NATIONAL AVIATION SAFETY PLAN 2018-2022

**DIRECTORATE GENERAL OF CIVIL AVIATION
INDIA**

Contents

Chapter 5. Safety Risk Controls   **24**

Glossary   **28**

Intentionally Left Blank

Foreword

It gives me immense pleasure to communicate that DGCA India has come up with a five year National Aviation Safety Plan (2018-2022) which promotes and supports prioritization and continuous improvement of aviation safety in India.

DGCA India introduced the first State Safety Plan in the year 2015 by conducting an array of meetings and discussions with the stakeholders and assessing the worldwide safety priorities. The effectiveness of the State Safety Plan was evaluated and published in the Annual Safety Review 2016 and 2017, which provided basis for the development of the National State Safety Plan for 2018-2022.

Being among one of the first countries in the world to have a State Safety Programmme (SSP) consistent with ICAO requirements, India's National Aviation Safety Plan (NASP) **incorporates the Safety Enhancement initiatives (SEI) contained in RASG-APAC and is in line with ICAO's GASP**.

The National Aviation Safety Plan (NASP) sets out a continuous improvement strategy, which helps to achieve objectives of the State through implementation of effective safety oversight and State Safety Programme.

NASP recognizes that it is important for everyone in aviation to work closely and in a collaborative manner to identify safety risks and ensure that the most appropriate practices and technologies are adopted to address and reduce these risks.

I appreciate the sincere and tireless efforts of the DGCA Safety Team in managing the State Safety Programme and achieving this goal.

(B S Bhullar)
Director General Civil Aviation

Overview

The National Aviation Safety Plan 2018-2022 is an outcome of some of the activities described in the State Safety programme (SSP), experience gained in the implementation of State Safety Plan 2015-2017, evaluation of the performance of the safety priorities and work undertaken by the stakeholders in implementation and maintenance of their Safety Management System (SMS). It also incorporates the Global Safety Priorities contained in the Global Aviation Safety Plan (GASP) and the Regional Safety Plan of (RASG-APAC).

It has been developed in partnership with the service providers and sets out the States' Acceptable Level of Safety performance in terms of aspiration goal of "No Fatal Accident" in commercial air transport aeroplane and helicopter operations including off-shore helicopter operations, effective implementation of ICAO safety related SARPs and s**afety priorities, objectives, safety performance indicators.**

To meet the objectives and targets, it incorporates action plan with the sole aim of further improving safety across the civil aviation industry. The action plan also incorporates the Safety Enhancement Initiatives (SEI) contained in RASG-APAC, which is in line with ICAO GASP.

Key Safety Priorities
- Airborne conflict
- Controlled flight into terrain
- Runway excursions and overruns
- Wildlife and bird strikes
- Loss of control in flight
- Runway Incursion and ramp safety
- Deficient maintenance
- Aviation Procedures & Documentation

Note:

1. Though the National Aviation Safety Plan is for five years, the targets are fixed for first two years (i.e. for 2018 and 2019). In the subsequent years (i.e. for 2020, 2021 & 2022), targets will be fixed based on the performance of the previous year.

2. The terms used in this document are in accordance with/defined in DGCA Civil Aviation Requirements or otherwise specified in the document.

