describes the processes, roles and responsibilities of the different actors and lays down general principles for European safety management, including safety action planning. EASP functionally corresponds, at EU level, to the State Safety Programme (SSP) as described in International Civil Aviation Organization (ICAO) Annex 19 'Safety Management'. It is prepared by the EC, in consultation with Member States and EASA, and updated as required.

In addition to being developed in accordance with the processes, roles and responsibilities described in EASP, EPAS is consistent with the ICAO global plans in the area of aviation safety and air navigation (refer to **Section 2.2**) and ensures alignment with the ATM Master Plan (MP).

The Basic Regulation introduced a dedicated chapter on aviation safety management, thereby creating a strong legal basis not only for EASP and EPAS, but also for the establishment and maintenance of SSPs and State Plans for Aviation Safety (SPAS) at Member State level.

The development of EPAS relies on dedicated stakeholder groups, in particular:

— the Member States' Advisory Body (MAB) that provides advice on strategic priorities;

— the Stakeholders Advisory Body (SAB) that reviews strategic orientation and performance indicators from an industry perspective; and

— the Technical/Sectorial Bodies (TeB, TeC, Sectorial Committees, representing Member States and industry respectively) that provide technical and operational advice as well as feedback on implementation.

The Basic Regulation requires EASA Member States to consider relevant risks and actions defined in EPAS within their national safety action planning process. In return, EPAS defines a number of specific actions addressed to and owned by Member States, to support the implementation of effective SSPs and SPAS. To support the establishment and maintenance of safety plans at Member State level and provide further visibility to the safety risks affecting the European aviation system, this EPAS edition includes the full set of domain safety risk portfolios, in a new Volume III.

The implementation of EPAS actions in the domain of systemic safety, including SSP and SPAS implementation, is supported by a specific stakeholder advisory body, the Safety Management TeB (SM TeB). Its main purpose is to provide a forum to exchange information and address implementation issues in the area of State safety management, as well as to provide input and feedback on EPAS implementation in regard to all systemic issues. The SM TeB also provides recommendations on further actions required to support EPAS, SSP and SPAS implementation. All EASA Member States are represented in the SM TeB; non-EASA European Civil Aviation Conference (ECAC) States are invited to attend as observers.

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32018R1139

2.1 Operational context

2.1.1 Introduction

This section provides an overview of the current context in which the EPAS actions are to be deployed. It also includes information on the European aviation system in terms of size, nature and complexity, including information describing the pre-COVID-19 situation, to serve as a reference for the recovery.

The information in this section has been obtained from the following sources:

- Economic data related to the Gross Domestic Product (GDP), aviation revenues, number of flights etc. was obtained from ICAO, International Monetary Fund (IMF) and Eurocontrol;
- Data collected through the EASA Standardisation Information System (SIS) concerning the number and type of aviation organisations approved in EASA Member States;
- Data available on the status of compliance with the EU Aviation Regulations within EASA Member States sourced from the EASA SIS; and
- Intelligence available within EASA operational departments as regards the impact of the pandemic in the various domains.

This information will be consolidated and further developed in future EPAS editions so as to ensure that the prioritisation of EPAS actions takes due account of the challenges and risks the European aviation system is facing.

Systemic, operational and environmental protection related hazards and challenges are further described in Chapter 3 Section 3.1 ‘Strategic Priorities’.

2.1.2 Operational context - General

Since the beginning of 2020, the global economy experienced the worst crisis since the Great Depression as a consequence of the COVID-19 pandemic. The depth and duration of this global health crisis make any forecast highly unreliable at the present time.

The crisis is affecting particularly the job market, employment conditions and other social aspects. However, sources of information to provide a consolidated view on social impacts like the employment situation in the aviation industry are currently not readily available.

At the global level, according to the last general International Monetary Fund forecast available (issued in October 2020) the Gross Domestic Product (GDP) would fall by -4.4% in 2020 and would rebound by 5.2% in 2021[6].

The COVID-19 pandemic is impacting the aviation sector in an unprecedented manner. According to EUROCONTROL[7], after a dramatic drop in traffic (90% reduction compared to 2019) during the months of April and May, European traffic recovered slightly and is expected to fully recover the level of 2019 traffic only in 2024 with the most optimistic scenario. The least optimistic scenario indicates a recovery in 2024 at 75% of the level of 2019 traffic.

6 https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020
7 https://www.eurocontrol.int/publication/eurocontrol-five-year-forecast-2020-2024

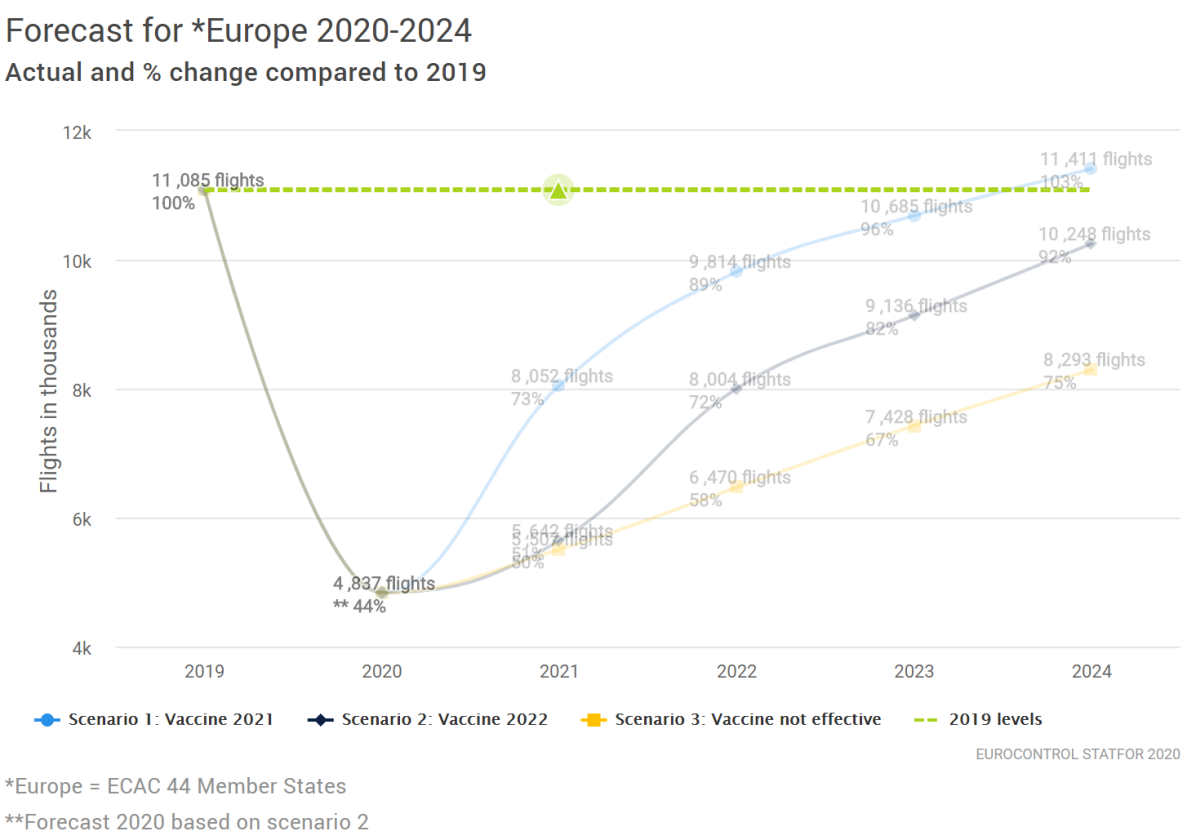

Figure 1: EUROCONTROL Five-Year Forecast for Europe 2020-2024[8]

Load factors have decreased significantly in 2020 compared to 2019. Intercontinental traffic volumes remain significantly lower, heavily impacted by the varying national travel restrictions. At the beginning of October 2020, compared to pre-COVID-19, domestic traffic in the US is 51% compared to 2019, while in China it has reached its pre-COVID-19 level[9].

According to ICAO[10], *'the latest estimates indicate that the possible impact on 2020 world scheduled passenger traffic compared to the original baseline would be an* overall reduction ranging from 49% to 51% of seats offered by airlines, *an overall reduction of 2,7 to 2,9 million passengers and a potential loss of gross passenger operating revenues for airlines of approximately 375 to 395 billion USD.'*

While airlines and their personnel are the ones impacted in the first line and the most severely, the entire sector will be affected, ranging from the manufacturing industry, air navigation service providers, airports, ground handling providers, maintenance providers, the aviation training industry and general aviation. Conversely, the recovery of the airline industry will lead the recovery of the entire sector. The mid to long-term impact of the crisis is not yet fully known, creating many variables and uncertainties for the sector and subsequently for EASA.

A few examples of the many variables to consider when trying to sketch the 'new normal' are mentioned below:

8 For updated information on the Eurocontrol Five-Year Forecast for Europe 2020 – 2024 the reader is invited to consult the Eurocontrol webpage: https://www.eurocontrol.int/covid19

9 https://www.eurocontrol.int/publication/eurocontrol-comprehensive-assessment-covid-19s-impact-european-air-traffic

10 https://www.icao.int/sustainability/Documents/COVID-19/ICAO_Coronavirus_Econ_Impact.pdf

- In Europe, Member States and the European Union are providing an unprecedented budgetary effort to mitigate the effects of the economic crisis. However, it is not yet known to what extent the various financial support programmes will lead to the expected positive outcome.
- The economic crisis is changing the way of living: teleworking, teleconferences, relocation of production centres closer to customer areas.
- The aviation sector value chain is facing a disruption subject to restructuration.
- Innovative solutions and new business models emerging to adapt to the new reality will have effects that are not yet known.
- The pandemic is also significantly shaping societal demands and it is safe to state that sustainability will play a much stronger role within public transport policies and the allocation of economic relief funds.
- The point in time at which a vaccine will be widely available is not known. Also, many efforts are on-going to alleviate travel restrictions in the EU (e.g. by replacing quarantines with COVID testing), but a coordinated approach at EU level is not yet in place. EASA and ECDC are working together on a testing protocol.

2.1.3 Operational context per aviation domain

2.1.3.1 Commercial air transport - aeroplanes

The reduction in passenger flights has resulted in a lack of capacity to transport cargo. Furthermore, quarantine measures imposed on flight crews made them unable to reach training facilities rendering the operations very complex, with the need for exemptions related to duty times, pilot training and the need to transport cargo in the cabin.

Airlines have grounded a huge number of aircraft, leaving flight and cabin crew members with uncertainty about the return to normal operations.

From the confirmed information available, it is difficult to estimate the number of operators ending operations or filing for bankruptcy. A very limited number of operators modified their existing business model to re-centralise operations in their respective regions and to cease even temporarily part of their operations. Finally, some operators might have used the pandemic crisis to diversify or even modify their business model focusing on cargo activities.

For other types of operation (commercial rotorcraft, specialised operations and non-commercial operations) the situation is more difficult to assess.

2.1.3.2 Aircrew and Medical

Travel restrictions between States have resulted in the closure of training, testing and checking facilities.

Flight and Cabin Crew

In this context, holders of professional pilot licences, instructor and examiner certificates, as well as cabin crew attestation holders are not able to timely reach or gain access to training facilities, including flight simulation training devices, where necessary. Therefore, they could not perform the required recurrent training requirements and/or checking requirements in order to continue to exercise their privileges. As a result, short-term exemptions were issued enabling them to continue functioning in their roles, subject to various conditions and mitigations, until the end of the validity period of the exemptions. Furthermore, the exemptions aimed to reduce the severity of the disruptions that would otherwise occur due to non-availability of a sufficient number of flight and cabin crew members to operate on behalf of their organisations. A similar approach was applied to holders of non-professional licences (PPL, LAPL etc.).

As the exemptions are of limited duration, and the end of the pandemic is not known, it is likely that further extensions are envisaged until such time the situation returns to normal operations. Said extensions will take into consideration the review of the already applied mitigation measures in relation to emerging safety and environmental issues.

The oversight of organisations in the aircrew domain, in general, continues to be performed using 'desktop methodologies' via virtual communication means during the COVID-19 pandemic. Activities requiring the physical presence of inspectors were limited and priorities were set based on risk analysis. Following evaluation by a number of Member State CAs it is realistic to assume that those methodologies will continue to be used also in the future, during return to normal operations.

Flight Simulation Training Devices

The onsite activities related to the oversight in the FSTD area have been seriously disrupted. This disruption in activity was mainly affecting the requirement for annual FSTD evaluations or complementary compliance audits for organisations. Some provisions for remote audits under exceptional circumstances and extensions of oversight periods had to be taken. However, over the time, these current requirements and associated practices provided an accurate picture of organisations' performance. Based on a risk analysis and following specific procedures, evaluations have been postponed to a later date or skipped and resumed at the next regulatory interval.

The Agency will use the opportunity of an ongoing rulemaking task to update flight simulation training device requirements with a view to align them with the current situation. The authority- and organisation requirements will be reviewed to allow more flexibility in the oversight in the FSTD area.

Medical

In general, almost all of the items mentioned for Flight and Cabin Crew is applicable for the medical part, too regarding aero-medical examinations and issuance of medical certificates, with one addition: during the peak of the first wave of the COVID-19 pandemic the demand for medical staff considerably increased, and, as a consequence, some medical assessors were involved in clinical medicine work which reduced their involvement in the oversight of aeromedical centers (AeMCs) and aeromedical examiners (AMEs).

This pandemic has raised awareness amongst aviation personnel of the need to prioritise and manage not just their physical health but also their mental health and wellbeing. During this time aviation personnel have had to find resilience through adapting and coping with extra-ordinary stress, anxiety, and for some, periods of mild depression - reactions all triggered by the abnormal circumstances of this pandemic. These are normal reactions to significant stressors and should be regarded as such without stigma as they are not necessarily indicators of mental illness. Managing mental health related issues during this time, as in many other circumstances, often does not require the involvement, diagnosis or treatment by health professionals, unless there are signs of deterioration requiring such professional attention. Unusual reactions make them seem abnormal when often they are not, which may perpetuate the stigma associated with mental health and cause further unwanted consequences. As a result, for medical assessors of Competent Authorities there will be additional workload which may further reduce their possibilities to maintain the effective oversight of AeMCs and AMEs.

In the context of the above, it is envisaged that the Agency, in cooperation with Member States' develop more detailed guidance based on the lessons learnt and share good practices, as needed, for all areas of the aircrew domain.

2.1.3.3 General Aviation

In Sports & recreational operation a noticeable reduction of activity is expected due to the combined effects of the economic and the political/ecological impact. For 'business aviation' data has shown a limited impact, except for the first lock-down period. Opportunities could be arising from the new operational context.

In the area of aircraft production some reduction is expected due to the economic impact. When it comes to design, activities are expected to grow due to the innovation drive coming from the European Green Deal transitional measures. General aviation is the cradle for innovation. Pilot training, including instructors, are expected to have a shift due to the changes in operations, with little need for commercial pilots at first, and a surplus of commercial pilots that could fill the GA instructors shortage.

2.1.3.4 Design and production

One of the Agency's core tasks is the approval and certification of aeronautical products such as aircraft, engines and equipment.

This activity is highly correlated to aircraft deliveries and orders, which, in turn, are linked to air traffic. Regarding commercial air transport, latest reports indicate that the pandemic has led to a reduction in industry development programmes of roughly 20% and a reduction in aeroplane production rates of approximately 40%, compared to 2019 levels. The rotorcraft domain proved more resilient with a limited reduction only.

As a consequence, the supply chain has been generally requested to reduce its production rate and staff resources (in particular as concerns contract employees), although larger Original Equipment Manufacturers (OEMs) have also decided to build stocks in order to maintain the production capabilities of some suppliers.

The situation in the supply chain, with the risk for a number of companies to become insolvent in 2021, will need to be carefully monitored. Reductions in cash-flow may also force some companies to take drastic measures that could impact staff know-how or production quality.

In the area of initial airworthiness of type design, the number of applications received and the number of certificates issued by the Agency provide an adequate estimate of the impact of COVID-19. In particular, overall for the period January to September 2020, the number of applications received dropped by 9% and the number of certificates issued dropped by 17% in comparison to 2019.

Regarding continued airworthiness of type design, the number of occurrences received and closed and the number of Airworthiness Directives (ADs) published constitute a fair indication of the impact of COVID-19. In particular, for occurrences received, an increase of 9% has been observed between the two periods, whereas an increase of 42% is recorded for the number of occurrences closed. Finally, the number of ADs published went down by 12% between the two periods.

The COVID-19 crisis and subsequent drastic reduction in commercial air traffic has resulted in a shift of the data source for technical occurrence reporting: there has been a logical reduction of the in-service occurrences, while the reports from production and more particularly maintenance (due to exceptional storage and de-storage of airplanes) have increased[11]. This also goes together with a significant increase in the number of applications for Alternative Methods of Compliance (AMOCs) to ADs.

In 2020, the number of active Production Organisation Approval (POA) holders has remained at the same level as in 2019, and an increase in new applications has even been noted.

2.1.3.5 Maintenance and continuing airworthiness management

The direct effect of the pandemic was a reduction of the global in-service fleet which is having a direct impact on continuing airworthiness organisations. Aircraft were sent to storage and/or phased out and gradually put

[11] On top of this, for occurrences closed, February 2020 registered a huge increase vs February 2019 (655 occurrences closed vs 166, i.e. +295%

back into service during spring/summer of 2020, depending on the region. Approved Maintenance Organisations (AMOs) and Continuing Airworthiness Management Organisations (CAMOs) were relatively resilient to the crisis due to the need for continued maintenance activities while fleets were grounded and due to storage/de-storage activities. However, a general reduction in expenditures on maintenance services was observed during 2020, with final values estimated in Europe to be around 50% of the pre-crisis levels.

AMOs, CAMO and Part-147 Maintenance Training Organisations (MTOs) tried to maintain their approvals, adjusting their business model to the reduced demand and waiting for the recovery phase. This resulted in a general reduction of staff numbers linked to reduced manpower needs, while in more limited cases it resulted in a reduction of the scope of approval and/or the number of approved locations. Surrendering of approvals also occurred mainly by organisations which do not form part of larger corporate groups and due to cases of merging approvals between different entities.

2.1.3.6 Air traffic management/air navigation services

COVID-19 generated high impact on revenue for the Air Navigation Service Providers (ANSPs) and other actors in this sector, compared to 2019. Consequently, there was a decrease in financial resources for ANSPs (for instance those generated by route charges), with a significant impact on ongoing and planned activities to maintain and further develop the ATM/ANS system. At strategic level, this situation led the European Commission and Member States to reconsider and modify the existing Single European Sky (SES) ATM Performance Scheme.

The oversight system needed to be reorganised to take into consideration the impact on operations and the reduced mobility in the context of lock-down measures and the application of teleworking policies. In many cases, competent authorities and national supervisory authorities needed to adjust the scope and frequency of their oversight activities in order to adapt them to a rapidly changing environment, subject to the evolution of the effects of the pandemic.

In general, ATM/ANS provision principles and procedures remained untouched, with potential adjustments necessarily introduced to address specific issues. One relevant safety issue was related to the maintenance of air traffic controller (ATCO) competence, both at operational and administrative level. For this purpose, EASA published general guidance and related templates in support of Member States and stakeholders affected.

Furthermore, EASA contributed to this effort by identifying and addressing a list of COVID-19 safety issues, several of which apply to ATM/ANS (e.g. ATCO fatigue, personnel wellbeing, restarting a complex system, etc.[12]).

2.1.3.7 Aerodromes and Groundhandling

The reduction in passenger flights and traffic volumes with many aircraft on the ground and airports nearly empty is having a devastating effect on airport businesses and groundhandling operations. For 2020, the airport industry projects an estimated total loss of revenue of EUR 30.90 billion (-64.2% - Source: Airports Council International (ACI) Europe forecast of 06/10/2020). While airports remain open, despite low passenger numbers, the economic pressure due to the large share of structural costs of keeping the airport and terminal operations open, is cause of additional concern for the airport industry.

[12] https://www.easa.europa.eu/sites/default/files/dfu/review_of_aviation_safety_issues_from_covid-19_final_0.pdf

In addition, newly introduced COVID-19 health safety measures (including a 1.5 m physical distance) are having a significant impact on airport performance and terminal operations leading to an additional need of staff to support COVID-19 measures and provide more physical space inside airport terminals. According to a recent study performed by EUROCONTROL (Impact assessment of COVID-19 measures on airport performance, 28 August 2020[13]) for the same passenger number in a queue in the pre-COVID period, much more space is required to manage COVID related safety measures:

- 50% at check-in;
- 100% at security control; and
- 35-50% in boarding gates.

This means that for those airports already saturated before COVID-19, the general saturation capacity with COVID-19 related health safety measures is expected to be in the range of 60-75% of their pre-COVID traffic volume during peaks.

For the groundhandling industry, with an estimated workforce of 1 million staff worldwide and around 150,000 staff in Europe alone, due to the decline of traffic and revenues, the groundhandling sector estimates that, compared to the pre-COVID era, the sector now employs less than 50% of its staff (AS, Open letter to the air transport authorities, 03 July 2020[14]).

The downward trend in traffic forecast combined with the continued loss in revenues, the high structural costs of keeping airports open and new health measures requiring additional staff and more physical space threaten the financial survival and business continuity of significant parts of the airport and ground-handling industry.

2.1.3.8 Drone operations

A direct impact of the pandemic on drone operations in Europe is the postponement of the applicability dates of the drone regulation (Regulation (EU) 2019/947[15]) to 31 December 2022, so drone operators have 6 more months to comply.

In general, the development of drone operations is still at its early stage and on-going. Drone operations are a relatively new concept, integrating technologies and infrastructure to accommodate such operations for various needs. Big drone industry players have begun and are still developing the drone/Unmanned Traffic Management (UTM) systems and applications to fit in this technology and infrastructure. The pandemic has not stopped the drone activity. A number of conceptual frameworks, platform architectures, methodologies and practical demonstrators continue to be developed across the EU for the benefit of drone operations. Drone operators are exploring the best way to start their operations, to test them in a real environment and to be in compliance with the future EU regulations.

While there is no statistical evidence showing a detrimental impact of the pandemic on drone development, the COVID-19 crisis has accelerated the use of drones. It is recognised that the pandemic has put drone operations in the front line of COVID-19, delivering vital supplies to medical personnel and for humanitarian aid transportation. Drones have been deployed in innovative ways. In their utilisation as part of the COVID-19 response, drone operations have provided solutions that are useful not only during the European response to the pandemic, but that may also support in the longer term. Moreover, in a number of fields where periodic services are required, COVID-19 has not significantly affected the use of drones.

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13 https://www.eurocontrol.int/publication/impact-assessment-covid-19-measures-airport-performance

14 https://www.asaworld.aero/news/essential-services-to-air-transport-such-as-ground-handling-must-be-further-promoted/

15 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0947

2.1.4 Overview of the aviation organisations, personnel and products monitored

In order to carry out its Standardisation duties, EASA collects information on the number of certificates, licences and declarations for various aviation domains. In addition of the general trends identified in the previous sections, the following table provides quantitative data on the organisations, aviation personnel and aircraft monitored in the EASA Member States. It compares 2019 and 2020 (**without UK**).

Having regard to the data in 2020 (based on information provided in October 2020), opposite trends between 2019 and 2020 depending on the indicators can be noticed and this cannot be explained at this stage. The consequences of COVID-19 could be a reasonable explanation for several negative trends (airport movement, number of aircraft …), However, efficiency measures could also play a role (e.g. reduce number of ATCOs with the introduction of new technologies or more efficient management of the airspace). There is also an increase in the number of flight crew licences, aircraft maintenance licences, aerodromes and heliports.

