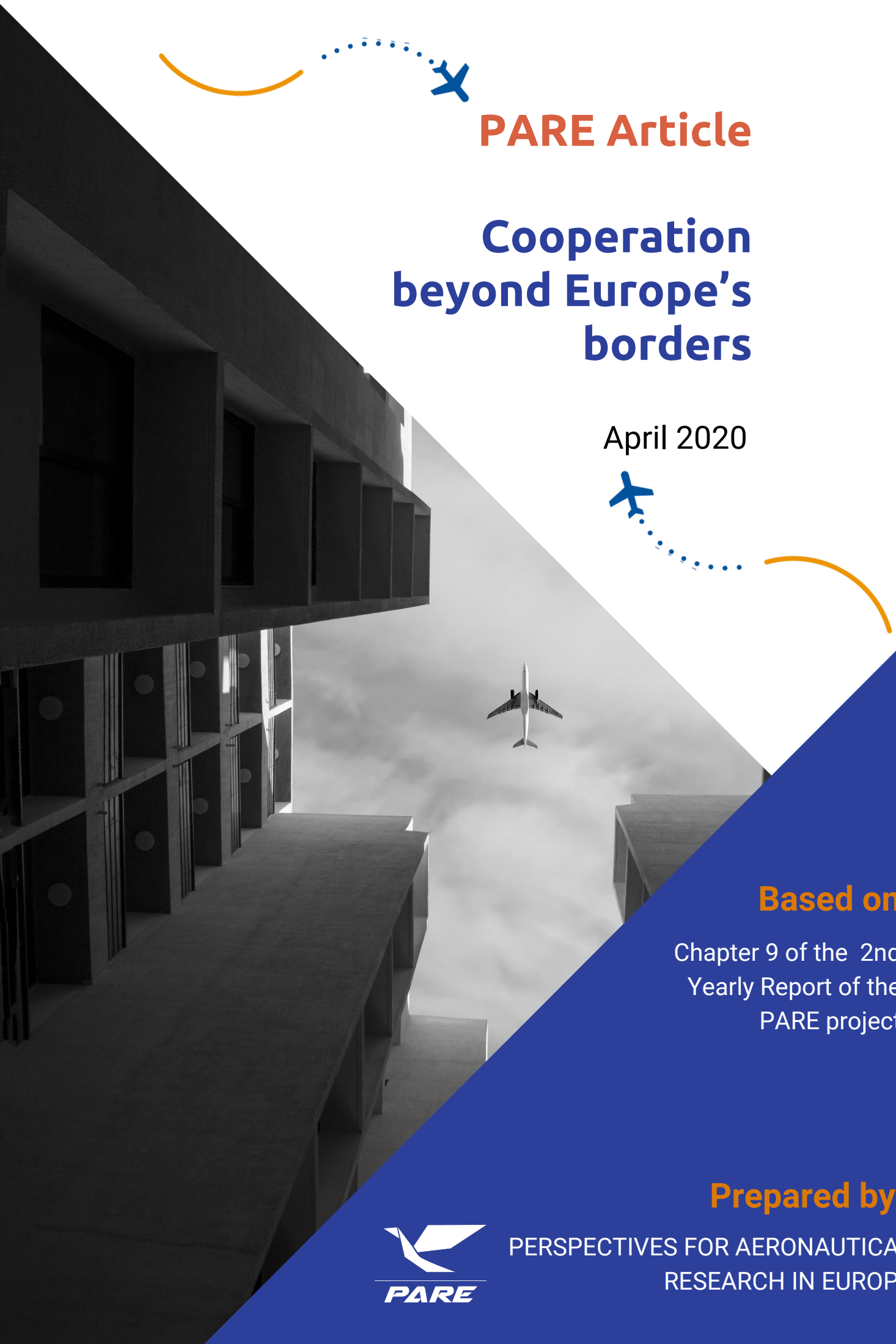

PARE Article

Cooperation beyond Europe's borders

April 2020

Based on

Chapter 9 of the 2nd Yearly Report of the PARE project

Prepared by

PERSPECTIVES FOR AERONAUTICAL RESEARCH IN EUROPE

02

Cooperation beyond Europe's borders

INTRODUCTION

To **support the 23 Flightpath 2050 goals** established by the Advisory Council for Aeronautics Research and Innovation in Europe (**ACARE**), the PARE project defined **35 complementary PARE objectives.** Objectives 37 to 42 are addressed in the **9th chapter** of **PARE's 2nd-year report**, entitled "**Cooperation beyond Europe's Borders**", which concerns areas of aeronautics that require cooperation between the worldwide communities. These include Air Traffic Management (ATM), harmonized certification rules, environmental effects, safety and security, and fair trade and open markets.