Representation of
Acceptable Level of Safety Performance

No Fatal Accident

Effective Implementation of SPIs and Targets

Effective Implementaion of ICAO SARPs
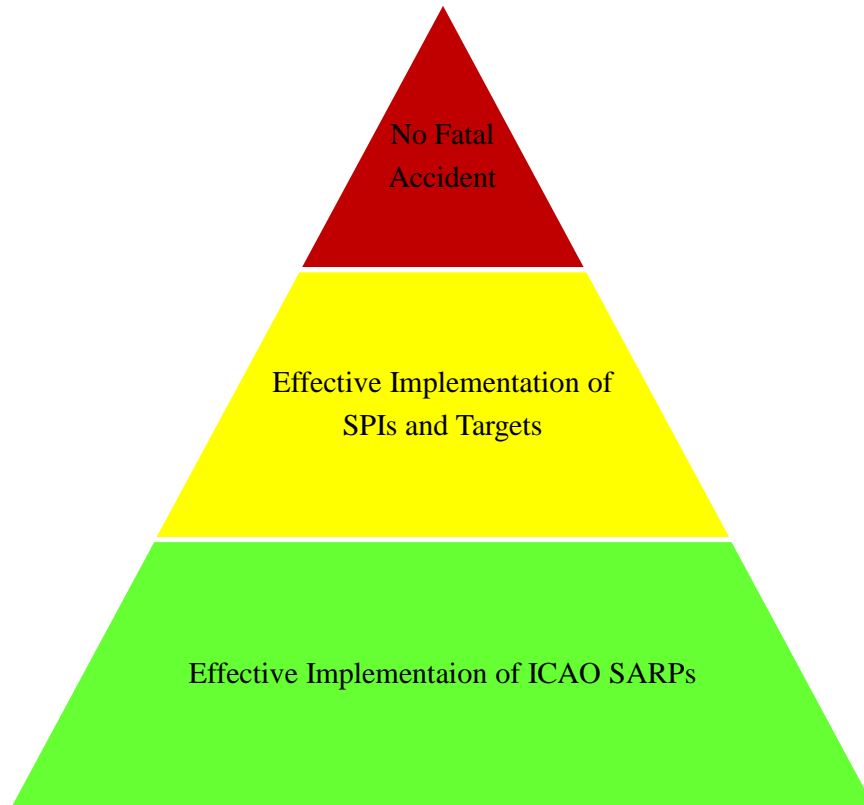
Presentation of National Aviation Safety Plan

State Safety Policy and Objectives	Key Safety Priorities		Safety Performance Indicators	Targets for Year 2018-2022
	Airborne Conflict	→	• Risk bearing Airporx • TCAS RA • Incorrect ATC Instructions • Airporx due to ATC failure • Communication errors	
	Controlled Flight into Terrain	→	• GPWS/EGPWS warning • Emergency landing of helicopter VFR flights	
	Runway Excursions and Overruns	→	• Unstabilised approach • Unstabilised approach that continue to land • Unstabilised approach while precision approach • Unstabilised approach while non-precision approach • Unstabilised approach while visual approach • Near runway excursion • Runway excursion	
	Wildlife and Bird Strikes	→	• Bird strike • Wildlife strike • Runway incursion by wildlife	
	Loss of Control in Flight	→	• Loss of control precursor events • Laser interference	
	Runway Incursion and Ramp Safety	→	• Runway incursion by aircraft • Runway incursion by vehicle • Runway incursion by person • Runway incursion involving Loss of situational awareness • Ramp incident	
	Deficient Maintenance	→	• Component/system failure • Maintenance errors	
	Aviation Procedures & Documentation	→	• Finding related to procedures • Finding related to workplace manual • Finding related to documentation	

Safety Action Plan

State Safety Objectives & Safety Risk Controls

Safety Objective (s) of Key Safety Priorities	
SO 1.1	Reduce the risk of airborne conflict
SO 2.1	Reduce the risk of CFIT events
SO 3.1	Reduce the number of runway excursions
SO 4.1	Reduce the number of wildlife strikes (ground)
SO 4.2	Reduce the number of bird strikes
SO 5.1	Reduce the number of loss of control precursor events
SO 6.1	Reduce the number of ground collisions between aircraft
SO 6.2	Reduce the number of ground collisions between aircraft and vehicles
SO 6.3	Reduce the number of ramp fatalities and serious injuries
SO 6.4	Reduce the number of runway incursions
SO 7.1	Improve the airworthiness of Indian registered passenger carrying aircraft (deficient maintenance)
SO 8.1	Improvement in Regulatory Compliances related to Procedures and Documentation
State Safety Risk Controls	
SO 9.1	Establish and maintain an appropriate regulatory framework and approach to ensure effective oversight
SO 9.2	Comply with international safety standards
SO 9.3	Ensuring qualified and trained technical personnel
SO 9.4	Prepare for the transition to a risk-based approach for regulatory oversight
SO 9.5	All service providers that have completed the implementation of SMS (as a percent of the total number) i.e. scheduled operators, non-scheduled operators, MROs, aerodrome operators and ANS service providers
SO 9.6	All other applicable service providers that have completed the implementation of SMS (as a percent of the total number) i.e. flying training and aircraft design & production organizations
SO 9.7	Service providers to develop an appropriate organisation safety culture
SO 9.8	To be able to effectively measure safety culture maturity
SO 9.9	Sharing and exchange of safety information