Item	2020	2019	Change in %
Air Operations			
AOC (Aeroplanes)	583	595	*-2.0%*
AOC (Helicopters)	247	255	*-3.1%*
NCC (Aeroplanes + Helicopters)	454	490	*0.2%*
SPO (Aeroplanes + Helicopters)	748	778	*-7.3%*
Aeroplanes CAT with EU Certificate of Airworthiness (number)	73,359	74,920	*-2.1%*
Helicopters CAT with EU Certificate of Airworthiness (number)	12,699	12,379	*2.6%*
Aircrew and Medical			
EASA Flight Crew licences - total	237,316	225,303	*5.3%*
Aeroplane pilots	*183,125*	*179,562*	*2.0%*
Helicopter pilots	*15,461*	*15,251*	*1.4%*
Other pilots (balloons, sailplanes)	*38,730*	*30,490*	*27.0%*
Approved Training Organisations (Flight Crew)	1,304	1,368	*-4.7%*
Flight Simulation Training Devices	1,051	981	*7.1%*
Aeromedical Centres (AeMCs)	84	86	*-2.3%*
Aeromedical Examiners (AMEs)	2,075	2,122	*-2.2%*
Design and production			
Part-21 Approved Production Organisations (Part-21 Subpart G)	620	621	*-0.2%*
Continuing Airworthiness			
Part-145 Maintenance Organisations	1,600	1,597	*0.2%*
Part-M Subpart-F Maintenance Organisations	402	424	*-5.2%*
Part-M Continuing Airworthiness Management Organisations (CAMOs)	1,549	1,584	*-2.2%*
Part-147 Maintenance Training Organisations	231	239	*-3.3%*
Part-66 Aircraft Maintenance Licences	60,155	54,343	*10.7%*

Air Traffic Management/Air Navigation Services			
Air Traffic Management/Air Navigation Service Providers	529	537	-1.5%
Air Traffic Controllers	21,408	21,626	-1.0%
Air Traffic Controller Training Organisations	130	127	2.4%
Aerodromes			
Total certified aerodromes	402	398	1.0%
Total exempted aerodromes	114	111	2.7%
Heliports (within the EASA scope)	12	8	50.0%
Movements in certified aerodromes (millions)	13.8	15.1	-8.4%
Movements in exempted aerodromes (millions)	0.83	0.97	-14.2%

Table 1: Organisations, aviation personnel and aircraft monitored in EASA Member States

2.2 Global Aviation Safety Plan (GASP) and Global Air Navigation Plan (GANP)

EPAS supports the objectives and priorities of GASP. The purpose of GASP is to continually reduce fatalities, and the risk of fatalities, by guiding the development of a harmonised aviation safety strategy and the development and implementation of regional and national aviation safety plans. A safe aviation system contributes to the economic development of States and their industries. GASP promotes the implementation of a State's safety oversight system, a risk-based approach to managing safety as well as a coordinated approach to collaboration between States, regions and industry. One of the GASP goals is for States to improve their effective safety oversight capabilities and to progress in the implementation of SSPs. Thus, GASP calls for States to put in place robust and sustainable safety oversight systems that should progressively evolve into more sophisticated means of managing safety. These objectives are mainly addressed in **Section 5.1**.

In addition to addressing systemic safety, GASP addresses high-risk categories of occurrences, which are deemed global safety priorities. These categories were determined based on actual fatalities from past accidents, high fatality risk per accident or the number of accidents and incidents. The following high-risk categories have been identified for the 2020-2022 GASP edition:

— controlled flight into terrain;

— loss of control in flight;

— mid-air collision;

— runway excursion; and

— runway incursion.

These are consistent with the key risk areas identified through the European SRM process[16]. The GASP global priorities are addressed in **Volume II**, the following **Sections**: **6.1.1.1** Aircraft upset in flight**, 6.1.1.2** Runway safety**, 6.1.1.3** Airborne collision (mid-air collisions) and **6.1.1.4** Terrain collision.

[16] Cf. EASA Annual Safety Review 2020 at https://www.easa.europa.eu/sites/default/files/dfu/easa_asr_2020.pdf

The purpose of **GANP**[17] is to drive the evolution of the global air navigation system to meet the ever-growing expectations of all sectors in the aviation community by equitably accommodating all airspace user operations in a safe, secure and cost-effective manner while reducing the aviation environmental impact. To this end, GANP provides a series of operational improvements to increase capacity, efficiency, predictability, flexibility while ensuring interoperability of systems and harmonisation of procedures. The implementation of the GANP is enabled by promoting the effective implementation of safety oversight and a safety management approach to oversight, including safety risk management to permit innovation in a managed way. The European ATM MP addresses the priorities and objectives set in GANP (refer to **Section 2.3.1**).

Since 2017, the ICAO Regional Office for the EUR/NAT region and EASA have been working together to develop a Regional Aviation Safety Plan (RASP) based on EPAS, thus allowing all States that are part of the EUR/NAT region to benefit from this approach. The aim of RASP is to facilitate the achievement of the GASP goals at a regional level. The Regional Aviation Safety Group (RASG)-EUR monitors the EUR RASP implementation and collects feedback from stakeholders with the assistance of ICAO and EASA. The first EUR RASP was issued in January 2019. This made EUR-NAT the first ICAO region having its RASP adopted. The second EUR RASP covering the period 2020-2022 was published in July 2020[18]. This second EUR RASP version is based on EPAS 2020-2024. Its reference period reflects the current GASP reference period 2020-2022.

To support the EUR-RASP planning process, EPAS actions in Volume II provide references to corresponding GASP 2020-2022 Safety Enhancement Initiatives (SEIs) addressed to States or industry, covering both organisational challenges and operational risks. GASP SEIs addressed to the regions are considered implemented through EU Safety Management at large, as described in EASP and implemented through EPAS. Consequently, they are not specifically referenced in EPAS.

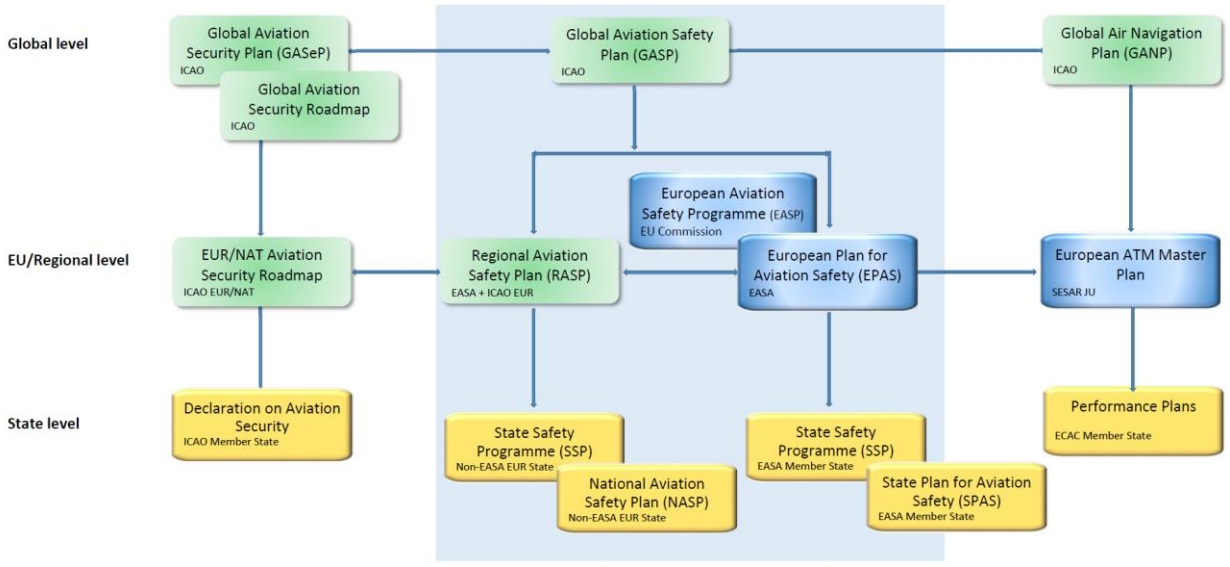

Figure 2: Relationship between EPAS and other programmes and plans

17 https://www4.icao.int/ganpportal

18 https://www.icao.int/EURNAT/EUR%20and%20NAT%20Documents/EUR%20Documents/EUR%20RASP/EUR%20RASP%202020-2022.pdf

2.3 ATM priorities

2.3.1 The ATM Master Plan (MP)

The European **ATM MP**[19] is the planning tool for setting ATM priorities across Europe. It defines the development and deployment priorities needed to deliver the Single European Sky ATM Research (SESAR) vision, which is regularly updated, through strong collaboration between all ATM stakeholders, in order to respond to the evolving aviation landscape.

Considering Article 93(c) of the Basic Regulation which stipulates that 'The Agency shall, where it has the relevant expertise and upon request, provide technical assistance to the Commission, in the implementation of the Single European Sky, in particular by contributing to the implementation of the ATM Master Plan (MP), including the development and deployment of the SESAR project', alignment between EPAS and the ATM MP needs to be ensured.

This alignment requires the identification of those SESAR Solutions in the ATM MP that can mitigate related safety risks identified by the European aviation safety system, while EPAS identifies actions that enable those solutions from the ATM MP.

Beyond this, the recent proposal on the implementation of the Single European Sky addresses also the challenges of ATM modernisation. This proposal includes enhancements for the effective coordination between all phases of the SESAR project, including the ATM MP. EPAS supports this objective and EASA's strengthened role to support the timely implementation of the ATM MP.

2.3.2 Future of the Single European Sky

The European Commission (EC) has recently issued the amended proposal on the implementation of the Single European Sky (the so called 'SES II+ recast') proposing an upgrade of the Single European Sky regulatory framework and the EASA Basic Regulation, which comes on the heels of the European Green Deal. The objective is to modernise the management of European airspace and to establish more sustainable and efficient flight paths. This has the potential to reduce air transport emissions by up to 10 %.

The proposal comes as the sharp drop in air traffic caused by the COVID-19 pandemic calls for greater resilience of our air traffic management, by making it easier to adapt traffic capacities to demand. Not adapting air traffic control capacities would result in additional costs, delays and CO_2 emissions. Meanwhile, obliging pilots to fly in congested airspace rather than taking a direct flight path entails unnecessary CO_2 emissions, and the same is the case when airlines are taking longer routes to avoid charging zones with higher rates.

To secure safe and cost-effective air traffic management services, the EC proposes actions such as:

— strengthening the European network and its management to avoid congestion and suboptimal flight routes;

— promoting a European market for data services needed for better air traffic management;

— streamlining the economic regulation of air traffic services provided on behalf of Member States to stimulate greater sustainability and resilience; and

— boosting better coordination for the definition, development and deployment of innovative solutions.

[19] https://www.atmmasterplan.eu/

EPAS supports these objectives and priorities set out in the EC proposal.

On the other hand, following the efforts put on mitigating the effects of the COVID-19 pandemic on the aviation industry and notably also on air navigation service providers (ANSPs), EASA is now focusing its efforts on supporting the return of aviation industry to normal operations. Regaining the previous scale of operations may still take considerable time, which may be used to prepare, in a constructive and forward-looking manner, for the 'new normal'.

In 2019 the Wise Persons Group on the future of the Single European Sky developed a set of 10 recommendations to enable additional ATM capacity in Europe, to be provided in a flexible and scalable manner, at reasonable costs, to deliver a more resilient ATM system, while continuing to ensure safety and security and meeting environmental concerns. Thus, EASA wishes to use the time until the previous scale of operations is established to prepare for the new challenges the ATM industry will be facing and support the implementation of those changes with the best suitable regulatory and non-regulatory measures by e.g. simplifying the regulatory framework vis-à-vis future ATM needs and supporting the transition towards a more digital ATM environment.

Based on its analysis, and following the objectives of the SES II+ proposals, EASA identified the following recommendations as directly relevant for consideration in this and future EPAS planning cycles:

Recommendation 3: Implement a Digital European Sky based on an agreed roadmap building on the recommendations described in the Airspace Architecture Study (AAS), managed by the Infrastructure Manager, ensuring resilience of the system.

Recommendation 4: Create a new market for ATM data service providers as recommended by the AAS.

Recommendation 6: Facilitate the transition towards the Digital European Sky by reviewing current licensing and training requirements for ATCOs, with full involvement of staff representatives.

The AAS, complementing the Wise Person Group Report (WPGR), proposes a progressive transition strategy towards the Single European Airspace System in three consecutive 5-year periods, while building on known good practices and quick-wins, as well as existing initiatives such as SESAR.

In its initial analysis of the recommendations made both in the WPGR and in the AAS, EASA identified three main rulemaking topics:

— ATCO mobility and training (WPRG Recommendation 6, AAS Recommendation 2);
— Cyber resilience (WPRG Recommendation 3); and
— Evolution of the ATS common requirements & airspace architecture (WPRG Recommendations 3 and 4, AAS Recommendation 1).

Regarding the first topic, one of the objectives will be to move from sector orientation to systems orientation, for increased flexibility and capacity. The related implementation actions will have an impact on RMT.0668 'Regular update of air traffic controller licensing rules (IRs/AMC & GM)'. The second topic is directly relevant for RMT.0720 'Management of information security risks'. Concerning the third topic, it will have an impact on RMT.0719 'Regular update of air traffic management/air navigation services rules' as the proposal addresses the creation of a distinct layer of ATM/ANS services for the creation of a new market within SES for ATM data service providers. Finally, the relevant WPRG and AAS recommendations that could not be addressed by the already referenced rulemaking tasks (RMTs), can be implemented using RMT.0682 'Implementation of the regulatory needs in support of SESAR deployment'. The details of these RMTs may only be determined on the basis of an agreed implementation roadmap that is still subject to further definition.

2.4 How EPAS is developed

EPAS covers a 5-year time frame. In line with Article 6(1) of the Basic Regulation, EPAS is updated on a yearly basis. Hence, EPAS is developed as a rolling 5-year plan in close cooperation with stakeholders, drawing increasingly from an evidence-based approach. The standard EPAS programming cycle foresees two distinct phases, each with a dedicated stakeholder consultation.

— During the first phase, the priorities derived from the EU Aviation Strategy (see **Chapter 3**) are discussed and confirmed with the EASA ABs. MAB and SAB take the lead in consolidating inputs from their domain sub-committees and provide EASA with the Member State/industry views on the priorities.

— Based on these priorities agreed/confirmed with the EASA Abs, the planning milestones for individual EPAS actions are defined or updated in line with the EASA Single Programming process. A draft EPAS is then developed and provided to all ABs for detailed comments.

Following the AB consultation and analysis of comments, the final draft EPAS is consolidated and presented for approval to the EASA Management Board (MB). Following its formal approval by the MB, it is published on the EASA website[20].

More information on EPAS development, including the application of the EC Better Regulation principles, the types of EPAS actions and their templates, a list of acronyms and definitions, as well as information on the various groups having a role in EPAS development can be found as stand – alone documents, downloadable from the EPAS dedicated webpage, part of the EASA website:

- https://www.easa.europa.eu/sites/default/files/dfu/how_epas_is_developed.pdf
- https://www.easa.europa.eu/sites/default/files/dfu/EPAS action types and templates.pdf
- https://www.easa.europa.eu/sites/default/files/dfu/list_of_epas_acronyms_and_definitions.pdf
- https://www.easa.europa.eu/sites/default/files/dfu/Working groups and Bodies having a role in EPAS.pdf

[20] https://www.easa.europa.eu/easa-and-you/safety-management/european-plan-aviation-safety

2.5 How EPAS is structured

The 2021-2025 EPAS edition comprises three distinct volumes:

— **Volume I** provides the executive summary as well as an introduction, describes the strategy and includes the key indicators. It consists of **Chapters 1** to **4**.

— **Volume II** contains the detailed list of EPAS actions. It consists of **Chapters 5** to **16**.

— A new **Volume III** provides the overview of the main safety risks affecting the European aviation system, in the form of key risk areas (KRAs) and domain safety risk portfolios. It consists of **Chapters 17** to **23.**

The three volumes are complemented by a number of supporting documents providing further details or assisting the reader.

Volume I

Volume I provides an executive summary with the main highlights of each edition. This is followed by an introductory chapter (Chapter 2) where the link with other planning documents at European and global level as well as the operational context in which EPAS actions are to be deployed are explained. The information on how EPAS is developed, including how new proposals to be included in EPAS can be submitted has been moved to the EPAS website. Chapter 2 also presents the structure of the document and how actions are monitored,

The overall structure of **Chapter 3 Strategy** remains basically unchanged in this edition.

Section 3.1 'Strategic priorities' addresses the following priorities:

— 3.1.1 Systemic safety

— 3.1.2 Operational safety

— 3.1.3 Safe integration of new technologies and concepts

— 3.1.4 Environment

Section 3.2 'Strategic enablers' includes the following enablers:

— 3.2.1 Research and innovation

— 3.2.2 Safety promotion

— 3.2.3 International cooperation

— 3.2.4 Digitalisation

— 3.2.5 Technical competence development

— 3.2.6 Standardisation

The information in these sections was updated to reflect the latest developments.

Section 3.3 'Update on the Basic Regulation Roadmap' is maintained to update the information on priorities guiding the implementation of the Basic Regulation, initiated with EPAS 2019-2023.

Chapter 4 Performance provides key indicators for EPAS monitoring, including:

— 4.1 Key indicators in terms of EPAS actions (and action completion)

— 4.2 Safety performance (with an outline for EPAS safety performance metrics)

— 4.3 Environmental performance (with reference to the EAER)

Volume II

The structure of Volume II reflects the various domains defined within the SRM process to provide a link with the corresponding safety data portfolios included in the ASR. The structure also facilitates the identification of actions relevant for different stakeholder groups:

— All systemic safety & competence of personnel issues are grouped within **Chapter 5**, which is further subdivided into seven distinct sections to address the various action areas.

— All actions other than those related to systemic safety & competence of personnel, corresponding to drivers 'safety', 'level playing field' and/or 'efficiency/proportionality' are grouped per **domain** (see **Chapters 6** to **15**). Within each of those chapters, actions are grouped per driver. For the driver 'safety', a further grouping per key risk area is applied where a significant number of actions is included (this concerns **Chapters 6** and **8** mainly).

— Regular update RMTs are included in the respective **domain** chapter.

— All actions corresponding to the driver 'environment' are included in a separate **Chapter 16**.

The below provides an overview of the Volume II structure:

Chapter	Title
5	**Systemic safety & competence of personnel**
6	**Flight operations — aeroplanes**
7	**Rotorcraft**
8	**General Aviation**[21]
9	**Design and production**
10	**Maintenance and continuing airworthiness management**
11	**Air traffic management/air navigation services (ATM/ANS)**
12	**Aerodromes**
13	**Groundhandling**
14	**Unmanned aircraft systems**
15	**New technologies and concepts**
16	**Environmental protection**

Within each chapter/section, actions are grouped per EPAS action type (RMT, SPT, RES, EVT, MST) and within each action type, they are listed in ascending order of the unique EPAS action reference number.

Where an action is relevant to more than one domain, its full description is included in the main domain Chapter, and a reference to it is added in the other domain Chapter(s).

Example:

[21] Non-commercial operations with aeroplanes with MTOMs below 5 700 kg, all operations with balloons and sailplanes.

- An action for flight crew training in the rotorcraft domain is included with its full description in **Section 5.3** 'Competence of personnel'. In addition, a reference to it is provided in **Chapter 7** 'Rotorcraft'.

Appendices to Volume II

The EPAS is complemented by seven appendices with additional information in support of or for easy access to the information provided in Volumes I, II and III:

— Appendix A: Deliverables published in 2020;

— Appendix B: Deliverables expected in 2021;

— Appendix C: Overview of new actions, deleted actions and actions on hold;

— Appendix D: Best Intervention Strategies overview;

— Appendix E: Transposition of ICAO SARPs in 2020; and

— Appendix F: Index.

***Note 1*:**

Appendix E is newly introduced with this EPAS edition. It provides an overview of the 2020 ICAO State Letters Type II transposition into EPAS rulemaking actions

Note 2:

For consistency, with this EPAS edition EPAS reference numbers for SPT, MST and RES actions are updated to include four digits.

Volume III

Volume III is structured in accordance with the currently available Safety Risk Portfolios, as follows:

Ch.	Title
17	Introduction
18	COVID-19
19	Aerodromes and Ground Handling
20	ATM/ANS
21	Commercial Air Transport – Aeroplanes (CAT A)
22	Human Factors
23	Non-Commercial Operations - Small Aeroplanes

Within Chapters 18 to 23 safety issues are listed in alphabetical order, thus not expressing any order of priority.

2.6 How EPAS is monitored

Section 4.2 presents an outline for EPAS safety performance metrics reflecting the EPAS strategic priorities in the area of safety and the high-level safety objective set out in the Basic Regulation to 'establish and maintain a high uniform level of civil aviation safety in the Union'.

The efficiency of actions included in EPAS in relation to environmental protection will continue to be monitored as part of the EAER (refer to **Section 4.3).** A new EAER will be published in 2022.

In accordance with Chapter II of the Basic Regulation, Member States are required to develop a SPAS, taking into consideration the actions they own in EPAS and providing justifications when such actions are not considered relevant to them. Accordingly, SPAS will be the primary tool for Member States to report on action implementation. States are expected to provide an up-to-date SPAS at least annually or, where the SPAS is not updated annually, a report on the implementation of EPAS actions. Implementation of the SPAS is also foreseen to be monitored as part of the EASA Standardisation activities.

For the remaining EPAS actions (RMT, SPT, RES and EVT), feedback on implementation is regularly provided during AB meetings. Most of the deliverables planned in EPAS are published on the EASA website (see rulemaking process[22], safety promotion[23], research projects[24] and evaluation of rules[25]).

22 https://www.easa.europa.eu/document-library/rulemaking-process-overview

23 https://www.easa.europa.eu/document-library/safety-promotion

24 https://www.easa.europa.eu/document-library/research-projects

25 https://www.easa.europa.eu/document-library/general-publications?publication_type%5B%5D=2481

3. Strategy

In the 2017-2021 programming cycle, EASA introduced the notion of strategic priorities for EPAS. The strategic priorities were initially based on the EC Aviation Strategy[26] and EASA's strategic plan. The safety priorities are based on the European Safety Risk Portfolios (SRPs), refer to **Volume III**. The efficiency and level playing field priorities are based on stakeholder feedback. The environmental priorities are aligned with the EAER 2019[27].

EASA regularly consults these priorities with key stakeholders. They have remained stable over time.

The COVID-19 pandemic, while first and foremost a humanitarian and public health challenge, is having unprecedented repercussions for the entire aviation sector. The economic impact of the crisis exceeds any of the events that had affected aviation in the past. Industry is faced with a dramatic economic downturn and an uncertain future. Authorities and organisations have been experiencing significant strain over the last months owing to the multiple implications of this unprecedented crisis. While various sources provide projections on what the aviation sector may look like, once the spread of the virus is under control, borders will be open again and the public will be massively returning to travel by air, it is premature to engage in a process to define strategic priorities for a post-crisis aviation system whose contours are not yet predictable.

Moreover, with many uncertainties resulting from the crisis and the dire economic outlook for the aviation industry, a strong focus on aviation safety and awareness of possible trade-offs between survival/profitability and safety remain essential.

Accordingly, the strategic priorities in this EPAS edition remain unchanged. Upon submission of this EPAS edition for approval, the Agency will initiate a process to define new EPAS strategic priorities for the reference period 2022-2026. For this process to be successful, a scenario/outlook of economic recovery and return to operations will be required first, in order to engage the EPAS strategy discussion with the EC and key stakeholders, framed under the Advisory Body structure.

[26] https://www.europeansources.info/record/communication-on-an-aviation-strategy-for-europe/

[27] https://www.easa.europa.eu/eaer/system/files/usr_uploaded/219473_EASA_EAER_2019_WEB_LOW-RES.pdf

3.1 Strategic priorities

3.1.1 Systemic safety

3.1.1.1 Improve safety by improving safety management

Despite the fact that the last years have clearly brought continued improvements in safety across every operational domain, the latest accidents and serious incidents and the massive worldwide impact of the COVID-19 pandemic on the aviation system underline the complex nature of aviation safety and the significance of addressing human and organisational factor aspects

Effective safety management including robust risk management policies and processes are essential in dealing with the multiple impacts of the pandemic on the aviation system, both at authority and organisation level. This is supported by ICAO Annex 19 and Regulation (EU) No 376/2014[28] on the reporting, analysis and follow-up of occurrences in civil aviation and when applicable, by flight data monitoring requirements[29].

Throughout 2020, in the context of the RNO project, EASA has been working closely with Member States and industry partners to identify and assess the new or emerging safety issues induced by the COVID-19 pandemic and the resulting extreme reduction in operations. This led to the identification of many different safety issues across a wide range of operational activities, with a significant safety management and human factors component[30]. In recognition of those EASA published a series of guidelines including on the role of operators' management systems in the COVID-19 recovery phase[31].

Examples of new safety issues identified as part of the dedicated COVID-19 risk assessment

— **SI-5003 Skills and knowledge degradation due to lack of recent practice**

The 90 % reduction in traffic means that most aviation professionals are not performing their normal tasks, sometimes they are doing a substantially different job, and sometimes they are not working at all or at a substantially reduced frequency. Simulator and classroom-based training has also not been taking place. Together, this results in a reduction in the skills and knowledge of aviation professionals and poses safety risks.

— **SI-5008 Risk assessments based on previous normal operations no longer valid**

Risk assessments performed by organisations and authorities are made in the context of specific operations and operating environments. The substantially changed and still-changing operating environment and the addition of 'new' types of operations mean that most risk assessments are no longer valid.

— **SI-5005 Restarting a complex system is challenging**

The aviation system is highly interconnected, sophisticated and made up of people and technology, meaning that the consequences of shutdown and restart are not completely predictable.

28 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0376&from=EN

29 In particular Regulation (EU) 965/2012 Part-ORO, ORO.AOC.130 and Part-SPA, SPA.HOFO.145

30 https://www.easa.europa.eu/sites/default/files/dfu/review_of_aviation_safety_issues_from_covid-19_final_0.pdf

31 https://www.easa.europa.eu/sites/default/files/dfu/EASA%20Guidelines_Role%20of%20operators%20MS%20in%20COVID-19%20recovery%20phase%20Issue%202.pdf

Organisations will need to prepare good communications and decision-making strategies, using personnel expertise, data, information and good internal and external coordination.

