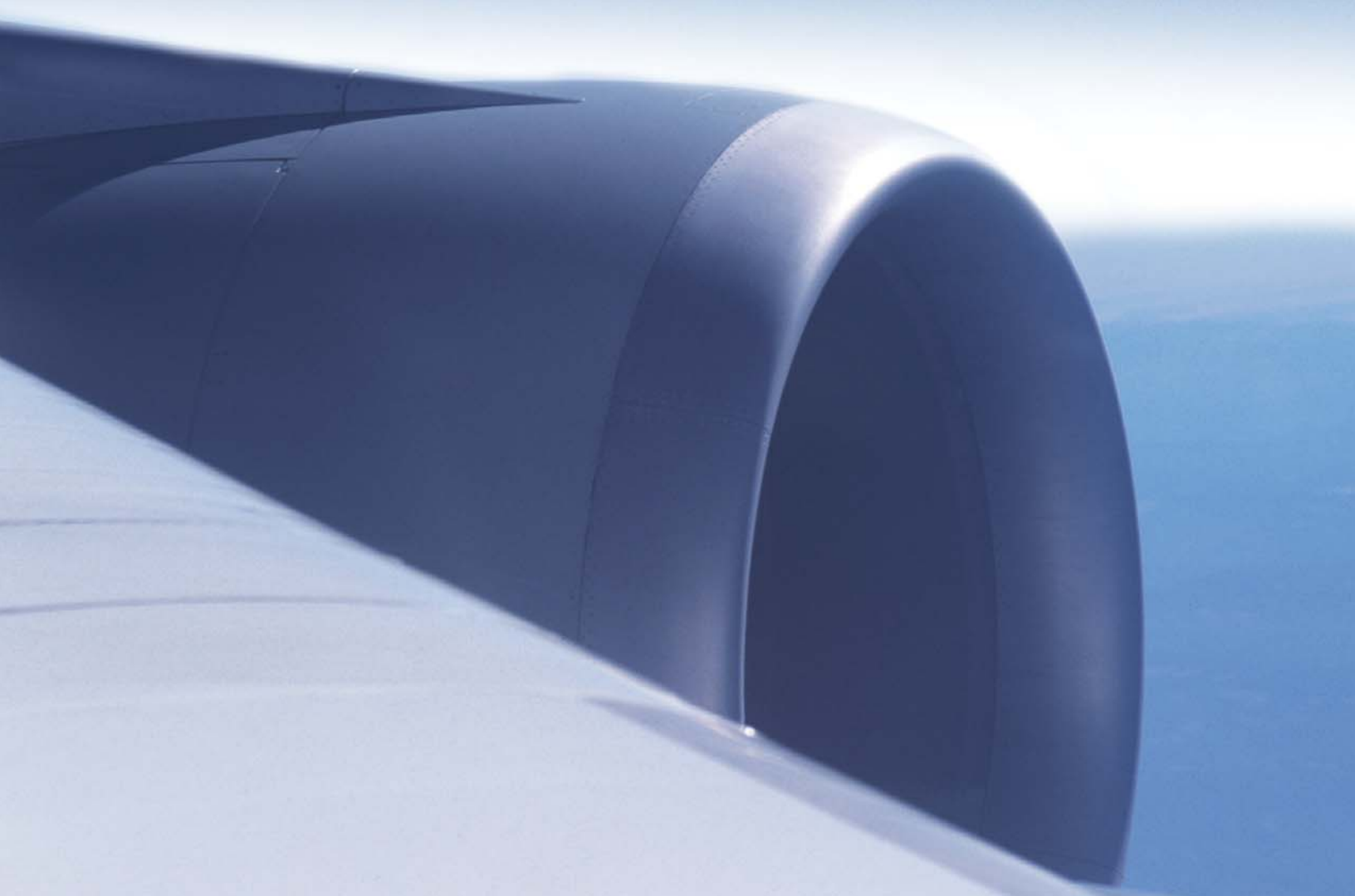


# Global Aviation Safety Roadmap

A strategic action plan for future aviation safety developed jointly  
by ACI, Airbus, Boeing, CANSO, FSF, IATA and IFALPA for ICAO