Summary of SPIs and Targets

SPI	Indicator	Actual 2017	Target 2018	Target 2019
1. Airborne Conflict				
1.1	Number of risk bearing AIRPROX per 10,00,000 flights over Indian airspace	1.86	1.8	1.74
1.2	Number of TCAS RA in controlled airspace leading to breach of separation per 10,00,000 flight over Indian airspace	17.09	16.57	16.07
1.3	Number of aircraft not or incorrectly complying with ATC instructions (including level bust) per 10,00,000 flights over Indian airspace	3.35	3.25	3.15
1.4	Number of AIRPROX attributable to ATC/ system failure per 10,00,000 flights over Indian airspace	8.17	7.92	7.68
1.5	Communication Errors	--	--	--
2. Controlled Flight into Terrain				
2.1	Number of GPWS/EGPWS warnings per 10,000 departures	3.31	3.21	3.11
2.2	Number of helicopter VFR flights that make emergency landing due to degraded visual environment per 10,000 departures	1.28	1.32	1.36
3. Runway Excursions and Overruns				
3.1	Number of unstabilised approaches per 10,000 approaches	6.28	6.1	5.91
3.2	Number of unstabilised approaches that continue to land per 10,000 approaches	6.65	6.45	6.25
3.3	Number of unstabilised approaches when performing a precision approach per 10,000 approaches	3.52	3.41	3.31
3.4	Number of unstabilised approaches when performing a non-precision approach (no vertical guidance) per 10,000 approaches	1.92	1.86	1.8
3.5	Number of unstabilised approaches when performing a visual approach per 10,000 approaches	0.76	0.73	0.71
3.6	Number of 'near' runway excursions per 10,000 approaches	0.01	0.01	0.01
3.7	Number of runway excursions per 10,000 approaches	0.07	0.06	0.05

SPI	Indicator	Actual 2017	Target 2018	Target 2019
4. Wildlife and Bird Strikes				
4.1	Number of reported bird strikes at all Indian airports per 10,000 movements	4.97	4.825	4.67
4.2	Number of reported wildlife strikes at all Indian airports per 10,000 movements	5.31	5.15	5.0
4.3	Number of runway incursions by wildlife at all Indian airports per 10,000 movements	0.22	0.21	0.2
5. Loss of Control in Flight				
5.1	Loss of control precursor events per 10,000 departures: • Actual stick-shaker/alpha floor • Low speed during approach events • Low speed during cruise events • Bank angle exceeding (maximum permitted) as per AFM for aircraft type • Windshear below 500 feet	0.64	0.62	0.6
5.2	Number of Laser interferences per 10,000 movements	0.16	--	--
6. Runway Incursion and ramp safety				
6.1	Number of runway incursions (aircraft) per 10,00,000 movements	7.95	7.71	7.47
6.2	Number of runway incursions (vehicle) per 10,00,000 movements	0.42	0.4	0.38
6.3	Number of runway incursions (person) per 10,00,000 movements	1.67	1.62	1.57
6.4	Number of runway incursion incidents involving loss of situational awareness by pilots, non-familiarization with aerodrome layout, distraction per 10,00,000 movements	2.09	2.02	1.95
6.5	Number of ramp incidents that result in damage to aircraft, vehicles or loss of life/ serious injury to personnel per 10,00,000 movements	25.13	24.37	23.63
7. Deficient Maintenance				
7.1	Incident involving component/system failure per 10,000 flight hours	2.3	2.23	2.16
7.2	Number of maintenance errors per 10,000 flight hours	1.53	1.48	1.43