— **SI-5009 Reduced focus on, or prioritisation of safety**

Multiple signals indicate that organisations may not be providing safety and safety management with the same level of attention and resources as was previously possible. These include stress at an individual level, dismissal or furlough of staff, and economic pressures. Focusing too much on returning to service and economic survival may reduce the minimum needed level of resources as well as the emphasis on human and organisational factors, to the detriment of safety.

Key actions:

— Incorporate safety management requirements in initial and continuing airworthiness (RMT.0251).

— Support States in implementing State Safety Programmes (MST.0001) and States Safety Plans (MST.0028).

— Encourage international harmonisation of SMS implementation and human factors principles (MST.0002 and SPT.0057).

— Encourage better implementation of FDM programmes by operators (SPT.0112, SPT.0113 and MST.0003).

— Support the implementation of a robust oversight system across Europe (MST.0032).

See **Volume II Section 5.1**.

3.1.1.2 Human factors

EASA collects data and information relating to human factors and human performance from various sources, including through occurrence reports, feedback from stakeholders, the experts in the Human Factors CAG (HF CAG) and other regulatory and oversight activities.

Within the HF CAG EASA analyses such data and information to determine the contribution of human factors and human performance to the various key risk areas.

Note: The EASA ASR[32] now includes specific data relating to human factors and human performance in the domain-specific analysis for the aeroplane and sailplane domains.

As the aviation system changes, it is imperative that we ensure that human factors and the impact on human performance continue to be taken into account, both at service provider and regulatory levels.

'Human factors' and 'human performance' are terms that are sometimes used interchangeably. While both human factors and human performance examine the capabilities, limitations and tendencies of human beings, they have different emphases:

— Human factors (HF) — this term focuses on why human beings function in the way that they do. The term incorporates both mental and physical processes, and the interdependency between the two.

— Human performance (HP) — the output of human factors is HP. This term focuses on how people do the things that they do. Note: Throughout Volume II, actions with a strong HF component are identified by adding 'HF' below the driver indication.

[32] https://www.easa.europa.eu/sites/default/files/dfu/easa_asr_2020.pdf

In 2019 the HF CAG prioritised a series of safety issues for a more in-depth analysis. These issues are systemic safety issues. Other CAGs address safety issues that also have HP elements[33]. In addition to this regular process, various human factors and performance aspects, including fatigue, are being addressed within the dedicated safety risk portfolios created following the identification of COVID-19-related safety issues.

An overview of issues identified as part of the regular European SRM process, as well as the dedicated COVID-19 review, together with their current status, is included below:

Safety issue assessments complete

— **Human factors competence for regulatory staff** (SI-3003)

Without HF competencies, regulators cannot adequately oversee HF implementation in the aviation industry.

— **Design and use of procedures** (SI-3007)

It is imperative for procedures to be designed so that they are usable, but this is increasingly difficult in the context of a complex system.

The related safety issue assessments are being addressed in the BIS 'Human Factors competence for regulatory staff' and 'Design and use of procedures' respectively. The first BIS resulted in the inclusion of two new EPAS actions in this EPAS edition:

- SPT.0115 **Provide Member States with a basis for training their staff in Human Factors**
- MST.0037 **Foster a common understanding, regulation and oversight of Human Factors**

The second BIS is still being processed and may lead to new EPAS actions for subsequent EPAS editions.

New HF safety issues identified as part of the dedicated COVID-19 risk portfolio, with mitigating actions under development are:

— **SI-5002 Aviation personnel fatigue**

With redundancy and furlough reducing the available number of personnel, those left working may have to work additional hours. The preparation for and eventual return to (new) normal operations will require significant additional effort in comparison with actual normal operations. These may both contribute to rising levels of fatigue.

— **SI-5003 Skills and knowledge degradation due to lack of recent practice**

The drastic reduction in traffic means that most aviation professionals are not performing their normal tasks, sometimes they are doing a substantially different job, and sometimes they are not working at all or at a substantially reduced frequency. Simulator and classroom-based training has also not been taking place. Together, this results in a reduction in the skills and knowledge of aviation professionals, and poses the associated safety risks.

— **SI-5006 Personnel may not feel safe and in control about returning to work**

The pandemic is a significant source of anxiety, stress and uncertainty for almost everyone. Worries about unemployment for aviation staff and their relatives may be exacerbated. During the shutdown, with people working from home and therefore isolated from normal support, the personal wellbeing

[33] As a result, the HF CAG also provides expertise to assess HF-related safety issues identified by the other CAGs.

of professionals is likely to have suffered. For those working, this may lead to task distraction/interruption, workload/task saturation, instructions or requirements not followed. Regardless of whether personnel are working, are employed, furloughed or unemployed, we have a duty of care to support the wellbeing of aviation professionals.

— **SI-5007 Decreased well-being of aviation professionals during shutdown**

Personnel will be returning to duty with a higher than normal psychological stress, potentially reducing staff performance and increasing safety risks. Organisations and authorities need to understand and develop strategies to mitigate these risks.

The results of the in-depth analysis of the above issues may lead to the determination of short-term mitigation actions not qualifying for inclusion in EPAS. More systemic issues or issues that are expected to remain in the medium to long term will be addressed as part of the regular European SRM cycle.

Further information on HF/HP safety issues can be found in Volume III.

3.1.1.3 Competence of personnel

As new technologies and new business models or operational concepts emerge on the market and the complexity of the system continues to increase, it is of key importance for aviation personnel to have the right competencies and for training methods to be adapted to cope with new challenges, such as COVID-19. It is equally important for aviation personnel to take advantage of the opportunity presented by new technologies to enhance safety.

The safety actions related to aviation personnel are aimed at introducing competency-based training for all licences and ratings, and at facilitating the availability of appropriate personnel in CAs. The Agency shall take due account of requests to introduce competency-based training and assessment (CBTA) for all categories of aviation personnel to whom the concept is addressed: aircraft maintenance personnel, pilots, ATCOs, air traffic safety electronics personnel (ATSEP), and flight operations officers. A phased approach to gradually reach the level of maturity required for the full implementation has been adopted. Moreover, for ATCOs, the existing European' performance objective is structurally very similar to an ICAO competency unit. The safety actions for the introduction of the new training concept initially address pilots, through training organisations and operators. These actions will contribute to mitigating related safety issues, which play a role in improving safety across all aviation domains. Training and education are considered key enablers.

Key actions:

— Introduce evidence- and competency-based training and assessment in the domains of FCL and OPS, as appropriate (RMT.0194, RMT.0599 and SPT.0012).

— Modernise the European pilot licensing and training system (RMT.0194).

3.1.1.4 Integrated Risk Management (security and safety)

Management of security risks with safety impact

The Basic Regulation addresses some of the interdependencies between safety and security in civil aviation and requires the EC, the Agency and the Member States to cooperate on security matters, where interdependencies between civil aviation safety and security exist.

The implementation of aviation security measures can have a direct impact on safety aspects of aerodrome or aircraft operations. Airport security, aircraft security or inflight security are the areas where the

interdependencies are highly visible and where any security requirements should also consider possible impacts on aviation safety.

Therefore, an integrated approach to management of safety and security risks across the spectrum of aviation activities would bring benefits such as a complete overview of risks, a better sharing of security information and the closure of gaps in the security system. Consequently, this would allow ensuring synergies where security measures can have an impact on safety and vice versa; avoiding thus incompatible actions and strengthening the overall safety and security of civil aviation.

In order to achieve this objective, there is an opportunity to apply the existing safety risk management process for the benefit of aviation security, focusing on any security risks with potential safety impact.

The proposed mechanism would take full benefit of the existing regulatory framework enabling us to understand vulnerabilities in aviation security with the objective of proactively developing and implementing mitigation measures at State and EU level to address them, therefore contributing also to the overall level of aviation safety. It would also allow defining and analysing trends in aviation security in order to provide an additional opportunity to improve the system. Finally, it would foster the implementation of a safety and security culture amongst EU Member States and stakeholders.

Key actions:

— Ensure that security occurrences with safety relevance are fully integrated in the existing Safety Risk Management including their analysis, identification of trends and mitigation of security issues as part of European SRM when applicable;
— Implement a regulatory framework for cybersecurity covering all aviation domains (RMT.0720).

Cybersecurity

Citizens travelling by air are more and more exposed to cybersecurity threats. In order for the new generation of aircraft to have their systems connected to the ground in real time, ATM technologies require internet and wireless connections between the various ground centres and the aircraft. The multiplication of network connections and the surge in digitalisation of aviation systems increases the vulnerability of the whole system. It is essential that the aviation industry and authorities share knowledge and learn from experiences to ensure systems are secure from individuals/organisations with malicious intent.

EASA signed a Memorandum of Cooperation (MoC) with the Computer Emergency Response Team (CERT-EU) of the EU Institutions on 10 February 2017.

EASA and CERT-EU have established a European Centre for Cyber Security in Aviation (ECCSA)[34]. The ECCSA's mission is to provide information and assistance to European aviation manufacturers, airlines, maintenance organisations, ANSPs, aerodromes (ADR), etc. in order to protect critical elements of the system such as aircraft, navigation and surveillance systems, data links, etc. The ECCSA will cover the full spectrum of aviation. In addition to the information-sharing initiatives intended to be implemented through the ECCSA, the strategy to address cybersecurity risks should be focused on research and studies, event investigation and response, knowledge and competence building, international cooperation and harmonisation and regulatory activities and development of industry standards.

Conflict zones

Since the tragic downing of Malaysian Airlines flight MH17 and the most recent incident with Ukraine International Airlines Flight 752 on 8 January 2020, there is a general consensus that States shall share their information about possible risks and threats in conflict zones. Numerous initiatives have been taken to inform the airlines about risks on their international flights.

Member States, European Institutions and EASA have established an alerting system with the objective of joining up available intelligence sources and conflict zone risk assessment capabilities in order to enable the publication of information and recommendations on conflict zone risks in a timely manner, for the benefit of all European Member States, operators and passengers. It complements national infrastructure mechanisms, when they exist, by adding, when possible, a European level common risk picture and corresponding recommendations. EASA acts as the coordinating entity for activities not falling directly under Member States' or the EC's responsibility and initiates the drafting, consultation and publication of Conflict Zone Information Bulletins[35].

The tragic accident with the downing of Ukraine International Airlines Flight 752 highlighted once more the importance of information sharing and risk assessments. Noting the valuable actions already implemented at EU level during the past 5 years, there is a need to enhance the current capabilities for information sharing and risk assessments at EU level. In this spirit, EASA proposes to explore possible mechanisms which would streamline the cooperation between EU institutions, national authorities and commercial aviation operators so that any relevant information on threats and risks in conflict zones or armed insurgencies could be shared without delay for the primary benefit of airspace users and national authorities. Such information, beside any other relevant information, could be taken into account in their own risk assessments, alongside any available guidance or directions from their CA, as appropriate.

[34] https://www.easa.europa.eu/eccsa

[35] https://www.easa.europa.eu/easa-and-you/air-operations/information-on-conflict-zones

Key actions:

— Disseminate information to both air operators and CAs in order to mitigate the risk associated with overflying conflict zones (SPT.0078).

— Develop a mechanism to improve information sharing and capacity building related to conflict zones or armed insurgencies.

3.1.1.5 Impact of socio-economic factors on safety

Article 89 of the Basic Regulation requires the Member States, the EC, the Agency and other Union institutions, bodies, offices and agencies to cooperate with a view to ensuring that interdependencies between civil aviation safety and related socio-economic factors are taken into account. In particular, it tackles the need to address socio-economic risks to aviation safety. EASA is also required to consult relevant stakeholders when addressing such interdependencies and to publish a review every 3 years, which shall give an objective account of the actions and measures undertaken.

In this perspective, the impact assessment methodology used under the BIS process has been significantly improved as regards social impact assessment and will be subject to continuous improvement throughout its implementation. Where relevant to the topic, such interdependencies are now part of the initial assessment of the issue, as it was the case, for instance, during the development of the Groundhandling Roadmap (see **Section 3.3**).

3.1.1.6 Data4Safety

Data4Safety (also known as D4S) is a data collection and analysis programme that aims at collecting and gathering all data that may support the management of safety risks at European level. This includes safety reports (or occurrences), flight data (i.e. flight parameters recorded on board the aircraft), surveillance data (air traffic data), weather data — these being only a few from a much longer list.

More specifically, the programme will allow us to identify better where the risks are (safety issue identification), determine the nature of these risks (risk assessment), and verify whether the safety actions are delivering the needed level of safety (performance measurement). It aims at developing the capability of discovering vulnerabilities in the system across terabytes of data.

An initial proof of concept (PoC) phase has been launched with a limited number of partners to test the technical challenges as well as the governance structure of such a programme. The PoC is planned to be completed in early 2021 and the programme will then open gradually the membership to the European aviation safety system stakeholders. A number of key building blocks have been achieved, in particular:

— The partnership principles have been framed into a programme charter.

— The data protection rules have been agreed upon and captured into the rules and procedures document and in a data sharing and protection agreement template.

— The Big Data infrastructure has been set up and a critical mass of data has already been uploaded into the ‘lake’.

— The use cases (Safety Performance Indicators and Directed Studies) for the PoC phase have been agreed upon and specified.

— Data scientists are now working with aviation experts to design the algorithms that will support the agreed use cases.

D4S is, in essence, a collaborative partnership programme that aims at inferring safety intelligence. This is done by organising a massive collection of safety data and, equally important, organising the analytical capacity amongst all European aviation safety system stakeholders. This will take the collaborative work with the industry at a scale never achieved before in Europe.

D4S will therefore directly respond to the GASP SEI 11A (GASP 2020-2022 Appendix A ORG Roadmap § 3.1.1) 'Work with industry stakeholders to leverage best practices with safety information analysis'.

3.1.1.7 Civil-military coordination and cooperation

Closer cooperation is needed between the civil and the military aviation stakeholders, including at the level of State safety management, to reconcile both airspace needs, and to achieve a safe and efficient use of airspace as well as to protect fundamental principles such as security or interoperability. Indeed, airspace should be considered as a single continuum, planned and used in a flexible way on a day-to-day basis by all categories of airspace users.

Within Europe, a good example of civil-military cooperation in the ATM area is the implementation of flexible use of airspace (FUA), which is now evolving towards a more advanced concept, the so-called advanced flexible use of airspace (AFUA). While this approach is desirable and commendable, it only accounts for the ATM aspects. A comprehensive approach could be introduced to address virtually all aviation areas.

Airworthiness

Military aviation is the prerogative and the responsibility of Member States, it would be beneficial from committing further to leverage and consolidate efforts by both civil and military in developing their aviation capabilities by taking elements from the civil world.

Based on consolidated expertise and experience, EASA provides effective support to military and industry applicants by going beyond adequate and prioritised technical advice for appropriate airworthiness and safety solutions.

An increasing number of European military authorities have already recognised that the civil model can, in part or fully, be extrapolated to military air systems. In those circumstances, they may move towards an 'as civil as possible, as military as necessary' approach through gradual convergence to civil standards if not adopting them for the design, manufacture and maintenance of military aircraft.

Safety intelligence and performance domains

The timely and accurate reporting of safety information at European level and beyond is critical to verify the achievement of global safety objectives and monitor the implementation of safety programme initiatives, such as EPAS.

Reliable military safety data sharing, primarily for aerodromes open to public use (dual-use platforms) and civil derivative aircraft (fixed wings and rotorcraft), would provide perspectives that are both global in nature as well as specific to individual areas, such as rotorcraft, where a substantial percentage of the fleet is operated by the military.

Going forward, tools to allow for a comprehensive assessment of safety performance, including State and military aircraft, would be of strong benefit to the entire aviation system and would support the goal of ensuring the highest common level of safety and environmental protection for the European aviation system.

Aviation security (including cybersecurity)

There is a shared understanding and growing concern within the military community that security and especially cybersecurity may introduce considerable risk for aviation, as systems on board aircraft and the European ATM System rely on increased connectivity and system of systems integration. Moreover, effectively mitigating cyber-related risks is key to enabling unmanned aircraft systems (UAS) (or drones)[36] integration into non-segregated airspace.

The strategic orientations adopted by EASA in developing its cybersecurity roadmap and the setting up of the European Strategic Coordination Platform (ESCP) provide the military with an opportunity to cooperate in an area of common interest in the wider context of the European aviation system.

Airspace, ANS, aerodromes open to public use

To meet the aerodrome challenges of delivering sufficient capacity, civil and military aerodromes will need to make progress to achieve a seamless airspace and globally harmonised ANS, where civil-military cooperation is a crucial element to foster in the transition process.

Key to successful cooperation is the establishment of trust and transparency so that the needs and requirements of civil and military aerodromes and services providers could be fully understood and that over time an integrated model could be achieved.

With a regional approach in areas of highly fragmented airspace and aerodromes open to public use, certain facilities and services shall be arranged so as to ensure the safety[37], regularity and efficiency of civil aviation as well as to ensure the requirements of military air operations are met, in particular by promoting a common understanding of key principles, sharing best practices and monitoring their practical implementation.

Key action:

— Member States to consider civil-military coordination aspects where relevant for their State Safety Programme (MST.0001).

3.1.2 Operational safety

3.1.2.1 Address safety risks in commercial air transport (CAT) aeroplane operations (airlines and air taxi, passenger/cargo) and NCC operations

During 2019, there were no fatal accidents involving European air operator certificate (AOC) holders performing CAT passenger/cargo. In this category, there were 27 non-fatal accidents; the number of non-fatal accidents was above the average of the previous 10-year period (22.3). In 2019, the number of serious incidents in this category increased in comparison with the average of the previous 10-year period, with 117 serious incidents recorded in 2019 in comparison with the 10-year period average of 86.5.

[36] Unmanned aircraft systems (UAS)' is the legal and technical term used in the EASA Basic Regulation as well as in the delegated and implementing acts adopted on the basis thereof. 'Drones' is the popular term used to be understood by persons with no aviation background. Both terms are used in EPAS and refer to the same thing.

[37] According to Article 2(5) of the Basic Regulation, when an aerodrome controlled and operated by the military is open to public use, Member States have to ensure that it offers a level of safety and interoperability with civil systems that is as effective as that resulting from the application of the essential requirements set out in Annexes VII and VIII to this Regulation (without prejudice to national security and defence requirements and Article 7(5) of Regulation (EC) No 550/2004).

In the European NCC operations category, there were no fatal accidents and 1 non-fatal accident in 2019. The number of serious incidents was significantly higher than usual, with 12 in 2019, compared with an average of 4.4 per year over the previous 10-year period.

The past 12 months have not only seen the upheaval that pandemic infection can bring to the world but have also witnessed the most significant grounding of a passenger aircraft for a generation, while 2019 was otherwise one of the safest for aviation in 70 years. The catastrophic failure and crash of two Boeing 737 MAX aircraft with the loss of all those on board contrasted with the otherwise very good safety record.

Following the Boeing 737 MAX accidents and safety recommendations from the Joint Authorities Technical Review (JATR), the United States National Transportation Safety Board (NTSB) and the Indonesian Komite Nasional Keselamatan Transportasi (KNKT), the Agency will assess the need to amend, where necessary in close coordination with its bilateral partners, the certification specifications and related AMC & GM for large aeroplanes as well as the need to amend Part 21 (Changed Product Rule).

The European SRM process identified the following as the most important risk areas for CAT aeroplane and NCC operations:

— aircraft upset in flight (loss of control)

  Aircraft upset or loss of control is the most common accident outcome for fatal accidents in CAT aeroplane operations. It includes uncontrolled collisions with terrain, but also occurrences where the aircraft deviated from the intended flight path or intended aircraft flight parameters, regardless of whether the flight crew realised the deviation and whether it was possible to recover or not. It also includes the triggering of stall warning and envelope protections.

  Key actions:

  — Review and promote training provisions on recovery from upset scenarios (RMT.0196 and SPT.0012).

  — Member States to address loss of control in flight by taking actions at national level and measuring their effectiveness (MST.0028).

  See **Section 6.1.1.1**.

— runway safety

  Runway excursion covers materialised runway excursions, both at high and low speed, and occurrences where the flight crew had difficulties in maintaining the directional control of the aircraft or of the braking action during landing, where the landing occurred long, fast, off-centred or hard, or where the aircraft had technical problems with the landing gear (not locked, not extended or collapsed) during landing. Runway excursions accounted for 81 high-risk occurrences recorded in the period 2013-2017 in CAT aeroplane and NCC operations.

  Runway incursion refers to the incorrect presence of an aircraft, a vehicle or a person on an active runway or in its areas of protection, which can potentially lead to runway collision as the most credible accident outcome. Manifested or potential runway collisions accounted for 28 high-risk occurrences recorded in the period 2013-2017. Despite the relatively low number, the risk of the reported occurrences was demonstrated to be significant.

Key actions:

— Require on-board technology to reduce runway excursions (RMT.0570).

— Promote and implement the European Action Plan for the Prevention of Runway Incursions (EAPPRI) and Excursions (EAPPRE) (RMT.0703) Opinion No 03/2019.

— Member States to address runway safety by taking actions at national level and measuring their effectiveness (MST.0028).

See **Volume II Section 6.1.1.2.**

3.1.2.2 Rotorcraft safety improvement

The **Rotorcraft Safety Roadmap** was delivered in November 2018, and following endorsement by EASA, is available on the EASA website[38]. The roadmap was initiated by EASA that tasked a group of external experts to develop, jointly with EASA, a set of ambitious proposals. This roadmap contains proposals for actions in order to significantly reduce the number of rotorcraft accidents and incidents. The initial analysis of data showed that the activities have to focus on light conventional rotorcraft and small operators. General Aviation (GA) rotorcraft where the number of accidents is recognised to be higher, are also within the scope of the roadmap. The roadmap covers safety and transversal issues that need to be tackled through actions in various domains, including training, operations, initial and continuing airworthiness, environment and facilitation of innovation.

The vision of the roadmap is to '**achieve significant safety improvement for Rotorcraft with a growing and evolving aviation industry**'. The group analysed a significant amount of data and took a very close look at the European 'helicopter landscape' before defining its objectives and identifying the actions to meet these objectives. The following objectives are defined in order to deliver the vision stated above:

Improve overall rotorcraft safety by 50 % within the next 10 years: Most of the accidents can be attributed to operational causes and it is recognised that influencing behaviour in the wider community is a complex process where step changes are difficult to achieve in the short term. However, for accidents caused by technical failures, an ambitious target is set to reduce the number of accidents caused primarily by technical failures by one order of magnitude.

Make positive and visible changes to the rotorcraft safety trends within the next 5 years: The aim of this objective is to drive the implementation of the quick-wins that are identified and to rapidly progress a number of safety improvements. A key performance indicator (KPI) for the safety objectives is the number of rotorcraft accidents in Europe that result in at least a fatality or a serious injury. Additional KPIs are based on the European Risk Classification Scheme (ERCS), complemented by the data collection activity using D4S to build robust data on accident rates. Helicopter safety performance indicators are published as part of the EASA ASR.

Develop performance-based and proportionate solutions that help maintain competitiveness, leadership and sustainability of the European industry: This objective also aims at supporting the development of new business models and encourage innovation.

[38] https://www.easa.europa.eu/download/Events/Rotorcraft%20Safety%20Roadmap%20-%20Final.pdf

This specific set of rotorcraft objectives align with the EASA Strategic Objectives, which have been used to derive the strategic priorities for EPAS. The main elements of the roadmap were presented in several fora, including the Rotorcraft Committee (R.COM) and the Rotorcraft Symposium.

The actions are organised in accordance with the following work streams:

— WS1 Safety Data,

— WS2 Safety Rating and market-based solution to incentivise safety,

— WS3 Training Safety,

— WS4 Training Devices and simulators,

— WS5 Safety Promotion,

— WS6 Helicopter Design improvements,

— WS7 Net Safety Benefit and CS Modernisation,

— WS8 Simplify,

— WS9 Continued Aviation Education,

— WS10 Fostering EU financial support for safety improvements.

In 2019, the Agency created an internal team to evaluate and integrate the recommendations contained in the roadmap into the EASA work programme. It was decided not to launch new RMTs but to include the inputs from the Rotorcraft Safety Roadmap in the scope of the current RMTs.

The main subjects of the Roadmap were organised in work streams and are described below:

Safety Data: EASA will engage with original equipment manufacturers (OEMs), operators and NAAs to collect and consolidate exposure data and other relevant statistics, such as flight hours or number of cycles of their products. A framework will be set up to exchange information with EASA in a manner which is mindful of personal data protection. In particular, the NoA will be used to facilitate the collection of data on fleet and flight hours from the NAAs. In order to enhance and promote reporting, new ways to report data, such as automatic reporting, will be investigated. The objective is to obtain enough data to enable us to work on accident rates instead of on numbers of accidents.

