



2011 State of Global Aviation Safety





A Coordinated, Risk-based Approach to Improving Global Aviation Safety

A specialized agency of the United Nations, the **International Civil Aviation Organization (ICAO)** was created in 1944 to promote the safe and orderly development of international civil aviation throughout the world.

ICAO sets the Standards and regulations necessary for aviation safety, security, efficiency and environmental protection on a global basis. It serves as the primary forum for cooperation in all fields of civil aviation among its 191 Member States.¹

Improving the safety of the global air transport system is ICAO's guiding and most fundamental Strategic Objective. The Organization works constantly to address and enhance global aviation safety outcomes through the following coordinated activities:

Policy and Standardization initiatives.

Monitoring of key safety trends and indicators.

Safety **Analysis**.

Implementing programmes to address safety issues.

In every case these activities are augmented by ICAO's detailed appraisal of global aviation safety metrics on the basis of established risk management principles—a core tenet of contemporary State Safety Programmes (SSP) and Safety Management Systems (SMS). Applying these principles in the field of aviation safety requires the Organization to pursue a coherent and consistent process of objective analysis, both proactive and reactive as applicable, in particular when evaluating safety risks.

In all of its coordinated safety activities, ICAO strives to achieve a balance between identified and assessed risk and the requirements of practical, achievable mitigation strategies.

This inaugural 2011 State of Global Aviation Safety Report is intended to provide Member States, the aviation community and the travelling public with a high-level analysis of air transport safety trends and indicators. It is also a comprehensive account of the significant aviation safety programmes being undertaken by ICAO and its partners, highlighting the Organization's important leadership role in fostering increased cooperation and innovation to enhance air transport safety outcomes worldwide.

Future ICAO Safety Reports will be published annually, providing ongoing updates to the air transport community on key safety indicators. These annual Reports will be supplemented when necessary by Special Editions such as this one, in order to commemorate the achievement of more significant safety milestones.

¹ This information is current as of the date of publication of this report.



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Note:

The United Nations' definitions of regions are used in the report.

This document focuses primarily on scheduled commercial flights as this type of traffic accounts for more than 60% of the total fatalities.

The scheduled commercial flights data was obtained from the Official Airline Guide (OAG).



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A More Proactive and Collaborative Approach to Aviation Safety

The safety levels that global air transport enjoys today represent an achievement built on the determination and efforts of the entire aviation community.

Recognizing the importance of informing its Member States, aviation stakeholders and the traveling public about the status of global aviation safety, ICAO has assembled a comprehensive review of safety-related initiatives and successes in the Organization's first-ever State of Global Aviation Safety report.

This report includes work undertaken by ICAO, its Member States and partnering organizations in recent years. It provides information that can serve as a basis for informed decisions on how to best continue improving aviation safety outcomes.

By providing this information in a clear and easy-to-understand format, ICAO has sought to promote improved accountability while ensuring consistency with its strategic objectives.

Over the past decade, the aviation community has witnessed a fundamental shift in its approach to safety. ICAO and partnering stakeholders have been developing and implementing pragmatic, risk-based approaches to address emerging global safety issues and to better focus the Organization's support to States with more pronounced safety challenges. The evolution of these strategies is critical to ensure that international civil aviation remains the safest mode of transportation even as it continues to accommodate the significant growth in global populations and air travel forecast for the near future.



Photo (From left to right) Roberto Kobeh González, Nancy Graham and Raymond Benjamin

ICAO will continue to lead efforts to promote a more proactive safety strategy and to develop efficient and effective solutions to meet the needs of the evolving international air transportation system. Our focus involves a shift to a new paradigm of aviation safety which addresses potentially critical situations based on a comprehensive and streamlined system for the analysis and sharing of safety information.

The State of Global Aviation Safety is intended as an essential reference publication. It presents a snapshot of safety performance within the international civil aviation system worldwide while providing helpful information about the numerous efforts to develop collaborative responses to safety concerns at the State, regional and global levels.

We invite you to take note of the information provided in this inaugural safety report and to disseminate it enthusiastically within your organizations. The information included here strongly supports the conclusion that to prepare our sector and the global and local economies it so fundamentally supports for the challenges ahead, safety performance in international civil aviation can and must be enhanced.

ICAO's vision is focused on this goal and we invite States and the aviation community to continue to collaborate with us in this effort. Safety remains aviation's fundamental and guiding strategic objective and our sector surely stands to benefit from this new and integral safety publication.

Roberto Kobeh González, *Council President*
Raymond Benjamin, *Secretary General*
Nancy Graham, *Director, Air Navigation Bureau*

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Executive Summary

2010 saw a return to growth as the total volume of scheduled commercial flights began to edge over 30 million per year.

In the context of this period of renewed growth, and in light of anticipated increases in air travel, it is imperative to maintain a very strong focus on initiatives that will further improve safety outcomes in the future.

ICAO is therefore continuously developing and refining more proactive and risk-based methods to further reduce the global accident rate, enabling the safe expansion of air travel in all regions.



Worldwide Traffic Volume: 2005–2010 *Scheduled commercial flights*



Accident Records: 2005–2010 *Scheduled commercial flights*



The number of accidents attributed to scheduled commercial flights increased in 2010 to 121, compared to 113 in 2009. This resulted in an accident rate of 4.0 per million departures, a marginal increase compared to the accident rate of 3.9 per million departures in 2009. While the overall number of fatalities in 2010 was below those in 2005 and 2006, there has been an increase in fatalities over the past three years. This trend serves as a reminder that cooperation between the various stakeholders is a key part of reducing the number of aviation accidents and related fatalities.

The ICAO Universal Safety Oversight Audit Programme (USOAP) continues to promote the systematic implementation of ICAO Standards and Recommended Practices (SARPs). As of the end of 2010, the USOAP had completed assessments of 93% of ICAO Member States, accounting for 99% of the traffic flown.

Cooperation has been a consistent goal and recognized strength of the aviation community. To keep pace with expansion and progress sector-wide, ICAO remains focused on the implementation and development of new safety initiatives. The Safety Collaborative Assistance Networks (SCAN), the Runway Safety Programme and Fatigue Risk Management Systems are only a few examples of how ICAO is working with stakeholders to identify and eliminate hazards.

The Organization is committed to improving aviation safety and enabling seamless cooperation and communication between stakeholders. ICAO continues to collaborate with established regional organizations, such as Regional Aviation Safety Groups (RASGs) and Regional Safety Oversight Organizations (RSOOs), and to promote the training and support necessary to address emerging safety issues.

USOAP Worldwide Coverage
190 ICAO Member States, end 2010



The Bottom Line

The resurgence of traffic experienced in 2010 was coupled with an increase in the number of accidents, resulting in an accident rate of 4.0 per million departures—a marginal increase compared to the previous year. ICAO is working in partnership with the international aviation community to achieve continuous reductions in the global accident rate, with an emphasis to improve safety performance in those

regions experiencing significantly higher accident rates or having specific safety challenges. This State of Global Aviation Safety report provides a summary of key indicators that define the scope and nature of the safety issues within global air transportation system, as well as an overview of the collaborative safety initiatives undertaken to address them at the global, regional and national levels.





Photo via aviation-images.com

2010

Air Transport Sector

The global air transport industry showed signs of recovery in 2010, with the number of scheduled commercial flights increasing by 4.5% globally since 2009 and generating positive financial results.

This increase represents the first significant annual growth in our sector since 2007 and coincides with an increase of 4.2% in the global real Gross Domestic Product (GDP)².

² Source: The World Bank, based on constant 2000 US dollars



Scheduled Commercial Flights: 2010

UN Region	Number of 2010 departures	Evolution 2010 vs. 2009	2010 departures %
North America	10,624,134	-0.6%	35%
Asia	7,629,403	10.6%	25%
Europe	7,263,218	2.6%	24%
Latin America and the Caribbean	2,976,575	13.0%	10%
Oceania	1,050,120	2.4%	3%
Africa	1,013,063	9.7%	3%
World	30,556,513	4.5%	100%

North America, which accounts for a third of global air transport traffic in terms of departures, was the only region to experience a small decrease (0.6%) in its aggregate traffic figures.

In contrast, both Asia and Europe, which represent a quarter of the global traffic, each experienced traffic growth. Asia with an increase of 10.6% moved from third to second in terms of regional departures. Europe moved to third in terms of departures but still experienced an overall increase in this category of 2.6%.

Latin America and the Caribbean, which together accounted for 10% of global traffic in 2010, experienced the largest increase in departures with a combined growth rate of 13%.

Oceania and Africa, each representing 3% of global air traffic, experienced increases of 2.4% and 9.7% respectively.



Latin America and the Caribbean, which together accounted for 10% of global traffic in 2010, experienced the largest increase in departures with a combined growth rate of 13%.

Shaping Policy and Progress through Consensus and Collaboration

The High-level Safety Conference (HLSC), held at ICAO Headquarters in Montreal in March 2010, provided recommendations to help further reduce the global accident rate through the early detection and proactive mitigation of safety risks. Adopting a collaborative approach, based primarily on the increased sharing of information for the purpose of promoting aviation safety, the HLSC endorsed a number of key safety initiatives contained within the ICAO Safety Framework.

The Safety Framework provides a mechanism to coordinate the numerous inter related ICAO safety programmes and is comprised of the following categories:

Policy and Standardization

Safety Monitoring

Safety Analysis

Implementation

The following chapters of this Safety Report provide a summary of the ICAO initiatives contained within the Safety Framework, many of which are directly related to the HLSC recommendations.



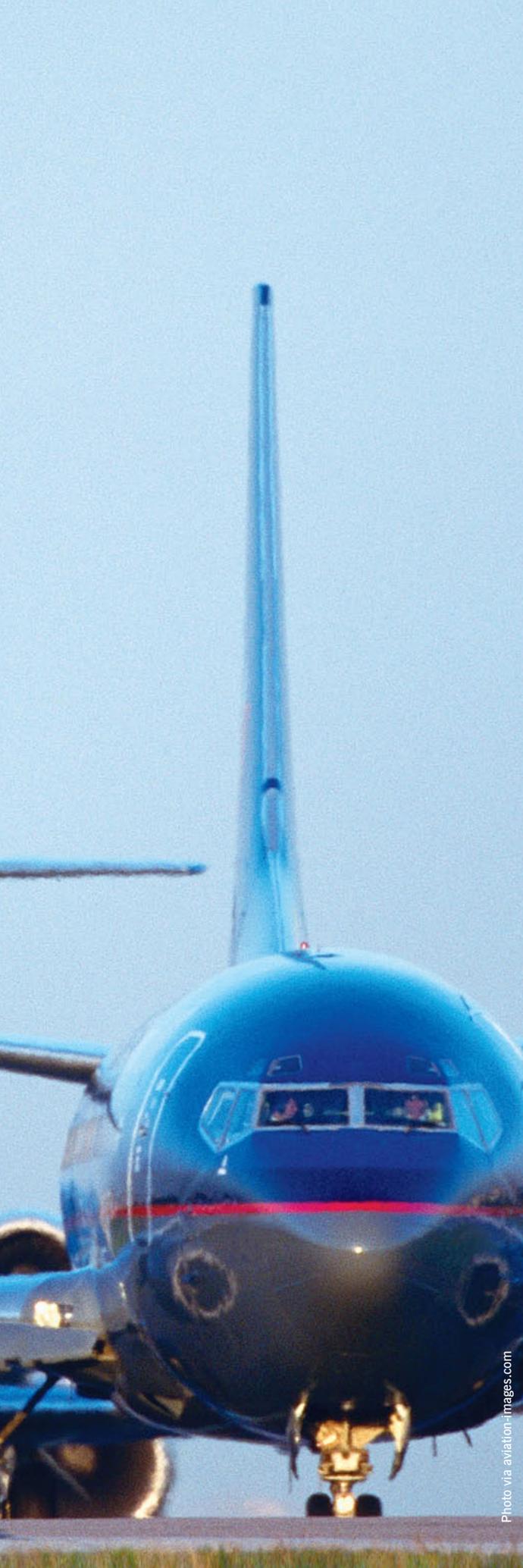


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Policy and Standardization

The global aviation system changes rapidly and continuously, fulfilling a unique mandate as a facilitator of social mobility and development and as a cornerstone of economic growth at the global, regional and local levels.

The policies, procedures and systems that allow civil aviation to achieve this mandate while remaining safe, secure, efficient and environmentally sustainable are prescribed within ICAO's coordinated international Standards and Recommended Practices (SARPs).

All these activities are harmonized by the principles and objectives outlined in the Organization's Global Aviation Safety Plan (GASP) and many State-specific safety SARPs are presently being collated into a new Safety Management Annex which is currently under development.

ICAO also initiates and manages projects addressing a wide range of safety issues, some of which have been detailed within the Implementation section on page 19.





Support through Strategic Leadership: ICAO's Global Aviation Safety Plan (GASP)

Recognizing the importance of a global framework to support ICAO's Strategic Objectives for the safety and sustainability of the air transportation system, the Organization developed and began to implement its strategic Global Aviation Safety Plan (GASP) in 1997.

The latest version of the GASP was published in July 2007. It has served as a high-level policy document guiding the efforts of States, industry partners and international organizations.



The 37th Session of the Assembly confirmed the Organization's intent to continue to apply the GASP as a strategic document for continued safety enhancement, focusing action where it is most needed. The Assembly accordingly directed the Council to update the GASP. Consistent with ICAO's inclusive approach to address systemic safety issues, this revision to the GASP will be accomplished in collaboration with key sectoral partners.

The GASP is being updated to incorporate principles associated with the implementation of State Safety Programmes (SSPs) and Safety Management Systems (SMS) to provide a strategic vision for the evolution of a comprehensive risk-based approach to further reduce the global accident rate.

Through this evolution of the GASP, the coordination of safety activities between ICAO, its Member States, associated international and regional organizations, as well as pertinent stakeholders will be facilitated. The revised GASP will provide an updated strategy for the international aviation community to continuously improve safety through the implementation of its Global Safety Initiatives (GSIs) and related activities.

The GASP GSIs seek to enhance safety in aviation operations through the promotion of collaborative approaches, including the sharing of safety information as well as the prioritization of investments in the people, technologies and assistance projects necessary to achieve sustainable results.

The GASP will continue to improve safety globally, with particular focus on improvements in regions facing more acute safety challenges.



Safety Management

State Safety Programmes (SSP) and Safety Management Systems (SMS) are essential to the successful evolution of a proactive safety strategy. Updates to the ICAO *Safety Management Manual* (Doc 9859) will provide detailed guidance to facilitate SSP and SMS implementation by States and service providers.

In addition, ICAO is working in close collaboration with Member States and international organizations to develop a new Annex dedicated to safety management responsibilities and processes. The new Safety Management Annex will include provisions on SSP, SMS, State safety oversight responsibilities as well as the collection, analysis, protection and exchange of safety data.

The Safety Management Annex will be based on safety management provisions initially adopted in Annexes 1, 6, 8, 11, 13 and 14, and on the recommendations of the Safety Management Panel (SMP), established by the Air Navigation Commission (ANC) in June 2011.





Photo via aviation-images.com

Monitoring: Key Safety Trends and Indicators

Statistical data highlights that the effective implementation of the critical elements related to safety oversight systems is instrumental to the achievement of positive and industry-wide safety outcomes. These outcomes are further aided by proper adherence to safety-relevant ICAO Standards and Recommended Practices (SARPs), as well as associated procedures and guidance materials.

In order to maintain an account of the degree of global adherence to its safety-related guidance, ICAO monitors its Member States on a regular basis through its Universal Safety Oversight Audit Programme (USOAP) activities.