SPI	Indicator	Actual 2017	Target 2018	Target 2019
8. Aviation Procedures & Documentation				
8.1	Regulatory audit findings related to procedures (measured in terms of percentage of total findings)	39%	38%	37%
8.2	Regulatory audit findings related to workplace Manual (measured in terms of percentage of total findings)	31%	30%	29%
8.3	Regulatory audit findings related to documentation (measured in terms of percentage of total findings)	10%	9.7%	9.4%

1

Safety Context

1.1 State Safety Programme

The Indian State Safety Programme (SSP) was initially published in November 2010 to meet the requirements of ICAO Annex 19. The SSP is an integrated set of regulations and activities describing as to how India manages and seeks the continuous improvement in aviation safety. The SSP recognises that States as well as service providers have safety responsibilities and provides a framework for all stakeholders to work together.

In compliance with the State Safety Programme, State Safety Plan 2015-2016 was developed, which extended for the year 2017. The performance of each of the State Safety Priorities has been analysed, and captured in Annual Safety Review 2016 and 2017. This has provided inputs for developing the National Aviation Safety Plan 2018-2022.

1.2 Safety Management System

Safety management principles provide a platform for parallel development of the SSP by the State and the SMS by its service providers. In developing the State Safety Legislative Framework, India has promulgated SMS requirements requiring that service providers implement their safety management capabilities allowing for the effective identification of systemic safety deficiencies and the resolution of safety concerns.

SMS is largely a performance-based system requiring the appropriate exchange of safety information with internal and external stakeholders. The State, through its SSP functions, provides both the oversight functions and facilitates implementation of appropriate data aggregation and information sharing initiatives.

1.3 Safety Indicators and Targets

Safety indicators are tactical monitoring and measurement tools of the State's safety performance. During the initial development and implementation of the SSP, the level of safety performance is normally represented by safety indicators related to high consequence outcomes (such as accident and serious incident rates) and high-level system assessment outcomes (such as effective implementation of ICAO SARPs). As the SSP matures, the level of safety performance can be complemented by indicators representing lower consequence system outcomes or deviation events. Safety performance indicators are generally monitored using basic quantitative data trending tools that generate graphs or charts and incorporate alert/target levels commonly used in technical, quality or reliability control systems.

Targets define long-term SSP safety performance objectives. They are expressed in numerical terms and must be concrete, measurable, acceptable, reliable and relevant. Targets also need to contain completion dates with milestones if it is to be achieved in phases or over an extended period of time. Targets provide a measurable way of ensuring and demonstrating the effectiveness of SSP.

The desired safety outcome is to reduce number of reported events for each SPI by 3% every year.

Though the NASP is for five years, the targets are fixed for the first two years (i.e. for 2018 and 2019). In the subsequent years (i.e. for 2020, 2021 & 2022), targets will be fixed based on the performance of the previous year.

1.4 National Aviation Safety Plan 2018-2022

The National Aviation Safety Plan 2018-2022 is an outcome of some of the activities described in the State Safety Programme (SSP), experience gained in the implementation of State Safety Plan 2015-2017, evaluation of the performance of the safety priorities and the work undertaken by stakeholders in implementation and maintenance of their Safety Management System (SMS).

SARPS as contained in ICAO Annex 19, Edition II requires that the States shall establish the acceptable level of safety performance to be achieved through their SSP. It further provides guidance that –

> *"An acceptable level of safety performance for the State can be achieved through the implementation and maintenance of the SSP as well as safety performance indicators and targets showing that safety is effectively managed and built on the foundation of implementation of existing safety-related."*

1.5 India Acceptable Level of Safety Performance

(a) No fatal accidents in the commercial Air transport operation of aeroplane and helicopters including offshore helicopter operations.

(b) Effective Implementation of ICAO SARPS and achieving overall effective implementation of 80%.

(c) Effective Implementation of State safety priorities, safety performance indicators and the targets.