Training Safety and Training Devices and simulators: Training is seen both as a risk area and as an opportunity. A large number of the in-flight accidents happen during training. The use of flight simulator training devices (FSTDs) and the development of new training devices such as, but not limited to, virtual reality (VR) should be strongly promoted for high-risk training scenarios. There is a wide consensus that better training is one key way to improve safety. EASA will promote a 15’ safety briefing during recurrent training and focus actions on instructors. EASA will additionally promote the development of simpler and less expensive simulators for light helicopters. Finally, EASA, together with the Helicopter Expert Group members, will develop a proposal (including a training needs analysis) for an innovative approach enabling the use of affordable training devices and associated credit for crew licensing. The changes will feed and be implemented within the context of RMT.0194, RMT.0196, RMT.0678 and RMT.0599.

Safety Promotion: In order to establish a sustainable and effective safety culture including the sharing of best practices, safety promotion is a fundamental activity. EASA is running actions such as SPT.0082 'Support the development and implementation of flight crew operating manuals (FCOMs) for offshore helicopter operations' and SPT.0094 'Helicopter safety and risk management'. Please refer to **Volume II Chapter 7** for all safety promotion actions related to Rotorcraft.

Helicopter Design improvements: When it comes to design, the roadmap contains a number of actions that are not visible in the public version of the documents or the presentations and are discussed between EASA and the respective OEMs.

CS Modernisation: This work stream will address the modernisation of the EASA CSs. Several RMTs have been initiated in that respect. EASA's rotorcraft team is engaged with industry and the other bilateral partner authorities on the modernisation of the CSs. Refer to **Volume II Chapter 7** 'Rotorcraft' and **Chapter 9** 'Design and Production' with the list of RMTs directly relevant to rotorcraft safety. Some of these tasks pertain to Part-26 requirements.

Simplify: The Agency has initiated the evaluation task EVT.0010 Helicopter operations in order to collect data and assess the regulatory burden put on small and medium-sized helicopter operators.

Evaluation of new concepts: The following new concepts were proposed and are evaluated:

— **Net Safety Benefit:** This task aims to establish a policy in order to introduce the net safety benefit concept in certification. Here, we are also going to evaluate technologies which are available. This activity has been initiated and is managed in the framework of the activities of the GA Roadmap.

— **Continued Aviation Education**: The Rotorcraft Safety Roadmap had suggested the introduction of a Continued Aviation Education (CAE) scheme based on existing Continued Medical Education schemes and experience, and the assessment of applicability to various rotorcraft personnel playing key roles in safety, to begin with accountable managers and nominated personnel. The scheme is also envisaged to be open the future to pilots, instructors, examiners and inspectors, maintenance staff, and GA pilots.

  A kick-off meeting was held in order to start the activities in view of Continued Aviation Education work stream of the Rotorcraft Safety Roadmap just prior to the ensuing COVID-19 crisis. The first action was for the participants to familiarise themselves with existing Continued Medical Education programmes. Yet, due to the crisis, the medical world had other priorities to deal with, resulting in the CAE work stream being put on hold for the time being.

— **Safety Rating**: The next big concept proposed is the introduction of a voluntary rotorcraft safety rating scheme. Such a scheme is used in the automotive industry with the crash test programmes Euro NCAP[39]. It is a good way to give an incentive to the manufacturers to make safety improvements to their vehicles and differentiate themselves (from the competition). A comparative review of the current safety rating schemes of different industries has been conducted. It covered a wide range of test programmes used not only in transport but also in other industries — for example, in the food safety industry. The initial concept evaluation and feasibility study were performed in May 2020.

[39] https://de.wikipedia.org/wiki/Euro_NCAP

3.1.2.3 Address safety risks in GA in a proportionate and effective manner

Between 2009 and 2018, accidents in Europe involving recreational aeroplanes, i.e. non-commercially operated small aeroplanes with MTOMs below 5 700 kg, led to between 64 and 113 fatalities per year, with a median of 82 fatalities per year. These figures exclude fatal accidents involving micro light airplanes, gliders and balloons. As such, this sector of aviation has the highest average number of fatalities per year.

In 2019, there were 37 fatal accidents causing 70 fatalities involving recreational aeroplanes. There were fewer fatal accidents in 2019 when compared to the 10-year average and fewer non-fatal accidents. The number of fatalities is 19% lower than the 10-year average and there were 16% fewer serious injuries than during the preceding decade.

There were 31 fatalities in sailplane operations in 2019, which is close to the 10-year average of 28 per year. However, the number of serious injuries in 2019 increased to 47, which is the highest figure since 2009. As concerns balloons, in 2019 there was 1 fatal accident, 19 non-fatal accidents and 3 serious incidents. These figures are similar to those for the preceding decade.

The GA roadmap is key to the EASA strategy in these domains. 2019 seems to show an improvement for GA fixed wing and a slight deterioration for gliders. In order to support the monitoring of safety performance and prioritisation of EPAS actions in the area of GA, Member States are invited to collect data on their GA fleet, as well as on flight hours, to provide such data to EASA, through the NoA.

Although it is difficult to precisely measure the evolution of safety performance in GA due to lack of consolidated exposure data (e.g. accumulated flight hours), it is reasonable to assume that more initiatives and efforts are needed to mitigate risks leading to these fatalities.

The following have been achieved:

— The GA Roadmap key achievements are presented in the GA Roadmap 2.0 update, published on 23 June 2020. Please follow the link to the EASA website for more details[40].

— The safety promotion task on airspace infringement (SPT.0089), developed in cooperation with the Safety Promotion Network (SPN) of the Member States, is now completed.

— The 3rd workshop on 'Enhance See and Avoid' was organised in the first quarter of 2019.

— The 'GA and low level weather' seminar was organised in the third quarter of 2019. On the same theme, a visual flight rules (VFR) into instrument meteorological conditions (IMC) simulator project was organised in the first quarter of 2019 as part of the safety promotion plan for GA.

To improve the dissemination of safety messages (MST.0025), in 2018 EASA introduced the GA Community website[41] and organised its Annual Safety Conference on 'Promoting Safety Together: a vision for the future of General Aviation'. Other dissemination actions include the GA roadmap roadshows and continued participation in AERO Friedrichshafen, the 'global show for General Aviation'. The GA Community site has been reinforced in 2019 with a new **GA Safety Together Facebook page[42]** in order to reach a wider audience.

EASA, in cooperation with its ABs, launched GA Roadmap 2.0. It concentrates on making GA safer and cheaper thanks to innovation and technology, and on supporting the implementation of new or amended regulations.

40 https://www.easa.europa.eu/domains/general-aviation/general-aviation-road-map

41 https://www.easa.europa.eu/community/ga

42 https://www.facebook.com/easagasafetypromotion

Key actions:

— Improve the dissemination of safety promotion and training material by authorities, associations, flying clubs, and insurance companies targeting flight instructors and/or pilots; to create a General Aviation Safety Promotion platform (SPT.0092).

— Support the introduction of new business models (i.e. cost-sharing platforms).

— Adapt design and production rules ('Part 21 Light') to become more proportionate to the risks (RMT.0727).

— Bring data to the GA cockpits: weather, flight information services (FIS), and traffic information data should progressively be made available in all GA cockpits (RES.0021).

— Support the implementation of new or amended regulations.

3.1.3 Safe integration of new technologies and concepts

This strategic priority supports the safe integration of new technologies, innovative solutions, and operating concepts into the aviation system and facilitate the emergence of such new technologies and solutions.

Many of the technologies and innovations emerging in the aviation industry bear significant potential to further improve the level of safety, e.g. by improving the collection and analysis of operational data, better condition monitoring of aircraft for the purpose of preventive maintenance, improved accessibility and better quality of meteorological information, etc.

At the same time, new operating concepts and emerging business models, novel aircraft or propulsion systems are emerging and their specific features may not be addressed in existing certification specifications and operational regulations (including flight crew licensing, air operations, continuing airworthiness, aerodromes operations and ATM/ANS). Some new business models such as those responding to the increased demand for flying in the cities (e.g. 'urban air mobility') or those generated by the increased digitalisation in the aviation industry (virtual/augmented reality, digital twins, etc.), the possible introduction of more autonomous vehicles and platforms, single-pilot operations and completely autonomous cargo aircraft, will challenge the way authorities regulate and oversee the aviation system.

Digitalisation and automation are rapidly increasing in aviation systems. While this has resulted overall in significantly improved safety, the trend towards increasing automation requires a renewed safety focus on the interactions between humans and automation. The next generation of automation will be using Artificial Intelligence (AI). This domain, no longer the province of science fiction, could well be the next 'game-changer' for aviation[43]. In the near future, new EPAS actions will be required to maximise related safety benefits, while mitigating any threats induced by the implementation of these new technologies. AI, and more specifically the Machine Learning (ML) field of AI, bears enormous potential for developing applications that would not have been possible with the development techniques that were used so far. As concerns EASA, AI will affect most of the domains under its mandate. AI not only affects the products and services provided by the industry, but also triggers the rise of new business models and affects the Agency's core processes (certification, rulemaking, organisation approvals, safety risk management and standardisation). This may in turn affect the competency framework of EASA staff.

[43] See AVIATION SAFETY – Challenges and ways forward for a safe future, Research & Innovation Projects for Policy, EC – Directorate General for Research and Innovation, January 2018: https://publications.europa.eu/en/publication-detail/-/publication/b4690ade-3169-11e8-b5fe-01aa75ed71a1/language-en/format-PDF/source-75248795

Further details on AI can be found in **Section 3.1.3.1.**

In this fast-evolving context, EASA is putting significant efforts into preparing the future with the identification of dedicated resources to research and innovation, such as the establishment of an Agency-wide AI implementation project team, the creation of an 'EASA Innovation Cell', increasing support to the development of EU aviation & aeronautics research programmes and projects, etc. **Research and Innovation** constitute essential enablers to reap the safety potential of new technologies and innovative solutions, while managing related risks. Refer to **Section 3.2.1** for further details.

The following paragraphs provide further information on various areas in which the Agency is active and that may see additional EPAS actions in a foreseeable future to ensure the safe integration of new technologies and concepts. **Sections 3.1.1.3** to **3.1.1.6**. provide further information on those areas where activities and initiatives are more advanced.

— **Virtual Certification: Modelling and Simulation (M&S)**

The aviation industry undergoes a digital transformation process which has a strong impact on how new technologies and innovations are developed and used, including the research and development, design, testing, certification, production/manufacturing, training, maintenance and oversight processes. M&S has the potential to accelerate the introduction of new technologies and innovative types of operation and are thereby contributing to the strategic objectives of the European Green Deal. Furthermore, it offers potential for cost efficiency gains for all involved parties. M&S tools can be automated and may benefit e.g. from ML solutions in order to optimise a particular design by performing extensive simulations. What is more, M&S has the capacity to further improve product safety as it provides the ability to interrogate many different design and operating conditions beyond the practical limitations of physical testing.

The industry will need guidance and requirements from the regulator on how M&S techniques can be applied and accepted in certification processes, in particular as regards the credibility of such techniques, including the verification and validation processes. The Agency therefore intends to establish an M&S roadmap which will describe the overall regulatory approach to modelling and simulation, including an action plan for rulemaking and standards development, contributions to relevant research and innovation projects, the advancement of innovative compliance methods, the cooperation with other regulators, as well as competency management aspects. This roadmap will be closely coordinated with the AI roadmap. Once agreed, related actions in terms of rulemaking, research, safety promotion, etc. will feed into future EPAS editions.

— **Higher airspace (HA) operations, including suborbital aircraft and space operations**

There is currently a regulatory gap for operations in the 'higher airspace'. It is a dynamically evolving topic, driven by new technologies and demand. There is a need to further explore ways to tackle this gap, including, but not limited to, the definition of HA limits (upper and lower). This airspace would affect several types of aircraft including e.g. balloons, airships, and high-velocity vehicles, manned and unmanned. In the short term, a concept of operations will be defined in a project led by the EC. The outcome of this work will be analysed by EASA to determine the need for regulatory activities in the medium/long term (2-4 years): this will be done in accordance with the High Level Principles listed in the conclusions of the 2019 European Higher Airspace Operations Symposium[44].

[44] https://www.eurocontrol.int/sites/default/files/2019-07/2019-04-09-ehao-symposium-conclusions.pdf

A European framework on HA operations would also ensure avoiding risks and challenges of fragmentation and would contribute to a level playing field. Furthermore, any definition of an upper limit to HA would need to cater for the operation of suborbital and space operations. As a subset of HA, suborbital and space operations will have an impact in more areas than just airspace operations.

Air operations regulations, for example, would need to be adapted for suborbital aircraft and space operations and the impacts on the ATM system will need to be addressed in both the current airspace management and HA. Moreover, as suborbital aircraft are currently envisaged to use rockets to reach the fringe of space, fuelling of such rockets at airports would require the installation of dedicated, protected areas. This new type of operations will also call for further civil-military cooperation and coordination. Currently some European States are interested in developing horizontal spaceports to operate such suborbital aircraft.

One suborbital aircraft project is currently being developed and tested in the USA ('Space Ship Two'); this project is gaining significant media coverage at present, but has not yet been operated commercially with paying passengers on board. Some suborbital aircraft projects exist as well in Europe ('Spaceplane', the VSH student challenge project[45] to develop a suborbital manned airborne, reusable hypersonic vehicle). Due to the challenges around the propulsion systems, the level of safety for such operations will require careful consideration.

— **Reduced crew**

PART-ORO (Annex III to Regulation (EU) 965/2012[46] — the 'Air OPS' Regulation) contains conditions and limitations addressing crew composition, FTL regimes and crew training. In the future, these conditions and limitations may evolve in order to potentially allow for the possibility for large aeroplanes conducting CAT to be safely operated by a single pilot, provided that effective mitigations (e.g. ground assistance, advanced cockpit with workload alleviation means, capability to cope with an incapacitation, etc.) are in place, in order to ensure an equivalent level of safety in each of the relevant areas affected. Should new RMTs be added or existing ones be amended to enable these kinds of operations, there will be an engagement with all relevant stakeholders via the established channels.

In 2019, EASA started an internal project aiming to evaluate the impact of required changes (internal and external) on a variety of aspects, including changes to the regulatory environment; interaction with ICAO; and changes in operators' business models and social impacts. A RES action was initiated in 2019 to support this project (RES.0028).

In addition to the above two, more areas of innovation are being closely monitored and are currently subject to BIS in particular to determine when to start the corresponding rulemaking work:

[45] VSH project is part of the Aerospace Student Challenge, which allows teams of European students, through collaborative work, to participate in the development of the project by addressing various aspects of the VSH system: propulsion, avionics, flight simulation but also maintenance, management, legal aspects, etc. while complying with the overall technical framework of the VSH. The name stands for VEHRA (Véhicule Hypersonique Réutilisable Aéroporté) Suborbital Habité, or Suborbital Manned ARHV (Airborne Reusable Hypersonic Vehicle), and the vehicle will be launched from a commercial aircraft, which will reach Mach 3.5 and an altitude of 100 km, the limits of space.

[46] https://eur-lex.europa.eu/legal-content/de/TXT/?uri=CELEX%3A02012R0965-20160825

— **Airships**

There are a number of airship projects in Europe. These lighter-than-air aircraft are likely to be used in specialised operations in the medium term. The existing flight crew licensing, air operations, continuing airworthiness and aerodrome regulations will need to be adapted to incorporate this type of operation.

— **Tilt-rotor aircraft**

There is currently one project under certification in the USA which will be validated in Europe. Such aircraft could thus be operated in Europe in the near future. Tilt rotor aircraft will require adaptation of the flight crew licensing, air operations, aerodromes and continuing airworthiness regulations in particular. For example, current air operations regulations only address fixed wing aircraft, helicopters and balloons.

3.1.3.1 AI Roadmap implementation

EASA developed an AI Roadmap that aims at creating a consistent and risk-based 'AI trustworthiness' framework to enable the processing of AI/ML applications in any of the core domains of EASA, from 2025 onwards. The first version of this document was published in February 2020 and is available on the EASA website under https://easa.europa.eu/ai.

Scope of the EASA AI Roadmap

The current breakthrough is the use of data-driven learning techniques (ML/Deep Learning (DL)), which are disruptive and, by opposition to development techniques, cannot be addressed through traditional approaches. They raise the need for developing novel methods.

Version 1.0 of the EASA AI Roadmap focuses on ML techniques using, among others, learning decision trees or neural network (NN)[47] architectures. Further development in AI technology will require future adaptations to this Roadmap.

[47] **Neural network (NN)** — A computational graph which consists of connected nodes ('neurons') that define the order in which operations are performed on the input. Neurons are connected by edges which are parameterised by weights (and biases). Neurons are organised in layers, specifically an input layer, several intermediate layers, and an output layer.

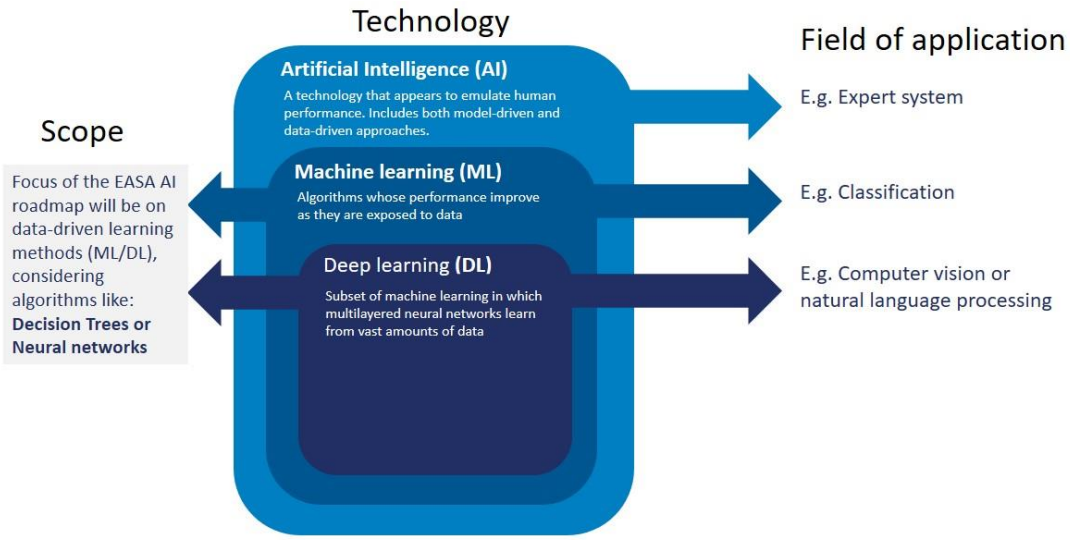

Figure *3*: AI taxonomy in the EASA AI Roadmap

Challenges

The power of ML lies in the capability for a system to learn from a set of data rather than requiring development and programming of each necessary decision path. It also involves a consequent number of challenges, including:

— the traditional ***development assurance frameworks are not adapted*** to ML;

— the lack of standardised methods for ***evaluation of the operational performance*** of AI/ML;

— the issue of ***bias*** in data-driven approaches;

— the lack of ***predictability*** and ***explainability*** of the ML application behaviour;

— the ***complexity*** of architectures and algorithms; and

— ***adaptive*** learning processes (continuous learning in operations).

Building blocks for the EASA AI Roadmap

The EASA approach is driven by the concept of 'AI Trustworthiness' that was introduced by the EC High Level Group of Experts on AI.

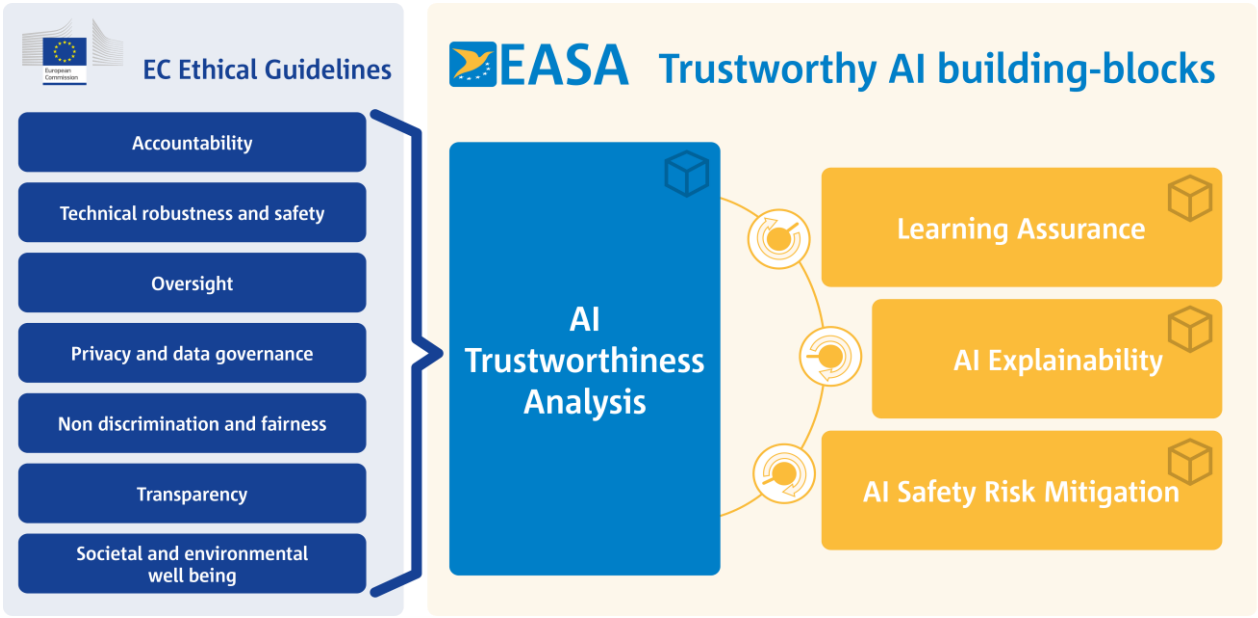

Figure 4: EASA AI Trustworthiness building blocks

All four building blocks are anticipated to be of importance in gaining confidence in the trustworthiness of an AI/ML application.

The ***AI trustworthiness analysis*** should provide guidance to applicants on how to address each of the seven key guidelines for trustworthy AI that were published in the report[48] from the EC High Level Group of Experts on AI in the specific context of civil aviation.

The objective of ***learning assurance*** is to gain confidence at an appropriate level that an ML application supports the intended functionality, thus opening the 'AI black box' as much as practicable.

Explainability of AI is a human-centric concept that deals with the capability to provide relevant and understandable information to the human(s) on how an AI application is coming to its results and outputs.

AI safety risk mitigation is based on the anticipation that the 'AI black box' may not always be opened to a sufficient extent and that supervision of the function of the AI application may be suitable to the necessary extent.

48 https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=60419

Key objectives

The main action streams identified in the EASA AI Roadmap are to:

1. Develop a human-centric AI Trustworthiness framework
2. Make EASA a leading certification authority for AI
3. Support European Aviation leadership in AI
4. Contribute to an efficient European AI research agenda
5. Contribute actively to EU AI strategy and initiatives

Timeline

The EASA AI Roadmap v1.0 foresees a phased approach, the timing of which is aligned with the industry AI implementation timeline. ***Phase I*** will consist in developing a first set of guidelines necessary to approve first use of safety-critical AI, in partnership with the industry, mainly through Innovation Partnership Contracts (IPCs), support to research, certification projects, and working groups. ***Phase II*** will build on the outcome of Phase I to develop regulations, AMC and GM for certification/approval of AI. A ***Phase III*** is foreseen to further adapt the Agency process and expand the regulatory framework to the future developments in the dynamic field of AI.

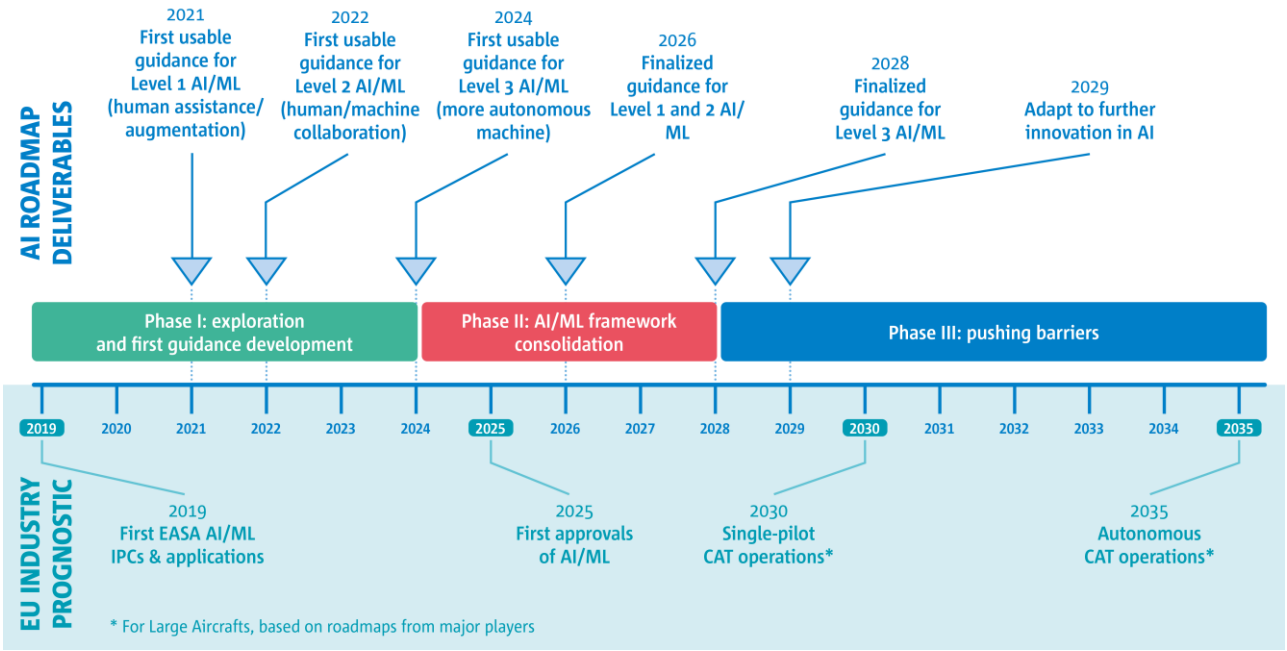

Figure 5: AI Roadmap phased approach

EASA will inform stakeholders on the progress of the implementation of this AI Roadmap and seek for feedback on the foreseen roadmap deliverables through public consultations.