AIR TRAFFIC MANAGEMENT

Air traffic is expected to continue to grow at a rate of 2 to 7% per year depending on the region of the world. The main potential limitation to this continuing growth is the capacity of the air traffic system, including airports and ATM. Airports are a local issue, although with far-reaching geographical implications in the case of major hubs. On the other side, **ATM is a global issue** in the sense that it should function seamlessly worldwide, over continents and across oceans, and in densely, sparsely or uninhabited regions.

Therefore, ATM is the major potential bottleneck to the growth of aviation on a global scale, with a particular incidence in developed regions with dense traffic like Europe and the north-eastern US, but gradually spreading to other regions. Considering this, **by 2050, the seamless compatibility of ATM systems must be promoted worldwide, across continents and oceans**.

KEY FINDINGS

- When **traffic approaches the available capacity**, there is a combination of entirely **undesirable consequences**: (i) departure and arrival delays that cause passenger dissatisfaction and can hinder business activities; (ii) aircraft in flying holding patterns awaiting permission to land and take-off queues of aeroplanes waiting to gain access to a runway; and (iii) increased fuel consumption, pollution and noise, precisely near the airport areas where these issues are more sensitive. The **economic losses** are not just increased fuel costs and lost revenues for airlines but also the **loss of valuable time** for passengers and business travel;

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- Through advances in technology and procedures, ATM in Europe and the US has mostly managed to stay ahead of the growth of air traffic, but not by a wide margin all the time, so there are still occasional delays and the overall challenge remains. This challenge is recognized at a political level as testified by the large programs **SESAR** - Single European Sky ATM Research - in Europe and **NextGen** - Next Generation Air Transportation System - in the US that aim to keep air traffic capacity ahead of air transport growth and avoid the risk of massive flight delays and cancellations;

- The **market for ATM equipment and services** includes radars, navigation and communication systems, satellite links, equipment for Air Traffic Control (ATC) centres and control towers, including operator consoles and other hardware and operating systems incorporating sophisticated software. The market for ATM equipment and services is considerable and not to be underestimated compared with the market for aircraft and airlines services since they are all complementary and interdependent;

- The **US**, by being a single nation, **has a unique Air Navigation Services Provider** (ANSP) and **certification authority**, which is the Federal Aviation Administration (FAA).On the contrary, **in Europe, although the Single European Sky** (SES) initiative was launched at the beginning of the present century, **the national border division of the airspace leads to a diversity of ATM services**, dominated by national ANSPs, as well as to national certification authorities. Despite all these factors, Europe betters the US in most ATM performance indicators (e.g. timeliness of flights) and achieves the same or higher safety standards;

- To achieve SES goals, **the European Parliament established an implementation framework of five interdependent pillars** - technology, legislative, safety – the European Union Aviation Safety Agency (EASA) –, airport and the human factor. Within the first pillar, SESAR was set up in 2007 as a joint undertaking (JU) on research & development in ATM, entitled SESAR I. Today, the second SESAR program is ongoing (SESAR 2020), more than €2 billion have been committed to this SES pillar and it is estimated that around 3000 experts are currently engaged in this program to improve ATM efficiency;

- Even though SESAR and NextGen have the same basic aim, the implementation frameworks for each are radically different, with the European approach based on a single, multi-stakeholder consortium, and the US model requiring close internal coordination between various government-led programmes to ensure interoperability of components delivered by a variety of consortia. **To ensure compatibility**, the **EU and US systems** don't need to be identical but have **aligned requirements for equipment standards and technical interoperability**.