2

Safety Focus

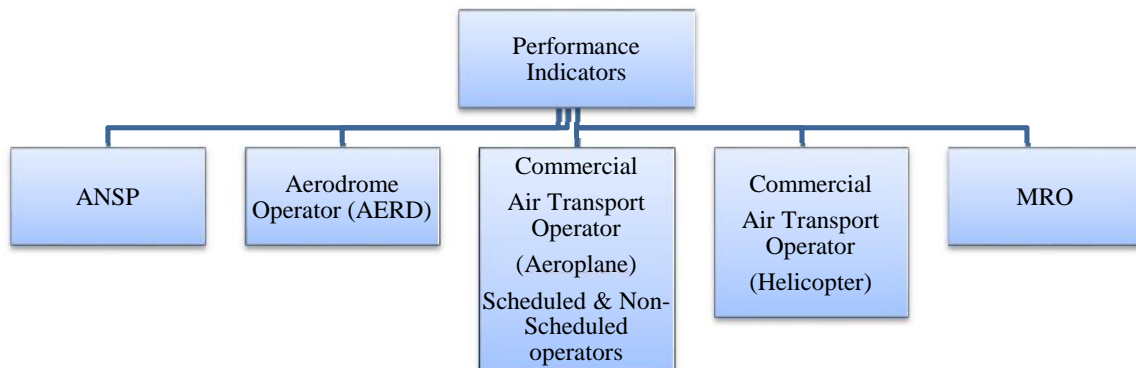## 2.1 State Safety Priorities

Based on the Global safety priorities, Regional safety priorities and using our own experience, supported by data from the State Safety Database, the DGCA is targeting eight State **Safety Priorities**. These are:

- *Airborne conflict*
- *Controlled flight into terrain*
- *Runway excursions and overruns*
- *Wildlife and bird strikes*
- *Loss of control in flight*
- *Runway Incursion and ramp safety*
- *Deficient maintenance*
- *Aviation Procedures & Documentation*

These will provide a focus for the DGCA and the wider-aviation community during the year 2018 and 2022.

For each **State Safety Priority**, we have developed **safety objectives**; proposed **desired safety outcome;** developed safety **action plan** and a number of **Safety Performance Indicators (SPIs).**

The SPIs have been identified as per the applicable stakeholder as illustrated below:

```
                        ┌─────────────────┐
                        │   Performance   │
                        │   Indicators    │
                        └────────┬────────┘
     ┌────────────┬──────────────┼──────────────┬────────────┐
┌─────────┐ ┌───────────┐ ┌──────────────┐ ┌───────────┐ ┌────────┐
│  ANSP   │ │ Aerodrome │ │  Commercial  │ │Commercial │ │  MRO   │
│         │ │ Operator  │ │Air Transport │ │    Air    │ │        │
│         │ │  (AERD)   │ │   Operator   │ │ Transport │ │        │
│         │ │           │ │  (Aeroplane) │ │  Operator │ │        │
│         │ │           │ │Scheduled &   │ │(Helicopter)│ │        │
│         │ │           │ │Non-Scheduled │ │           │ │        │
│         │ │           │ │  operators   │ │           │ │        │
└─────────┘ └───────────┘ └──────────────┘ └───────────┘ └────────┘
```

These are explained in more detail in Sections 3, 4 and 5.

2.2 Monitoring Effectiveness of Safety Risk Controls

In addition to focusing on State Safety Priorities, it is important that the effectiveness of key State Safety risk controls is measured and continuously improved. The focus for the years 2018 to 2022 will be on ensuring the following:

- *Effective State safety oversight;*
- *Implementation of service providers' Safety Management System;*
- *Implementation of recommendations emanating from accidents, serious incidents, incidents and AIRPROX events;*
- *Progressive adoption of aviation safety culture;*
- *Addressing significant safety concerns raised by ICAO and implementation of other ICAO provision; and*
- *Safe operations of Remotely Piloted Aircraft System (RPAS).*

3

State Safety Priorities
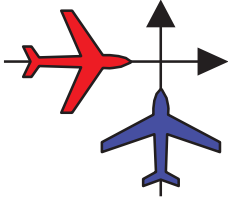
SP1: Airborne Conflict
Whilst technology has helped reduce the number of actual airborne collisions, even a single event can cause huge loss of life. This undermines confidence in Indian aviation and, in turn, will impact the Indian economy as a whole.