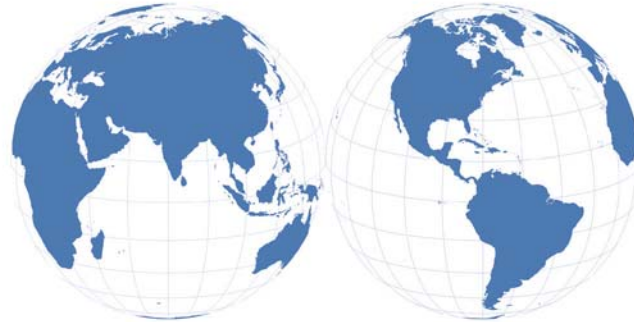
  
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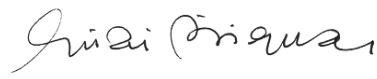


  
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# AIM: A reduction of the global accident risk in commercial aviation



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# A Global Strategy for Aviation Safety

Leadership in safety requires an understanding of the situation, an acceptance of responsibility, a commitment to action and clear strategies and targets. For Governments and States, safety leadership must involve taking the issue from the margins to the mainstream to help guide policy and action. For industry, it must reach beyond the design and technology and penetrate the management and culture of aviation. The attainment of a safe system is the highest priority in aviation. The moral imperative for action to reduce the accident rate still further is self-evident, the operational benefit is immense, and the business case highly compelling.



Ultimately, however, the acceptable or tolerable accident rate is determined by the perception of safety needs by society and the international community. Acceptable safety risk is related to the trust attributed to the aviation safety system, which is undermined every time an accident occurs. Therefore, the challenge is to drive an already low accident rate even lower. To achieve the next major breakthrough in that rate, there is a need to move beyond the traditional government/industry model, with its adversarial role-playing of regulator versus the regulated. An action plan of global dimension is required, one that clearly identifies the roles played by the regulatory and industry elements, while emphasising their complementary nature. The plan should also enable global leadership and coordination that is currently lacking in aviation safety.

The Industry Safety Strategy Group (ISSG), inspired by the International Civil Aviation Organisation (ICAO) at the Seventh Air Navigation Commission (ANC) Industry Meeting (May 2005), was formed to address this need. ICAO called upon those industry partners who were in a position to do so to work together to develop a common roadmap for aviation safety. This Global Aviation Safety Roadmap Part 1 – A Strategic Action Plan for Future Aviation Safety, has been developed by the ISSG under the coordination of IATA with the participation of Airbus, Boeing, Airports Council International (ACI), Civil Air Navigation Services Organisation (CANSO), International Federation of Air Line Pilots' Associations (IFALPA) and Flight Safety Foundation (FSF).

The Roadmap seeks to attain safety benefits in the near to medium-term through a phased approach. It is a high level, conceptual analysis using “broad strokes”, which invites early involvement by ICAO to help pave the way for a Part 2 document that will focus on more specific action. All this is aimed at achieving a partnership that will result in a reduction of the global accident risk in commercial aviation.

## The Need for a Global Aviation Safety Roadmap

The aviation industry currently adopts a somewhat reactive approach to managing safety. Effort often appears to be inconsistently applied and uncoordinated. The Global Aviation Safety Roadmap (hereafter referred to as “the Roadmap”) is an action plan for the future of the aviation industry that adopts a proactive, rather than reactive, approach to managing safety. The Roadmap found both in the centrefold and at Appendix A, provides a means to ensure that safety initiatives throughout the world deliver improved safety by the coordination of effort, thus reducing inconsistency and duplication. The Roadmap should incorporate a process to analyse risks so as to best prioritise initiatives.

# Goals and Objectives

The primary objective of the Roadmap is to provide a common frame of reference for all stakeholders, including States, Regulators, airline operators, airports, aircraft manufacturers, pilot associations, safety organisations and air traffic service providers. The Roadmap will coordinate and guide safety policies and initiatives globally, thus reducing the accident risk for commercial aviation. Such a frame of reference is critically important to ensure oversight of the progress towards aviation safety standards, avoiding both duplication of effort and uncoordinated strategies. It is an action plan for a proactive future for world air transport safety.