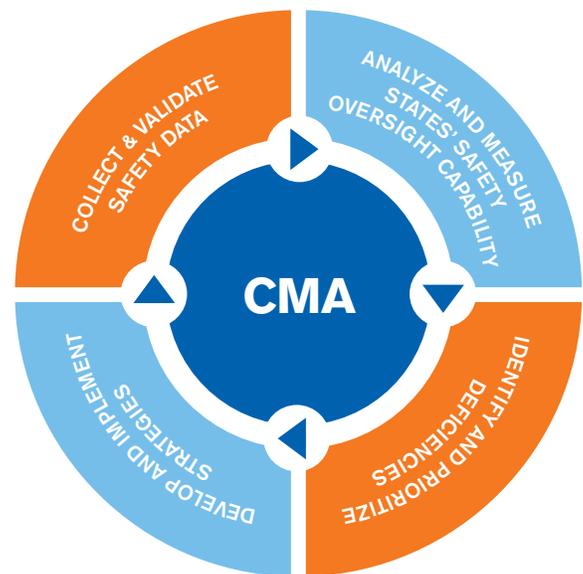
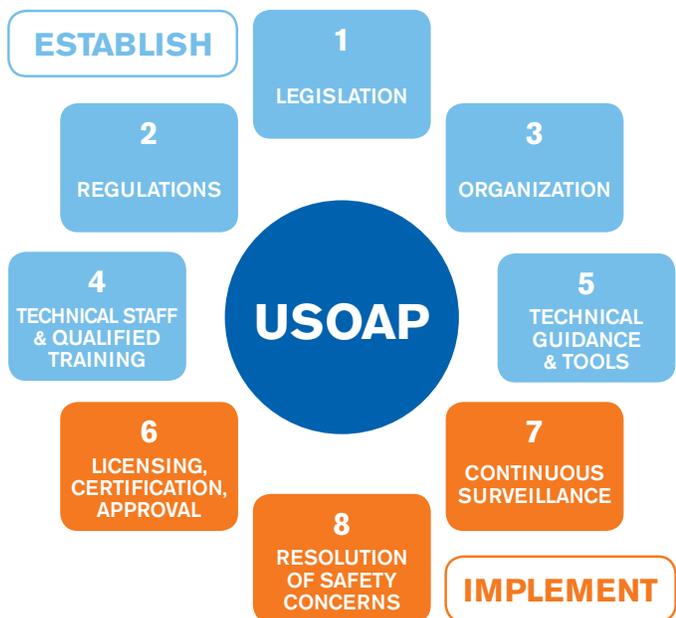
Universal Safety Oversight Audit Programme

The ICAO Universal Safety Oversight Audit Programme (USOAP) has unquestionably contributed to improving the safety of international civil aviation in all regions of the world.

At the heart of the programme's success lies the fundamental and time-tested process of identifying deficiencies and then encouraging States to develop and implement plans to correct them after analyzing the audit results.

In 2011, ICAO began its transition with the USOAP to a Continuous Monitoring Approach (CMA), which will be implemented in a phased evolution as of 2013. The CMA represents a long-term, flexible, cost-effective and sustainable method of identifying safety deficiencies, assessing associated risks, developing assistance strategies and prioritizing improvements. The CMA aims to provide a continuous report of a States' effective implementation, as opposed to the 'snap-shot' audit conducted once every six years under the comprehensive systems approach.

USOAP Methodology and the Continuous Monitoring Approach, to be implemented in 2013



The State Aviation Activity Questionnaire (SAAQ), compliance checklists, and the USOAP Audit Manager application are the current tools which enable ICAO to perform the detailed reviews of State safety oversight systems for civil aviation. These tools are used by Member States to provide information which enhances eventual on-site activities as well as allowing USOAP auditors to facilitate the determination of:

1. The level of aviation activity for each State.
2. Member States' level of implementation of SARPs for each of the safety-related ICAO Annexes, based on the audit results and compliance checklist completed and submitted by States.
3. The percentage effective implementation of the eight areas audited, by State, by a selected group of States, by region or globally.
4. The types of difficulties experienced by Member States in establishing an effective safety oversight system in each of the eight areas audited.

Transparency and the sharing of information associated with the evolution of the audit programme have likewise contributed to improving safety. The unobstructed availability of timely, unbiased and authoritative safety information is essential for sound decision-making and cost-effective investment of human and financial resources.

These USOAP audit results complement information already available and enhance our knowledge and understanding of the specific areas where we should focus our efforts.

The Eight Areas Audited for Effective State Safety Oversight

- 1 **Primary aviation legislation and civil aviation regulations**
- 2 **Civil aviation organization**
- 3 **Personnel licensing and training**
- 4 **Aircraft operations**
- 5 **Airworthiness of aircraft**
- 6 **Air navigation services**
- 7 **Aerodromes**
- 8 **Aircraft accident and incident investigation**

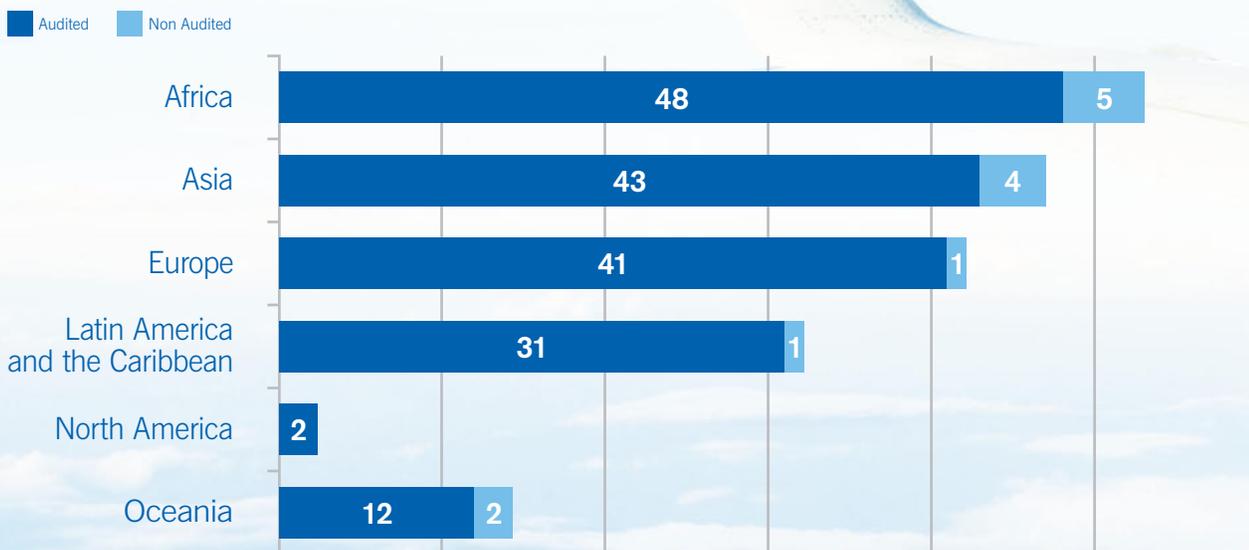


USOAP Summary

The following chart indicates the geographical distribution, by UN Region, of all 190 ICAO Member States and the 177 of those audited under the USOAP as of 31 December 2010.

These 177 audited ICAO States represent 93% of all ICAO's membership and account for 99% of the total traffic flown by all ICAO Member States.

Audited States by Region *as of 31 December 2010*





Each ICAO Member State, in its effort to establish and implement an effective safety oversight system that reflects the shared responsibility of the State and the broader aviation community, should address all of the eight Critical Elements (CEs) as highlighted by ICAO. These eight categories address the entire spectrum of a State's civil aviation activity.

To standardize the conduct of its audits under the USOAP, ICAO has established audit protocol questionnaires. The protocol questions are based on the Chicago Convention, SARPs established in the safety-related Annexes to the

Convention, as well as associated ICAO guidance material including, but not limited to, the ICAO safety oversight manual (Doc 9734—*The Establishment and Management of a State's Safety Oversight System*).

Each audit protocol is a comprehensive checklist covering all areas of a State's safety oversight system subject to a the USOAP audit process. Using the audit protocol as a guideline, auditors are then able to determine a State's capability for safety oversight.

Global Audit Results

Effective Implementation of Safety Oversight Systems by Area







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Safety Analysis

Previous chapters of this document provided an overview of 2010 aviation activity, including summaries of the air transport system and State safety oversight. Each of these topics provides a piece of the puzzle relative to the ‘big picture’ of aggregate global aviation safety levels.

This chapter presents the conclusions generated by various safety analysis activities performed at ICAO, highlighting recently developed tools and capabilities that assist the Organization in identifying safety risks and outcomes.

As these analytical tools mature, the more detailed information they provide will serve as a basis for increased levels of safety intelligence and as a ‘safety-compass’ for guiding the more effective allocation of ICAO and State resources.



Global Accident Rates

As its primary indicator of aggregate safety in the global air transport sector, ICAO studies the accident rate based on scheduled commercial air traffic with a Maximum Take-off Weight (MTOW) above 2250 kg. Aircraft accidents are categorized using the definition provided in Annex 13 to the Chicago Convention—*Aircraft Accident and Incident Investigation*.

Exposure data is comprised of scheduled commercial operations that involve the transportation of passengers, cargo and mail for remuneration or hire.

The figure below shows the evolution of the accident rate since 2005 and an accident rate for 2010 of 4.0 accidents per million departures.

In addition to the global accident rate as calculated historically, ICAO is committed to working with its partners to develop a harmonized accident rate, based on common criteria that will be developed in the future.

Global Accident Rate *accidents per million departures*



Regional Accident Statistics

To further analyze the state of aviation safety, the accident data for scheduled commercial air transport is broken down according to United Nations regions. The table below provides insight into the state of aviation safety in different regions in the context of global outcomes.

While Africa has the highest regional accident rate, it also accounts for the lowest percentage of global traffic volume, 3% of scheduled commercial traffic.

The Asian region has the lowest accident rate, yet it features the largest overall number of accidents which result in fatalities, 38% of the accidents were fatal accidents.

The accident rate for the European region is slightly below the global accident rate and is characterized by a relatively small percentage of accidents which result in fatalities, 8%.

Latin America and the Caribbean has a higher than average accident rate, 31% of which result in fatalities. This region also has a small percentage of global traffic, 13% of scheduled commercial traffic.

North America has an accident rate below the world average and, despite having the highest number of accidents, it experienced no fatal accidents for the year 2010.

The Oceanic region has the lowest accident record and, similar to North America, had no fatal accidents in scheduled commercial air transport for the year 2010.

The considerable variance in traffic volume among regions is a factor which needs to be considered when drawing broader conclusions from accident rate information.

Accident Statistics and Accident Rates: 2010

UN Region	Traffic	Accidents		Fatal Accidents
		Number	Rate ³	
Africa	1,013,063	17	16.8	3
Asia	7,629,403	24	3.1	9
Europe	7,263,218	24	3.3	2
Latin America and the Caribbean	2,976,575	16	5.4	5
North America	10,624,134	35	3.3	0
Oceania	1,050,120	5	4.8	0
World	30,556,513	121	4.0	19

³ The accident rate is defined by the number of accidents per million departures

The table below reflects the percentage of accidents in the context of overall traffic share per region.

While regional accident rates are often used to determine safety performance, the volatility of such indicators varies significantly according to the wide disparity in regional traffic volumes. Larger traffic volumes reduce the impact

of individual accidents on the overall accident rate, requiring complementary data to round out the scope and nature of regional safety outcomes.

ICAO's initiative, known as Safety Intelligence, addresses these gaps and discrepancies and is highlighted in detail on page 17.

Accidents and Traffic Distribution: 2010

UN Region	Percentage	
	Traffic	Accidents
Africa	3%	14%
Asia	25%	20%
Europe	24%	20%
Latin America and the Caribbean	10%	13%
North America	35%	29%
Oceania	3%	4%

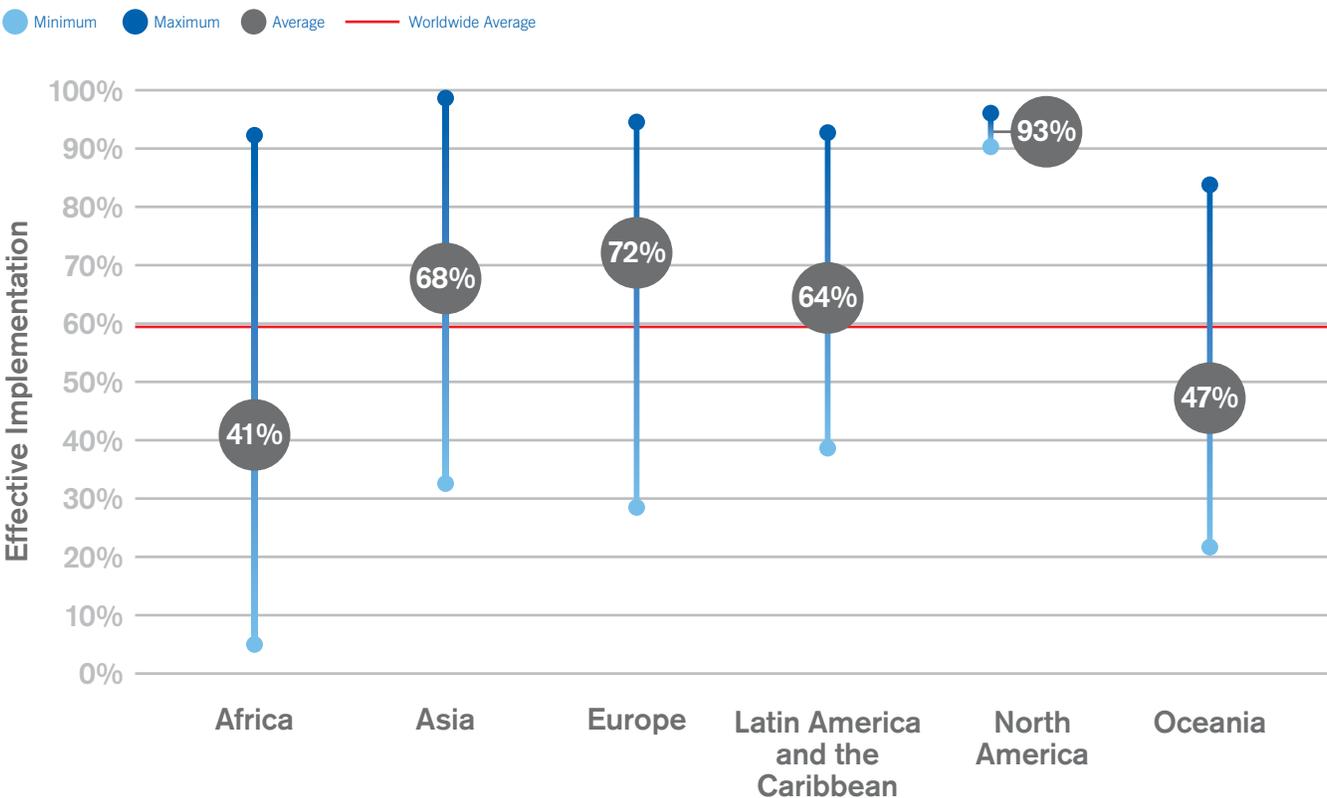
USOAP as a Safety Indicator

Effective State safety oversight capabilities, as measured by the USOAP, provide a proactive indicator of safety performance. The figure below shows the maximum, minimum and average effective implementation values of USOAP protocols for each region.

The figure shows the wide range of levels of effective implementation that exist across the globe.

The rate of effective implementation was shown to correlate with accident rates at the High-level Safety Conference in 2010. To better utilize the proactive and predictive information contained in these USOAP audit results, the data has been presented below as a safety risk synthesis for the audited States.

Effective Implementation by Region



In this graph below, the effective implementation for each State is represented in the vertical axis. Traffic volume, expressed as the number of departures per year, is on the horizontal axis.

As the traffic volume for a State increases, it tends to exhibit a higher level of effective implementation.