Table 3.1-SP1 Safety Measures Already in Place

DGCA References	Safety Measures Already in Place
CAR Section 2, Series I, Part VIII	ACAS is mandatory for all operators operating air transport services to, through within and over flying Indian airspace
Operations Circular 07 of 2010	Guidance material published on ACAS performance based training
Operations Circular 07 of 2010	Promotion of the use of simulators and interactive CBT for ACAS training
AIC 02 of 2017	Guidelines on Avoiding Confusing/Similar Call-Signs by Airline Operators

The **safety objective** (SO 1.1) is to reduce the risk of airborne conflict occurring through tracking and actively managing events that can lead to a collision.

Safety Action Plan:

Table 3.2-SP1 Safety Objectives

Safety objective(s)	Action	Stakeholder(s)

SO 1.1: Reduce the risk of airborne conflict	a. All air operators shall provide training to relevant staff that includes:
	  i. Detailed classroom sessions on TCAS including limitations of RA for the pilots and ATCOs
	  ii. CRM training for pilots with specific emphasis on situational awareness with respect to traffic
	  iii. Ensuring understanding of the guidelines issued for ACAS command during recurrent training of pilots.
	  iv. Procedure to be reviewed for critical airspace wherein the maximum number of TCAS-RA are being reported
	  v. Follow standard departure, arrival and route procedures
	
	b. Regular proficiency check and structured refreshers for ATCOs
		1. Air Operators
		
		2. ANS Provider

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 3.3-SP1 SPIs

SPI	Metrics	Stakeholder	Reported in 2017
1.1	Number of risk bearing AIRPROX per 10,00,000 flights over Indian airspace	ANSP & CAO	1.86
1.2	Number of TCAS RA in controlled airspace leading to breach of separation per 10,00,000 flight over Indian airspace	CAO	17.09
1.3	Number of aircraft not or incorrectly complying with ATC instructions (including level bust) per 10,00,000 flights over Indian airspace	ANSP	3.35
1.4	Number of AIRPROX attributable to ATC/system failure per 10,00,000 flights over Indian airspace	ANSP	8.17
1.5	Communication Errors	CAO, CHO, ANSP	

Note: Risk Bearing AIRPROX: Category A & B as per Air Safety Circular 05 of 2009.

SP2: Controlled Flight into Terrain

Controlled Flight into Terrain (CFIT) events are one of the most common causes of accidents. Whilst technology has made certain amount of intervention, however, this is still a key area of concern for scheduled, non-scheduled fixed-wing and helicopter operations.

CFIT accidents are caused due to lack of flight crew vertical/horizontal position awareness in relation to ground, water or obstacle. More than two-thirds of all CFIT accidents have occurred due to the result of altitude error or lack of vertical situational awareness. The CFIT accidents also occur during reduced visibility associated with instrument meteorological conditions, darkness or a combination of both the conditions.

MSAWS alerts the air traffic controller with both visual and aural alarms when an airplane penetrates, or is predicted to penetrate, a predetermined MSA in the protected terminal area. The GPWS warning is normally the flight crew's last opportunity to avoid CFIT. Incidents and accidents have occurred because flight crew have failed to make timely and corrective action in response to the GPWS warnings.

Table 3.4-SP2 Safety Measures Already in Place

DGCA References	Safety Measures Already in Place
CAR Section 2, Series I, Part VII	Implementation of ICAO Standards for installation of GPWS equipment
Operations Circular 02 of 2017	Guidance on training programme on use of GPWS
Operations Circular 09 of 2017	Approach and Landing Accidents Reduction (ALAR) and Controlled flight into terrain (CFIT) reduction tool kit
Air Safety Circular 09 of 2013	Non-punitive policy towards helicopter pilots who decided to abort the mission and carryout safe forced landing due to deteriorating weather conditions

The safety objective (SO 2.1) is to further reduce the risk of CFIT events occurring through tracking and actively managing events that can lead to a collision.