The Roadmap is based upon high-level principles that have been accepted by industry as vital to the enhancement of safety levels within global commercial aviation. It was not developed to replace data-driven regional initiatives such as the United States Commercial Aviation Safety Team (CAST), Europe's JSSI (JAA Joint Safety Strategy Initiative) or the Pan-American Aviation Safety Team Initiative (PAAST). Rather, it is intended to build on these immensely valuable programmes, highlighting key areas that governments and industry must act on. Above all, it must tackle those areas that currently are not effectively addressed. Therefore, the Roadmap requires the acceptance and commitment of both governments and industry to be effective. In addition, the Roadmap requires ongoing leadership, oversight and assessment of its implementation and subsequent effects. It is intended to be a living document, subject to periodic review and revision.

The Roadmap aims to assist with the implementation of harmonised, consistent and coherent safety oversight regulations and processes, which properly reflect the global nature of modern air transportation. It highlights the need for State commitment to provide truly independent, adequately funded and effective civil aviation regulators. Moreover, the Roadmap looks to structured programmes, which are effectively implemented in an "open reporting" environment and a "just culture" for the systematic collection, analysis and dissemination of safety reports and information that will be used solely for the prevention of accidents.

This strategic safety initiative is intended to add impetus to an already improving state of aviation safety. It identifies a continuum along which progress can be measured. The Roadmap recognises that there will always be reactive elements in safety management but emphasizes near and mid-term mileposts against which stakeholders must plan for the future and gauge their progress.

At this stage, the Roadmap is not designed to provide detailed guidance to achieve the desired endpoints. Depending upon specific developments and circumstances, there may be multiple routes to gain the same objective. The importance and utility of the Roadmap is to ensure that stakeholders' collective efforts converge upon common objectives. It is a map, and does not provide detailed directions. Industry stakeholders, together with ICAO, must develop those separately, as appropriate.

## Stakeholders

The chief stakeholders in the civil aviation sector are States, ICAO, airlines/operators, airports, air navigation service providers, aircraft and equipment manufacturers, maintenance and repair organisations, regional organisations, international organisations, and industry representatives. Fundamental for the success of a Roadmap for safety is to ensure the commitment of all stakeholders in the aviation sector to improving safety. This should be the starting point of the journey.



# Metrics

This Roadmap is about the continuous improvement of our aviation safety system. Information derived from accurate data is the basis for improvement of any system. Without such information, effective progress is stymied. Development of a comprehensive data collection and analysis programme that involves all system stakeholders is critical. To ensure the availability of accurate information, the data gathering system must be threat-free to the data supplier. Protection of the sources of safety-related information must be guaranteed for an effective collection system, and such information must not be used in a criminal prosecution. This does not preclude the use of safety-related information gathered from other sources being used in a judicial proceeding.

Data are available from numerous sources within the aviation community. To be useful the data must be transformed into information that can be used by system managers to make informed decisions. It is critical that data be collected based upon a systematic plan that has a well thought out objective. Data collected in other ways will increase liabilities of the collection agencies and will not enhance aviation safety.

The safety plan must provide for appropriate use of safety information at the local, State and regional level. Additionally, information acquired from different parts of the world must be analysed to glean best practices for potential local adoption to mitigate potential hazards. The Roadmap describes specific steps and milestones that must be coordinated by industry and ICAO to achieve this level of international safety metrics.

Data permits the continuous monitoring of the safety status of the system. The Roadmap will define the metrics-establishment programme recommended to the stakeholders, both to identify current status and show progress in safety programme implementation. To be effective, metrics must be collectable and measurable, and must reflect the current situation accurately. Metrics must be established to measure the level of implementation and effectiveness of improvement projects. They must also be able to identify changing and emerging risks in the system.