KEY ACTIONS

To achieve PARE objective 37, it is recommended that **cooperation between SESAR in Europe and NextGen in the US is supported** to ensure compatibility across the North Atlantic and provide the basis for progress in the world ATM market as the growth of air travel increases capacity needs elsewhere.

HARMONIZED CERTIFICATION

Aircraft certification is the process whereby an **applicant requests approval from an aviation regulatory authority**, such as the FAA and EASA, **for manufacturing a new aircraft model or making changes to an existing aircraft**. Some decades ago, different national certification authorities required different tests for the same purpose, duplicating effort and increasing cost with no benefit to safety or efficiency. The harmonization of certification standard avoids such costly duplications.

Since FAA and EASA are the leading certification authorities, the continuation of common or compatible certification standards and the mutual acceptance of certification results should continue as new technologies emerge and possibly new aircraft configurations as well. Taking this into account, **by 2050, harmonized certification standards must be promoted worldwide as already exist in other sectors to ensure the growth of aviation as the safest mode of transport**.

KEY FINDINGS

- The certification of an airliner is the final stage of the development process and can also be the most complex, time-consuming and expensive, involving: approved standards, guidance, tests, methods, procedures as well as data submittals and plan documentation. It **takes about 3 000 flying hours for 3-5 years involving 3 to 6 prototype of pre-production aircraft**, and it is difficult to compress without significantly increasing risks that could become delays and further costs;

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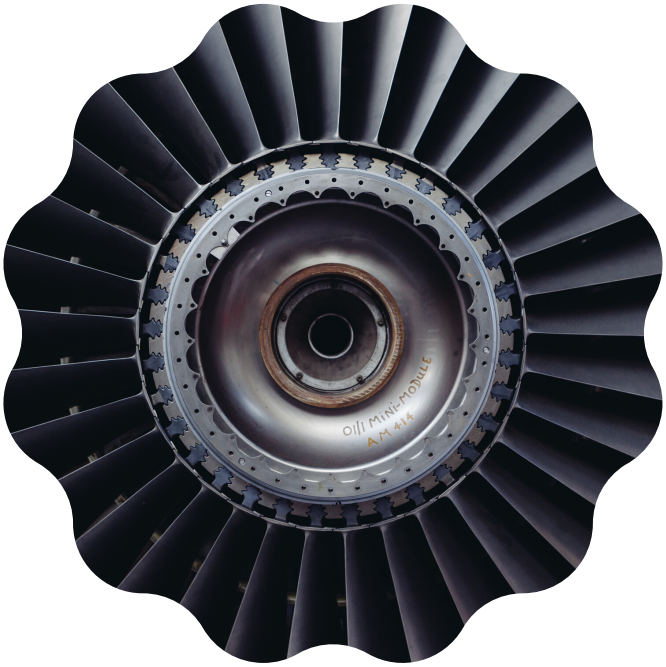
- **Grandfather rights** refer to the right of a manufacturer to continue certificating successive derivatives of a mature aircraft type under the certification rules applicable when the original design was cleared, despite subsequent advances in safety regulation. They **were established in the EU in 2003 with the creation of EASA**, under the safety pillar of the SES framework;

- The overall framework for harmonized and coordinated certification between EASA and the FAA is currently established by the **agreement between the US and the EU on cooperation in the regulation of Civil Aviation Safety**, which entered into force on 2011. The main objectives of the agreement are to automatically accept certain approvals issued within the other certification system and enable the reciprocal acceptance of findings of compliance during validation processes;

- Despite the advantages of harmonized certification, an **inevitable consequence** is that **certification can become a hurdle to newcomers to the market** that do not have either the technology demonstration or the program discipline capabilities to go through a complete certification process.

KEY ACTIONS

To accomplish PARE objective 38, it is recommended to **strengthen the cooperation of EASA/FAA on common certification standards and their adoption worldwide** to avoid duplication or degradation in specific regions.