Safety Action Plan:

Table 3.5-SP2 Safety Objective

Safety objective(s)	Action	Stakeholder(s)
SO2.1: Reduce the risk of CFIT events	a. Emphasize, monitor and enforce pilots to carry out instrument approaches, follow all stabilized approach criteria and SOPs for approach and landing b. CFIT awareness programmes, through ALAR Tool Kit and training films with correlation of similar incidents c. Training modules covering situational awareness mainly on changeover from auto flight to manual flight, standard	1. Air Operators 2. Indian MET Dept.

Safety objective(s)	Action	Stakeholder(s)
	phraseology, adherence to checklists, altimeter settings and availability of serviceable landing aids, terrain specific warnings e.g. EGPWS/GPWS d. Analysis and follow-up of EGPWS events e. Assessments during Line checks f. Helicopter operations, provision for improved MET forecast even at uncontrolled airfields g. Strict monitoring and enforcement of MET minima	

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 3.6-SP2 SPIs

SPI	Metrics	Stakeholder	Reported in 2017
2.1	Number of GPWS/EGPWS warnings per 10,000 departures	CAO, CHO	3.31
2.2	Number of helicopter VFR flights that make emergency landing due to degraded visual environment per 10,000 departures	CHO	1.28
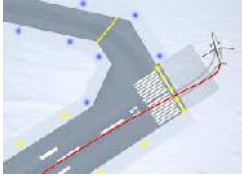
SP3: Runway Excursions and Overruns

Globally, runway excursions and overruns are the cause of more accidents and serious incidents than any other single cause. Both remain a significant problem in India, particularly during the monsoon season.

Table 3.7-SP3 Safety Measures Already in Place

DGCA References	Safety Measures Already in Place
CAR Section 2, Series I, Part VII	Implementation of ICAO Standards for installation of GPWS equipment
Operations Circular 01 of 2013	Non-punitive policy towards pilots who decide to go around
Operations Circular 03 of 2014	Guidance on all weather operations training programme
Operations Circular 03 of 2017	Guidance on unstable approaches
Operations Circular 09 of 2017	Approach and Landing Accidents Reduction (ALAR) and Controlled flight into terrain (CFIT) reduction tool kit
Air Safety Circular 02 of 2017	Guidance on procedures to be followed during non-availability of RESA
CAR Section 4, Series B, Part I	Guidance on RESA has been included
CAR Section 8, Series C, Part I	All Weather Operations

The **safety objective** (SO 3.1) is to reduce number of runway excursions at all India airports and at all times of the year.

Safety Action Plan:

Table 3.8-SP3 Safety Objective

Safety objective(s)	Action	Stakeholder(s)
SO3.1: Reduce the number of runway excursions	a. All air operators shall provide a training module to includes: i. CRM class: • Increased emphasis on coordination between two pilots with respect to traffic clearances given by ATC ii. Flight Safety Class: • Causes of runway excursions • Increased emphasis on situational awareness with respect to traffic on approach/departures/taxiing on runways iii. Simulator training: • On performance limited airfields • Stabilized approaches • Training on cross-wind landings to a level required for operations b. Continuous periodic monitoring through route/ in-flight	Air Operators

Safety objective(s)	Action	Stakeholder(s)
	checks c. FOQA monitoring of landings made beyond the touchdown zone of the runway (Extended/long flare). d. In case of non-precision approach, the operators are encouraged to carryout Continuous Descent Final Approach Technique (CDFA) Specialized ALAR Tool Kit training on visual illusion faced while transitioning to visual segment of approach	