Effective Implementation (EI) versus Traffic per State

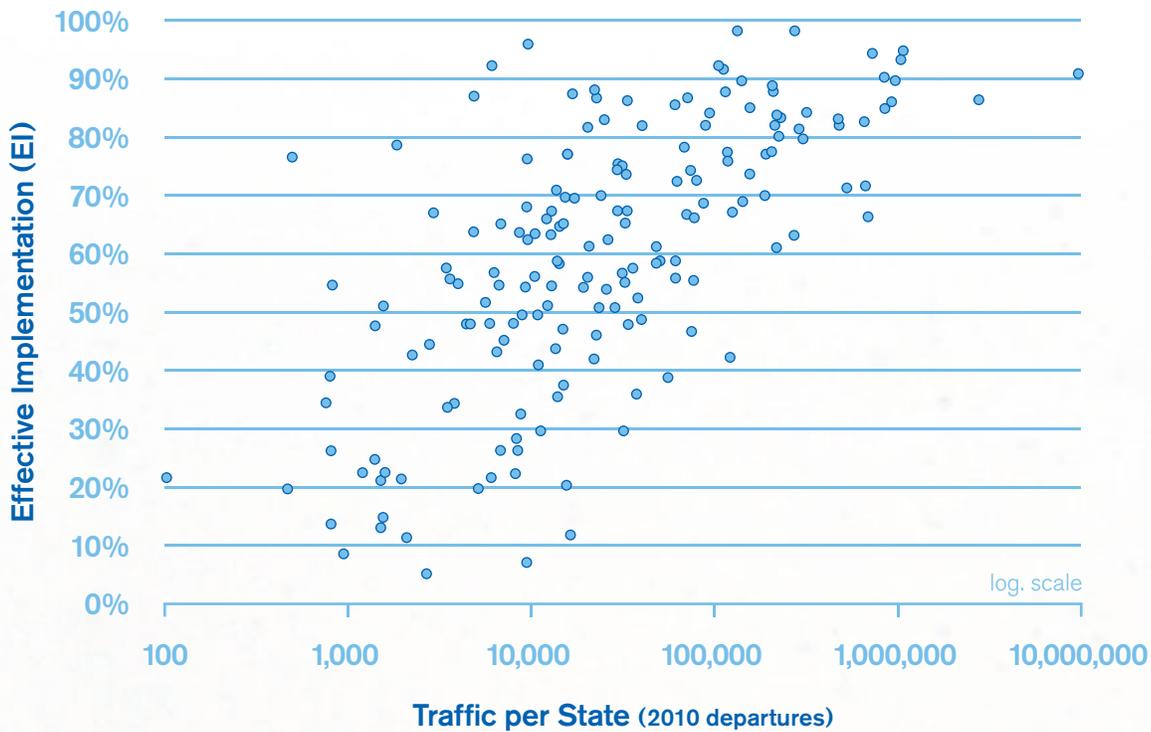


Photo via aviation-images.com



Safety Analysis Initiatives

Safety Intelligence

In 2010, ICAO initiated a risk-assessment approach to enhance aviation safety based on Safety Intelligence.

The Organization accomplishes its objectives in this regard through identification and analysis of heterogeneous data sources, such as:

- Accident statistics.
- USOAP Audit results.
- Economic Indicators.
- Traffic volume and traffic growth.
- Traffic distribution factors, including the proportion of flights flown by a State's Air Operator's Certificate (AOC) holders vs foreign operators.

This Safety Intelligence enables the Organization to cultivate a holistic understanding of safety issues and opportunities to assist Member States and regional and sub-regional organizations. It also assists with the benchmarking of performance indicators.

Integrated Safety Trend Analysis and Reporting System (iSTARS)

The integrated Safety Trend Analysis and Reporting System is a web-based utility which combines different safety-related datasets and allows for effective and integrated safety analysis.

This system contains a variety of relevant safety datasets as well as analysis tools that allow users to explore, through interactive graphs, the significance of the information beyond the raw data. In particular, the iSTARS database includes detailed USOAP audit results by State, traffic data and all accidents and incidents reported to ICAO since January 2005.

iSTARS also provides interactive maps allowing for easy visual correlation of independent datasets.



Partnership in Action

SKY brary

SKYbrary is an electronic repository of safety information, initiated by EUROCONTROL in partnership with ICAO and other aviation organizations. It serves as a comprehensive source of aviation safety information and is available to users worldwide. As a web-based platform, SKYbrary enables users to access safety data from websites and databases of various aviation organizations, including regulators, service providers and industry.

SKYbrary has focused on providing coverage of loss of control, runway excursions and incursions, controlled flight into terrain and loss of separation, and is presently adding coverage on operational issues and aircraft airworthiness.

www.skybrary.aero





Photo via aviation-images.com

Implementation

In line with its underlying mandate and as a natural consequence of its policy, monitoring and analysis activities in this area, ICAO further promotes global aviation safety through the implementation of specific initiatives, tools, training activities and programmes. These are aimed at improving targeted safety outcomes across the breadth of civil aviation's operational domains.

ICAO is assisted in its implementation activities by its comprehensive regional network, which allows it to cultivate strategic partnerships with local organizations and stakeholders in order to provide the most cost-effective and operationally beneficial assistance possible to its Member States.

This section outlines the global resources and leadership ICAO brings to bear in this regard as it continues to foster improved understanding and more efficient assistance in all areas of aviation safety.



Training

New ICAO Training Policy

ICAO adopted a new Training Policy in 2010 to better support implementation and standardization efforts through courses, seminars and workshops on emerging issues.

The new Policy applies to all training provided by ICAO Bureaus, Regional Offices and training organizations issuing a certificate of completion or a certificate of achievement accompanied by the ICAO logo and better defines ICAO's role in the provision of aviation safety and security training.

The Organization has additionally established a more focused Aviation Safety Training Section (AST), the mandate for which is to ensure that all global aviation safety-related training is of the highest quality and delivered at the most affordable cost.

The training capabilities are more effective and user-focused through the use of e-learning tools and new partnerships with endorsed training organizations.

Evolving from TRAINAIR to TRAINAIR PLUS

ICAO has also made significant enhancements to the TRAINAIR programme in recent years, culminating in the new TRAINAIR *PLUS* Programme.

The original ICAO TRAINAIR programme was part of a broader UN initiative that provided much needed competency-based training knowledge, tools and materials to government training providers across multiple sectors for over two decades.

During 2010, ICAO completed a comprehensive series of reviews of the core TRAINAIR scope and objectives. It will have reintroduced the programme in 2011 as TRAINAIR *PLUS*, better aligning it with the new Training Policy and expanding the programme's reach and usefulness for both private- and public-sector aviation training providers.

TRAINAIR *PLUS* now includes significantly revised course development procedures and requirements, a new approach to the development of Standardized Training Packages (STPs) and sharing library, and a self-sustaining budgetary mechanism.

As part of the evolution from TRAINAIR to TRAINAIR *PLUS*, ICAO has also implemented a more formal assessment process addressing the following critical areas affecting the provision of effective aviation training:

- Organization and official certifications;
- Facilities and technology supporting training;
- Training delivery;
- Instructor qualifications;
- Training design and development;
- Training quality systems.

As an effective tool to implement competency-based and cost-effective training, TRAINAIR *PLUS* plays a critical role in human resource and skills development.

Regional Cooperation

ICAO's Regional Network

ICAO's Regional Offices assist Member States with the enhancement of the safety and efficiency of their aviation systems. The Regional Offices also promote ICAO's policies and Standards and Recommended Practices (SARPs).

Regional Aviation Safety Groups (RASGs)

In line with the ICAO Global Aviation Safety Plan (GASP) and the Industry Safety Strategy Group (ISSG) Global Aviation Safety Roadmap (GASR) objectives, ICAO RASGs serve as a focal point to ensure effective harmonization and coordination of all efforts and programmes aimed at reducing aviation safety risks.

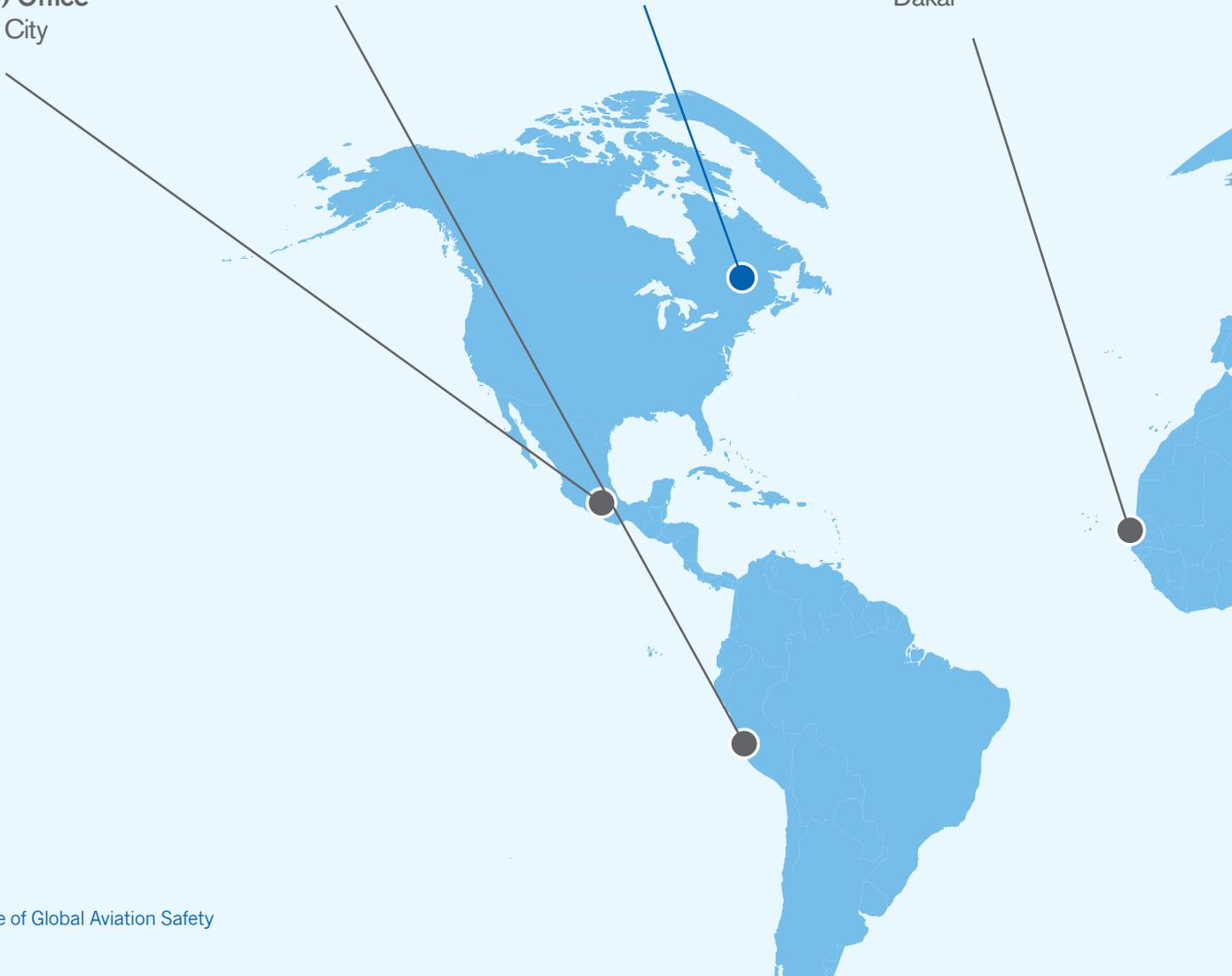
Related planning focuses primarily on defining common safety priorities and implementing goals for pertinent States and

**North American
Central American
and Caribbean
(NACC) Office**
Mexico City

**South American
(SAM) Office**
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**ICAO
Headquarters**
Montreal

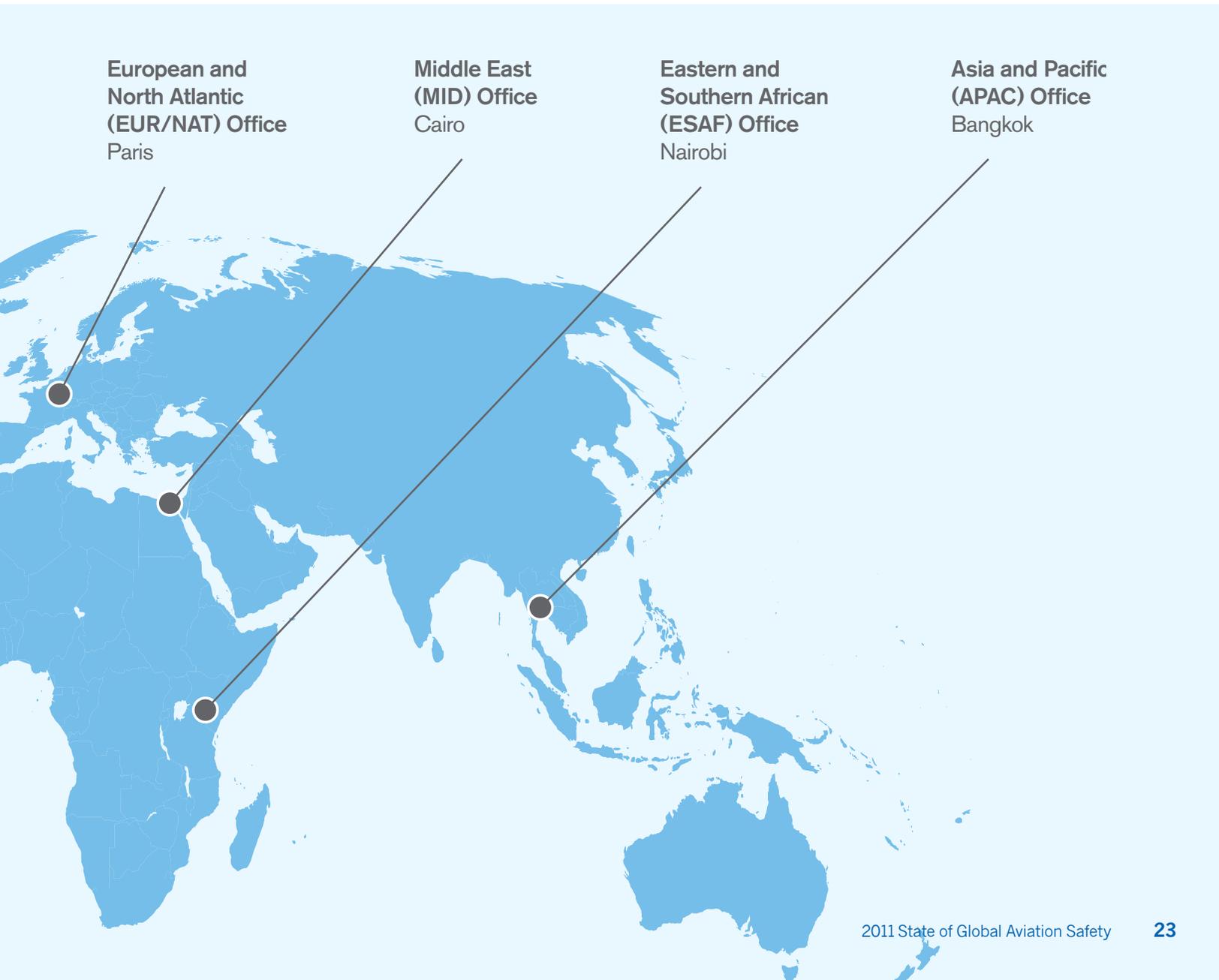
**Western and
Central African
(WACAF) Office**
Dakar



regional aviation stakeholders. An added objective of the groups is eliminating the duplication of efforts through the establishment of more cooperative regional safety programmes.

This type of broad-based and coordinated approach significantly lessens the financial and human resource burden on States in the affected regions, while delivering measurable improvements to benefit local aviation safety performance outcomes.