As a starting point, it is necessary to understand the status of the States with respect to compliance with international standards. Results of the Universal Safety Oversight Audit Programme (USOAP) audits (or other equivalent means of assessment), and progress in correcting discrepancies are baseline metrics. Progress in implementing safety management principles and processes can be measured in a number of ways, including collecting such metrics as the status of IATA IOSA audits at operators, and other similar mechanisms.

All safety improvement programmes must be based on data and follow a “Plan, Do, Check, Act” cycle, which is outlined in the Roadmap. Once data illustrates the need for action, the plan of action is developed. The plan is then implemented and the progress to the plan is measured. Effectiveness of the plan must be measured, and the plan revised if the desired results have not been achieved. This continuing cycle of analysis, identification, action, measurement and revision is a core feature of any safety improvement programme and will be fully outlined in the Roadmap.



# Risk Measurement

Safety is essentially a performance expectation. For the Roadmap to lead to a reduction of the global accident risk in commercial aviation, it is important to develop it in such a way that performance can be measured and used to track the definable reduction in risk expected in the near and mid-term.

The aircraft fleets which ICAO would like the Roadmap to address consist of Jet and Turboprop aircraft with take-off weights of greater than 5700 kg, embracing Western and Eastern-built fleets. As part of the implementation of the Roadmap, metrics should be developed to help measure the risk reduction in these fleets.

To measure its performance in safety the industry has typically focused on accident rates expressed in various ways, such as accidents or hull losses per million sectors or flight hours. The fatal accident rate has become the most compelling metric, but when applied regionally this metric is volatile, emotive in its application and is not particularly helpful.

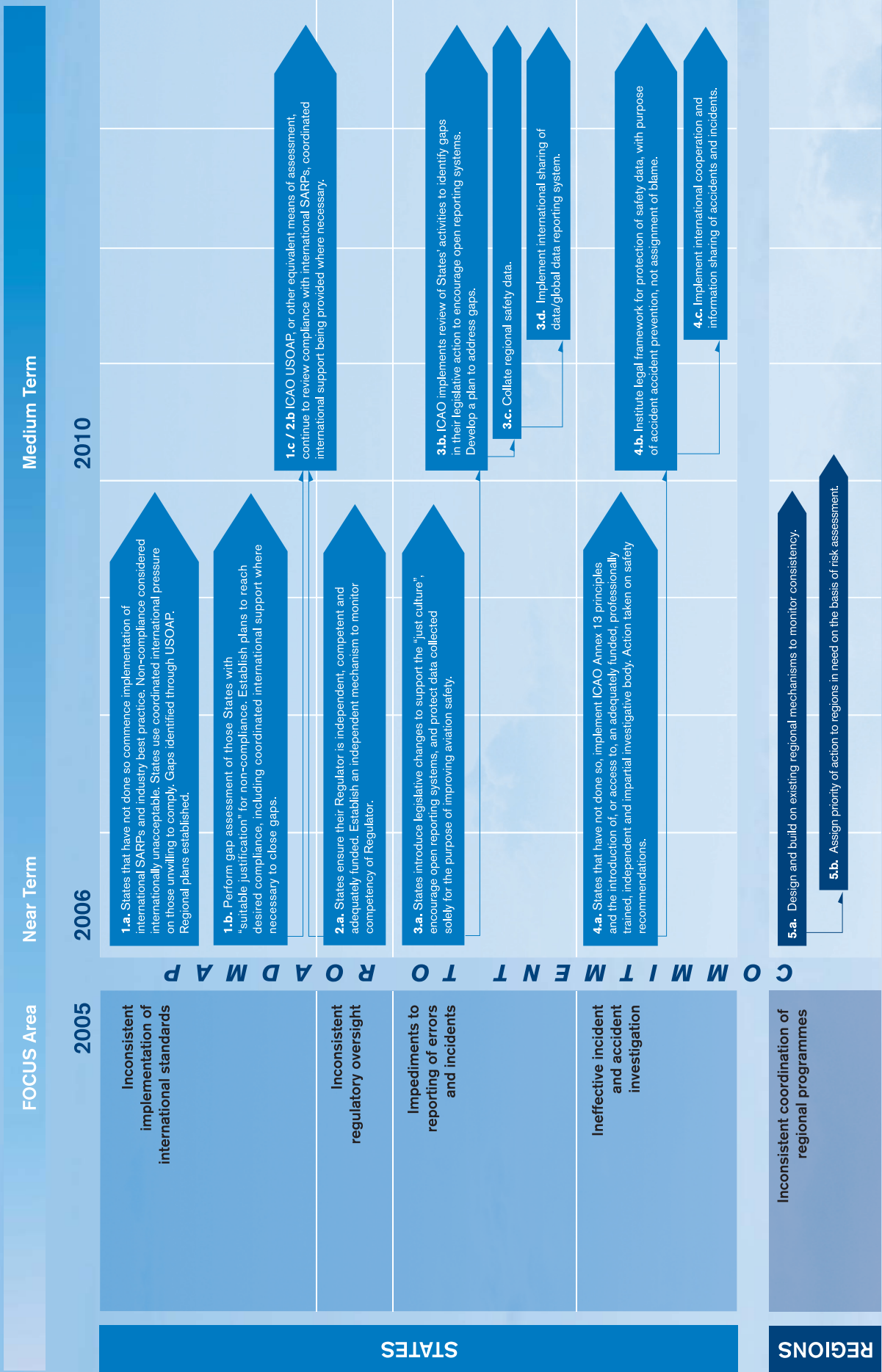
Currently the most prominent safety programmes of the world tend to be reactive in nature. They point to general threats in aviation, including those associated with regions having high accident rates, those involving cargo fleets, or those targeting particular accident categories, such as approach and landing, loss of control, runway incursion, turbulence-related and ramp accidents and incidents. It is essential for the Roadmap to take these safety programmes and their measuring systems into account and build on their experience. Most importantly, the Roadmap must call for safety intelligence already gained by those programmes to be shared between State and industry, fully optimising existing mechanisms and governance structures. It must aim for the maximum return in terms of intervention strategies and focus, and above all, drill for the gems that will help to prevent similar accidents from recurring.