AVIATION EFFECTS ON THE ENVIRONMENT

The effects of aviation on the environment can be considered at two levels: (i) locally as the emission and noise near airports; (ii) globally as in-flight emissions worldwide. Aviation contributes a small percentage (about 3.5%) to global pollution of the environment caused by human activity, but its influence is extremely unfavourable locally, in the areas of airports. Nevertheless, contrary to airport noise (generated by taking-off and landing aircraft) that can be solved at a local level, **emissions are a global issue and require considerable international negotiation**. Considering this, **by 2050, the effects of aviation on the environment on a global scale must be minimized.**

KEY FINDINGS

- Emission of aviation pollution is a result of the combustion of fuel used to power the aircraft, and its level depends on the fuel quality and the process of combustion. Basic fuel used in modern civil aircraft is aviation kerosene. **During the different phases of aircraft operation, several greenhouse gases** (GHG) **are emitted to the atmosphere**, including i) carbon dioxide (CO2) – which is composed by carbon monoxide (CO) and oxygen (O2); and ii) nitrogen oxides (NOx) – which includes nitrogen oxide (NO) and nitrogen dioxide (NO2), and cause the occurrence of ozone (O3) and photochemical smog;

- In 2012, it was estimated that European aviation represented 22% of global aviation's CO2 emissions. Similarly, **aviation now comprises 14% of all EU transport NOx emissions and 7% of the total EU NOx emissions**. From 2005 to 2014, CO2 emissions increased by 5%. The increase in emissions is, however, less than the increase in passenger-kilometres flown over the same period, due to an improvement in fuel efficiency driven by the introduction of new aircraft, the removal of older aircraft, and improvements in operational practice;

- Projections indicate that **future technology improvements are unlikely to balance the effect of future traffic growth** (and consequently emissions growth). Although alternative clean propulsion technologies are under development - such as electric-powered aircraft or cryogenic hydrogen fuel - these options are unlikely to be commercially ready before 2030. Alternatives include sustainable aviation fuels (SAFs), which are produced from bio-based feedstocks that have lower GHG emissions. Nevertheless, the price of bio-based aviation fuel relative to fossil-based kerosene is one of the major barriers to its greater market penetration;

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- Emission regulations can also play an important role in mitigating the environmental impact of aviation, but they need to be implemented on a global scale. The International Civil Aviation Organization (ICAO), created in 1944 as a specialized agency of the United Nations (UN), is committed to implementing a **global market-based measure to address GHG emissions from international aviation**, entitled **CORSIA** - Carbon Offsetting and Reduction Scheme for International Aviation;

- Modern solutions directed to reduce aircraft impact for the environment was the subject of **two biggest programmes concerning aviation implemented by the EU**: 1) **SESAR I** which aimed at decreasing of air transport impact on the natural environment by 10%; 2) **Clean Sky 2**, a continuation of the Clean Sky programme, in the frames of which there would be developed new technological solutions which would be more environmentally friendly (new aircraft, new power units, airborne systems and so on).

KEY ACTIONS

To achieve **PARE objective 39**, it is recommended that **the reduction of environmental effects of aviation on a global scale is a key point in the EU cooperation with other countries**.

SAFETY

Aviation authorities in Europe have banned foreign airlines from flying into Europe deemed not to meet adequate safety standards. This is necessary to protect the safety of those flying into and out of Europe, for business or leisure travel, and also of the residents that could become the victims of eventual accidents. On one side, the list of banned airlines could be of use to warn passengers that might be attracted to fly with those airlines in other regions of the world.

On the other side, an **effort to cooperate with aviation regulatory authorities worldwide**, in particular in less developed regions, **helping them to implement safety standards by providing technical assistance**, would be a preventive measure leaving bans as the necessary last resort in fewer cases. Taking this into account, by 2050, aviation safety must be promoted worldwide, including for European and other passengers flying with non-European airlines.

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KEY FINDINGS

- In principle, all airliners should be equally safe because they meet the same applicable EASA/FAA certification standards, Airbus/Boeing/Bombardier/Embraer and other manufacturers have comparable engineering skills and thoroughly develop operating and maintenance procedures. As a consequence, **aviation remains the safest mode of transport**, although with relatively large differences across the globe;

- The **reasons for reduced relative safety in other regions of the world** can be several: (i) persistence of extreme weather conditions in some regions, like arctic, tropical or deserts; (ii) operation of older aircraft requiring more careful maintenance; (iii) less adherence to maintenance and operating procedures that conditions (i) and (ii) require; (iv) weaker oversight by authorities. It must also be acknowledged that in all regions of the world the safety standards also vary considerably depending on the type of operation: (i) airliners and business jets are much safer than private aircraft; (ii) transport is safer than crop spraying or firefighting that involve low altitude flying near obstacles and obscurants;