Within the GASP and GASR frameworks, RASGs build on the work already done by States, existing sub-regional organizations such as Cooperative Development of Operational Safety and Continuing Airworthiness Programmes (COSCAPs) and/or Regional Safety Oversight Organizations (RSOOs). RASGs also support the establishment and operation of a performance-based regional safety system.





Cooperative Development of Operational Safety and Continuing Airworthiness Programmes (COSCAPs)

COSCAPs have been created to enhance safety of air transport on a regional basis through the establishment of cooperative entities that provide technical services to COSCAP participants. Each COSCAP is directed by a Programme Steering Committee composed of DGCA, ICAO representatives, technical advisers, representatives from the donor partners and other stakeholders. COSCAPs provide a focal point for queries, facilitate the sharing of technical expertise and enhance the safety oversight capacity of civil aviation authorities. Through COSCAPs, technical personnel are able to perform such tasks as providing training courses, developing harmonized regulations, creating technical guidance materials, performing certification and surveillance activities and assisting States in developing corrective action plans to address safety deficiencies. Presently, nine cooperative programmes function under the COSCAP model.

The **COSCAP-SA (South Asia)** commenced operations in 1998 and is comprised of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. Five experts are assigned to the programme and harmonized regulations have been developed in some specialized areas. This COSCAP provides a significant amount of training and support to Member States. Annual funding averages around 400,000 USD. The donor partners of this COSCAP are Member States, the DGAC of France, EASA, U.S. FAA, Airbus and Boeing.

The **COSCAP-CIS (Commonwealth of Independent States)** commenced operations in 2001, and is comprised of Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. This COSCAP is essentially a part of the Interstate Aviation Committee (IAC), an organization formed by intergovernmental agreement of the Member States. The COSCAP-CIS is funded by Airbus and Boeing with a focus on developing harmonized regulations and providing training. At present, one person is assigned to this COSCAP, and the annual budget is in the range of 100,000 USD.

The **COSCAP-SEA (South East Asia)** began operations in 2001. The participants are Brunei, Cambodia, the Hong Kong Special Administrative Region (SAR) of China, Indonesia, the Macao SAR of China, Malaysia, Myanmar, People's Democratic Republic of Lao, Philippines, Singapore, Timor Leste, Thailand, and Vietnam. There is one flight operations expert, assisted by technical officers on periodic, short-term assignments. This COSCAP provides a significant amount of training and support to its members. Annual funding averages around 400,000 USD. The donor participants are the COSCAP participants, CASA of Australia, DGAC of France, EASA, U.S. FAA, Boeing and Airbus.



The [COSCAP-NA \(North Asia\)](#) began operations in 2003, with a membership including China, Democratic People's Republic of Korea, Mongolia, and Republic of Korea. There is one flight operations expert, assisted by technical officers on periodic, short-term assignments. A significant amount of training and support is provided to Member States. Annual funding averages around 400,000 USD, with the Member States, DGAC of France, EASA, U.S. FAA, Transport Canada, Airbus and Boeing as donor partners.

The [COSCAP-UEMOA \(Union Économique et Monétaire Ouest Africaine\)](#) commenced operations in 2006, and is comprised of Benin, Burkina Faso, Guinea-Bissau, Ivory Coast, Mali, Mauritania, Niger, Senegal and Togo. Presently, there are six regional inspectors, and funding of 600,000 USD is provided to ICAO by the UEMOA Commission to recruit staff. Travel and other expenses are funded directly by UEMOA Commission.

The [COSCAP-GS \(Gulf States\)](#) commenced operations in 2006, and is comprised of Bahrain, Kuwait and United Arab Emirates. There is one flight operations expert and one airworthiness expert assigned to this COSCAP. Harmonized regulations based upon the Joint Aviation Requirements have been developed, and these are presently being adapted to EC requirements. Training is being provided to Member States, and annual funding is in the range of 600,000 USD.

The [COSCAP-CEMAC \(Communauté Économique et Monétaire de l'Afrique Centrale\)](#) began operations in 2008 with Member States of Cameroon, Central African Republic, Chad, Republic of Congo, Gabon, Equatorial Guinea and Sao Tomé and Principe. Presently, there are four officers, with around 1 million USD funding provided by the CEMAC Commission and the Member States.

The [COSCAP-SADC \(South African Development Community\)](#), operating since 2008, is comprised of Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. With the goal of establishing a SADC Safety Oversight Organization, this COSCAP has one flight operations expert supported by two regional inspectors. Harmonized regulations and guidance materials have been developed. The budget for 2011 is approximately 400,000 USD.

The [Latin American Cooperative System of Safety Oversight \(SRVSOP\)](#) commenced as a regional safety oversight organization in 2001. Member States are Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Panama, Paraguay, Peru, Uruguay, and Venezuela. The SRVSOP programme is integrated with the ICAO Regional Office in Peru, with some ICAO technical officers providing support to the Regional Office and the SRVSOP. Annual funding, in the range of 400,000 USD, provides for a technical officer in each of the fields of flight operations, airworthiness and personnel licensing, along with support staff. SRVSOP funding is provided by Member States, Airbus and the CAE company.

Regional Safety Oversight Organizations (RSOOs)

The ICAO Universal Safety Oversight Audit Programme (USOAP) revealed that a number of ICAO Member States have difficulties in resolving their safety deficiencies due to an internal lack of financial, technical and/or qualified human resources.

In an effort to provide a viable solution to this longstanding issue, ICAO took the initiative to develop Regional Safety Oversight Organizations (RSOOs) through which groups of

States can collaborate and share resources to improve their safety oversight capabilities. There are currently eight RSOOs that have been established and are operational in regions around the world.

More recent RSOO achievements include the Banjul Accord Group Regional Safety Oversight Organization (BAGASOO) and the associated Regional Accident Investigation Agency (BAGAIA). The ICAO African Comprehensive Implementation Programme (ACIP) represents another such effort.



Support was also provided to assist with the future establishment of an RSOO for the North East Africa region (Eritrea, Ethiopia, Somalia and Sudan), as well as the South African Development Community (SADC) region. These RSOOs are expected to be fully operational over the next several years.

In the case of existing RSOOs, ICAO also provided the Pacific Aviation Safety Office (PASO) with training seminars in 2010 covering the surveillance of foreign operators, general safety oversight and the development of funding mechanisms to ensure its seamless operation.

In a related development, newly-revised guidance on the establishment and management of RSOOs in the *Safety Oversight Manual* (Doc 9734), Part B, will have been updated during 2011 to include extensive advice on establishing a dependable funding mechanism for an RSOO.

ICAO will also have held an RSOO Symposium during October 2011 at its Headquarters, featuring the participation of stakeholders involved in ICAO's RSOOs and COSCAPs, including major States and donor institutions.



Regional Accident and Incident Investigation Organizations (RAIOs)

Regional Accident and Incident Investigation Organizations can facilitate implementation of accident and incident investigation systems by providing economies of scale through the sharing of the necessary financial and human resources, enabling States to fulfil their investigation obligations in order to secure a safer international air transportation system.

The *Manual on Regional Accident and Incident Investigation Organization* (Doc 9946) was published in March 2011 in response to a recommendation from the last AIG Divisional Meeting. It provides guidance on the establishment and management of an RAIO and outlines the duties and responsibilities of its Member States.

Principal objectives of an RAIO are:

- a) To ensure the establishment of an adequately funded, professionally trained, independent and impartial regional aircraft accident and incident investigation organization.
- b) To ensure that all aircraft accidents and incidents are investigated in compliance with the provisions of ICAO Annex 13—*Aircraft Accident and Incident Investigation*.
- c) To enhance cooperation, eliminating duplication of effort.
- d) To enhance information sharing.

It is noted that a regional investigation system must be 'independent' and be perceived to be so. It is necessary to ensure that a clear separation exists between the organization responsible for investigations and the civil aviation authorities responsible for regulation and safety oversight, as well as other organizations whose interests could conflict with the tasks entrusted to the investigation authority.

An agreement establishing an RAIO must be registered with ICAO, as per Article 83 of the Chicago Convention.





Safety Initiatives

The following highlights ICAO's ongoing efforts to implement safety-related improvements across a wide range of domains as it continues to bring its SARPS in all pertinent areas fully up-to-date with the latest risk analyses and data.



Assistance Success Stories

The cooperative spirit of ICAO's Member States has been consistently demonstrated through financial and technical assistance projects that have succeeded in raising the level of global civil aviation safety. The following represent a cross-section of some of the State-to-State assistance success stories that have resulted in positive aviation safety outcomes.



India

The Airport Authority of India and ICAO conducted training programmes in the areas of airport management and airport security for personnel from other Member States, including Mauritius, Nigeria, Philippines, South Africa, Tajikistan, Thailand and Uganda. In conjunction with these programmes, ICAO awarded fellowships to personnel from Bangladesh, Mauritius, Nigeria, Saint Lucia, and Zimbabwe.



France

The French Civil Aviation Authority (DGAC) has been providing assistance for the past several years to Cambodia in the development of regulations for the certification of aerodromes, and has provided training to Cambodia's aerodrome inspectors. As a result, the airports of Phnom Penh and Siem Reap have been certified.

For the past two years, France and the European Commission have provided financial contributions to Ukraine, resulting in the hiring and training of three new inspectors for the civil aviation authority of Ukraine.

The French DGAC worked through cooperative arrangements with other States in the area of surveillance of air operators, including Algeria, Kazakhstan, Libya, Mauritania, Morocco, Oman, Philippines, Qatar, United Arab Emirates and Yemen.



Republic of Korea

Korea has contributed a total of 510,000 USD to ICAO programmes for specialized support and improvement of aviation safety since 2006. Korea has developed various web-based aviation safety tools in international versions and has distributed these, free of charge, to over forty ICAO Member States. Since 2003, Korea has contributed 1,000,000 USD to regional groups and programmes, including COSCAPs.



Assistance Success Stories



United States

Four U.S. federal agencies have recently provided assistance to civil aviation projects. The Department of Transportation, through the Safe Skies For Africa initiative, funded two regional Accident and Incident Investigation Workshops in Botswana and Senegal, and in collaboration with ICAO hosted two Train-the-Trainer courses. These courses resulted in new instructors from sub-Saharan African countries to teach aviation safety inspector courses in the areas of aircraft airworthiness and flight operations.

The Federal Aviation Administration (FAA) provided assistance to the Member States of the East African Community's Civil Aviation Safety and Security Oversight Agency by posting two flight safety inspectors in Entebbe, Uganda to provide expertise and on-the-job-training. The FAA signed agreements with several countries to promote aviation safety, including China, India, Mexico and Brazil, as well as the European Union and the Latin American Civil Aviation Commission.

The U.S. Trade and Development Agency (USTDA) awarded a grant to Haiti's national airport authority following the earthquake in 2010. USTDA is providing nearly 1,000,000 USD to Vietnam towards compliance with ICAO Standards. USTDA has structured agreements with China and India for bilateral technical cooperation, and has awarded a grant to India towards training for regulatory oversight officials.

The Millennium Challenge Corporation (MCC), a foreign aid agency of the U.S. government, has targeted improvement in aviation safety and requires partner countries to implement policy reforms alongside infrastructure projects. MCC is investing 183,000,000 USD in Mali to modernize and expand Bamako-Sénou International Airport and to strengthen civil aviation safety and airport management. MCC is investing 6,000,000 USD in Tanzania to upgrade the airport on Mafia Island to increase potential for revenue-generating tourism.



Australia

Four Australian governmental agencies are involved in programmes of cooperation and assistance with States in the Asia-Pacific region, in particular with Indonesia and Papua New Guinea. These agencies are the Department of Infrastructure and Transport, the Civil Aviation Safety Authority, the Australian Transport Safety Bureau, and Airservices Australia. The cooperation and assistance programmes enhance regional aviation safety through training, mentoring, and capability building activities.

Additionally, the Australian Transport Safety Bureau has engaged with other investigation agencies in the Asia-Pacific region and has provided training to investigators and assistance with accident investigation to regional neighbours. Airservices Australia initiated and supports the South West Pacific Safety Forum for regional air navigation service providers. This effort has had a positive effect on regional air safety, has engendered greater air safety awareness and has increased incident reporting and analysis.

Australia also supports the Pacific Aviation Safety Office (PASO), a cooperative regional safety oversight organization created to assist its Member States in meeting international obligations. As a member of PASO, Australia is providing financial support and practical assistance to the organization.



Singapore

The Singapore Aviation Academy, the training arm of the Civil Aviation Authority, has for more than 50 years trained over 3,400 personnel from more than 160 countries, with 1,300 receiving fellowships awarded by the Singapore Government.

As a member of the COSCAP-SEA, Singapore has contributed technical experts to provide assistance and training to other COSCAP-SEA members in flight operations, cabin safety, aircraft airworthiness, safety management systems and audit procedures, and has provided 642,000 USD in terms of training alone.

Internationally, Singapore has contributed in the development and enhancement of international safety standards, and has maintained active involvement in the planning of contingencies for public health emergencies of international concern.



European Union

A number of international technical assistance projects have been financed and conducted by the EU. Civil aviation cooperation programmes have been arranged with neighbouring countries and with States in Africa, Asia and Latin America. EU technical assistance primarily targets States and regional organizations that lack resources and/or technical expertise, with the aim of improving the level of safety.

As examples, technical assistance projects were developed to support the States in the Western Balkans in implementing the EU aviation safety regulations. The EU is currently engaged in developing a number of projects in Africa, South Asia and Southeast Asia. For many of these activities, ICAO is a prime partner with the EU.

From the perspective of concrete implementation of these projects, the EU's European Aviation Safety Agency (EASA) has played a growing role, in close cooperation with the European Commission.



Japan

Japan has conducted seminars in the areas of ATM and airport planning, with participation by 23 civil aviation personnel from 14 countries in Asia, Oceania and Africa.

The Japan Civil Aviation Bureau (JCAB) dispatched 15 experts to five countries in Southeast Asia to provide technical assistance in specialized areas of air traffic control and air navigation systems. An additional five experts were sent by the JCAB to provide technical assistance and support related to safety of flight operations.



Assistance Success Stories

Investment institutions play an important role in raising global aviation safety levels, as evidenced by the following successes achieved through their support.



European Investment Bank

As the EU's financing institution, the EIB has provided long-term financing, including 72 billion EUR to projects within the EU in 2010. Projects in the air transport sector are directed toward achieving international safety standards. Recent projects financed by the EIB include airport improvement projects in Dublin, Ireland; Chisinau, Moldova; Beijing, China; and Amsterdam, Netherlands.

The EIB has also financed ATM projects with the aim of increasing flight safety, efficiency and air traffic capacity. Recent projects in this area include upgrade works to air navigation systems in Spain and Portugal, and assistance to ASECNA, the African service provider for nineteen countries for harmonization with the ICAO Air Navigation Plan for Africa.



World Bank Group

The WBG is a source for financial and technical assistance to developing countries through low-interest loans, grants and interest-free credits. In 2010, the WBG assisted and supported select countries with over thirty projects in the air transport sector and twenty-eight investment agreements, with a total volume in the air transport portfolio of 1.25 billion USD. A major focus continues to be Africa, where several air transport safety and security projects were developed and implemented. These projects financed regulatory reform, capacity building and infrastructure.

In response to growing traffic in the Middle East, the WBG financed airport infrastructure, and in Haiti responded to the earthquake with an emergency grant of 65 million USD to repair critical infrastructure, including the airport and air traffic control systems. In Asia, the WBG supported infrastructure projects to foster trade, tourism and economic growth. In Russia and the Dominican Republic, the WBG financed airport projects, and in Africa and Latin America facilitated aircraft financing.





Aircraft manufacturers contribute significantly to global aviation safety programmes. The following summarizes the contributions of Boeing and Airbus to recent safety-related challenges.



Boeing

Boeing provided technical experts and contractors at the request of the civil aviation authorities of Argentina and the United Arab Emirates to assist in preparing for a scheduled U.S. FAA International Aviation Safety Assessment (IASA). The support provided by Boeing contributed to the overall success of these assessments resulting in both States receiving an IASA Category 1 rating, which is defined as meeting ICAO Standards.