Analysis of accidents, though valuable, is taking the forensic (historical) view. Today, proactive programmes such as IATA's Safety Trend Evaluation Analysis and Data Exchange System (STEADES) take a more prognostic (predictive) approach to threat assessment and risk measurement through the use of incident and "normal event" flight data analysis/FOQA data programmes. Moreover, the safety intelligence that yields from proactive auditing programmes such as USOAP and the IATA Operational Safety Audit (IOSA) must also be shared between stakeholders in an endeavour to become more diagnostic on a global scale. There are numerous other safety data sources around the world, all with the potential to be integrated in a global system for determining risk more proactively.

The Roadmap should look to these sources in an effort to develop the capability of establishing data/information analysis and sharing programmes that enable more effective ways of measuring safety levels and determining risk. Most importantly, the industry must develop analytic resources that will enable more effective intervention in accident prevention to be achieved. Further beyond the medium-term horizon, this global analysis capability should identify changing and emerging risks such as those that may arise from changes in aviation systems and even demographics.



# Global Aviation Safety Roadmap



COMMITMENT TO ROADMAP

STATES

REGIONS



COMMITMENT TO ROADMAP

Impediments to reporting and analysing errors and incidents

Inconsistent use of safety management systems (SMS)

Inconsistent compliance with regulatory requirements

Inconsistent adoption of industry best practice

Non-alignment of industry safety strategies

Insufficient number of qualified personnel

Gaps in use of technology to enhance safety

6.a. Industry (management) commits to a "just culture" of reporting all safety related incidents and potential safety issues without fear of reprimand to involved parties.

6.b. Identify and implement common metrics and descriptors of precursor events needed to enable adoption of a proactive approach to managing risk.

6.c. Establish and integrate across the industry shared incident/error databases. Demonstrate and disseminate the benefits of open reporting.

7.a. ICAO SMS standards published. Confirm need for formal (mandated) SMS across all sectors and disciplines of the industry.

7.b. Develop a plan for incorporation of SMS into audit process.

7.c. Develop audit processes to assess operation of SMS function.

7.d. Implement review of SMS during audits.