- In Europe, the blacklist program began in 2005. First, an EU Member State (MS) identifies airliners subject to operating bans within their territory (after inspecting its aircraft that landed at the MS airport) and afterwards, the FAA and EASA, in coordination with the EC, evaluate on common criteria the airliners. The **resulting EU Air Safety List or "blacklist"**, which **includes a list of all airlines banned from operating in Europe and another of airlines that are restricted from operating under certain conditions in Europe**, is published at least every three months in the Official Journal of the European Union. These banned airliners are encouraged to improve their levels of safety and can request a compliance review from the EC to be removed from the list;

- ICAO is the primary forum for cooperation in all fields of civil aviation among its 193 MS. The UN agency promulgates Standards and Recommended Practices (SARPs) to facilitate harmonised regulations in aviation safety, security, efficiency and environmental protection on a global basis. As part of this effort, ICAO established in 2015 the **Aviation Safety Implementation Assistance Partnership** (ASIAP), to coordinate efforts for the provision of assistance to its MS, and created the initiative **"No Country Left Behind"** (NCLB), which focuses on assisting all MS on priority basis to provide support for the implementation of ICAO's SARPs;

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- Despite the excellent safety performance of aviation in Europe, **recent events remind the need to always remain vigilant and constantly search for weaknesses in the system** before they manifest in an accident. EASA, MS and industry have been working closely together in **safety risk management** (SRM), namely hazards identification, risks assessment and decision-making on the best course of action to mitigate those risks at European level. **EASA's 9th edition of the European Plan for Aviation Safety** (EPAS), which covers the five years between 2020 and 2024, puts increased emphasises on the importance of the SRM process.

KEY ACTIONS

To achieve PARE objective 40, it is recommended to **support activities raising the aviation safety standards to more uniform high levels across the globe**, in particular helping the improvement of airlines banned from flying into Europe that may still carry European passengers elsewhere.

SECURITY

European citizens often travel to countries with popular tourist destinations and important business hubs, outside the jurisdiction of the authorities that apply stricter security standards (such as Europe, the US or Japan), and are at greater risk of security threats like extremist groups that target aviation and foreigners. To **boost security in these less developed regions and continue to attracting business and tourism**, which may be of interest to these regions, **it is fundamental to support and cooperate with the local authorities.** Thus, **by 2050, aviation security must be promoted worldwide**, including at airports and destinations frequently used for European business and holiday travel.

KEY FINDINGS

- **Integrating security systems and operations into the planning and design of airport construction and refurbishment projects can be a very complex task** since (i) security systems involves equipment, technologies, procedures and operational approaches that need clear and concise guidelines; (ii) there is an environment of evolving threats, often accompanied by the implementation of new legal or regulatory requirements and operational updates to counter the changing threat conditions; (iii) security systems are inherently difficult to plan, design, and implement when applied to airports, which are designed to facilitate the fast and efficient movement of customers and goods;

- Moreover, **airports tend to be in a constant state of change** in terms of their physical layouts, operations, and tenants, and while the number of new airports being built is relatively small, **many airports and terminals are being remodelled, expanded, and upgraded**. The majority of changing security requirements will be accomplished in existing facilities that are often decades old, designed at a time when the threat profile and the security environment were dramatically less stringent than they are today.

- The **airport operator has a responsibility to provide a safe and secure operating environment and infrastructure**. The extent of necessary facility protection should be examined by the local **Airport Security Committee**, based on the results of a comprehensive security assessment of the existing facility. High priority should be placed on the protection of the aircraft from the unlawful introduction of weapons, explosives, or dangerous substances;