Boeing and the USTDA have been working together for the last four years to support the Civil Aviation Authority of Vietnam in establishing an aviation legal structure and framework that meets ICAO Standards.

Boeing has been involved with technical assistance to the Philippines for four years, and in 2011 worked with the Civil Aviation Authority in contracting an external consultant firm to assist the Philippines in preparing for a future FAA IASA mission.

In addition, Boeing contributed up to 50,000 USD to each COSCAP to assist in implementation, totalling 180,000 USD annually in COSCAP contributions. Combined with other financing, Boeing contributed an annual total of 230,000 USD to ICAO initiatives.



Airbus

Airbus considers Performance-based Navigation (PBN) as one of the best solutions to safety concerns such as runway excursions and controlled flight into terrain, and has viewed PBN as a method to optimize airport access in a safe and efficient manner. Quovadis is the flight operations services company of Airbus that focuses on developing flight operations to optimize aircraft and airspace usage. Quovadis has been working on the deployment of PBN procedures globally through support to States by matching industry needs with demands for safety.

Quovadis, in cooperation with the French civil aviation school (ENAC) and the French civil aviation authority (DGAC), has been participating in several programmes to deploy required navigation performance (RNP) procedures. Quovadis and the Philippines have accelerated a project to implement RNP procedures at 12 airports, and Quovadis, India and ENAC are working in cooperation to deploy RNP at Cochin airport.

The Airbus organization has contributed 50,000 USD annually to the three COSCAPs in Asia Pacific to cover the costs of training and short-term consultants, as well as funding projects for the Commonwealth of Independent States and the Latin American Cooperative System of Safety Oversight.



Assistance Success Stories



The Flight Safety Foundation

The FSF recently completed a major update to its Approach and Landing Accident Reduction Toolkit and distributed these toolkits free of charge to ICAO Member States, along with a study on runway excursions.

The FSF also conducted a Functional Flight Test Symposium to discuss flight checks and their inherent safety risk, with participation by personnel from forty-one countries. The symposium focused on a subject that had not been formally addressed before, and resulted in the development of shared recommendations and best practices that are publically available on the FSF web site.

Additionally, the FSF conducted a special mission to South Sudan at the request of the UN World Food Programme to assess the shortfalls of the air traffic control system. Safety concerns were identified, and the FSF worked with ICAO, stakeholders and donors to raise awareness, resulting in the immediate problems being addressed prior to the inauguration of the new State.



ICAO's Technical Cooperation Bureau

Through TCB assistance projects, the civil aviation authorities of various ICAO Member States have received support in updating legislation, regulations and procedures for the provision of efficient and effective aviation safety oversight. The ICAO TCB has provided technical assistance and administered service agreements with States with the goal of improving aviation safety. As examples, TCB has been working with Panama to modernize Tocumen International Airport with a 100 million USD project, resulting in the airport serving as one of the most important hubs in Latin America.

TCB has worked with Venezuela in the areas of airport infrastructure and air traffic management systems on projects totalling more than 200 million USD.

In Peru, the air traffic surveillance services have been improved through a technical cooperation project with TCB for the acquisition and installation of eight secondary radars, an air traffic control centre and a communication system.

TCB and ASECNA were instrumental in providing safe air navigation services for the independence day celebration of South Sudan in July 2011.

Various Member States have established Fellowship Training Programmes for Developing Countries, which are managed by TCB. Additionally, TCB manages cooperative arrangements through the nine COSCAPs that provide assistance with aviation safety oversight on a multi-State regional scale.



SAFE: Aviation Safety Fund

During the past decade, ICAO's aviation safety programme has experienced significant growth and refocusing.

With this in mind, ICAO has created a financial mechanism which would allow for the collection and use of voluntary contributions from States and other donors in a responsible, consistent, transparent, efficient and timely manner, while minimizing administrative costs. The Fund was aptly named the SAFE Fund.

Monies collected in the SAFE Fund are used for:

- Short term assistance to States with significant safety concerns without the means to develop and implement corrective action plan.
- Safety projects, consistent with the ICAO Strategic Objective on safety, but which cannot be fully funded through the ICAO regular programme budget.
- Contingency planning allowing ICAO to act immediately and effectively on urgent safety issues and in response to unforeseen events.

In order to mobilize resources for the replenishment of the SAFE Fund, ICAO has developed a strategy which seeks to solicit contributions from donor States, the private sector, as well as members of civil society.

To date 1,033,735 USD have been donated to the SAFE Fund by ABIS Group, China, Cameron, Fiji, France, Italy, Mexico, Mauritius, Netherlands, Nigeria, Pakistan and the Republic of Korea. The Russian Federation has pledged an annual contribution of 119,364 USD and the United States have pledged 1,000,000 USD.



Safety Collaborative Assistance Network (SCAN)

During the ICAO High-level Safety Conference in March 2010, a proposal was made for the creation of a group to facilitate transparency and information sharing.

From this proposal, the Safety Collaborative Assistance Network (SCAN) was formed to serve as a facilitator and coordinator for the exchange of safety-related information regarding financial and technical assistance projects and activities.

SCAN provides a new communication channel for discussions amongst donors and assistance providers regarding ongoing projects and planning needs for future assistance endeavors. It assists with matching donors to worthwhile projects and enables potential donors to analyze where assistance is needed. This allows donors and assistance providers to avoid costly and time-consuming duplication of efforts.

SCAN is compiling a list of existing assistance programmes and proposed assistance projects in need of funding, based upon an analysis of safety-related data from a variety of sources. SCAN participants include focal points from governmental agencies, regional groups, manufacturers, financial institutions and aviation organizations that provide financial and/or technical assistance pertaining to civil aviation.

ICAO is working with States to develop targeted plans of action to address safety oversight deficiencies through risk-based analysis. The results of these analyses and information on assistance opportunities are shared through SCAN.



Runway Safety Programme

Aviation has achieved a remarkable safety record, with fewer than four accidents per million departures worldwide. Nonetheless, the global accident rate has remained essentially constant over the past 10 years, with runway-related event categories consistently representing the largest accident grouping.

Improvements in runway safety are therefore essential if we are to achieve our objective to continually reduce the global accident rate, as well as related fatalities, despite projected growth in air traffic for the foreseeable future.

As a result, the international aviation community has called upon ICAO to demonstrate leadership in the effort to reduce the number of runway-related accidents and incidents. Through its Runway Safety Programme, ICAO aims to coordinate a global effort to improve runway safety.

Historical analysis has taught us that accidents are normally the result of contributing factors across multiple aspects of the aviation system. The ICAO Runway Safety Programme is therefore taking a multidisciplinary approach, requiring collaboration among regulatory authorities as well as stakeholders in air traffic management, airport operations, flight operations and the design and manufacturing sector.

The aim is to share best practices and other innovative approaches being developed by aviation safety experts to continuously reduce risks encountered in the critical takeoff and landing flight phases.

As part of the Runway Safety Programme, ICAO convened the Global Runway Safety Symposium (GRSS) at its Headquarters in May 2011. The themes of the GRSS, based upon safety management principles, are related to the assessment of risks and consideration of mitigation measures having the potential to improve safety through increased standardization, collaboration across all relevant operational disciplines, the sharing of safety information and the implementation of technical solutions to address runway safety issues.

From this Symposium, the framework for a series of Regional Runway Safety Workshops was identified, with commitment gained from partnering organizations for continued support and involvement. These Regional Seminars will follow the themes of the Global Runway Safety Symposium, enabling regionally-specific actions through the sharing of information and the identification of best practices to improve runway safety.





Aerodrome Enhancements

ICAO established a global Friction Task Force (FTF) in 2008, comprised of representatives from eight States and five international organizations. FTF participants represent the interests of airports, airlines, pilots, air traffic controllers and aircraft manufacturers.

The FTF has been designed to respond to a number of related airport runway friction and aircraft braking performance concerns. For instance, current runway friction measuring devices, when used on surfaces contaminated with slush and snow, often yield unreliable results. In addition, there is an urgent need to report runway surface conditions in a more standardized manner so that flight crews can use this information to determine safe and effective performance characteristics for their aircraft during take-off and landing.

The objective of the FTF is therefore to review and update the international specifications for the assessment, measurement and reporting of the runway surface friction characteristics. Since its inception, the FTF has finalized proposed amendments to the global provisions in, *inter alia*:

- Annex 14—*Aerodromes, Volume I—Aerodrome Design and Operations*
- Annex 15—*Aeronautical Information Services*

A circular on *Runway Surface Condition Assessment, Measurement and Reporting*, containing latest information on friction and related issues, has also been developed. Phase 2 of the FTF mandate will commence shortly and will be focused around the development of a global runway condition reporting format as well as the development of common taxonomy across all ICAO provisions.

Foreign Object Damage (FOD) has been demonstrated to cause USD\$920 million in annual direct costs to airlines. Sector-wide FOD figures have been estimated at USD\$12 billion globally employing the same research criteria⁴. FOD is also potentially a serious safety risk to aircraft and airport operations, as was exemplified on 25 July 2000 when 100 passengers, nine crew members, and four people on the ground were killed due to FOD.

In response to a request from the 37th Assembly, ICAO has initiated a work programme to develop harmonized provisions governing the use of automated FOD detection systems. Objectives for the programme include a globally agreed definition and taxonomy for FOD, as well as its effective integration into airport safety management systems.

The provision of a **Runway End Safety Area (RESA)** is extremely important in mitigating death and damage due to runway overruns. New and amended SARPs and guidance material for Annex 14, Volume I, are therefore being developed and will be applicable in 2012. These measures will strengthen the requirement for the provision of RESA and introduce related mitigation tools.

In an effort to strengthen runway incursion prevention measures, several proposals in regard to **stop bars** and their operation are currently under consideration. It is expected that additional new and amended SARPs for Annex 14, Volume I, will similarly become applicable in 2012 to strengthen the holistic approach to runway incursion prevention measures.

⁴ 2010 IATA STEADES study.



Accident Investigation Process Enhancements

In response to recommendations emanating from the Accident Investigation and Prevention (AIG) Divisional Meeting (2008), the Tenth Edition of Annex 13 became applicable on 18 November 2010.

Amendments for aviation safety included:

- Revision of the definition for 'accident' to include unmanned aircraft systems.
- Investigation of serious incidents to aircraft of minimum mass of 2,250 kg.
- New provisions for the administration of safety recommendations.
- Protection of cockpit airborne image recordings.
- Public availability of safety lessons through final reports.
- Requirements for safety data from very light jets to now be reportable to ICAO.

The addition of the provisions to investigate accidents involving unmanned aircraft systems and serious incidents will increase the information now available on the causes and contributing factors of these occurrences.

Keeping better track of safety recommendations, meanwhile, provides for improved access to information on mitigation actions related to safety deficiencies identified either during accident investigations and/or safety studies.

By making final reports available to the public, the air transport community will significantly increase the dissemination of safety lessons on a global scale and improve related public relations and outreach efforts.

Another recommendation of AIG/08 called for ICAO to develop guidance regarding policies and procedures for carrying out accident and incident investigations, with the goal of assisting States that were lacking related documentation as identified by ICAO USOAP audits.

Accordingly, the *Manual on Accident and Incident Investigation Policies and Procedures* (Doc 9962) has been developed by ICAO and will be published shortly. The guidance is presented as an implementation tool for the development of a State's policies and procedures manual for investigations, and is consistent with international practices. The vision in developing Doc 9962 was to provide a document that States could use as a template to insert their specific material into a document that contains appropriate policies and procedures so as to ensure compliance with Annex 13 during investigations.

Doc 9962 will assist States implement the provisions set forth in Annex 13—*Aircraft Accident and Incident Investigation*.





Flight Recorder Research and Recommendations

A combination of advances in aircraft systems and flight recorder technology, in addition to lessons learned from recent accident investigations, has alerted the air transport community anew to the importance of the availability of recorded data.

ICAO's Flight Recorder Panel (FLIRECP) has therefore undertaken a comprehensive review of the provisions surrounding flight recorders and has provided new amendments and recommendations regarding the following proposals:

Alternate power sources for recorders, which shall automatically engage and provide 10 minutes of cockpit voice recorder operation when the normal power supply to the recorder is interrupted. An amendment proposal to Annex 6 resulted.

Deployable flight recorders were considered as an option to have recorder data available when the wreckage is difficult to locate. If an aircraft enters an attitude which is typically unrecoverable the deployable recorder would be ejected. The Emergency Locator Beacon (ELT) would activate to transmit the position of the recorder (and therefore the wreckage) whether on land or at sea. The flight data and cockpit voice recordings would be available as soon as the deployable recorder was recovered. This subject is still under discussion.

Continuous or triggered transmission of flight data whereby the flight data is made available for the investigation of accidents and/or to facilitate the locating and recovery of on-board recorders. Recognition was also given to better use of regular aircraft position reports sent as part of Aeronautical Operational Control (AOC) messages over Aircraft Communications Addressing and Reporting Systems (ACARS), as well as more widespread operational use of Automatic Dependent Surveillance—Contract (ADS-C), which would expedite search and rescue and recovery of on-board recorders after accidents. The work of the Triggered Transmission of Flight Data Working Group (TTFDWG) is still in progress and this subject is being considered.

New technology to safeguard flight data and/or to facilitate the localization and recovery of on-board flight recorders was considered. Two near-term solutions proposed were the extended duration of emission of Underwater Locator Beacons (ULBs) to 90 days instead of 30 days by means of enhanced batteries, as well as the installation of low-frequency ULBs attached to the airframe to improve the propagation of the acoustic signal. This option was translated into proposed amendments to Annex 6—*Operation of Aircraft*.

Due to the lack of sufficient data for the investigation of accidents of smaller helicopters involved in commercial operations, amendments to Annex 6 for the introduction of **lightweight recorder systems** for these helicopters were proposed. The lightweight recording systems are specifically designed for small aircraft where there is currently no requirement to have any form of airborne recorder.

Volcanic Ash Advances

The Eyjafjallajokull eruption in April 2010 paralyzed aircraft operations in the Western and Northern parts of the European Region (EUR) and Eastern portions of the North Atlantic (NAT) Region for many days, prompting ICAO and the entire aviation community to take urgent measures.

Complementing ongoing efforts that had been undertaken within the International Airways Volcano Watch (IAVW), and with the assistance of the International Airways Volcano Watch Operations Group (IAVWOPSG), ICAO established an emergency Task Force immediately following the Eyjafjallajokull event to assist in the development of a global safety risk management framework. This made possible the short-term determination of safe levels of operation in airspace contaminated by volcanic ash.

The International Volcanic Ash Task Force (IVATF) comprises members from 16 States and 14 regional/international organizations. Its participants represent airframe and engine manufacturers, aviation safety regulators, operators, meteorological authorities and the scientific community together with ICAO.

After developing the short-term ash density recommendations (via emergency teleconferences during the eruption) that permitted the exceptional operation of aircraft in airspace contaminated by volcanic ash, the IVATF held its first meeting at ICAO Headquarters in July 2010. It elected a Programme Coordinator and established four sub-groups (Science (SCI), IAVW Coordination, Air Traffic Management (ATM) and Airworthiness (AIR)).

The July 2010 IVATF agenda included:

- An overview of lessons learned from the Eyjafjallajokull eruption.
- A review of regional contingency plans and the operational responses to volcanic ash encounters, notifications and warnings.

- The development of ash concentration thresholds.
- The improvement of ash detection/avoidance systems.
- The improvement and harmonization of ash dispersion models and their visual presentation.

On the basis of this agenda, the Task Force endorsed twenty-five deliverables which are now being addressed by the four sub-groups. The Task Force is progressing its work and will have completed its second meeting as of July 2011.

A Volcanic Ash Challenge Team (VACT) meeting was convened on 20 September 2011, comprising senior officials from an invited number of States and international organizations. The VACT reviewed the work undertaken by the IVATF since July 2010 and committed to supporting ICAO in addressing outstanding issues, as necessary to move forward in a consistent, coherent and ultimately safe manner.