7.e. Define interface points between industry focus areas and develop a plan for SMS programme integration across all interfaces.

8.a. With full management support, execute independent assessment and GAP analyses within the industry of regulatory compliance to address areas of non-compliance.

8.b. Perform regular independent audits of operational safety to assess ongoing compliance across the industry.

9.a. Improve structures (through management commitment) for maintaining knowledge of best practice and identify future developments (e.g. ICAO best practices website, IATA and ESF publications).

9.b. With industry openly sharing information regarding the benefits of best practices, implement performance benchmarking of dissemination consistency.

10.a. Design a mechanism for coordination and sharing of safety strategies.

10.b. Coordinate and share safety strategies, seeking to achieve alignment and minimise duplication.

11.a. Identify requirements for sustaining aviation safety against projected growth of commercial aviation (matching task and resources).

11.b. Implement plans to provide appropriate numbers of qualified people.

11.c. Establish audit processes to confirm that people resource plans will deliver the appropriate numbers.

11.d. Resource plans to deliver the appropriate numbers of qualified people.

12.a. Define proven technology gaps. Industry works together to identify areas where technology might provide significant safety benefits.

12.b. Deploy proven technologies that have been developed to enhance safety.

12.c. Integrate measures to close technology gap.

# The Regional Dimension

Because the aviation system is complex, all parts of the industry must work together. Experience has shown that the most successful aviation safety initiatives have resulted from industry, Regulators, manufacturers and other involved organisations working together to address common safety issues.

There is no better example of this than the North American CAST programme, which was formed in 1997 to bring all the players, including Regulators, to the table in response to the challenge from the Gore Commission in the United States to reduce the fatal accident rate by 80% by 2007. This regional plan projects a 73% fatality risk reduction by 2007 through a programme of prioritised safety enhancements. If a business case for safety is necessary, the CAST programme case is quite compelling. The cost breakdown of the current U.S. accident rate amounts to \$76 for every flight. Implementation of the enhancements will reduce these costs by \$56 per flight, resulting in a savings of approximately \$620 million every year.

In Europe, the Joint Airworthiness Authorities (JAA) is sponsoring the JAA Safety Strategy Initiative (JSSI). JAA's Future Aviation Safety Team (FAST) is analysing future hazards based on studying areas of change in the industry, particularly in relation to technology. The FAST initiative has developed action plans for safety improvements, some of which are now being implemented by the European Aviation Safety Agency (EASA). The CAST and JSSI/FAST programmes are already highly integrated and playing a leading role globally in aviation safety.

The Pan American Aviation Safety Team (PAAST) comprises aviation organisations represented in the region, including government, airlines, ICAO and IATA Regional offices and related organisations. PAAST has established action team leaders who understand the local conditions, legal systems, culture, etc., to work on the various safety enhancements in their local regions.

Similarly structured to PAAST, the African Safety Enhancement Team (ASET) has been driving hard to improve the accident rate in the region. Africa is urgently in need of a safety roadmap for the near and medium-term. To this end, IATA and ICAO have already met to determine focus areas,

primarily in the realms of ATC and aerodrome infrastructure safety. However, safety regulation and oversight are also very high priorities in this regional programme. It is expected that this ICAO/IATA work would combine with the Global Aviation Safety Roadmap activity.

The Roadmap should also endeavour to reinforce the work of the Cooperative Development of Operational Safety and Continuing Airworthiness (COSCAP). Sponsored under the ICAO Technical Cooperation Programme, COSCAPs are established in South Asia, Southeast Asia, and North Asia, all of which have established safety teams and focused on CAST-like safety enhancements. In addition, COSCAPs have been formed in Commonwealth of Independent States (CIS), Latin America, West Africa, Central Africa, Southern Africa, and the Banjul Accord Group (BAG).

With the regional safety teams and COSCAP activity in mind, the Roadmap must proceed with caution in advocating more sophisticated safety initiatives which may detract from some of the basic obligations of States to correct infrastructure and other deficiencies already identified.

The message coming from the regional programmes described above is that focused action combined with the introduction of new capabilities can lead to significant reduction in the accident rate.