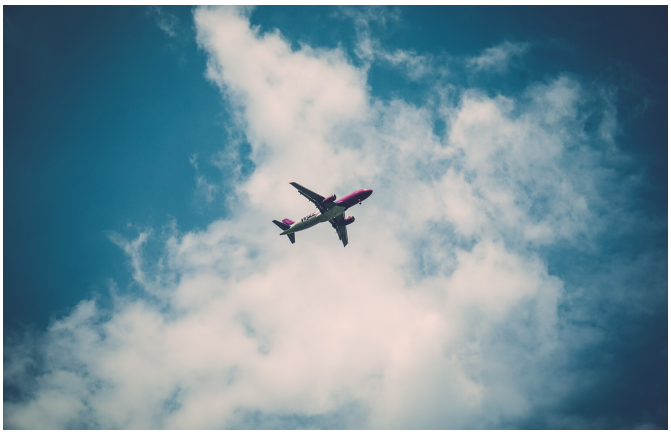
- Secure air transport service enhances connectivity in trade, tourism, political and cultural links between States. ICAO has a **Global Aviation Security Plan** (GASeP) that seeks to **unite the international aviation security community** and **help MS and stakeholders enhance the effectiveness of global aviation security.** Based on the main challenges that ICAO MS face, GASeP identifies key priority outcomes where ICAO, States and stakeholders should focus their urgent attention, resources and efforts: (1) enhance risk awareness and response; (2) develop security culture and human capability; (3) improve technological resources and foster innovation; (4) improve oversight and quality assurance; and (5) increase cooperation and support.

KEY ACTIONS

To accomplish PARE objective 41, it is recommended to **support high-security levels at airports outside Europe by cooperating with authorities eager to keep European business/tourism travel,** and otherwise warn travellers of risk.

FAIR TRADE & OPEN MARKETS

Aircraft manufacturing is arguably the most contested industry in international trade governance, mainly because the **traditional tools of trade governance are particularly ill-suited to aircraft manufacturing**. Considering this, promoting a level playing field is not easy and desirability and quality may function more effectively and subtly than harsh political pressures.



Regarding **open markets**, **major exceptions in civil** (all non-military) **aviation do exist**, generally uncontested, being the most visible and long-standing the **Japanese airliners' tendency to buy Boeing aircraft more often than from Airbus,** though the difference has reduced over time. To help undermine protectionist and biased local choices, safe and efficient aircraft should be made available.

Taking into account this, **by 2050, an open and fair market for aircraft must be promoted as far as possible at least in the civil sector**.

KEY FINDINGS

- Trade disputes are not unknown in aviation at the highest level of the World Trade Organization (WTO). Since Airbus emerge some 40 years ago to challenge Boeing's position as the world's dominant aircraft manufacturer, **the US and EU governments on behalf of Boeing and Airbus**, respectively, **have been accusing one another** of illegitimately propping up their respective national champions, while simultaneously professing their own innocence in providing support. The **Canadian government on behalf of Bombardier has also accused the Brazilian government of subsidizing Embrae**r;

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- The **basic logic behind trade enforcement mechanisms**, whether pursued unilaterally or multilaterally through the WTO, **is an attempt to "level the playing field" or to correct the market for the distortions of government interventions**. However, when it comes to aircraft manufacturing, there has never been anything close to a perfectly competitive, distortion-free market: not only are subsidies on the production side, but governments are also the most important consumers of aircraft, buying both military planes and consumer planes for publicly-owned national airlines;

- Since 1953, Boeing has been the top provider of commercial jetliners (Japanese carriers have ordered more than 970 Boeing jetliners) to Japanese airlines and a major supplier of military equipment and aircraft to the Japanese Ministry of Defence, retaining still today deep supplier (around 150 Japanese companies are suppliers to Boeing), customer and partner relationships across Japanese government, industry and civil society. **In the past decade, nearly 80% of the commercial aircraft ordered by Japanese customers have been Boeing products**;

- In **recent years, Airbus has significantly strengthened its position in the Japanese commercial aircraft market.** In 2013, Japan Airlines (JAL) signed a major order for the A350 XWB, which was soon followed by orders from All Nippon Airways Holdings (ANA) for the A320 family and, early in 2016, for the A380. Besides, over 20 major Japanese companies work with Airbus on various commercial aircraft programmes.

KEY ACTIONS

To achieve PARE objective 42, it is recommended a **competition based on quality rather than other interests**, which is **supported by the advances in efficiency and compliance with the highest environmental, safety and security standards**.

For more information about these topics, you can access the **full chapter here**.