From a regional perspective, the ICAO response consisted of the comprehensive review and update of the ICAO European and North Atlantic (EUR/NAT) Regional Volcanic Ash Contingency Plans. In addition, guidance material to support operational exercises has been provided to the EUR/NAT Office.

Recent Measures

EUR/NAT Exercise VOLCEX 11/01	April 2011
IVATF Third Quarterly Teleconference	April 2011
IVATF/2 Meeting, Montreal	July 2011
IAVWOPSG/6 Meeting, Dakar	September 2011
Establishment of a Volcanic Ash Challenge Team	Fall 2011



Fatigue Risk Management Systems

Until this year, the only international Standards available for managing fatigue in flight operations were related to prescriptive flight and duty time limitations. Scientific and operational support of Fatigue Risk Management Systems (FRMSs), however, is increasingly becoming accepted as a means for more comprehensively managing fatigue risks.

In the few cases where States have allowed some operators to implement an FRMS, they have done so in the absence of internationally accepted minimum requirements. This has resulted in:

- Certain operators being seen to have unfair operational advantages.
- A lack of consistency in the implementation of FRMS.
- Difficulties in the provision of adequate assessment and monitoring of FRMS by regulators.

To address these concerns, ICAO established an FRMS Task Force consisting of 35 scientists, regulators, operators and industry representatives. The Task Force developed a proposal for FRMS Standards and Recommended Practices (SARPs) and supporting guidance material. The proposal replaced current Standards related to prescriptive flight and duty limitations with new FRMS SARPs to identify States' responsibilities in establishing fatigue management regulations in general. Additional proposed SARPs outlined the minimum requirements of an FRMS.

The FRMS SARPs proposal was reviewed by States and accepted by the Air Navigation Commission. It was adopted by the Council in May 2011 and the Standards will be effective before the end of 2011.

Based on the work of the FRMS Task Force, detailed guidance material has also been developed to support the FRMS SARPs in the form of two complementary manuals: one for operators and one for States. Both are freely available on the web.

The *FRMS Implementation Guide for Operators* has been developed with IATA and IFALPA. It provides information about, and examples of, how the minimum requirements can be operationalized. The *FRMS Manual for Regulators* provides information related to a process for the regulatory oversight of FRMS.

To launch the new FRMS provisions, ICAO convened its first FRMS Symposium in August 2011 and hosted the FRMS Forum's 3rd Annual Meeting immediately afterward. These events included four days of information sharing between the 500+ participants and were of high relevance to regulators and operators alike.

Following the FRMS Symposium, ICAO, in association with IATA and IFALPA, are presenting regional FRMS Seminars, with the first in London in November this year. The aim of the Regional FRMS Seminars is to raise awareness about the now globally accepted approach to FRMS and the implications for both regulators and operators in terms of oversight and implementation. FRMS Seminars are planned for delivery in every region by the end of 2012.

To keep the aviation community better informed and provide easy access to FRMS resources, a dedicated fatigue management area has been developed for ICAO's public web site. It aims to help States and operators better manage fatigue-related risks and will continue to evolve with increased scientific insights and as the aviation industry's experience with FRMS grows.

Extended Diversion Time Operations

The Special Operations Task Force (SOTF) concluded its drafting of proposed Extended Diversion Time Operations (EDTO) Standards and submitted them to the ICAO Air Navigation Commission (ANC) which concluded its preliminary review. These have now been sent for consultation to States and International Organizations.

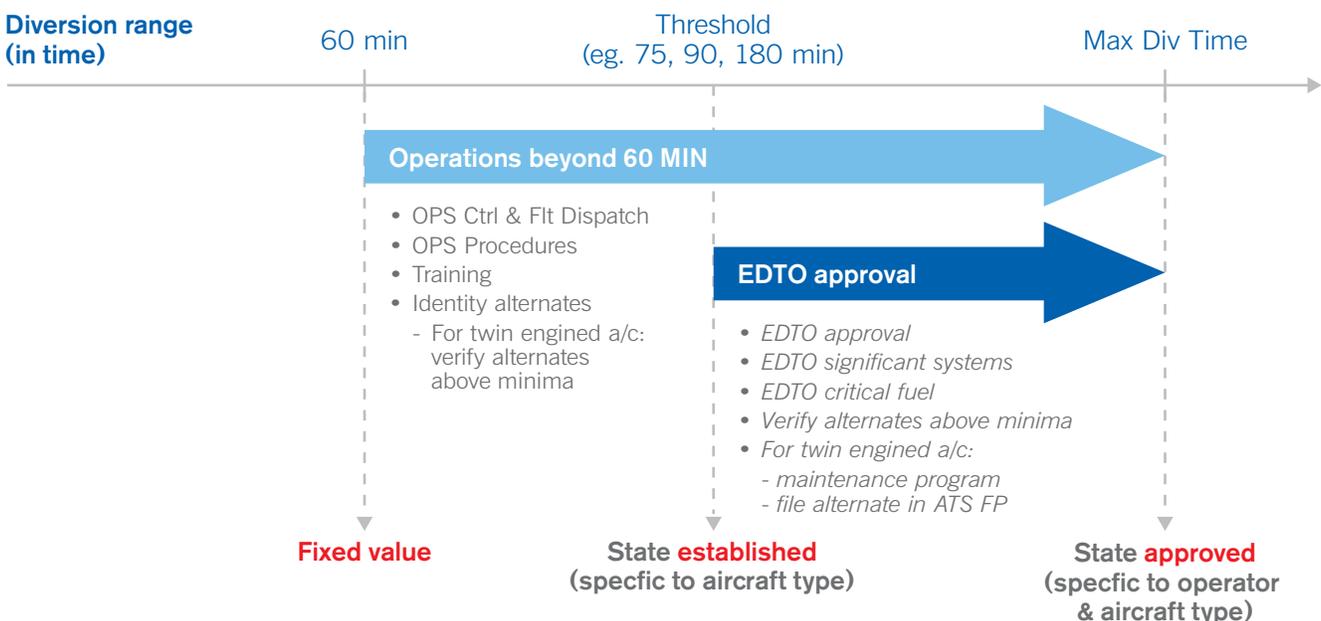
EDTO is an evolution of Extended-Range Twin-Engine Operations (ETOPS) based on sectoral best practices and lessons learned from twin engine operations. The proposed SARPS basically divide Chapter 4, Section 4.7 into operations beyond 60 minutes from an en-route alternate aerodrome and extended diversion time operations.

Proposed provisions for operations beyond 60 minutes regardless of the EDTO would require operators to have:

- Operational control.
- Flight dispatch.
- Operational procedures.
- Identify en-route alternate aerodromes.
- The most up-to-date information provided to the flight crew on identified en-route alternate aerodromes, including operational status and meteorological conditions.

Proposed provisions for EDTO approvals follow the structure of current ETOPS provisions, where the State of the operator must approve the appropriate threshold time and maximum diversion time for an operator with a particular aircraft type. Compared to current provisions for two-engine aircraft, there are no additional requirements. Threshold time and maximum diversion time will be new for aircraft with more than two engines. These airplanes normally have a maximum diversion time equal to the maximum range of the airplane due primarily to system redundancy. States may wish to restrict the maximum diversion time based on an operator's lack of long range operations experience. In addition, the approved threshold time will mark the point beyond which additional requirements, such as re-assessing en-route alternate aerodromes, will need to be complied with.

Generic EDTO graphical representation





Coordinated Global Responses to Public Health Emergencies

Since 2003, when Severe Acute Respiratory Syndrome (SARS) reduced the number of passengers travelling through certain airports in Asia to one sixth normal levels, the economic as well as socio-medical effects of public health emergencies have become better understood and well recognized.

ICAO has been working with the World Health Organization (WHO), International Air Transport Association (IATA), Airports Council International (ACI) and others to develop new provisions and supporting guidance to help address public health emergencies in the following documents:

- Annex 6—*Operation of Aircraft*
- Annex 9—*Facilitation*
- Annex 11—*Air Traffic Services*
- Annex 14—*Aerodromes*
- *Procedures for Air Navigation Services—Air Traffic Management*

This guidance helps States and service providers to protect flight safety, reduce public health risks and minimize the adverse financial impacts caused by unexpected public health emergencies.

With the recent adoption of the Continuous Monitoring Approach (CMA) with respect to the Organization's Universal Safety Oversight Audit Programme (USOAP) activities, questions on public health emergency preparedness planning will now also be included as part of the USOAP process.

One of the main challenges to the successful management of public health emergencies is the diverse nature of these events. Public health emergencies require coordinated action from many different stakeholders, making effective communication between a State's public health and regulatory aviation authority particularly important. Experience shows this communications capacity often needs strengthening before an appropriate public health emergency plan for aviation can be developed.

Direct Assistance to States through CAPSCA

To help States plan for public health emergencies that affect aviation, ICAO provides workshops, seminars and assistance visits to States and their international airports by means of the Cooperative Arrangement for the Prevention of Spread of Communicable Disease through Air Travel (CAPSCA) project.

Details can be found on the CAPSCA web site at www.capsca.org



Performance-based Navigation (PBN)

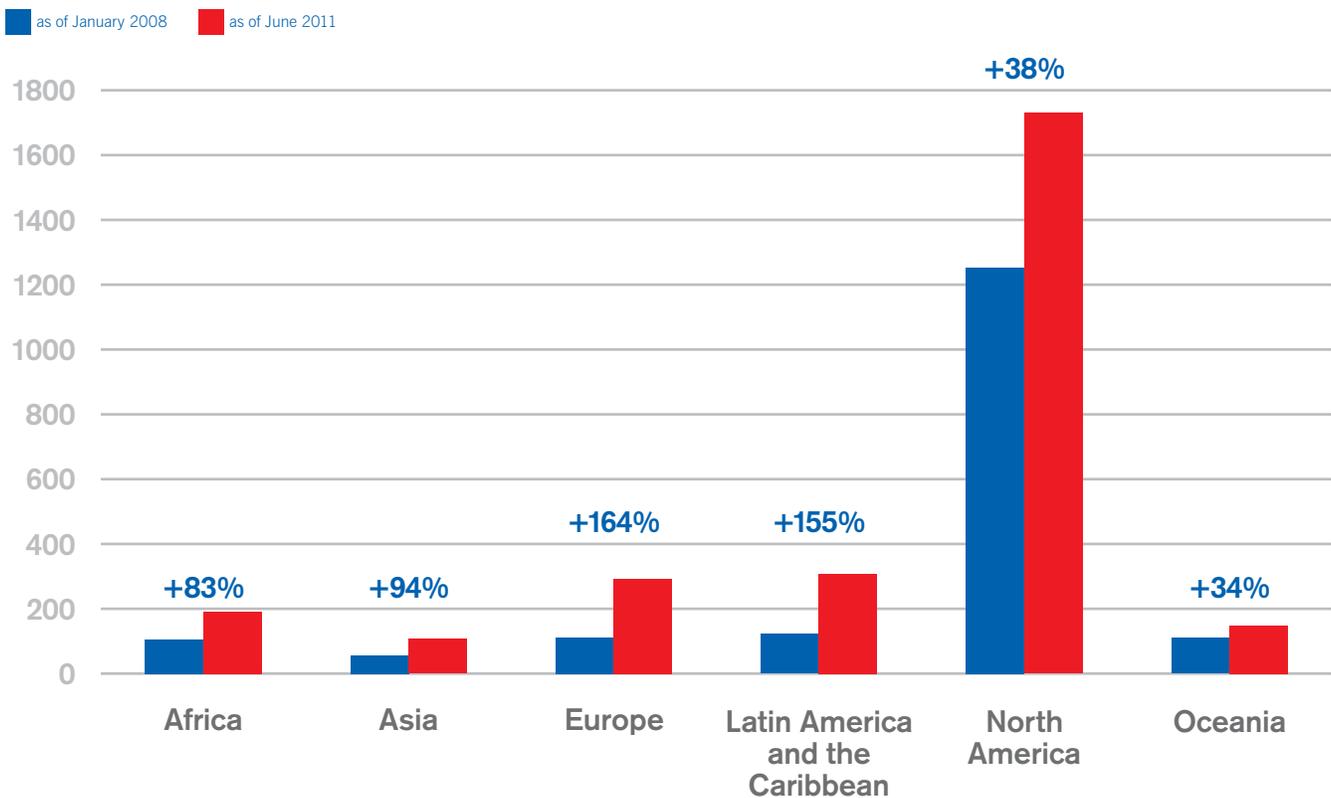
The evolution of air navigation systems coupled with advances in flight deck automation provide a means for aircraft to navigate more accurately without having to overfly ground-based navigation aids. This capability is known as Area Navigation or RNAV.

The PBN concept has facilitated RNAV implementation through the introduction of globally applicable navigation performance specifications. As a result, the navigation capabilities are very predictable, enhancing safety by providing improved obstacle

and terrain clearance as well as aircraft-to-aircraft separation. PBN is also a key enabler for runway safety, providing lateral and vertical guidance to virtually any runway as a cost-effective alternative to non-precision approaches.

PBN implementation has grown rapidly as shown in the figure below, with the number of PBN approaches approved prior to June 2011 depicted in blue, while those approved after 1 June 2011 are depicted in red.

Number of implemented PBN approach procedures per UN Region on international airports





Given that PBN operations (PBN OPS) require that the aircraft and flight crew be approved according to well-defined performance specifications, controllers have a high degree of confidence that the aircraft flying PBN routes will navigate accurately, adhering closely to their assigned trajectories. This reduces controller workload allowing them to focus on other tasks and, in this manner, enhancing safety.

Various ICAO Panels, Study Groups and Task Forces have been working in a collaborative manner to complement SARPs and guidance material that support PBN implementation. Achievements for 2011 include:

1. Implementation/education activities

- a. The Go-Team is a collaborative effort involving ICAO, IATA and other industry partners, which assists States in PBN implementation. To date, the Go-Team has carried out five visits to Thailand, UAE, Mexico, Germany and Kenya.
- b. Four workshops were performed in 2011 to familiarize participants with airspace design as it relates to PBN implementation. Four additional workshops are planned in New Delhi, Mexico City, Paris and Kiev.
- c. To ensure availability in the future, ICAO is developing an **airspace design workshop**, based on EUROCONTROL/FAA initiatives.
- d. In a cooperative effort with ICAO, COSCAP-South East Asia and the Australian Civil Aviation Safety Authority (CASA), a PBN OPS approval handbook has been developed.

2. Panels and Study Groups

- a. **Instrument Flight Procedures Panel (IFPP).**
 - **Continuous Descent Operations (CDO).** The CDO Manual (Doc 9931) has been completed and is available on the ICAONET as well as a hard copy.
 - **RF Legs Charting.** Radius-to-Fix (RF) legs allow for the inclusion of curved flight tracks in arrival and approach procedures, improving the use of airspace and allow procedures to be developed to/

from runways that are otherwise limited to traditional linear flight paths or—in some cases—not served by an Instrument Flight Rules (IFR) procedure at all.

- b. **Separation and Airspace Safety Panel (SASP).**

The Separation and Airspace Safety Panel (SASP) has recently concluded work on new minima specifically tailored for PBN approved aircraft. These minima are being published in the *Procedures Air Navigation Services – Air Traffic Management (PANS-ATM)* as they are approved. In addition, the SASP has also approved improved Standards related to aircraft speed variations in oceanic airspace.

- c. **Navigation Systems Panel (NSP).** The main focus of PBN-related work in the Navigation Systems Panel (NSP) is to update the *Global Navigation Satellite Systems (GNSS) Manual* (ICAO Doc 9849), by incorporating PBN terminology and including recent developments in the GNSS field.

- d. **Performance-based Navigation Study Group (PBN SG).**

The PBN SG is working on new navigation specifications to be included in the new edition of the PBN Manual which is expected to be available in 2012.