## Enablers For Success

The Roadmap would therefore need to reflect measures already in progress. In applying a data-driven approach to the regions it is important not to lose sight of those safety concerns already on the horizon, such as the issue of flags of convenience. The regional perspective on safety is likely to be different from region to region, and even from country to country within those regions. There is likely to be a need to break the strategies down into sub-regions or even individual countries. Most importantly, the Roadmap should not just focus on past records but also future risk and growth in the regions.

The development of this Roadmap takes into account the conditions and forces known as enablers that must exist and be utilised to improve safety management. Enablers can serve as roadblock removers or system accelerators that can hasten progress. Therefore, successful implementation of the Roadmap will depend upon recognising and fostering the enablers that are critical for getting various regional groups to adopt proactive safety measures. Some enablers are universal in nature, while others are more tailored to the needs of a particular region or stakeholder. Understanding how to leverage and coordinate these enablers effectively will be one of the first tasks in constructing a more detailed Roadmap that defines various routes for achieving objectives in different regions. The Roadmap identifies these enablers and describes the preferred timing or conditions for deploying those that are needed.

Some enablers are universal, but their level of maturity varies considerably among different regions, particularly where the safety challenge is the greatest. Such enablers also apply to different aviation domains. For instance, having a basic aviation law that establishes a national aviation authority is a fundamental enabler that applies to the legal and governance domain. A corollary universal enabler is having societal expectations that demand an honest, transparent authority that establishes and oversees safety regulations based on international standards. Similarly, learning safety lessons from safety-related accidents and incidents requires a legal basis that enables independent, impartial

accident and incident investigations and protects safety data from use in prosecutions. Other universal enablers describe factors that are equally important for assuring a safe aviation system, but which may depend upon industry stakeholders for their existence. Such enablers would include an airworthy fleet, a competent and skilled technical workforce, a reliable air traffic management system, and a sound and dependable aviation infrastructure.

All these enablers are major factors that must be considered in the Roadmap. Due to their scope and complexity, some may present a greater challenge for the industry than others that are more limited in scope and therefore more tractable. Examples of tangible enablers include understanding safety as a key element of a successful business plan, defining targeted safety enhancements that can be accomplished through specific training or technology, and the development of key regional safety advocates or mentors with unique local knowledge needed to implement best industry safety practices. Ultimately, the key enabler on a global scale is the commitment of States to achieving worldwide consistency in the application and enforcement of international standards of safety regulation.

By defining various levels of enablers and identifying appropriate opportunities for their promotion, the Roadmap can make a significant contribution in guiding stakeholders toward effective coordinated efforts throughout the world. The Roadmap can pinpoint where explicitly sharing expertise and promoting international safety management system principles could yield major progress toward safety improvement goals in developing regions.



## Focus Areas

In developing this Roadmap, the key focus areas have been identified that should be addressed by stakeholders for successful implementation of the plan. Stakeholders have been divided into three basic groups: States, industry and regions, with focus areas developed for each group.

For States, the key focus areas are:

- Inconsistent implementation of international standards
- Inconsistent regulatory oversight
- Impediments to reporting of errors and incidents
- Ineffective incident and accident investigation

For regions, the key focus area is established as:

- Inconsistent coordination of regional programmes

For industry, the key focus areas are:

- Impediments to reporting and analysing errors and incidents
- Inconsistent use of safety management systems
- Inconsistent compliance with regulatory requirements
- Inconsistent adoption of industry best practice
- Non-alignment of industry safety strategies
- Insufficient numbers of qualified personnel
- Gaps in use of technology to enhance safety

These focus areas, with specific objectives and timelines for implementation, are found in the Global Aviation Safety Roadmap found both in the centrefold and at Appendix A.

## Communications

The Roadmap that has been presented is a common frame of reference for all stakeholders. Even in the course of this early development of the Roadmap it has become a useful communications tool amongst the stakeholders.

Effective communication systems are an essential element to improving safety across the aviation industry. They will enable safety improvements to be discussed in a structured way, and will facilitate the creation and maintenance of a safety culture in all parts of the aviation industry, while at the same time allowing each stakeholder to understand the business and constraints among them.