3.1.3.2 Engine/aircraft interface and certification

In 2016, EASA, together with the FAA, initiated a joint Engine/Aircraft Certification Working Group (EACWG) to look at improving engine/aircraft interface certification practices on the large transport category aircraft powered with turbine engines. The group was tasked to conduct an in-depth review of current certification practices and processes, and to develop recommendations for EASA and FAA leadership on changes that would streamline and improve the overall certification process.

An effective and efficient certification process, combined with streamlined certification requirements and standards, will have clear safety benefits.

The EACWG identified a total of 29 recommendations, in the following areas:

— conducting a certification programme;

— understanding and developing the regulatory requirements;

— understanding if the engine/airframe certification interface is working effectively; and

— addressing specific rule and policy gaps.

A number of recommendations made were outside the scope of the EACWG, such as reviewing the operational regulations to determine whether discrepancies exist between these and certification regulations.

The list of recommendations is included as Appendix D to the final report issued by the EACWG in June 2017[49].

EACWG also recommended the formation of a follow-on, joint EASA/FAA/Industry group to monitor the successful implementation of the recommendations. In September 2018, the Certification Management Team (CMT), following a request from EASA and the FAA, approved the creation of the Engine Aircraft Certification Tracking Board (EACTB). Through this endorsement, the composition of the group is extended to the four authorities in the CMT (EASA, FAA, TCCA, ANAC).

The objectives of the EACTB are to:

— establish a forum and process for engine and aircraft airworthiness authorities and industry to review conflicts and gaps between engine and aircraft regulations in order to eliminate them and to proactively review regulatory change opportunities;

— track the completion, implementation and effectiveness of the (29) EACWG recommendations; and

— develop an efficient process for conducting certification programmes, defining multiparty project reviews with engine/aircraft applicants and regulators early in a certification effort to list, detect and resolve regulatory gaps, overlaps and independencies, so that manufacturers can communicate conflicting regulatory requirements to the engine and aircraft authorities, escalate and resolve them.

Since its constitution, the EACTB has managed to progress effectively on 20 of the 29 recommendations, with high focus on the CMT ‘top three’, on the additional three EACTB recommendations that are deemed of high priority by the group, and with ad hoc responsiveness to other engine/aircraft interface conflicts which have emerged.

[49] https://www.easa.europa.eu/sites/default/files/dfu/EACWG_final_report_June_2017.pdf

The EACTB has also deployed efforts in the direction of settling the appropriate forum for resolution of potential regulatory difficulties in the engine/aircraft interfacing.

Top-3 CMT Items:

— Recommendation R-2.8: Issue Papers to Policy

— Recommendation R-4.6: Fire Prevention

— Recommendation R-4.7: Electrical Wiring Interconnection System (EWIS)

Additionally, 3 Items identified by the EACTB:

— Recommendation R-4.1: F&R Testing

— Recommendation R-4.5: Inhibit Engine Protection Systems

— Recommendation R-4.4: Extended-range Twin-engine Operational Performance Standards (ETOPS)

These efforts will be continued during the next period, and the EACTB will be coordinating with the Certification Authorities for Propulsion (CAPP) and with the Certification Authorities for Transport Airplane (CATA) for the pursuing and progressing on the recommendations, and the fulfilment of the EACTB objectives.

EASA will consider these recommendations for future rulemaking actions, which would be incorporated into EPAS once the CMT has agreed to the conclusions of the EACTB.

3.1.3.2 Ensure the safe operations of UAS (drones)

Common European rules for UAS operations and registration

EASA has developed common European rules to contribute to the development of a common European market while ensuring safe operations, providing a level playing field, as well as respecting the privacy and security of EU citizens.

In February 2019, Europe got one step closer to harmonised rules for safe drone operations as the EASA Committee voted unanimously to approve EC's proposal for an Implementing Act to regulate the operations of UAS in Europe and the registration of drone operators and of certified drones. Commission Implementing Regulation (EU) 2019/947[50], accompanied by Commission Delegated Regulation (EU) 2019/945[51], defining the technical requirements for drones, were published in June 2019. The Delegated Regulation was immediately applicable while the Implementing Regulation became gradually applicable within a year from publication. By the end of 2023, the transitional period will be completed, and the Regulation will be fully applicable.

These Regulations have been amended by Commission Implementing Regulation (EU) 2020/639[52], accompanied by Commission Delegated Regulation (EU) 2020/1058[53] introducing two European standard scenarios allowing the use of a declaration submitted by the UAS operator to the CA. The applicability date of the European standard scenarios will be 1 January 2022.

50 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1570893991756&uri=CELEX:32019R0947

51 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1570894011520&uri=CELEX:32019R0945

52 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R0639

53 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R1058

With the above Regulations, the proposed EASA general concept, establishing three categories of UAS operations ('open', 'specific' and 'certified', with different safety requirements, proportionate to the risk), is adopted at European level and will be implemented.

Moreover, as the number of UAS operations increases, there is a need to establish unmanned traffic management systems, referred to as 'U-space' in Europe. There has been a huge development of U-space during the last year and it is expected that this will develop even faster in the years to come. The ATM MP reflects the details about the integration of UAS in the EU airspace.

Following the publication of the above-named EU Regulations, EASA published in October 2019 the related AMC and the GM — see ED Decision 2019/021/R[54]. These AMC & GM include:

— a revised version of the draft AMC and GM that were published with Opinion No 01/2018[55];

— the specific operations risk assessment (SORA) as AMC to the risk assessment that is required in the 'specific' category;

— the first predefined risk assessment to assist operators when applying for an authorisation in the 'specific' category; and

— explanations resulting from the discussions held with stakeholders during the approval of the regulation.

In parallel, EASA is working on the next regulatory actions that will enable safe operations of UAS and the integration of these new airspace users into the European airspace.

Key actions:

— A Decision amending the AMC & GM to define the risk classification for UAS operations in the 'specific' category, operating in urban environment and to introduce additional predefined risk assessments.

— A first NPA for UAS in the 'certified' category addressing all aviation domains (initial airworthiness, continuing airworthiness, remote pilot licences, aircraft operations, rules of the air, ATM/ANS and aerodromes) as well as VTOL operations: the NPA is expected in Q2/2021 and is planned UAS operations in an urban environment (under RMT.0230).

— Opinion No 01/2020, on a high-level regulatory framework for the U-space[56], was published in March 2020 (under RMT.0230) and the EC will submit a revised draft regulation at the EASA Committee in Q1/2021.

EASA continues to assess the need for action in the field of UAS in particular in relation to the harmonised implementation of the adopted regulations for the 'open' and 'specific' categories, the development of the necessary regulations for the 'certified' category and the safe and harmonised development and deployment of U-space across the EU.

The safe integration of all new entrants into the airspace network will be one of the main challenges in relation to the integration of UAS technologies and related concepts of operation.

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54 https://www.easa.europa.eu/document-library/agency-decisions/ed-decision-2019021r

55 EASA Opinion No 01/2018: Introduction of a regulatory framework for the operation of unmanned aircraft systems in the 'open' and 'specific' categories

56 This task is also linked to RMT.0376 as there is a need for suitable conspicuity devices from the manned aviation when entering in the U-space airspace.

EASA Counter Drone (C-UAS)[57] Task Force —Action Plan

The analysis of the events in Gatwick in December 2018 identified the need to support aerodrome operators, ATS providers and aircraft operators in preventing and managing incidents of unauthorised drone operations in the surroundings of aerodromes, while at the same time keeping operational disruptions at a minimum.

As not all European airports are equally prepared for unauthorised drone encounters, guidance material is needed on how to assess this risk, how to set up a drone incident management process, and how to best clarify the roles and responsibilities of the different actors with an active role during such incidents. Clarity is also required regarding the occurrence reporting requirements in relation to drone incidents. And last but not least, an overview over the types of counter drone technologies ranging from, detection, classification and tracking to neutralisation of unauthorised drones.

In order to avoid a diversity of national measures, EASA has proposed to act as the European coordinator of an action plan containing five objectives and to collaborate with the affected stakeholders, namely the Member States (including NAAs and Law Enforcement Authorities), aerodrome operators, aircraft operators, ANSPs, EUROCONTROL and the EC.

The C-UAS Action Plan is subject to periodic review and amendment. Issue 1 of the proposed action plan was distributed to the stakeholders for review, contribution and endorsement, after which Issue 2 was published in July 2019, which took the feedback and proposals into account. The latest Issue 3 includes numerous amendments to the C-UAS Action Plan as the work on the implementation progresses.

The action plan is articulated around five objectives:

[57] Counter unmanned aircraft systems.

#	Objective	Deliverable	Timeline/ Status
1	**Educate the public** to prevent and reduce misuse of drones around aerodromes	1. Safety Promotion material to create public awareness and understanding of the existence and purpose of geographical zones. 2. AMC & GM defining a common unique digital format for UAS geographical zones.	1. Complete 2. In progress
2	Prepare **aerodromes** to mitigate risks from unauthorised drone use	EASA guidance material (in the form of a manual) describing the roles and responsibilities of the actors, and best practices on how to respond to unauthorised drone operations in the surroundings of an aerodrome.	In progress
3	Support the assessment of the **safety risk of drones** to manned aircraft	Paper (Input to Objective 2) addressing the consequences of drone collision with manned aircraft.	In progress
4	Ensure that **C-UAS measures** are swiftly considered and implemented from a global safety perspective	Contribution to the development of International Standards to support the safe and harmonised implementation of Counter-UAS Systems into airport environment and ATM/ANS systems.	In progress
5	Support adequate **occurrence reporting**	1. Define high-level criteria to classify airprox events. 2. Evaluate compatibility of existing occurrence reporting procedures for inclusion of occurrences involving UA. 3. Develop a suitable action plan to integrate UA in common occurrence reporting procedures.	1. Initiated 2. Initiated 3. Initiated

Table 2: C-UAS Action Plan

The output from the above actions will become guidance material and will be provided in addition to EASA's rulemaking activities on U-Space and to the EASA implementation plan for Commission Delegated Regulation (EU) 2019/947 and Commission Implementing Regulation (EU) 2019/945.

Other actions of non-regulatory nature on drones

— Coordinated safety promotion to create understanding and awareness of the rules and to support safe UAS operations in the long term (SPT.0091);

— Aircraft drone collision research action (RES.0015).

— Conduct a series of webinars with Member States on different topics related to Regulations (EU) 2019/945 and (EU) 2019/947 in order to promote common understanding & harmonised implementation.

3.1.3.3 New air mobility

Until now, the air travel over urban areas has been limited to very special operations, such as police operations or HEMS. New aviation partners are seeking new business models to provide more services to citizens, ranging from parcel delivery by air within the cities to flying air taxis. These new business models and operations need to be performed in a safe and secure manner to maintain the confidence that citizens have in the air transport system. EASA has a key role to play in this area.

Key action:

— Develop rules or amend existing ones, where necessary, to address new technologies and operational air transport concepts (RMT.0731 'New air mobility'). This now includes a new subtask to develop flight crew licensing and operational rules for gyroplanes.

3.1.3.4 Electric and hybrid propulsion, vertical take-off and landing (VTOL) aircraft

Innovation in any industry is a key factor influencing its competitiveness, growth and employment potential. With this strategic priority in mind, and looking at the increasing number of new aircraft manufacturers and suppliers working on aircraft using electric propulsion (and increasingly electric systems), it becomes apparent that there are very strong prospects as well as demand, from industry and governments, to have hybrid propulsion and eventually fully electric aircraft. The market potential is therefore considered significant with related effects on wealth and job creation. The use of electric and hybrid propulsion systems has the potential of significantly reducing aviation environmental footprint in terms of both gaseous emissions and noise. However, in order to ensure that this objective is met, the full life cycle of the product needs to be taken into account as well as the energy mix used.

To encourage the safe integration of new technological advancements in the wider electrical aviation sector overall, flexibility in the approach on all types of concepts, variations and design types will be enhanced.

To allow for the projects to thrive, a number of complex issues need to be tackled from a regulatory perspective.

In terms of rulemaking for aircraft design requirements, EPAS actions will be included, once enough experience will have been gained on the use of special conditions (SCs). The use of performance-based and non-prescriptive specification's is already laid down in the SCs for VTOL and electric and hybrid propulsion and may be embedded also in the future CSs, as already used for e.g. CS-23.

With regard to VTOL, at the end of 2018, following receipt of applications for small VTOL aircraft, EASA launched a public consultation on its proposal for a SC that included suitable airworthiness standards to enable the certification of small VTOL aircraft. The number and the nature of the comments received provide an indication that such aircraft may have to be treated as a new product category which would neither fit the CS-23 nor the CS-27 product category. Following the public consultation, EASA finalised and published the SC. This SC for the certification of those aircraft is intended to represent the first component of the regulatory framework to enable the safe operation of air taxi and electric VTOL (eVTOL) aircraft in Europe.

With regard to the environmental compatibility of VTOL, in anticipation of future air taxi operations in urban areas, a number of noise measurements were performed on small VTOL aircraft in summer 2019; this activity continued throughout 2020.

With regard to electric and hybrid propulsion systems, EASA also developed a dedicated set of SCs, which will be applied together with existing airworthiness codes (CS-E, CS-23, CS-27, etc.) for the certification of products, and on a case-by-case basis for each application.

Moreover, in order to enable standardised type certification of electric and hybrid propulsion systems (EHPS), either in the case of having a separate type certificate (TC) for the EHPS, or in the case where the EHPS would be integrated into the aircraft TC, a set of specifications will be established in a dedicated SC for EHPS. The proposed SC-EHPS was published for public consultation on 27 January 2020 and consultation ran until 19 June 2020. EASA received 501 comments and plans to provide consolidated answers and issue the final SC-EHPS in early 2021.

The first small aircraft type model with fully electric propulsion system was EASA type-certificated on 15 June 2020.

Likewise, in electric and hybrid aviation, EASA aims to continue building up knowledge on emerging technologies, to establish TACs or IPCs to identify certification challengers on innovative products, and to continue liaising with relevant industry and standardisation working groups. EASA is also engaged through providing technical training to its staff.

In terms of rulemaking actions for other aviation domains, RMT.0731 is expected to lead to different streams of activities, one of them being to address the regulatory gaps identified in the existing regulations with regard to electric and hybrid propulsion.

Key actions:

Adapting existing regulations to support the introduction of aircraft with electric and hybrid propulsion systems will be done through a number of RMTs, as follows:

— RMT.0731 (New Air Mobility) for continuing airworthiness requirements for all types of aircraft[58].

— RMT.0230 (Drones), also addressing manned e-VTOL electric propulsion aspects related to the ADR, ATM, FCL, OPS domains.

— RMT.0678 (FCL) and RMT.0573 (OPS), addressing a first set of FCL and OPS electric propulsion-related requirements for other aircraft types that are not covered by RMT.0230; and

— The environmental protection requirements regarding emissions and noise with electric and hybrid propulsion will be assessed with the existing RMT.0727 (Alignment of Part 21 with Regulation (EU) 2018/1139 (including simple and proportionate rules for General Aviation)), RMT.0230 (Drones) and RMT.0514 (Implementation of the CAEP amendments: Climate change, emissions and noise).

Potentially, more streams to cover other future projects could be added in RMT.0731, including the development of CSs based on experience gained in certification projects applying SCs such as for VTOL or electric and hybrid propulsion.

3.1.3.5 Enable the implementation of new operational solutions developed by SESAR

EPAS also caters for the regulatory and implementation needs of the SESAR essential operational changes and other new technological advancements (such as, but not limited to, U-space technological solutions, virtualisation and cloud-based architecture and remote tower operations).

Since the Basic Regulation repealed Regulation (EC) No 552/2004[59], global interoperability, civil-military cooperation and compatibility with other regions' development plans, such as NextGen, form an integral part of EASA's work. Furthermore, EPAS provides a proactive and forward-looking view to support the implementation of the essential operational changes required to achieve the SESAR target operational concept safely.

In future rule-making tasks EASA will consider SESAR on-going R&D work and Airspace Architecture Study recommendations on **Virtualisation and ATM data as services** - that will allow transition to virtual centres and a common data layer allowing more flexible provision of ATM services. **Dynamic management of airspace** – that will facilitate dynamic grouping and degrouping of sectors and managing the staff resources accordingly. **Capacity-on-demand** agreements to ensure the continuity of air traffic services by enabling more dynamically a temporary delegation of the provision of air traffic services to an alternate centre with spare capacity

Furthermore, EASA will consider additional implementation support actions that facilitate the achievement of operational improvements and new ATM operational concepts. These actions should approach the implementation needs of the enabling infrastructure in a comprehensive manner, thus facilitating the safe, secure and interoperable implementation of cost-effective solutions considered as necessary. Such solutions could include GNSS (incorporating dual frequency multi-constellations), SATCOM, and other satellite-based CNS solutions or others emerging from the telecommunications field, so as to avoid requiring specific

[58] Terms of Reference: https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0731

[59] Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (the interoperability Regulation)

technological solutions; but instead to specify clear performance and competence requirements as appropriate to the anticipated operations.

Key actions:

— Support the development of data link operations through RMT.0524, expanding the current Commission Regulation (EC) No 29/2009[60] to alternate data link technologies compliant with performance requirements.

— Support the implementation of performance-based navigation in the European ATM network as per Commission Implementing Regulation (EU) 2018/1048[61] (SPT.0108).

— Support the implementation of the regulatory needs in support of SESAR deployment (RMT.0682). This encompasses regulatory actions at rule level and validation of industry standards and complements RMT.0161, which will allow the establishment of additional detailed specifications applicable to ground systems and their constituents, whenever necessary.

— Support the implementation of the Air Traffic Data Services provision by amending the current Commission Implementing Regulation (EU) 2017/373 to enable these services (RMT.0719).

— Assess SESAR R&D Solutions related to ATC provision (e.g. dynamic cross-border sectorisation, Virtual centre concept, capacity on demand services) and consider their implementation by amending the applicable regulations (e.g. Commission Regulation (EU) 2015/340) via RMT.0668, as an enabler for increased ATCO mobility.

— Assist stakeholders in implementing Virtual centres concept and dynamic cross-border sectorisation, where the need arises by exploring the means to enable moving towards a system driven ATCO training and licensing that would allow the ATCOs to provide services outside their sector through RMT.0668.

3.1.3.6 Enable all-weather operations

The European industry should have the capability to take full advantage of the safety and economic benefits generated through new technologies and operational experience. This represents a widely recognised interoperability subject touching on a wide range of areas, including performance-based aerodrome operating minima (PBAOM), related aerodrome equipment to support such operations, and procedures for both CAT and GA.

Aircraft operations have always been influenced by the weather. Whilst modern aircraft design and the availability of weather observations and forecasts contribute to a predominantly very safe flying environment, there remain occasions where severe weather events have been identified as being a contributing factor in the causal chain of accidents and incidents. Such events remain of concern within the aviation community and corresponding SRs have been addressed to EASA by accident investigation authorities.

Since 2015, EASA has increased its focus on weather-related challenges and, as part of that work, has sought to identify whether the meteorological information available to pilots could be enhanced. Accordingly, EASA organised a first workshop dedicated to ‘Weather information provided to pilots’.

60 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1570907047400&uri=CELEX:32009R0029

61 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018R1048on

Following the workshop and the acknowledged need to take further action, EASA integrated the 'Weather Information to Pilots' project within the activities of RMT.0379 'AWO'. A project team put together in April 2016 — involving representatives from international organisations, associations and industry — was tasked with an assessment of the situation and this resulted in the 'Weather Information to Pilots Strategy Paper'[62] issued in January 2018. The EASA Strategy Paper focuses on the weather phenomena that introduce risk to aviation, describes the current mitigation measures, the deficiencies and how to overcome them. The scope of the paper is focusing on CAT aeroplanes.

The EASA Strategy Paper proposes nine recommendations to further improve weather information and awareness. The recommendations are detailed on the Weather Information to Pilots webpage[63] and on pages 28-29 of the Strategy Paper itself.

They are summarised below:

— **Recommendation #1: Education and training:** weather hazards, mitigation, and use of on-board weather radar.

— **Recommendation #2: Improved weather briefing presentation:** promote improvements to the presentation of weather information in-flight briefing.

— **Recommendation #3: Promotion of in-flight weather information updates:** promote the use of the latest information available to ensure up-to-date situational awareness.

— **Recommendation #4: Pan-European high-resolution forecasts:** support the pan-European developments regarding the provision of high-resolution forecasts for aviation hazards (e.g. CAT, icing, surface winds, cumulonimbus (CB), winter weather).

— **Recommendation #5: Use of supplementary 'Tier 2' weather sources for aviation purposes:** develop the necessary provisions to support the use of supplementary 'Tier 2' meteorological information by pilots.

— **Recommendation #6: Development and enhancement of aircraft sensors/solutions:** promote the development of intrinsic aircraft capabilities to facilitate the recognition and, if required, the avoidance of hazardous weather.

— **Recommendation #7: Connectivity to support in-flight updates of meteorological information:** promote deployment of connectivity solutions (uplink and downlink) to support the distribution of meteorological information to pilots.

— **Recommendation #8: Provision of enhanced meteorological information:** promote provision of high-resolution observed and forecast meteorological information, particularly data with high spatial and temporal resolution such as imagery derived from satellite and ground weather radar sources.

— **Recommendation #9: On-board weather radar, installation of latest generation equipment:** promote the installation of the latest generation of on-board weather radars, with emphasis on including capability for wind shear and turbulence detection.

To support the above, a BIS 'Weather Information to Pilots' was produced in 2020 and consulted with the ABs. As a first result, a new safety promotion task is included in this edition.

62 https://www.easa.europa.eu/sites/default/files/dfu/EASA-Weather-Information-to-Pilot-Strategy-Paper.pdf

63 https://www.easa.europa.eu/easa-and-you/air-operations/weather-information-pilots

Key actions:

— Review and update the AWO rules in all aviation domains (RMT.0379), supported with relevant safety promotion activities.

— Promote the availability of enhanced meteorological information and uplink connectivity (SPT.0114).

3.1.4 Environment

Environmental protection and the sustainability of the aviation sector has been growing in importance over the years and is a key priority for citizens, policy makers and the industry.

EASA has an explicit mandate to protect the environment, climate and human health. In 2019, as a follow-up to the initial 2017 Environmental Strategy, the Agency stepped up its actions towards a cleaner, quieter and more sustainable aviation system by broadening the scope and ambitions of the strategy, through the launch of the EASA Sustainable Aviation Programme (2020-2024) with the following main objectives:

A. Facilitate the decarbonisation of the aviation system through Agency initiatives

B. Act towards sustainable aviation through environmental certification and standards

C. Act towards sustainable aviation through effective transversal actions

D. Act towards sustainable aviation through a Flight Standards Environmental Action

Some key initiatives developed under Objective A are:

	**Reduction of aircraft emissions** through facilitating and monitoring the use of **Sustainable Aviation Fuels (SAF)** within Europe.
	Promoting **low-emission solutions** through facilitating the introduction of **electric and hybrid aviation**, such as the recently certified first fully electric general aviation aircraft type.
	**Reduction of aviation's environmental footprint** through the development of an **Environment Label ('EcoLabel' – a voluntary initiative)** for aviation, by providing harmonised, reliable and easily understandable information for more **sustainable choices**, coordinated within EASA Member States. It should allow rewarding those air transport operators making efforts to reduce their environmental footprint and help increase the effectiveness of other measures like the ReFuelEU initiative, zero pollution, the Environmental Noise Directive, etc.
	Aiming for **zero emissions aviation**, the Agency is engaging with MS to conclude dedicated partnership agreements, such as the one with Norway which was successfully initiated in February 2020.

3.1.4.1 Act towards sustainable aviation through robust, efficient and innovative certification

In the area of aircraft and engine technology, the Agency's product certification activities ensure that products are as quiet and clean as possible, thereby reducing negative impacts on the health of citizens. At the same time, the Agency innovates to develop **the most cost-effective environmental certification process in the world**, thereby contributing to the competitiveness of the European industry.