- e. **Approach Classification Task Force (ACTF).** The ACTF has now agreed on a concept to make approach classifications more intuitive for the pilot, and to facilitate future integration in ICAO documentation.

3. Flight Procedure Programme (FPP)

To date, the FPP has delivered training courses to 133 people from 22 States and Administrations in PBN procedure design and RNP AR procedure design. In addition, the FPP, in cooperation with the Asia COSCAPs, conducts PBN Implementation Workshops that focus on identifying the impediments to PBN implementation and to assist in developing related action plans for States.

Phase 2 for the FPP will start 1 January 2013 and run until 31 December 2017 during which the FPP will continue the training and implementation efforts already mentioned while developing additional capabilities and training in validation, quality assurance and safety assessment.

Dangerous Goods (DG)

Dangerous goods (DG) are carried regularly and routinely by air all over the world. States are required by Annex 18 to the Chicago Convention (Safe Transport of DG by Air) to have inspection and enforcement procedures in place to ensure that dangerous goods are being carried in compliance with the requirements in ICAO Doc 9284—*Technical Instructions for the Safe Transport of Dangerous Goods by Air*.

State assistance in the DG area has been seeing tremendous expansion in recent years as ICAO continues to provide key inputs, training and support in this essential area of aviation safety. The Organization is also working more closely on new developments with key partners such as the International Federation of Air Line Pilots' Associations (IFALPA) and the International Federation of Freight Forwarders Association (FIATA), amongst many other contributing organizations.

Most recent developments in the DG area include the 23rd Meeting of the Dangerous Goods Panel (DGP/23). It met for two weeks in October 2011 to recommend amendments to Doc 9284, its Supplement, and ICAO's Emergency Response Guidance (ERG). If approved by the Council, these amendments will be incorporated in the 2013–2014 editions of these documents.

The ERG, or 'Red Book', is the industry standard guide for aircraft incidents involving DG. ICAO collaborated extensively with IFALPA on the new revisions to the ERG and additional reviews of the DG information required to be given to pilots-in-command will likely be on both Organizations' agendas in 2012.

Other guidance updates concluded in 2011 included new reference material covering the transport by air of persons subjected to radioactive material intake. This was an amendment to Doc 9284 developed in coordination with the International Atomic Energy Agency (IAEA) following the tragic events at the Fukushima nuclear power plant. Revisions to packing instruction Classes 3, 4, 5, 8 and 9 and Division 6.1, were duly reflected in the 2011–12 edition of Doc 9284 after lengthy consultations.

Looking forward, ICAO will be conducting a safety risk assessment based on data collected from dangerous goods-related accidents and incidents. The Organization is also developing competency frameworks for DG personnel, lithium batteries and the transport of DG by helicopter.

With respect to new and improved training offerings, initial DG Training on the ICAO Technical Instructions was launched in 2011 with courses held on location in various States and at ICAO Headquarters. The programme consists of updated material from the recently revised ICAO Doc 9375—*Dangerous Goods Training Manual* and several courses that assist States in complying with the broad principles outlined in Annex 18 and Doc 9284.

Also in 2011, ICAO formalized a partnership with FIATA for the new ICAO/FIATA Freight Forwarder DG Training Programme. State Inspector Level DG Training is also currently under development and will be launched in early 2012.





Aviation Language Requirements

Since the first ICAO symposium on the subject in 2004, disparities in the quality and appropriateness of language proficiency tests have been identified as key obstacles to the effective implementation of ICAO's aviation language-related safety objectives.

The decision to establish a process to endorse language tests used for licensing purposes was one of a series of steps taken by ICAO after the issuance of its Language Proficiency Requirements (LPRs) several years ago. After extensive consultations, the Organization launched a programme in September 2010 to develop and implement an ICAO test endorsement process.

The initial endorsement project Working Group included members from the International Civil Aviation English Association (ICAEA), the International Federation of Air Line Pilots' Associations (IFALPA), the International Federation of Air Traffic Controllers' Associations (IFATCA), and the International Language Testing Association (ILTA). It was tasked with developing the endorsement process framework.

Based on feedback received when the process was first presented at an ICAO Conference in Paris (December 2010), the Working Group was expanded to include input from practitioners experienced with developing and using language tests for aviation. At all times, however, measures were taken to ensure the Group included testing, operational and speech sampling experts.

This project has now been completed and the new language proficiency testing endorsement procedures were officially established by ICAO as of 3 October 2011.



The Next Generation of Aviation Professionals (NGAP)

ICAO, its Member States and key industry partners have joined efforts to develop policies to ensure that enough competent personnel are available to manage and maintain the future global air transportation system.

ICAO launched several of its Next Generation of Aviation Professionals (NGAP) initiatives in 2010, including an NGAP Symposium conducted in Montreal in the early part of that year. The 2010 ICAO High-level Safety Conference (HLSC) and the 37th Session of the ICAO Assembly both recommended that States support the objectives of the Organization's NGAP initiatives.

The 2010 NGAP Symposium proposed specific actions in two areas: the updating and modification of the regulatory environment in order to improve the effectiveness and efficiency of training and education; and the mobilization of the air transport community toward a common effort to 'revitalize' the image of aviation professions.

These challenges were addressed at last year's event by ten separate Panels made up of experts and specialists representing the full range of air transport stakeholders, including civil aviation authorities, airlines, Air Navigation Service Providers (ANSPs), training and education providers and other international organizations.

One of the main tasks of the NGAP initiatives is to reach out to States, regions and the broader aviation community to seek input and consensus on the complex solutions to the present personnel challenges. For this reason, four NGAP Regional Conferences were organized in conjunction with the ICAO TRAINAIR PLUS programme during 2011, as follows:

Incheon, Republic of Korea	29 Mar–1 Apr
Marrakech, Morocco	18–20 May
Bucharest, Romania	28–30 Jun
Quito, Ecuador	14–16 Nov

In every case, Seminar participants were presented with a summary of ongoing or planned NGAP worldwide and regional initiatives. Panels representing specific areas of the air transport system debated NGAP issues and additional presentations were delivered by representatives from States, international organizations, aircraft manufacturers, academia and aviation training organizations, airline operators, ANSPs and maintenance organizations.

The next NGAP Symposium and further Regional Seminars are currently on the global aviation agenda during 2012.



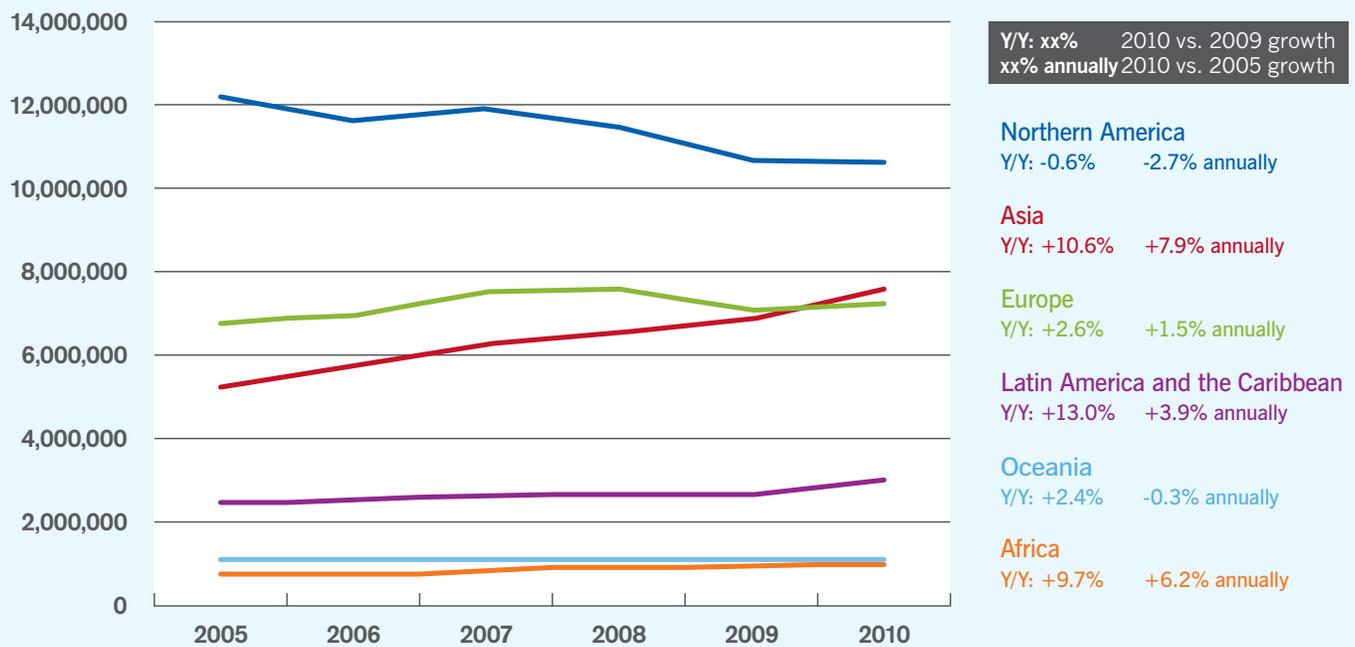


Appendix 1: Traffic Overview

Commercial Air Transport Summary

The following figure and table show scheduled commercial flight departures for the years 2005 to 2010.

Scheduled Commercial Flight Departures: 2005 to 2010



UN Region	2005	2006	2007	2008	2009	2010	Growth 2010 vs. 2009
North America	12,174,163	11,653,537	11,923,490	11,482,988	10,689,767	10,624,134	-0.6%
Asia	5,212,416	5,747,063	6,251,806	6,500,555	6,899,203	7,629,403	+10.6%
Europe	6,739,640	6,959,274	7,517,638	7,589,772	7,080,906	7,263,218	+2.6%
Latin America and the Caribbean	2,459,928	2,504,222	2,614,748	2,661,184	2,633,385	2,976,575	+13.0%
Oceania	1,063,628	1,074,095	1,076,593	1,080,537	1,025,329	1,050,120	+2.4%
Africa	751,220	752,761	830,628	907,671	923,277	1,013,063	+9.7%
Grand Total	28,400,995	28,690,952	30,214,903	30,222,707	29,251,867	30,556,513	+4.5%



As this clearly reveals, the region with the highest departures total over the past six years is North America. Traffic volume in this region has been trending lower however, with a marginal year-over-year decrease experienced from 2009 to 2010 as well as an average 2.7% annual decrease over the six-year period.

Asia's average annual traffic increase of 7.9% during this timeframe was the largest percentage growth rate experienced by all regions. As a result, Asia's total traffic volume in 2010 ranked second to North America.

While Europe experienced a 2.6% year-over-year increase in 2010, the region's average annual growth rate during the 2005–2010 period was 1.5%. Accordingly, European 2010 traffic volume ranked third, behind the North America and Asia regions.

Traffic in the Latin America and Caribbean region has increased steadily throughout the six year period, experiencing an average annual growth rate of 3.9% as well as a 13.0% year-over-year increase in 2010.

Oceania's traffic remains stable since 2005 (0.3% yearly decrease).

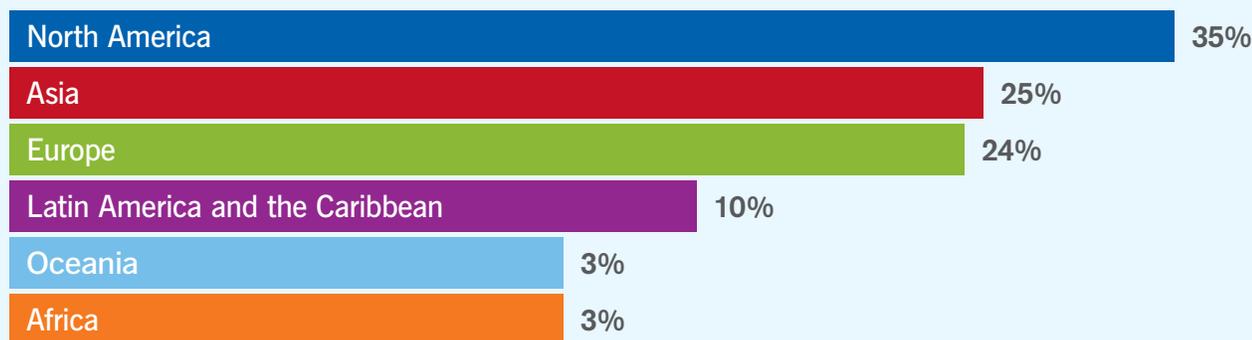
Africa continues to have the lowest number of departures but is experiencing steadily increasing traffic volume with an average annual increase of 6.2% within the region.

Although worldwide scheduled commercial traffic experienced a decrease of 3.2% in 2009, due exclusively to the joint and extraordinary impacts of the global financial crisis and skyrocketing crude oil prices, the increases realized in 2010 surpassed not only the affected 2009 figures but the uncompromised 2008 traffic totals as well.

More specifically, the 4.5% year-over-year increase from 2009 to 2010 resulted in traffic volume 1.1% higher than the 2008 results. While considerable, it should be noted that not all regions experienced growth between 2008 and 2010 and that the growth that was achieved was concentrated in select regions including Asia, Latin America and Africa.

The next figure depicts the worldwide distribution of 2010 regional scheduled commercial traffic. As it can be observed, North America includes one third of the global traffic while both Asia and Europe each comprise about one quarter of the global traffic. Latin America and the Caribbean accounts for 10% while Oceania and Africa each represent approximately 3% of the global traffic.

Worldwide Distribution Regional Scheduled Commercial Traffic: 2010



Airport Results

This section includes basic information related to the global airport network.

The table below depicts information regarding commercial airports according to the number of departures. While there are about 3,850 commercial airports worldwide, only 15 airports have more than 200,000 departures per year. The

airports in this group represent 0.4% of the total number of commercial airports, but account for 13% of total departures. In total, only 138 airports have more than 50,000 departures per year, indicating that the concentration of traffic is limited to a relatively small number of airports. Consequently, less than 13% of the commercial airports service over 80% of the global traffic.

Commercial Airports According to the Number of Departures: 2010

Groups per number of departures	Airports per group		Departures per group	
	Number	%	Number	%
> 200 000	15	0.4%	4,107,601	13%
100 000 – 200 000	49	1%	6,906,526	23%
50 000 – 100 000	74	2%	5,204,739	17%
10 000 – 50 000	378	10%	8,531,525	28%
4 000 – 10 000	456	12%	2,844,693	9%
2 000 – 4 000	489	13%	1,377,274	5%
1 000 – 2 000	649	17%	922,057	3%
< 1 000	1,736	45%	662,098	2%
Total	3,846	100%	30,556,513	100%



The table below shows the top 15 airports ranked according to scheduled commercial departures in 2010. This table also provides information regarding departures in 2009 and the change in traffic between 2008 and 2009 as well as between 2009 and 2010. According to this table, the number of departures for these top 15 airports increased by 1.5% in 2010, after a 3.2% decrease in 2009. Also, 10 of 15 airports

had experienced growth in 2010, with the largest increases at ORD-Chicago (6.3%), PEK-Beijing (5.6%), DTW-Detroit (4.9%) and CLT-Charlotte (4.3%). Furthermore, DEN-Denver and PEK-Beijing are the only airports with increases in departures between 2008 and 2010 whereas IAH-Houston and CDG-Paris each experienced a 9% decrease during this timeframe.