While each stakeholder has a strong commitment to aviation safety, there is the potential for gaps in the communication among them in the aviation sector. At all levels there are “disconnects” between the stakeholders who, perhaps, do not sufficiently understand each other’s business and constraints, and do not communicate about safety improvements in a regular structured way. This inevitably leads to uncoordinated safety strategies and initiatives. Therefore, an effective communication plan, which should form an integral part of the Roadmap implementation, is required to support the Roadmap in the future.

Coordination among stakeholders can be achieved in various ways. At the international level, ICAO and the organisations representing each area should continue to work together to ensure the continuing relevance of the safety Roadmap. However, there is also a need for appropriate national and local structures to ensure that all stakeholders can communicate effectively with each other at these levels. The formation of the ISSG provides a natural opportunity to facilitate such communication, ensuring that it remains connected to the various sectors of the aviation community.

By encouraging close communication between and among State and industry within a structure of sound regulation and oversight, this Roadmap should bring about a more effective global safety management system that is driven by data, risk and shared safety information in a culture of open reporting and trust. The benefits in terms of reducing the accident rate are an opportunity we cannot forego.





## The Next Steps

This Roadmap contains elements that are directed at ICAO and States, and others that are directed at industry. There is a necessity for the Air Navigation Commission of ICAO to review the Roadmap and assess the need to incorporate elements of the Roadmap within ICAO Strategic Objective A – Safety. Some elements of the Roadmap directed at industry are not under the direct purview of ICAO, thus the ISSG is determined to follow up on their implementation. There is therefore a need to coordinate future development with ICAO.

- 1) At the meeting held on 3 February 2006, the ANC agreed to: (1) review the Roadmap (2) assess how appropriate components of the Roadmap can be integrated with ICAO's Strategic Objective on Safety (3) develop ways of future ICAO action on the Roadmap with the continuing work of the ISSG
- 2) The Roadmap will be presented to the Directors General of Civil Aviation Conference (DGCA/2006) on a Global Strategy for Aviation Safety.
- 3) As a priority, the ISSG will develop regional action plans with the emphasis on those regions where assistance will clearly be needed. Regional implementation shall make use of funding, expertise and resources from other States or from sources such as the World Bank.
- 4) The ISSG will prepare Part 2 of the Global Aviation Safety Roadmap by 31 October 2006 providing an action plan for implementation.
- 5) The ISSG will continue to work with ICAO and other stakeholders to encourage States and industry to accept responsibility for the implementation of all elements of the Roadmap in order to achieve a reduction in the global accident risk within commercial aviation.



# List of Acronyms

|         |  |
|---------|--|
| ACI     | Airports Council International   |
| ASET    | African Safety Enhancement Team  |
| BAG     | Banjul Accord Group  |
| CANSO   | Civil Air Navigation Services Organisation                                 |
| CAST    | Commercial Aviation Safety Team  |
| CIS     | Commonwealth of Independent States   |
| COSCAP  | Cooperative Development of Operational Safety and Continuing Airworthiness |
| EASA    | European Aviation Safety Agency  |
| FAST    | Future Aviation Safety Team  |
| FOQA    | Flight Operational Quality Assurance                                       |
| FSF     | Flight Safety Foundation   |
| IATA    | International Air Transport Association                                    |
| ICAO    | International Civil Aviation Organization                                  |
| IFALPA  | International Federation of Air Line Pilots' Associations                  |
| IFFAS   | International Financial Facility for Aviation Safety                       |
| IOSA    | IATA Operational Safety Audit  |
| ISSG    | Industry Safety Strategy Group   |
| JAA     | Joint Airworthiness Authorities  |
| JSSI    | Joint Safety Strategy Initiative   |
| MRO     | Maintenance and Repair Organisations                                       |
| PAAST   | Pan-American Aviation Safety Team Initiative                               |
| SMS     | Safety Management Systems  |
| STEADES | Safety Trend Evaluation Analysis and Data Exchange System                  |
| USOAP   | Universal Safety Oversight Audit Programme                                 |