Supersonic and hypersonic aircraft

It is likely that supersonic transport (SST) aircraft will be operated in Europe in the medium term.

Specific landing and take-off noise regulations will need to be adapted for supersonic aeroplanes safeguarding the high level of environmental protection in Europe. In order to ensure a level playing field with subsonic aircraft, these supersonic landing and take-off noise regulations will be guided by the international noise certification standard for subsonic aeroplanes.

It is expected that SST aeroplanes will be restricted to fly at supersonic speeds over high seas in order to avoid unacceptable situations to the public — from sonic booms to begin with. There is a long-term ambition to work on the definition of a sonic boom noise certification standard for 'low-boom' SST aircraft that will safeguard no such unacceptable situations will be present. This is one precondition to facilitate supersonic flights over land. As regards emissions certification standards, SST aircraft and engine emissions regulations need to be developed and updated, respectively, to ensure environmental compatibility of supersonics.

Key actions:

— The Agency has a new mandate to collect and **verify aircraft noise and performance information** for noise modelling around airports, as per Regulation (EU) 598/2014[64] Article 7.

— A number of **novel technologies** are rapidly approaching market maturity. In order to respond proactively to these technologies and allow for smooth certification based on robust environmental assessments, a dedicated activity will be launched to assess their environmental characteristics and sustainability. This will include the electric propulsion project as well as the sustainability assessment of alternative fuels. The success of this activity will be ensured by engaging traditional stakeholders as well as aviation environment non-governmental organisations (NGOs).

— The Agency will develop environmental protection requirements for supersonic transport aeroplanes (RMT.0733).

3.1.4.2 Act towards sustainable aviation through technical leadership for smart and proportionate standards

The Basic Regulation makes direct reference in Article 9 to the relevant Volumes of ICAO Annex 16. The Agency applies the EU Better Regulation principles in terms of environmental standards is fulfilled through effective involvement upstream in the ICAO-CAEP process.

Key actions:

— A key priority from the European perspective is the CAEP work on **supersonic** transport to safeguard that **the current high level of aviation environmental protection in Europe does not deteriorate** and a level playing field between subsonic and supersonic jets is ensured. Furthermore, the environmental certification requirements for supersonic transport must on the one hand not undermine the historic environmental improvements that have been achieved by subsonic aircraft, and on the other hand help to avoid potential operating restrictions that affect the wider sector.

— EASA expertise in ICAO standard setting will continue to be made available to the EC for ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (**CORSIA)**, provided there is a suitable funding mechanism.

64 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1570907778872&uri=CELEX:32014R0598

— As the Basic Regulation permits Europe to create environmental standards in those areas where no ICAO standards are available, efficient rulemaking will focus on areas where Europe would like to take the lead (e.g. hybrid and electric aircraft).

— Smart standards are also synonymous with '**data-informed' standards**. In this regard, EASA is continuously improving the quality of its impact assessment capabilities by collecting and analysing flight data (Data4Safety) and developing state-of-the-art tools to monitor and forecast aviation's noise and emissions as well as the costs of candidate policies to mitigate those (H2020).

The Agency will bundle its efforts on digitalisation of its environmental activities under the *EASA Environmental Portal*. The Portal aims at achieving efficiency gains inside the Agency, as well as for NAAs (e.g. in issuing noise certificates), manufacturers, operators and aerodromes (e.g. in collection of noise certificates).[65].

3.1.4.3 Act towards sustainable aviation through effective transversal actions at European level (Article 87 implementation)

The Basic Regulation contains a broadened mandate for the Agency on environmental protection with an objective to 'prevent significant harmful effects on climate, environment and human health' (Article 87(1)). As this is a new requirement stemming from the EASA Basic Regulation, currently there is no process defined. It is proposed to anchor this activity to the EASA quality system and create a related core process.

The EC, EASA, other EU institutions as well as Member States are called to cooperate on environmental matters including on the EU Emissions Trading System (ETS) and on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)[66] (Article 87(2)). This cooperation is implemented through bilateral agreements of the Agency (e.g. the MoU with the European Chemicals Agency (ECHA) on REACH) and pan-European structures, like the ECAC European Aviation Environmental Group (EAEG).

Key actions:

— The Agency assists the EC with the definition and coordination of policies and actions (Article 87(3)). Current actions are, for example, related to CORSIA and the study on non-CO_2 effects of aviation on climate.

— The Agency is newly mandated to perform and publish an environmental review which shall give an objective account of the state of environmental protection relating to civil aviation in the Union. Said review shall also contain recommendations on how to improve the level of environmental protection in the area of civil aviation in the Union (Article 87(4)). As the EAER developed with the European Environment Agency (EEA) and EUROCONTROL and published in January 2019 contains already the 'objective account' with the best available data, the Agency will now publish the recommendations with the next edition of the report in 2022.

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65 Current Module 1: Noise data and certificates; Potential future modules: 2: Emissions data including CO_2; 3: Impact assessment models; and 4: CORSIA

66 Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the **Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)**, establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

— Based on the outcome of the 2019 work on **circular economy** indicators and **life cycle assessments** of novel technologies, the Agency will build an effective circular economy policy both for traditional airline activities as well as new urban air mobility concepts.

— Based on its technical expertise and independence, the Agency is ideally placed to provide expertise and strategic steer to **international cooperation and research activities** (Horizon Europe, CleanSky3). As part of this, EASA can act as a contract manager or as a technical partner to the EC to support the implementation and monitoring of environment-related research projects. Similarly, EASA will support ECHA by providing aviation technical expertise into the REACH process.

3.1.4.4 Act towards sustainable aviation through actions for increased operational efficiency

The Agency will perform further analysis to more clearly identify room for related regulatory or non-regulatory actions, focusing on areas including:

— monitoring ATM environmental performance/ANSP environmental labelling;

— identifying and removing regulatory barriers;

— supporting elements for hybrid and electric operation;

— optimising operational procedures, such as abundant fuel carrying; and

— supporting/endorsing the Airport Carbon Accreditation programme (involving also groundhandling).

3.2 Strategic enablers

Safety is EASA's core business. Over the years, EASA's mandate has evolved to meet the needs of the sector and EASA has grown its capacity and processes in **safety risk management** to effectively identify, assess and mitigate risks, supported by intelligent safety data analysis.

As further highlighted by the COVID-19 crisis, the need to ensure **agility and resilience** in the system is key to being able to meet the current and **changing risk landscape**; for example, with regard to health and security, whilst ensuring the highest safety levels.

In the current context, it is essential for EASA to support the European aviation industry not only to survive but also to emerge from the current COVID-19 crisis stronger, greener and ready for the future. This is achieved through key programmes and activities on sustainability and the environment, research and innovation, the digitalisation roadmap, international cooperation, certification, oversight/standardisation and rulemaking.

Under the current climate, it is more vital for EASA to continue delivering the volume and quality of services required by the industry in the most efficient way, but also to demonstrate the agility to react quickly to external factors and the ability to keep pace with the trends of the market.

This new context and market trends will require a review of the EPAS strategic enablers as of the next planning cycle, on the basis of the strategic statements that guide the EASA Single Programming Document (SPD).

1		**SAFETY & RESILENCE**	EASA ensures European safety and oversight standards effectively mitigate risks, including safety risks related to security and health threats.
2		**SUSTAINABILITY**	EASA develops the standards and practices necessary for aviation to be environmentally committed.
3		**COMPETITIVENESS**	EASA uses its international presence to promote European standards and support industry competitiveness worldwide.
4		**COMPETITIVENESS & RESILENCE**	EASA creates favourable conditions for industry, through its rules, policies and research, to innovate safely and profit from new market opportunities.
5		**RESILIENCE**	EASA is agile, efficient and ready to face current and future challenges.

3.2.1 Research and innovation

The European aviation industry has gone through a successful development in the past decades placing Europe at a leading position in the global competitive market. Significant elements of this success story are the European aviation research and innovation (R&I) programmes of the EU as well as the Member States' and industry's research activities. Therefore, these initiatives are of high relevance to the setting-up of EPAS actions. They contribute to EASA's objectives for ensuring the highest level of safety, security and environmental protection in Europe.

New technologies and concepts emerge at an unprecedented pace (See **Section 3.1.3)**.

The European and national R&I programmes, including Clean Sky / Clean Aviation and SESAR are developing new aviation concepts and solutions, which will need to be certified or approved prior to entering operation in Europe as well as in third countries. Furthermore, new entrants, in particular in the drone sector, bring new requirements to the European aeronautics arena and necessitate new European regulatory responses.

It is essential for Europe that EASA is in the position to support and assist the streamlining of the deployment of those new solutions. To meet these objectives, notably with regard to the safe integration of new technologies and concepts, and to measure how environmental protection is improved, EASA must be equipped with new tools, agile methods, test/demonstration standards and modular evolutionary approaches for product certification and operational approval processes. This requires a number of evolutions to the current regulatory framework in order to cope with these current and future expected developments.

EASA Research and Innovation (R&I) strategy

To achieve above goals, the R&I strategy is articulated in the following four dimensions:

A. **Stakeholder Dimension**: to build a strong partnership with key players in R&I to facilitate the introduction of new technologies and innovations.

Key actions:

— Promote long-term partnerships with key R&I stakeholder groups.

— Contribute to the design and evaluation of the R&I policy and to R&I programming actions.

— Contribute to selected priority R&I projects with advice on certification and regulatory aspects.

B. **Regulatory Dimension**: to provide an agile and effective regulatory system for a smooth and timely integration of new technologies and innovative operations.

Key actions:

— Ensure technology-agnostic, risk-based and consistent rules across all aviation domains.

— Link EPAS with the new technologies and innovation intelligence results.

— Link the coordination of industry standards development with the rulemaking programme in EPAS.

C. **Organisation Dimension**: to strengthen the Agency's capacities to reduce the time to market of new technologies and effectively oversee innovative operations.

Key actions:

— Establish a new intelligence function to support strategic planning and decision-making.

- Strengthen incubator capacities to address emerging technologies and innovations.
- Develop new processes and tools to support the certification of new technologies.
- Develop new processes and tools to support the oversight of innovative operations.

D. **Competency Dimension**: Accompany R&I developments through a forward-looking competency management.

Key Actions:

- Obtain new competences through participation in R&I projects and networking.
- Facilitate and promote knowledge-sharing on new technologies and innovation.
- Provide training opportunities for the new competences needed to certify and oversee new technologies.

Research Partnerships

Playing a pivotal role between innovation and the development of safety, security or environmental protection standards, EASA is positioned to federate the future aviation R&I network comprising Member States, the industry and the aviation research community. It can also support the development of new instruments for European aviation research and innovation projects' prioritisation and coordination, in support of the EU Advisory Council for Aviation Research and Innovation in Europe (ACARE) Strategic Research and Innovation Agenda (SRIA)[67].

The EASA Basic Regulation entails that EASA supports the development of EU aviation/aeronautics research programmes and projects; develops synergies and collaboration between the Agency and publicly funded research; and catalyses cooperation between national aviation research programmes and research centres. To this end, EASA concluded an MoC with the Association of European Research Establishments in Aeronautics (EREA) and several National Aviation Research Centres. EASA has also established a cooperation with the research focal points from Member States.

Research Agenda

Regularly, EASA experts and external stakeholders suggest or request research topics that are needed to tackle the issues identified. These topics are prioritised on a yearly basis and included in the 'Research Agenda[68]', which groups the requests for a given period, even without having immediate funding. The Agency Research Agenda 2020-2022[69] encompasses a series of innovation- and efficiency-related actions besides safety-focused research.

Research actions

The research projects that become part of EPAS are those that are triggered by SRs addressed to EASA or that are already covered by a funding source or likely to be funded by the start of the reference period of the given EPAS. Further information on the Agency's research activities can be found on the EASA website: https://www.easa.europa.eu/easa-and-you/safety-management/research.

67 2017 edition of ACARE SRIA: http://www.acare4europe.org/sria

68 EASA Research Agenda 2019-2021 rev 1

69 EASA Research Agenda 2020-2022

In March 2020, EASA and the EC signed a Contribution Agreement for the contract management and technical steering of 10 urgent research projects by the Agency. These 10 research projects are funded to 100% by H2020 funds and concern the following projects:

RES.0003 — Cabin air safety
RES.0006 — Effectiveness of flight time limitation (FTL) rules
RES.0008 — Integrity improvement of rotorcraft main gear boxes (MGB)
RES.0009 — Helicopter offshore operations — new floatation systems
RES.0013 — Quick recovery of flight recorder data
RES.0015 — Vulnerability of manned aircraft to drone strikes
RES.0016 — Fire risks caused by portable electronic devices on board aircraft
RES.0024 — Assessment of environmental impacts — engine emissions
RES.0025 — Assessment of environmental impacts — aircraft noise
RES.0026 — Market-based measures (ETS and CORSIA)

EASA Innovation Cell

In March 2018, EASA launched the internal Innovation Cell, whose task is to coordinate actions supporting the safe introduction of innovation in the aviation market. The Innovation Cell is a cross-Directorate, non-hierarchical structure, coordinating internal actions along six principles:

1. Organise innovation as part of our business: The Innovation Cell disseminates information and coordinates projects on innovation.

2. Learn: It is essential for EASA to learn as soon as possible about new technologies and principles. This can only be achieved through partnerships with industry. EASA staff can participate in innovative projects through IPCs and MoC on innovation.

3. Educate: The EASA approach to innovation needs to become a corporate value. The Innovation Cell animates an internal knowledge community of more than 100 persons to date who share information, discuss impacts, and collaborate on projects through an online platform.

4. Timely adapt regulations and methodologies: EASA acknowledges the need to adapt regulations and certification methodologies in line with the maturation of new technologies (e.g. blockchain and AI).

5. Be technology 'agnostic': In times of technology proliferation, EASA acknowledges the need to move to performance-based rules, which do not prescribe a given technology, but provide a performance target.

6. Engage with new entrants: Innovation brings about a new 'breed' of stakeholders, such as drone manufacturers or operators, new digital companies, etc. EASA needs to integrate them into the community of stakeholders in order to take their views into account but also to educate them on the extremely high safety expectations of the aviation community.

The IPCs and MoC on innovation are being developed together with key industry stakeholders. Their objective is twofold: to ease the safe introduction of new technologies in the aviation market and to better prepare EASA to face innovation challenges by bridging the knowledge asymmetry with industry on new technologies. The current IPCs and MoC cover a wide spectrum of topics such as single-pilot operation concepts, the certification of ML, new avionics concepts, virtualisation and digitalisation of ATM functions, electric and hybrid CAT, etc.

3.2.2 Safety promotion

From the beginning of 2019, EASA has launched a new Safety Promotion Strategy that will take an increasingly proactive approach to the way EASA communicates with the European aviation community. This will position EASA's as a safety promotion leader in Europe and worldwide having a recognised brand that creates interest, engagement and helps to improve safety. Understanding that different aviation stakeholders have very different needs in terms of information and communication channels, the strategy takes a domain-based approach. It has been split into operational domains such as aircraft operations, aerodromes and groundhandling, GA, rotorcraft and drones.

When possible, safety promotion will be used as a light and effective alternative to rulemaking and oversight. It will also support a better understanding of EU civil aviation regulations and provide more information on safety intelligence and analysis results. The strategy will provide continual information on a wide range of safety topics at domain level, with technical content adjusted to its target audience (from advanced for specialised professionals to basic for the general public). A wide range of communication tools will be used to spread safety messages and this will see EASA becoming more active on social media and using new and novel ways to inform people about safety. Within EPAS, there is a number of specific SPTs and this is augmented by a number of new actions to promote important safety topics in each of the main operational domains.

This EPAS edition includes ten new SPTs.

3.2.3 International cooperation

One of the EC strategic priorities is that the EU becomes a stronger global actor. As an Agency of the EU, EASA cooperates with national, regional and international organisations alike in order to enhance global aviation safety and to support the free movement of European products and services on a global level. ICAO recognises the value of regional approaches to ensuring or improving aviation safety and recognises the importance of regional cooperation mechanisms such as Regional Safety Oversight Organisations (RSOOs) in this respect. EASA plays a significant role in supporting and complementing ICAO's activities within the EU and the EUR/NAT region (e.g. in crisis management like during the COVID crisis) as well as in pursuing European interests at ICAO. In this perspective, the strategic priorities at an international level are the following:

- **Strive, through international cooperation, that citizens' interests for safety and environmental protection are being met at global level.** This can be achieved through:
  - contribution to the improvement of global safety and environmental protection;
  - support to the resolution of safety deficiencies through technical assistance; and
  - promotion of regional integration wherever effective.
- **Ensure a global level playing field for European industry.** This can be achieved through:
  - promotion of fair and open competition and removal of barriers to market access;
  - enabling efficient oversight between international partners; and
  - promotion of EU aviation standards around the world.
- **Enable the European approach.** This can be achieved through:

— coordination of common European positions at ICAO;

— strengthening the coordination with ICAO and the Member States on the Universal Safety Oversight Audit Programme (USOAP);

— bringing together different European actors in technical assistance; and

— promoting the recognition of the European system at ICAO level.

3.2.4 Digitalisation

Digitalisation has become a daily reality and strategic multi-annual plans are in place at European level to encourage and implement electronic workflows and acceptance of electronic identifications to achieve a more flexible and efficient transmission of data and reaching the target of environmental sustainability.

The COVID-19 crisis has shown even more the increased effectiveness of digital products over more traditional, paper-based solutions and many organisations (also within the civil aviation environment) are launching a digital transformation initiative: the use of technologies such as digital identity, AI and blockchain in transforming paper-based processes into digital mechanisms.

Digitalisation in the aviation field

Aviation is moving fast to digitalise all areas, as there are demonstrated tangible benefits in all areas: safety, economics, operations, traffic management and control, manufacturing, training and maintenance.

Automation, remote control, machine to machine communication, robotics: 3D printing, virtual and augmented reality, AI/cognitive computing, ML, and sensors are among the technologies that will be increasingly used in aviation and that will impact the activity of regulators and aviation authorities.

In order to exploit the full digitalisation potential, the aviation sector needs to progress in the 'information management' dimension. Today, the fragmentation of data in terms of both taxonomy and storage does not allow a significant progress for the analysis according to the latest methodologies. These developments are increasingly challenging traditional aviation regulations and calling for an evolution towards more performance-based, technology-neutral requirements, which will enable the novel business models that emerge from the digital transformation, increasing at the same time safety and efficiency.

Such a rapid and disruptive change calls for a number of actions at different levels, involving EASA and the full European aviation safety system:

— actions needed to keep abreast of digitalisation issues, in particular in relation to product certification and operations;

— key EASA digitalisation activities needed, both for external purposes (e.g. digital licences for pilots) or internal purposes (e.g. digitalisation of processes); and

— actions needed to implement EU's digital agenda and e-government action plan.

The roadmap will have due regard to digitalisation-induced cybersecurity issues and related EPAS actions.

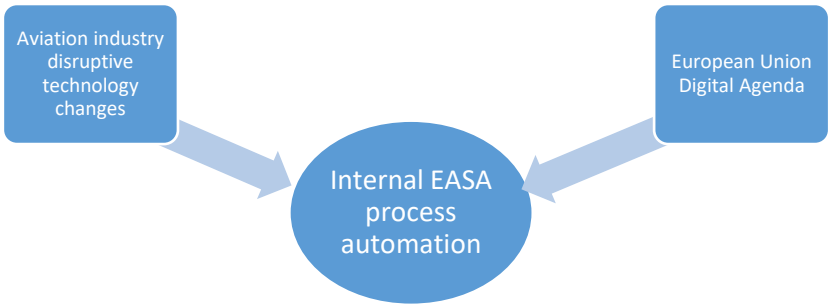

Figure 6: Digital transformation strategy drivers

CORAL Programme

At EASA, the Certification and Organisation Approval information hub programme (CORAL) programme drives the digitalisation of the Agency. Conceived to improve services to industry, analyses over the last 2 years have led to the extension of the scope of the programme to cover all Agency processes, due to the need to use all data sources to make comprehensive progress. By establishing the Transformation Department in 2020 and adopting the Scaled Agile framework to govern the programme, the intention is to synchronise extensive process redesign with digitalisation, in order to take full advantage of the investment. The programme should bring significant economic benefits, beside the ability to remain on par with developments in the aviation industry and the ability to accompany European authorities in their digitalisation journey.

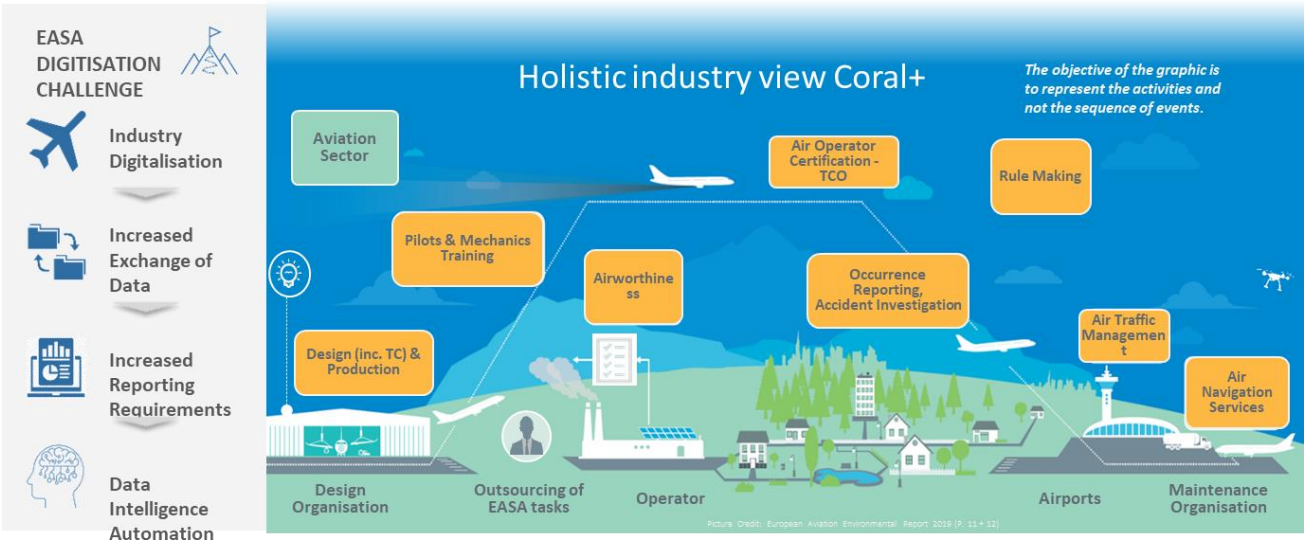

Figure 7: EASA high-level digitalisation roadmap

EASA eRules digital platform

EASA eRules[70] is a comprehensive, single IT system for digitalisation of EU aviation rules. It thereby provides for an **complete repository of these EU aviation rules** and is used for storing, sharing, searching, drafting and publishing of all aviation rules ('hard and soft law'). The consolidated versions of rules are so far published in 'pdf' format and will soon be published in web format integrated to the EASA website.

The EASA eRules digital platform:

— allows extracting the content for new amendments and in addition can be used to generate 'change information documents' comparing two versions of the same rule from the eRules portal, using the comparison feature;

— can be integrated with the EASA rulemaking workflow and with other applications using EU aviation rules internally and externally (NAAs, industry); and

— provides content in XML to enable integration with internal and external applications that use rules as a reference.

Due to the fact that rules are treated as data, new ways of publishing and communicating on rules are possible. The future developments of this platform will allow to fully integrate the rulemaking process with the eRules platform and to make the XML format available to external stakeholders.

Digital pilot licences (dLAP)

The digital Licences for EU Aviation Pilots (dLAP) project aims to introduce digital pilot licences into the European aviation domain with the objective of providing an easy-to-use service and enabling flight crew to carry their licences, including medical certificates, in a fully digitised format on their own personal mobile devices.

The envisaged IT platform used to support dLAP should provide a digital signature workflow for electronic Identification (eID) in accordance with the applicable European standards to enable secure verification of the identities of the flight crew members. The said platform should also enable the Member State CA-authorised flight examiners and aero-medical examiners as well as SAFA/SACA inspectors to update, validate and/or authenticate respectively the licences in real time. The said platform should be complemented by a web portal with multiple interfaces to be viewed in a standard web browser for the aforementioned users. dLAP should also have an interface with the repository of information in accordance with Article 74 of the Basic Regulation thereby enabling effective cooperation between EASA and the CAs. The platform should further ensure prevention of fraudulent or forged licences as well as incorporate robust security measures for authentication and access control.

During the EASA MB meeting of June 2018, the MB expressed support for the project and approved the financing of the first PoC-phase (refer to MB Decision No 13-2018[71]) to prepare the planning for the development of the eventual dLAP platform. In continuation of the above, EASA aims to launch the development of the platform in 2021, in collaboration with a select group of interested European Member States, with a view to having dLAP operational by the end of 2022.