Top 15 Airports Ranked According to Scheduled Commercial Departures: 2010

Airport				2010		2009	
Code	City	State	UN Region	Departures	%	Departures	%
ATL	Atlanta (Intl)	United States	Northern America	469 268	-2.8%	482 677	0.9%
ORD	Chicago (O'Hare)	United States	Northern America	437 890	6.3%	411 995	-7.3%
DFW	Dallas/Ft. Worth (Intl)	United States	Northern America	316 582	1.5%	311 831	-2.6%
DEN	Denver (Intl)	United States	Northern America	306 920	1.0%	303 970	0.6%
LAX	Los Angeles (Intl)	United States	Northern America	269 754	3.4%	260 874	-10.3%
PEK	Beijing (Capital)	China	Asia	257 630	5.6%	243 927	12.5%
IAH	Houston (G.Bush Intl)	United States	Northern America	253 887	-1.7%	258 233	-7.6%
CLT	Charlotte	United States	Northern America	243 176	4.3%	233 071	-2.7%
LHR	London (Heathrow)	United Kingdom	Europe	236 754	2.0%	231 999	-3.2%
CDG	Paris (Charles De Gaulle)	France	Europe	232 932	-3.9%	242 295	-5.6%
FRA	Frankfurt	Germany	Europe	231 837	3.3%	224 324	-4.3%
DTW	Detroit (Metro Wayne)	United States	Northern America	221 760	4.9%	211 394	-5.5%
MAD	Madrid	Spain	Europe	217 829	1.5%	214 695	-5.5%
PHL	Philadelphia (Intl)	United States	Northern America	210 890	-2.0%	215 086	-3.0%
MSP	Minneapolis/St. Paul (Intl)	United States	Northern America	200 492	-0.9%	202 266	-1.8%
Total:				4 107 601	1.5%	4 048 637	-3.2%

The table below depicts the number of commercial airports in each region as well as traffic density expressed as the average number of departures per airport. The data represented in this table is based on the 2010 scheduled commercial flights. As indicated, the number of airports as well as the average number of departures per airport varies significantly across

the regions. North America and Europe have the highest average of number of departures per airport. Also, the largest number of airports is found in North America and Asia, both having over 900 airports with scheduled commercial flights. Oceania and Africa have similar statistics in both categories.

Airport Distribution per UN Region: 2010

UN Region	Number of Airports	Average number of departures per Airport
North America	976	10,885
Asia	701	10,361
Europe	907	8,412
Latin America and the Caribbean	521	5,713
Oceania	370	2,834
Africa	371	2,735
Total	3,846	7,945

Appendix 2:

Analysis of Accidents—Scheduled Commercial Air Transport

This section provides a detailed analysis of accidents during 2010 as well as a review of accidents over the past 6 years.

The data used in the analyses are for aircraft providing scheduled commercial air transport having a maximum take-off weight exceeding 2250 kg.

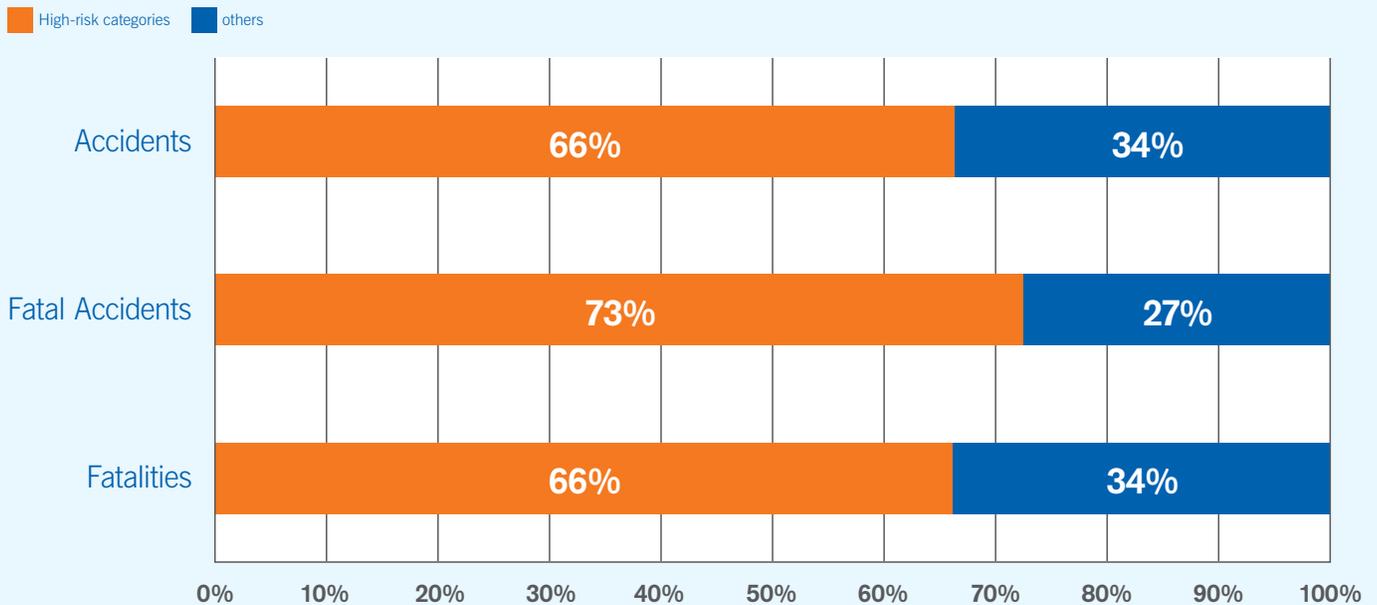
High-Risk Accident Occurrence Categories

Based on an analysis of accident data covering the 2005–2010 time period, ICAO has identified 3 high-risk accident occurrence categories:

- runway safety related events⁵
- loss of control in-flight
- controlled flight into terrain

As indicated in the figure below, these 3 categories cover 66% of the total number of accidents, 73% of fatal accidents and 66% of number of fatalities.

Distribution of High-risk Accidents: 2005–2010

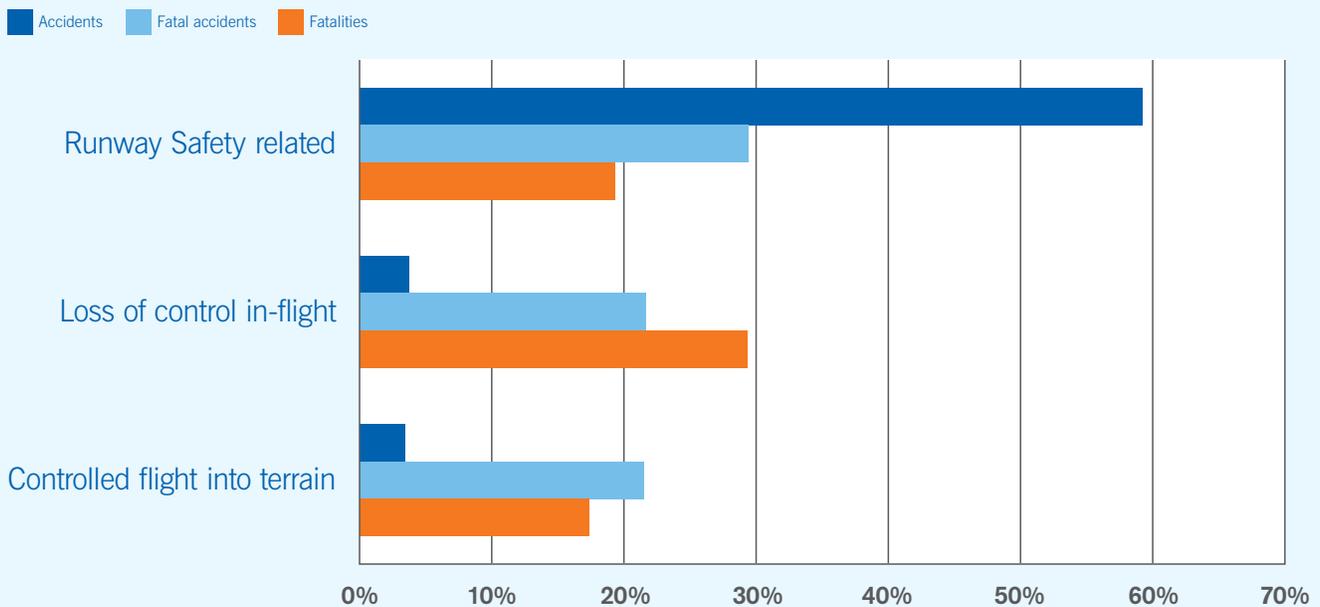


⁵ Runway safety related events include the following ICAO accident occurrence categories: Abnormal Runway Contact, Bird strike, Ground Collision, Ground Handling, Runway Excursion, Runway Incursion, Loss of Control on Ground, Collision with obstacle(s), Undershoot / Overshoot, Aerodrome



The following provides a summary of the distribution of the accidents, the fatal accidents and of the fatalities related to the 3 high-risk occurrence categories from 2005–2010.

Percentage of All Accidents: 2005–2010



Runway safety accidents represent 59% of all accidents, accounting for 29% of all fatal accidents and 19% of all related fatalities reported between 2006 and 2010.

While the loss of control in-flight occurrence category represents only 4% of all accidents, this category is of

significant concern as it accounts for 22% of all fatal accidents and 29% of all fatalities.

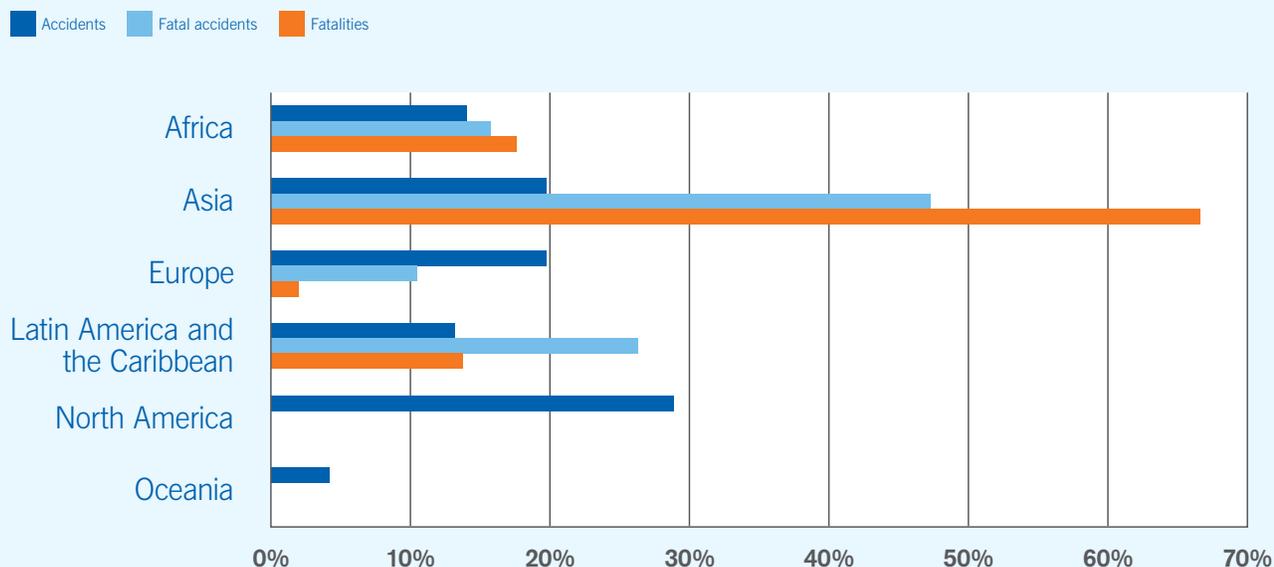
Similarly, accidents related to controlled flight into terrain account for only 3% of all accidents but represent 22% of all fatal accidents and 17% of fatalities.



2010 Accidents by UN Region

The figure and the table below indicate the percentage of accidents and related fatalities attributable to the region in which they occurred.

Accidents by Region of Occurrence: 2010



2010	Africa	Asia	Europe	Latin America and the Caribbean	North America	Oceania	Total
Accidents	17	24	24	16	35	5	121
Fatal Accidents	3	9	2	5	0	0	19
Fatalities	125	471	14	97	0	0	707

The regional distribution of accidents is relatively consistent, ranging between 13% and 29% across five UN regions. Oceania, accounting for 3% of all accidents, being the notable exception.

Asia, the region with the highest annual traffic growth rate during the 2005–2010 period (see figure above), accounts for 20% of all accidents, but for 47% of all fatal accidents and 67% of all fatalities.

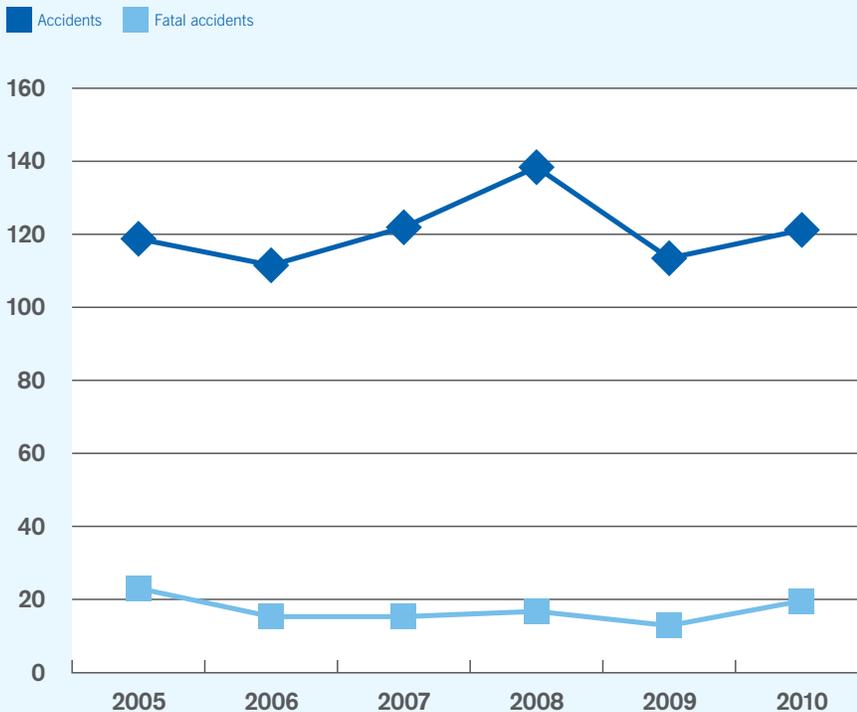
Even if North America had both the highest traffic volume and greatest number of accidents, no fatal accidents were experienced in the region in 2010.



2005–2010 Accident Trends

The figure below shows the number of total and fatal accidents on commercial scheduled flights during the 2005–2010 period.

Accident Trends: 2005–2010

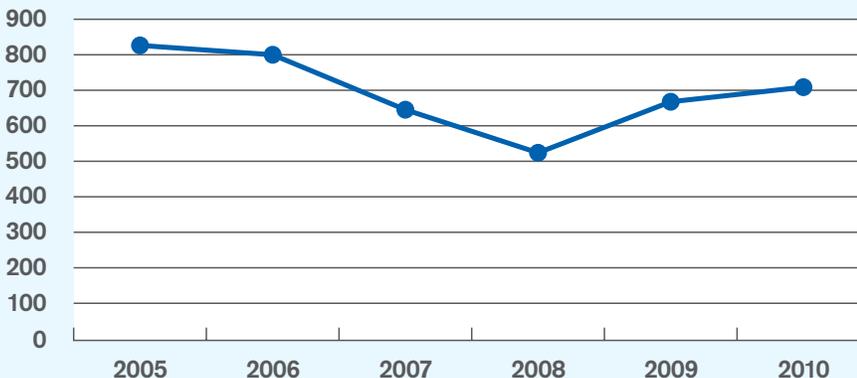


The number of accidents experienced annually is more or less stable since 2005 at approximately 120 events per year, resulting in an equivalently stable accident rate of approximately 4 accidents per million departures as shown in the figure on page 12 in the Safety Analysis section.

2010 experienced a 7.1% year-over-year increase in the total number of accidents in scheduled commercial air transport compared to 2009 while the traffic increased only by 4.5% during the same period. As a result, the 2010 accident rate increased slightly from 3.9 to 4.0 accidents per million departures.

The figure below shows the number of fatalities for the above mentioned fatal accidents.

Fatality Trends: 2005–2010









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