70 https://www.easa.europa.eu/document-library/easy-access-rules

71 https://www.easa.europa.eu/sites/default/files/dfu/EASA%20MB%20Decision%2013-2018%20adopting%20dLAP%20financing%20decision.pdf

In parallel, EASA, in coordination with ICAO EPL TF, aims to amend the European regulatory framework to enable dLAP as an alternative to the paper licence.

3.2.5 Technical competence development

According to ICAO Annex 19 'Safety Management', qualified technical personnel is a critical element (CE-4) of the State safety oversight system. Annex 19 stipulates that States shall establish minimum qualification requirements for the technical personnel performing safety-related functions and provide for appropriate initial and recurrent training to maintain and enhance their competence at the desired level.

Consequently, in line with the GASP, EPAS considers technical competence development as a strategic key enabler for an effective State oversight system.

Aviation is a very dynamic sector with rapidly innovating technologies and business models. At the same time, it is confronted with evolving new risk scenarios in terms of both safety and security. These rapid changes are a challenge for the staff of aviation authorities, as well as for aviation organisations, to keep abreast of new developments and to update their knowledge and competencies to fulfil their responsibilities.

Furthermore, the Basic Regulation provides a framework for pooling and sharing of technical resources between the Member States and EASA. The implementation of this new approach needs to be based on harmonised training and assessment standards for aviation personnel.

EASA will therefore continue to focus on the following key areas:

— Maintenance and further development of EASA staff based on competence mapping and training programmes.

— Cooperation with training organisations for providing training.

3.2.6 Standardisation

The Standardisation process monitors how States apply the requirements of the Basic Regulation and of the delegated and implementing acts adopted on the basis thereof. Moreover, monitoring of application of Regulation (EU) No 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation has been added to the scope of the Basic Regulation, upon request of the EC. In particular, the Agency assesses the States' capability to discharge their safety oversight obligations.

What we want to achieve

Through the application of the EU aviation safety regulations and the deployment of EPAS, EASA supports the establishment and the maintenance of robust oversight systems across Europe, where each CA is able to properly discharge its oversight responsibilities.

To that end, it is essential that Member States, through their CAs, are capable of managing the safety risks identified at State level. This presumes that those risks are identified through a process to collect and analyse data and are mitigated in an effective way, implying the measurement and monitoring of safety performance leading to continual improvement.

In addition, exchange of information and cooperation with other CAs, implementation of management systems in all organisations, as well as the availability of adequate personnel in CAs, are essential enablers.

Currently identified weaknesses

The 2019 SAR identified the following areas of concern:

— The quality of the certification and oversight performed by CAs remains in some cases unsatisfactory. The severity of the issues varies from domain to domain, but it is consistently present.

— Although progress has been noted in the functioning of the authorities' management systems, the oversight of undertakings' management systems is still below the expected standard. This slows down the implementation of a risk- and performance-based oversight by CAs.

— As also noted during the SYS inspections[72], the use of available data and intelligence to drive a more effective and better targeted oversight, is still sporadic and not widely spread as it should, leaving data analysis, when done, detached from the oversight performed.

— The polarisation of States in terms of level of maturity of application of the rules that was noted during the last years is confirmed. A large proportion of those States that were struggling to meet the minimum standards has not improved, while those States where the authority is sufficiently performing are working on further enhancing their way of conducting oversight. The separation between the groups is quite marked and there is little exchange between the two. This underperformance of some CAs undermines the integrity of the EU aviation system and needs to be properly addressed.

— Finally, some CAs still display a reactive attitude and do not use inspection findings and safety information such as occurrences, incidents, and accidents to adapt and improve their oversight system. Undertakings' Non-Compliances demonstrate that the quality/management systems of organisations are still not at the expected level of compliance and/or effectiveness.

A number of actions are presented in **Volume II Section 5.6** to drive improvements in these areas of concerns.

It should also be noted that, in line with the priorities of the Basic Regulation, EASA started to roll out an implementation support programme that will entail activities mainly aimed at strengthening the safety oversight capability of the Member States, together with targeted support activities addressing SSP and SPAS implementation, thus enabling a robust and harmonised EU aviation safety system.

These targeted implementation support actions that are addressed to domains and/or States, do not qualify for inclusion as EPAS actions.

[72] Standardisation inspections that focus on the implementation of Regulation (EU) No 376/2014 and on the verification of competent Authorities' management systems.

3.3 Update on the Basic Regulation Roadmap

On 10 April 2018, the EASA MB requested EASA to present a roadmap outlining the priorities for the implementation of the Basic Regulation. The roadmap received the MB's support during the June 2018 MB meeting.

It identified the areas of the Basic Regulation where work was to be initiated or start in the range 2019-2021. It constitutes an important input also for this EPAS edition.

The roadmap identifies not only rulemaking activities, but also Certification- and Standardisation-specific projects, involving policies' or procedures' drafting, initiatives with roadmaps, support to Member States, etc.

When it comes to rulemaking and policy setting, the following activities identified in the Basic Regulation were already included in previous EPAS editions and will continue to be delivered:

— Development of a regulatory framework for drones and urban air mobility

— Work on cybersecurity

— ATM/ANS (Article 44) Opinion covering interoperability issues:

  — RMT.0679 — SPI: completed, see Commission Regulation (EU) 2020/587 of 29 April 2020
  — RMT.0524 — DLS: Opinion due in 2022

In order to better encapsulate and reflect in EPAS the new areas introduced by the Basic Regulation, the strategic priority 'Safe integration of new technologies and concepts' was introduced with EPAS 2019-2023 (see **Section 3.1.3**).

Under RMT.0727, EASA will publish an Opinion in early 2021 for simpler and more proportionate rules for aircraft intended for sports and recreational use, including the use of declarations instead of certificates and approvals. This RMT is a key action in the context of the GA Roadmap 2.0. Furthermore, the Agency is working on a proposal for the implementation of other items introduced or amended by the Basic Regulation, such as non-installed equipment, permit to fly, restricted certificate of airworthiness, etc. An Opinion may become available in 2022/23.

In the areas of groundhandling and on new aspects of environmental protection (not covered by ICAO Annex 16), the following activities will be undertaken:

— On **groundhandling** (Articles 33 & 37), during 2018, EASA engaged in a fact-finding phase, via safety assessment and dialogue with Member States and stakeholders. In March 2019, a dedicated groundhandling conference organised by EASA concluded this fact-finding phase and presented the groundhandling roadmap, defining the scope and objectives. A new RMT was added in EPAS 2019-2023 to address requirements for the provision of groundhandling-related services (RMT.0728). A new SPT was also added to address any non-regulatory groundhandling matters (SPT.0102). Following a temporary suspension of related rulemaking activities due to COVID-19, it is now planned to resume work on RMT.0728 in 2021.

— On **environmental protection**, EASA redefined its strategy including the implementation of Article 87, where EASA will engage in developing a measurement methodology for novel technologies (supersonics, electric propulsion/urban mobility) as well as in updating the EAER. See **Section 3.1.4.**

Moreover, the Basic Regulation **in Chapter II**, 'Aviation safety management', Article 7 requires States to establish and maintain an SSP in accordance with international SARPs (ICAO Annex 19) and with the European

Aviation Safety Programme (EASP). Basic Regulation Article 8 requires States to complement their SSP with a SPAS. Such a plan shall include the risks and actions identified in EPAS that are relevant for the Member States concerned. A new EPAS action was created with EPAS 2019-2023 to account for this new requirement (see MST.0028). A dedicated repository for Member States' SSP documents and SPAS was made available to facilitate the dissemination of such documents[73]. In addition, a States Safety Exchange Forum was created to encourage the sharing of guidance material and good practice[74]. With EPAS 2020-2024, EASA communicated its expectation for Member States to have a SPAS available by the end of 2020. Considering the dramatic impact of the COVID-19 pandemic on the aviation industry and the additional workload created for States by the need to deal with the public health aspects within their SSP, adapt their oversight to the new situation and more generally to support the safe return to operations, the target for the related EPAS action is now set to 2021 Q4. This will provide Member States some additional time to get prepared for the extension of EASA Standardisation activities to address SSP and SPAS; expected towards the end of 2021/beginning of 2022.

The development of new technologies, new business models and more generally speaking economic/social/societal changes, may have an impact on aviation safety. It is important for the Agency to have a clear vision on those changes that can potentially affect safety. Stakeholders and **EU Aviation Social Partners** should help to build this vision.

Article 74 of the Basic Regulation requires EASA to develop a **repository** which aims at facilitating the exchange of information between the CAs, EASA and the EC. Considering the huge quantity and complexity of information as well as the obligation to comply with data protection requirements, the MB decided to set up a dedicated Task Force which falls under MAB. The Task Force will focus on specifications per domain, the global architecture and the governance of the future platform. In 2019, the domains to be addressed were mainly drones, exemptions and aero-medical data. The technical solution shall rely on the EASA CORAL outputs. CORAL was initiated as an emergent programme with the purpose of harmonising projects through system integration and end-to-end digitalisation. The implementation of additional domains (e.g. licences, opt-outs, opt-ins) will be done step-by-step and in line with the CORAL milestones, with the ultimate goal to have all domains covered by 2025.

An important milestone was reached with the inclusion of drones in 2020.

Article 89 of the Basic Regulation requires EASA to consult relevant stakeholders when addressing interdependencies between civil aviation and related socio-economic factors. EASA is therefore enhancing the cooperation with EU aviation social partners in order to reinforce its capacity to assess potential social impacts of the EU aviation regulations and to address socio-economic risks to aviation safety. Refer to **Section 3.1.1.5**.

Paragraph 2 of **Basic Regulation Article 140** stipulates that 'Not later than 12 September 2023 the implementing rules adopted on the basis of Regulations (EC) No 216/2008 and (EC) No 552/2004 shall be adapted to this Regulation'. To a large extent, this will be addressed as part of RMT.0727 on initial airworthiness. Additional changes to rules will be driven by concrete safety, proportionality or level playing field improvements. In addition, the limited capacity of the EASA Committee will need to be taken into account when setting priorities.

[73] https://imf.easa.europa.eu/case/eab/mabtebs/SSPDocuments/Forms/AllItems.aspx
[74] https://imf.easa.europa.eu/collab/SSEF/SitePages/Home.aspx

4. Performance

4.1 Key indicators in terms of EPAS actions

This section presents an overview on the number of actions detailed in **Volume II**, illustrating the distribution by EPAS action type, as well as by domain affected by these actions.

It encompasses **170 actions**. The majority of actions are rulemaking tasks (52.0 %), followed by safety promotion tasks (20.0 %). Half of these actions are strategic, meaning they are linked to the areas highlighted in **Chapter 3**.

28 EPAS actions **were completed in the course of 2020.** With most of those being rulemaking tasks, the backlog continues to be resorbed. Finally, this EPAS proposes 22 **new actions**, including 5 new rulemaking tasks, 3 new research projects, 1 new evaluation task to assess the rules for commercial small aeroplane operations under Part CAT and Part SPO, as well as 3 new actions for Member States and 10 new safety promotion tasks. An overview of all new actions is included in **Volume II Appendix C**.

Most of the EPAS actions are in the domains 'Systemic safety & competence of personnel' and 'Design and production'.

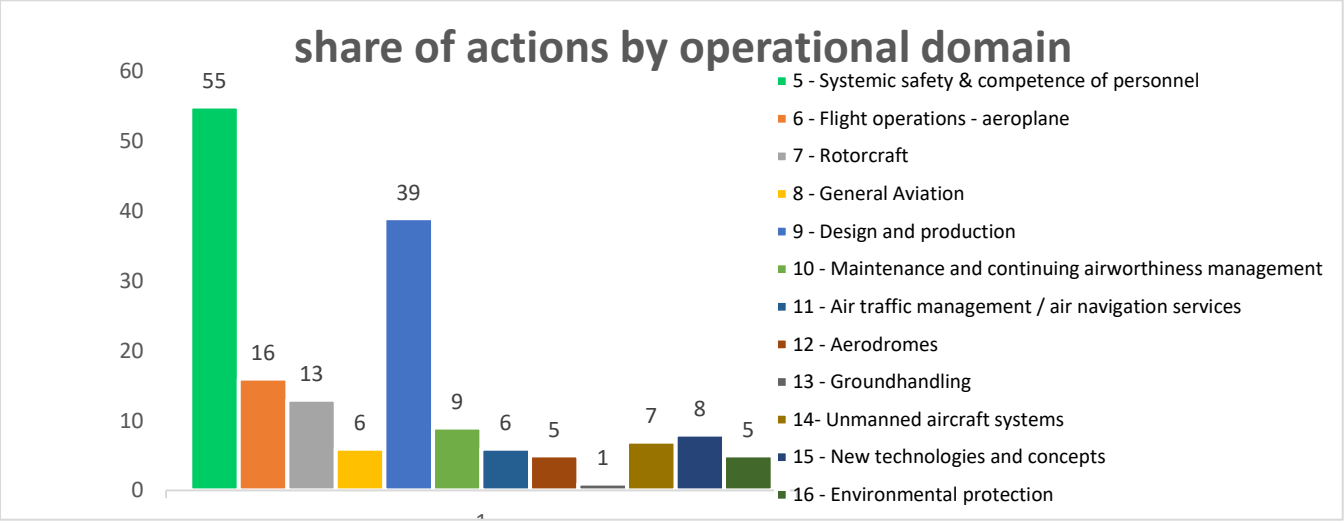

Figure 8: Distribution of EPAS actions by domain

Most of the actions in EPAS are rulemaking projects.

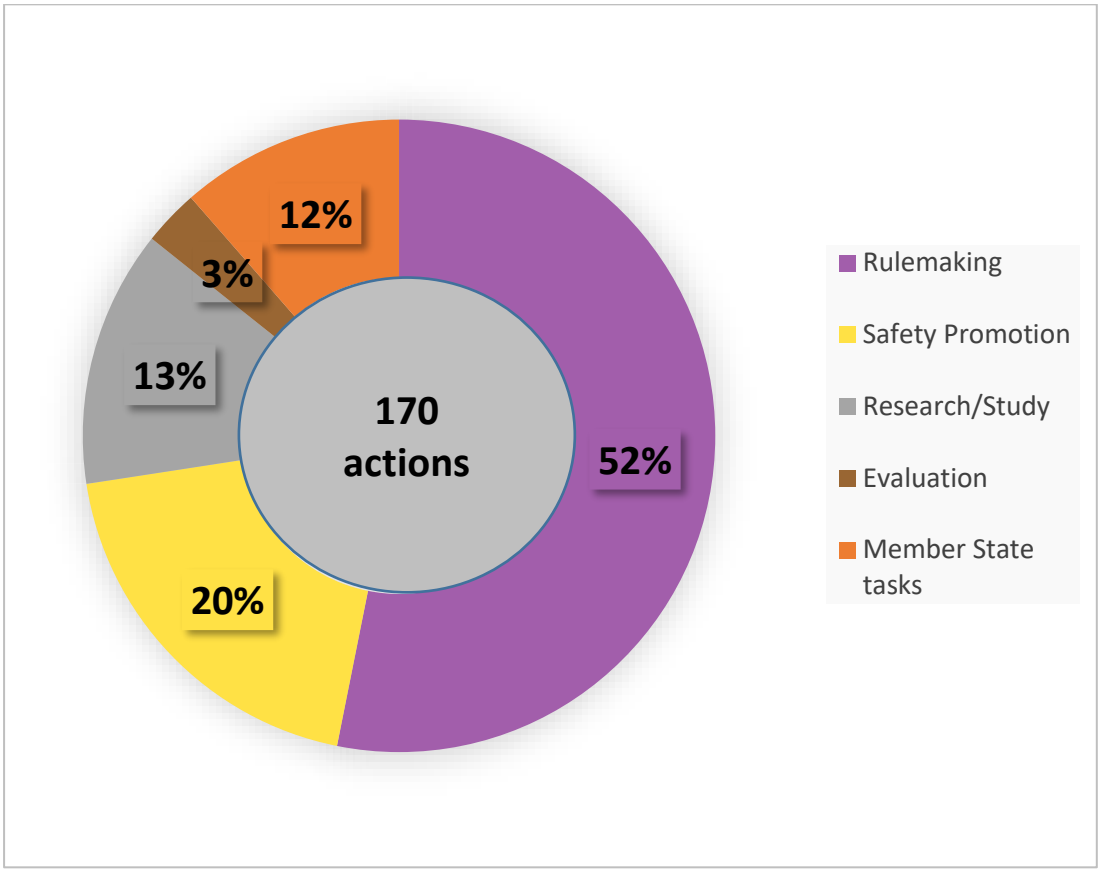

Figure 9: Distribution of EPAS actions per action type

Average duration of rulemaking tasks and adoption process

The table below shows the average duration of RMTs for Opinions and Decisions published by EASA in 2020 (meaning from ToR publication to Opinion/Decision publication), as well as the average duration of the adoption process for Opinions adopted in 2020 (meaning from Opinion publication to the vote in the EASA Committee).

Average duration — Decisions published by EASA in 2020	*Average duration — Opinions published by EASA in 2020*	*Average duration — Opinions adopted by the EC in 2020*
3,5 years	2,9 years	1,7 years

Development of EPAS actions between 2018 and 2021

In the below graph, the line shows the overall number of actions in the respective EPAS edition and the bars show the breakdown by activity type. The trend shows a constant decrease of ongoing rulemaking actions and a slight increase in safety promotion and research actions.

Over the past four years, the number of active rulemaking tasks has decreased by 38 %.

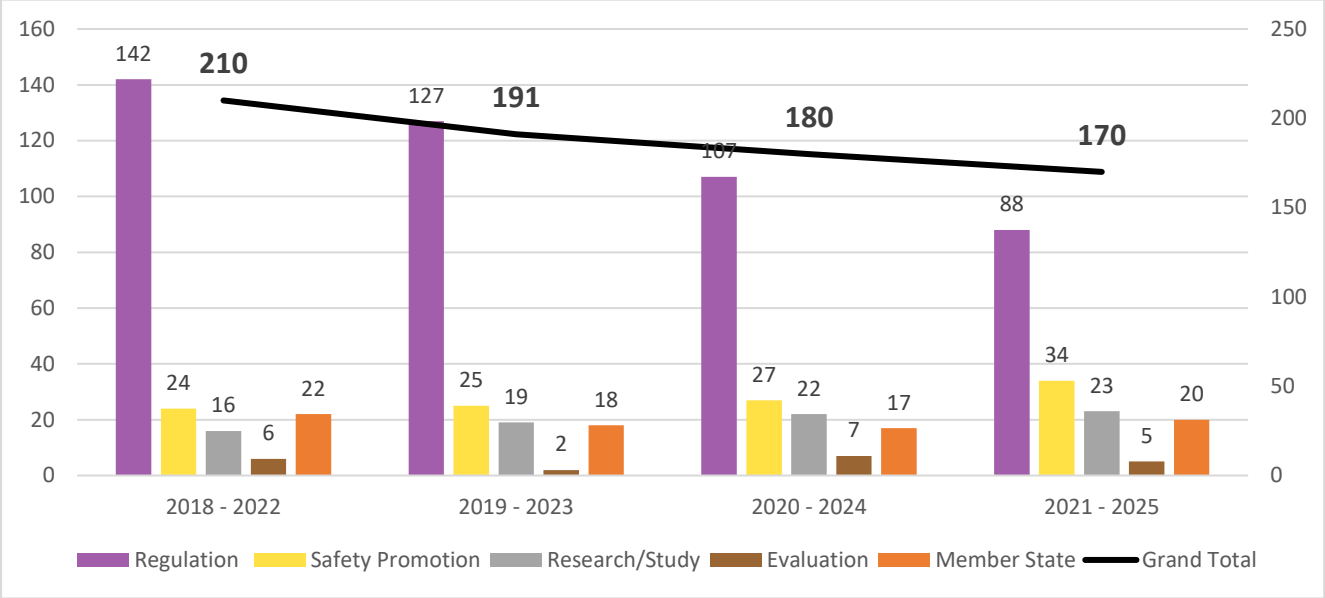

Figure 10: Trend of total number of actions per EPAS edition from 2018 to 2021

Rulemaking output

The graphs on the next pages show not only the total rulemaking output of EASA (Figure 11), but also separately the rulemaking activity leading either to Opinions (hard law and associated soft law, Figure 12) or to stand-alone Decisions[75] (soft law, Figure 13), as the latter have little impact on the Member States' resources.

These graphs do not reflect Decisions (AMC and GM) that are waiting for the adoption of the related Opinions.

[75] Decisions that are not linked to any Opinion, meaning where the scope of the corresponding rulemaking task is limited to creating new or amended soft law (typically AMCs and GM).

Rulemaking activity — EASA

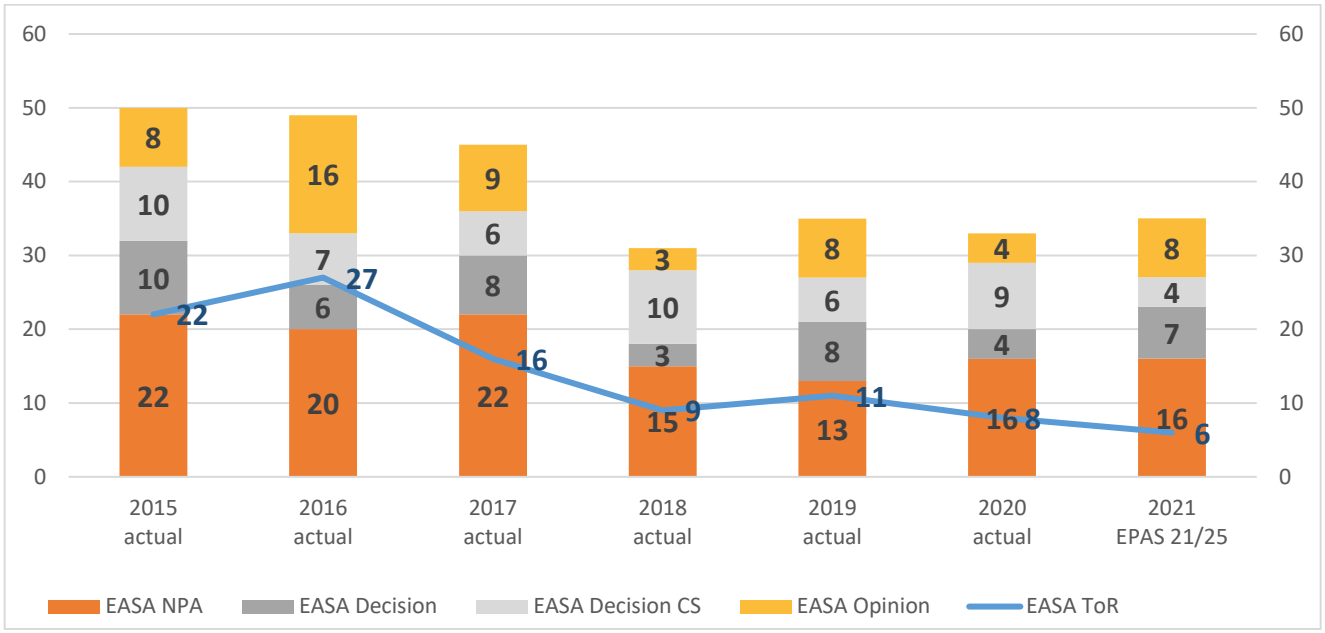

Figure 11: Rulemaking activity EASA 2015–2021 – total rulemaking output[76]

Rulemaking activity leading to Opinions (hard law and associated soft law)

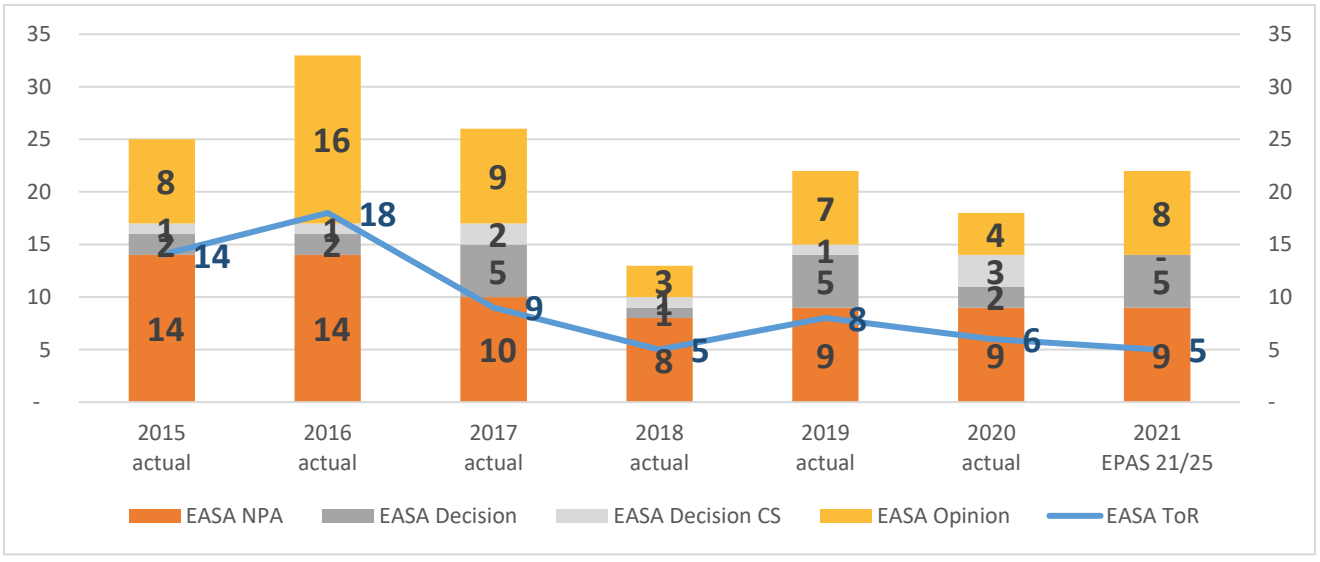

Figure 12: Rulemaking activity EASA 2015–2022 — Opinions and associated soft law

The above graph shows the rulemaking output related to Opinions and associated soft law, meaning any RMT that contains at least one Opinion and related soft law. Generally, the development of an Opinion and the related soft law is done in parallel, as part of the same rulemaking project.

[76] The actions mentioned in Appendix C as "on hold" are not included in this graph.

Rulemaking activity related to soft law

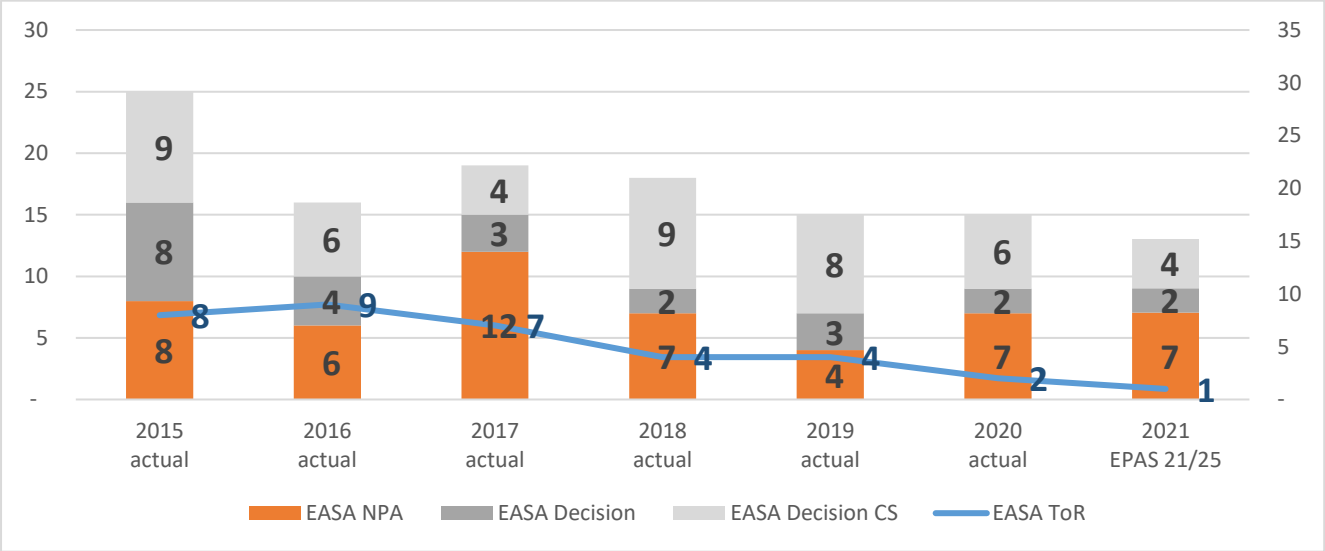

Figure 13: Rulemaking activity EASA 2015–2021 related to soft law

The above chart shows the outputs related to soft law, meaning those resulting from rulemaking tasks that only lead to 'stand-alone' Decisions. These tasks do not require the involvement of the EC, nor the EASA Committee, and have less impact on Member States' resources.

Split between hard/soft law and soft law (trend showing the evolution since 2019-2023 EPAS edition)

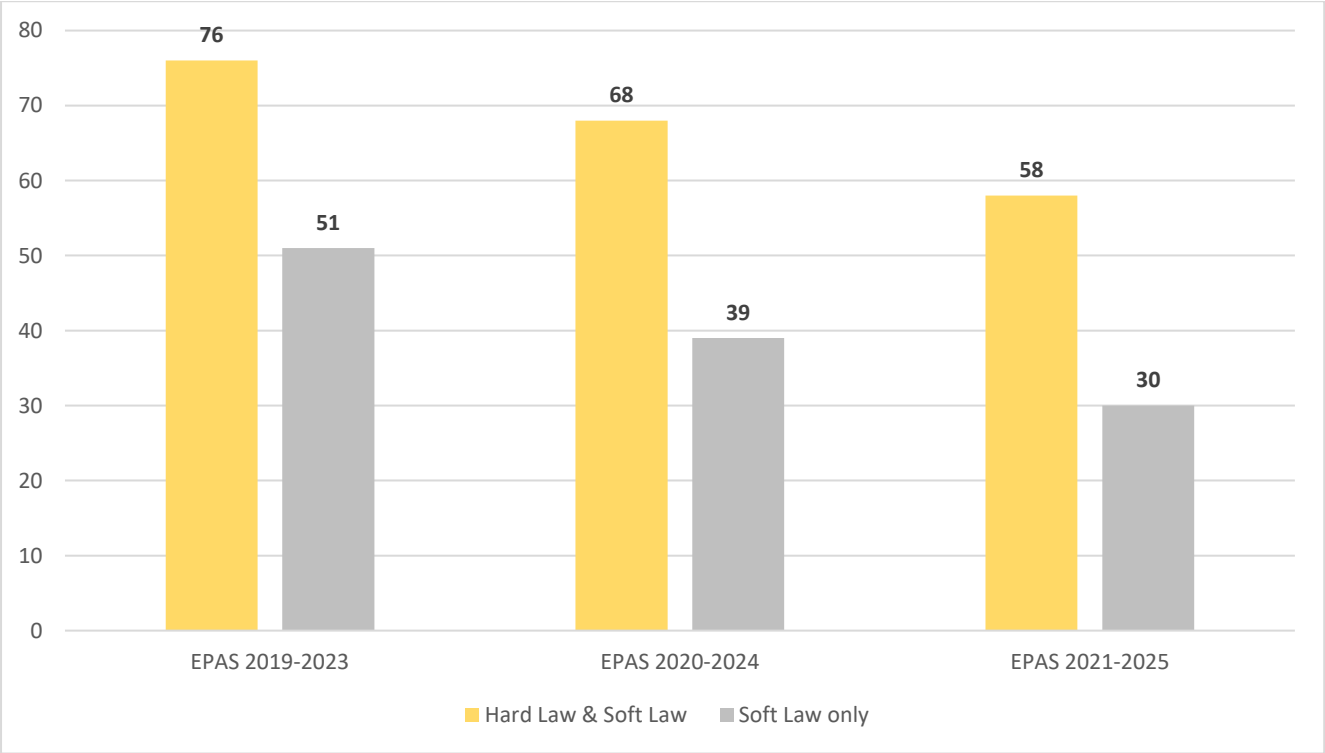

Figure 14: Split between hard/soft law and soft law

Following the delivery of a number of opinions and decisions (as detailed in Appendix A) the overall number of RMT actions continues to decrease.

4.2 Safety performance

This section presents an outline for EPAS safety performance metrics reflecting the EPAS strategic priorities in the area of safety and the high-level safety objective set out in the Basic Regulation to 'establish and maintain a high uniform level of civil aviation safety in the Union'. EPAS safety performance goals, indicators and targets also align with the 2020-2022 GASP goals and targets as relevant in the EASA system.

EPAS proposes an 'aspirational goal' overarching the different EPAS indicators, as an alternative to the GASP aspirational goal of 'zero fatalities in commercial operations by 2030 and beyond', as follows:

'achieve constant safety improvement with a growing aviation industry'

This goal is deemed 'aspirational' as it represents an ambition of achieving an ever-safer aviation system. It is intended to address all operational domains. It is carried forward from EPAS 2020-2024, hence it does not consider the impact of the COVID-19 pandemic and the drastic reduction in air traffic. The overall goal to achieve constant safety improvement remains valid in particular with regard to the specific risks resulting from the current crisis and for the return to operations. Setting a new EPAS aspirational safety goal may be done as part of the next EPAS planning cycle.

EPAS SPIs shall serve to monitor the impact of EPAS actions on the overall level of safety performance. New safety issues are identified and monitored via the European SRM process.

In accordance with Article 6 of the Basic Regulation, EPAS shall specify the level of safety performance in the Union, which the Member States, the EC and EASA shall jointly aim to achieve. The level of safety performance shall be determined on the basis of the EPAS SPIs and where relevant, associated safety performance targets, as well as considering the safety-related indicators and targets defined in the SES ATM Performance Scheme.

Principles for establishing EPAS SPIs and targets

SPIs and targets shall monitor both safety **outcomes** (such as accidents, incidents and injuries) and the enablers, in terms of **systems and processes**[77] required to maintain effective safety management at authority and organisation levels.

Setting safety performance targets as part of EPAS is considered more relevant for process-based indicators, to drive positive system 'behaviours'. For safety-outcome-related metrics, which are derived from occurrence data, it is proposed to not consider setting safety performance targets, but to define 'baseline performance' and monitor the system against this baseline performance. Proposed 'baseline' indicators are included in Table 3.

Outcome-based indicators shall consider as main inputs:

— the number of fatal accidents;

— the number of fatalities; and

— the number of non-fatal accidents and serious incidents.

This is aligned with the high-level ICAO safety metrics, thereby facilitating comparison of European performance with that of other regions or with global averages. The number of fatal accidents and fatalities provide the highest level of safety outcome monitoring, while the non-fatal accidents and serious incidents combined provide monitoring of higher-risk events. These can subsequently be reviewed to identify key risk areas that inform EASA's safety priorities. Looking to the future, when the ERCS has been implemented across the Member States, an

[77] The efficiency of systems and processes established and implemented by EASA will continue to be monitored through the EASA SPD related indicators.

additional indicator that monitors high-risk occurrences may be considered. This could be in addition to or instead of monitoring non-fatal accidents and serious incidents. The data portfolios published in the ASR include incident data sourced from the European Central Repository for accident and incident reports in aviation (ECR) under Regulation (EU) No 376/2014. As the implementation of Regulation (EU) No 376/2014 improves, EASA expects to be able to integrate more incident data into the monitoring framework.

Monitoring systems and processes

It is proposed that related SPIs be defined and monitored in three areas:

1. Member States' oversight capabilities

This is related to 2020-2022 GASP Goal 2 and the EPAS strategic enabler 'Standardisation'.

Monitoring is based on the EASA Standardisation rating, as an alternative to the ICAO USOAP Effective Implementation (EI) indicator. The Standardisation rating is used for the prioritisation of Standardisation inspections. It aims at emulating the expert's confidence in the CA's ability to discharge its safety oversight capabilities. The Standardisation rating considers elements related to size, nature and complexity of the State authorities and functions, the number and type of open Standardisation findings, as well as the State's reactivity in relation to findings closure, once the final report has been sent.

In 2020 the EASA Standardisation rating has been significantly impacted by the various measures that were applied in order to deal with the acute phase of the COVID-19 crisis. The Agency granted Member States with specific conditions such as extending due dates of findings not having a direct impact on safety.

Furthermore, in more general terms, during the acute phase of the crisis the situation in Member States largely differed as some States went into full lockdown with no commercial activity besides essential cargo and helicopter emergency medical services (HEMS), whereas others continued to operate at least domestically. Then, from June onwards when aviation activities recovered slightly, the Agency has been working closely with competent authorities to check how they were coping with the restart but it is too early to capture this via specific indicators.

For these reasons, the Standardisation rating 2020 cannot be used as a reliable indicator of the level of standardisation within EASA Member States and is not provided. Relevant information for 2019 is included instead to serve as a pre-COVID-19 reference against which to 'benchmark' the ratings in the future, when the situation will normalise.

The following graph and table provide information on the level of standardisation within EASA Member States on the basis of the EASA Standardisation rating. The information in the graph is 'anonymised' by not referencing the ratings of individual States. The graph is based on data sets ranked in ascending order, showing the average Standardisation rating and indicating the distance from that average, across all domains.

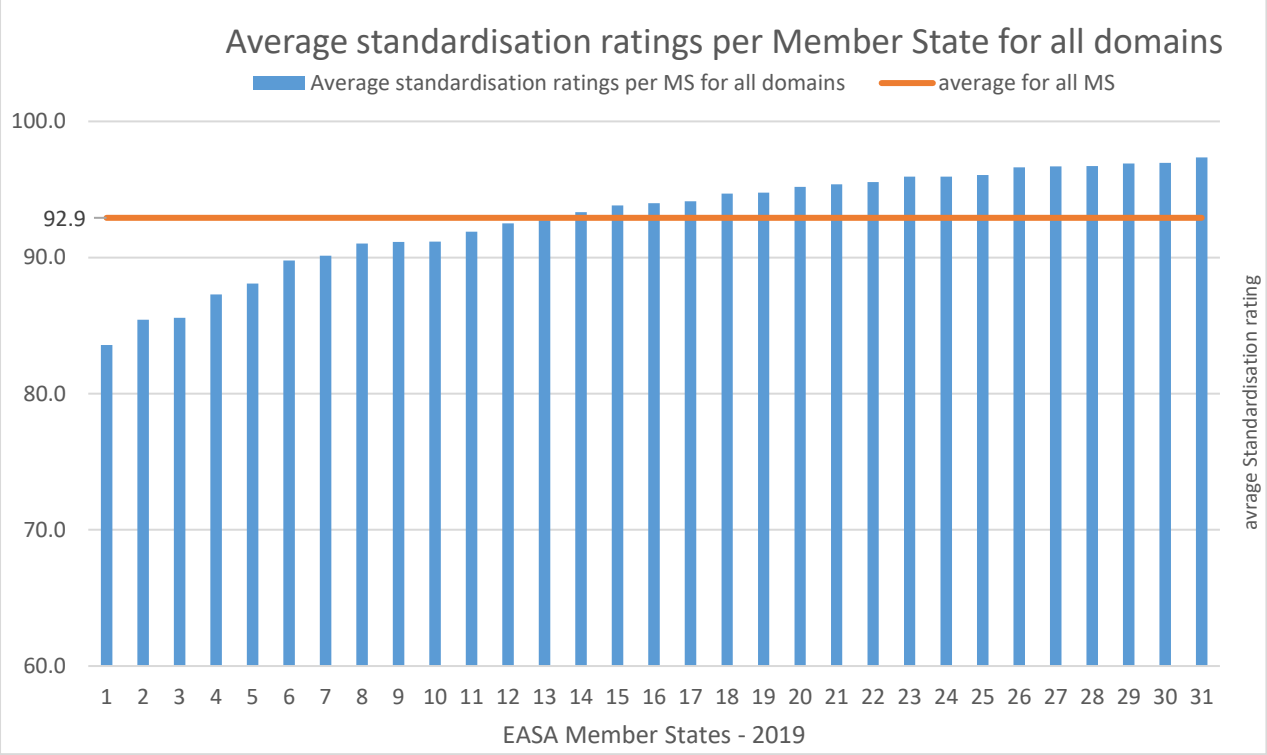

Figure 15: Average Standardisation rating - all domains - 2019

Domain	SR Min 2019	SR Max 2019	Average SR 2019	% of MS below average	% of MS above average
AIW	76.8	100.0	93.0	35 %	65 %
OPS	73.1	100.0	90.6	45 %	55 %
FCL	74.3	100.0	94.3	42 %	58 %
MED	87.8	100.0	95.8	52 %	48 %
FSTD	78.7	100.0	95.5	35 %	65 %
ATM/ANS	78.4	100.0	91.9	42 %	58 %
RAMP	66.5	100.0	90.0	39 %	61 %

Table 3: Standardisation rating information per domain – 2019

2. Member States' progress with SSP implementation

This is related to GASP Goal 3 and the EPAS strategic priority 'Systemic safety'.

Related indicators will mainly be based on data available through ICAO iSTARS. Feedback provided by Member States will also be considered. EASA will in addition collect relevant documentation from States (SSP and SPAS, cf. MST.0001 and MST.0028). In the future, this monitoring area will consider results from the EASA Standardisation of the implementation of Basic Regulation Articles 6 and 7.

The objective is aligned with the 2020-2022 GASP requiring States to achieve an effective SSP, as appropriate to their aviation system complexity, by 2025.

3. Effective implementation of SMS in aviation organisations

This partially addresses 2020-2022 GASP Goal 5 and addresses the EPAS strategic priority 'Systemic safety' and the requirements in the Basic Regulation.

Monitoring the implementation of SMS in industry should focus on compliance with relevant requirements and effectiveness of SMS key processes. To develop a common set of indicators and targets on effective implementation of SMS, an agreed methodology for assessing SMS, as well as a method to score and aggregate related assessment results would first need to be developed and implemented. Such an assessment and scoring methodology is currently only available in the ATM/ANS domain, as part of the SES ATM Performance Scheme. It should also be considered that SMS requirements are not yet applicable in the initial and continuing airworthiness domains. Moreover, while the EASA Management System assessment tool is promoted through EPAS action MST.0026, EASA has not yet received sufficient feedback on the use of the tool.

For the above reasons, no detailed EPAS indicators and targets are proposed on SMS effectiveness (for domains other than ATM/ANS, since here this indicator is monitored in the context of the European ANS Performance Review). However, it is proposed to monitor the following:

(a) the extent to which the EASA Management System assessment tool (or similar) is being used by Member States, and

(b) the status of compliance with EASA Management System (SMS) requirements.

EASA's monitoring will be based on oversight data provided by CAs covering the following management system requirements for those domains where ICAO Annex 19 SARPs have already been introduced:

- Changes to the organisation;
- Management system;
- Contracted activities;
- Personnel requirements; and
- Record-keeping.

No data/information on individual organisations will be requested. EASA will convert numbers into rates based on the data that Member States provide regularly through the Standardisation Information System. EASA will also report on those indicators for organisations under its oversight in the domains where the requirements listed above are already applicable.

The first data collection exercise was initiated in October 2020.

Once sufficient data is available on the status of compliance with management system (SMS) requirements and experience is gained with collecting and consolidating such data, EASA, in close cooperation with the ABs, will propose more advanced indicators to measure SMS effectiveness in industry.

The results of monitoring safety performance in the above three areas will be presented and discussed at regular AB meetings.

Alignment with the ATM Performance Scheme

Significant effort has been invested by the Agency, Member States and industry to ensure that the Safety Key Performance Area of the SES Performance Scheme aligns with the principles and technical direction of EASA's performance monitoring framework. The performance indicators for Reference Period 3 of the Performance Scheme were designed by an Agency-led working group in 2016 and then associated AMC and GM were published in 2018. These indicators measure the effectiveness of safety management at organisation level and then monitor safety outcomes via untargeted tier 2 performance indicators, using the European Central Repository as the data source.

Outcome-based indicators

Monitoring safety outcomes addresses 2020-2022 GASP Goal 1 and the EPAS strategic priority 'Operational safety'.

Indicators related to key risk areas are identified through the European SRM process and described in the EASA SRPs. EASA, in cooperation with the European NoAs, developed a safety performance framework that identifies different tiers of SPIs.

— **Tier 1** transversally monitors all the domains and the overview of the performance in each domain. Tier 1 considers the number of fatal accidents and fatalities in the previous year compared with the average of the preceding decade. In addition to this, for CAT aeroplanes, detailed statistical indicators have been developed to identify the accident and serious incident rates over a 4-year period. These will be updated periodically to monitor performance against the baseline (see Table 3).

— **Tier 2** covers the key risk areas at domain level. Tier 2 provides the number (and where available, the rate) of fatal accidents and the ERCS risk level for each domain in the ASR, divided into the key risk areas.

These 'operational' safety indicators will continue to be monitored through the European SRM process. Likewise, reporting on those will continue to be done through the EASA ASR.

The following tables provide an overview of the current Tier 1 indicators, reproduced from the ASR 2020:

Type of operations	Fatal Accidents 2019	Fatal Accidents 2009-2018 Min - Max	Fatalities 2019	Fatalities 2009-2018 Min - Max	Fatalities 2009-2018 Median
Aeroplanes					
CAT	0	0 - 2	0	0 - 228	2.5
NCC	0	0 - 1	0	0 - 4	0.5
Specialised operations	5	3 - 9	16	4 - 28	12.5
Non-commercial operations	37	34 - 61	70	64 - 113	82
Helicopters					
CAT	4	1- 4	17	2 - 22	7.5
Specialised operations	1	0 - 8	1	0 - 17	5.5
Non-commercial operations	3	2 - 10	5	2 - 22	13
Balloons					
all	1	0 - 3	1	0 - 10	1
Sailplanes					
all	28	18 - 30	31	21 - 40	28

Table 4: Tier 1 Indicators — cross-domain comparison of EASA Member States aircraft fatal accidents and fatalities, 2009-2018 & 2019

Infrastructure	Fatal Accidents 2019	Fatal Accidents 2009-2018 Min - Max	Fatalities 2019	Fatalities 2009-2018 Min - Max	Fatalities 2009-2018 Median
ADR & GH	0	0 - 3	0	0 - 8	0.5
ATM & ANS	1	0 - 2	7	0 - 8	0.5

Table 5: Tier 1 Indicators — cross-domain comparison of EASA Member States infrastructure fatal accidents and fatalities, 2009-2018 & 2019

EASA-Member States accident rate		
Time period	Per 10 000 movements	Per 10 000 flight hours
4-year period [2011-2014]	**0.044**	**0.023**
2011	0.044	0.024
2012	0.048	0.026
2013	0.034	0.018
2014	0.051	0.026
3-year period [2015-2017]	**0.028**	**not available**
2015	0.031	not available
2016	0.023	not available
2017	0.030	not available

EASA-Member States fatal accident rate		
Time period	Per 10 000 movements	Per 10 000 flight hours
4-year period [2011-2014]	**0.001**	**0.0004**
2011	0.001	0.001
2012	0	0
2013	0	0
2014	0.002	0.001
3-year period [2015-2017]	**0.001**	**not available**
2015	0.002	not available
2016	0.001	not available
2017	0	not available

Accident rate by size of AOC holder (Number of movements)		
AOC holder flying activity over the analysed period	Accident rate per 10 000 movements	
	period [2011-2014]	period [2015-2017]
Band A: Less than 7 100 movements	0.17	not available
Band B: 7 100 - 35 099 movements	0.18	not available
Band C: 35 100 - 101 999 movements	0.06	0.04
Band D: 102 000 - 199 999 movements	0.04	0.03
Band E: More than 199 999 movements	0.03	0.03

Table 6: Tier 1 Indicators for CAT aeroplanes, baseline figures 2011-2014 & 2015-2017

In **Tables 4 and 5,** in addition to minima and maxima, the median number of fatalities is shown for the period 2009-2018. This is because for some aircraft domains, the median number provides a better representation of the number of fatalities per year. This is typically related to the number of passengers on board aircraft involved in fatal accidents. Sailplanes usually only have one person on board and the number of fatal accidents and both the mean and median number of fatalities are very similar. By contrast, CAT airline fatal accidents may involve one or several hundred fatalities; therefore, the annual number of fatalities varies and the mean and median figures are quite different. In **Table 6**, accident rates were calculated as part of an NoA survey and analysis work. These calculations are based on the accidents reported to the Agency under Regulation (EU) No 996/2010[78].

[78] Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC.

The flight hours and movements were determined based on the NoA survey and extensive, detailed review of the data to ensure accuracy and completeness.

It is important to note that these 'baseline' performance measures may be used by States to monitor sector-based performance; they should, however, not be adopted as safety performance targets for individual regulated entities. To ensure continuous improvement in safety, regulated entities must establish their own SPIs and associated targets, in a manner acceptable to their CA.

Note that these indicators are kept in this EPAS edition for reference only and will no longer be updated. Given the significant decrease in movements and flight hours due to the COVID-19 crisis, comparing current safety performance with a baseline established before the COVID-19 pandemic may not be meaningful. The next EPAS edition will provide a new set of indicators (currently being developed by the NoA).

4.3 Environmental performance

The efficiency of actions included in EPAS in relation to environmental protection will continue to be monitored as part of the EAER[79].

The report is led by EASA with support from the EC, the EEA and EUROCONTROL. EAER provides a valuable source of objective and accurate information on the environmental performance of the aviation sector and sets the scene for Europe's ambition to make the sector more sustainable. It includes performance indicators that provide an overview of the sector's environmental performance over time. This includes technology/design, sustainable aviation fuels, air traffic management/operations, airports, market-based measures and the latest scientific understanding on environmental impacts from aviation.

EASA published the 2nd edition of the report in January 2019 and, in line with EASA's expanded environmental protection remit, is responsible to update the EAER every 3 years. EASA has already started to work in the next update expected in 2022.

[79] https://www.easa.europa.eu/eaer/downloads