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 3.9-SP3 SPIs

SPI	Metrics	Stakeholder	Reported in 2017
3.1	Number of unstabilised approaches per 10,000 approaches	CAO	6.28
3.2	Number of unstabilised approaches that continue to land per 10,000 approaches	CAO	6.65
3.3	Number of unstabilised approaches when performing a precision approach per 10,000 approaches	CAO	3.52
3.4	Number of unstabilised approaches when performing a non-precision approach (no vertical guidance) per 10,000 approaches	CAO	1.92
3.5	Number of unstabilised approaches when performing a visual approach per 10,000 approaches	CAO	0.76
3.6	Number of 'near' runway excursions per 10,000 approaches	AERD, CAO	0.01
3.7	Number of runway excursions per 10,000 approaches	AERD, CAO	0.07

Note:
'Near' Runway Excursion is an occurrence where aircraft is not able to maintain the directional stability on the runway which may result in damage to the runway edge/end lights. However, aircraft continues to remain on the paved surface.

SP4: Wildlife and Bird Strikes

Wildlife and bird strikes pose a significant threat to flight safety and have caused a number of accidents, including incidents in India. Most incidents occur at the critical phase of flight resulting into structural damage, as well as damage to aircraft systems. As such, both wildlife and bird strikes remain a major focus for the DGCA.

Table 3.10-SP4 Safety Measures Already in Place

DGCA References	Safety Measures Already in Place
a. Order No. AV-15023/1/2009-AS (NBCC) dated 02.12.2013 b. Revised order dated 20.04.2017	National Bird Control Committee
Ministry of Home Affairs Letter No. 53/1/80-Public dated 07.05.1980	Airfield Environment Management Committees
Rule 91, Aircraft Rules 1937	Primary legislation (Aircraft Rules) preventing dumping of garbage and de-skinning of animals within a 10 km radius around airport
Recommendation of NBCC	Education and outreach programmes
Recommendation of NBCC	Extensive audits and inspections
Air Safety Circular 02 of 2011	Comprehensive data collection activities
Aerodrome Circular 06 of 2017	Guidance on Wildlife Hazard Management

The **safety objectives** (SO 4.1 and 4.2) are to reduce the number of wildlife and bird strike events at Indian airports.

Safety Action Plan:

Table 3.11-SP4 Safety Objectives

Safety objective(s)	Action	Stakeholder(s)
SO4.1: Reduce the number of wildlife strikes (ground) SO4.2: Reduce the number of bird strikes	a. Reiterate generation of pilot reports on wildlife sighting b. Awareness campaign in localities and schools regarding wildlife hazards c. Dedicated team managed by trained staff to ensure implementation of wildlife strike control measures d. Review of existing mitigation action and identify the areas of improvement with airport management e. Appraise administration of all the State Government, through communication to the Chief Secretaries of the States on the importance of compliance of Rule 91 of the Aircraft Rules 1937 f. Instruct management of all airports to take effective steps for mitigation of wildlife hazard g. Detailed study of the wildlife species around the airport. h. Adoption of Habitat Management Strategies	1. Air Operators 2. Aerodrome Operators

Implementation of this Safety Action Plan is a continuous process.

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 3.12-SP4 SPIs

SPI	Metrics	Stakeholders	Reported in 2017
4.1	Number of reported bird strikes at all Indian airports per 10,000 movements	ANSP, AERD, CAO, CHO	4.97
4.2	Number of reported wildlife strikes at all Indian airports per 10,000 movements	ANSP, AERD, CAO, CHO	5.31
4.3	Number of runway incursions by animal at all Indian airport per 10,000 movements	ANSP, AERD, CAO, CHO	0.22

SP5: Loss of Control in Flight

Loss of control can be caused by many events, such as system or component failure, aircraft damage or even severe weather. However, the most significant secondary cause of accidents resulting from a loss of control relates to 'control upset' either induced by the pilot and/or when operating at low altitude, such as final approach and landing.

Table 3.13-SP5 Safety Measures Already in Place

DGCA References	Safety Measures Already in Place
Operations Circular 03 of 2011	Guidance material for training of pilots in high altitude and high speed flights
CAR Section 5, Series F, Part-II	100% Flight Data Monitoring by the operators
CAR Section 8 Series H Part II	Flight Crew Training and Qualification Requirements for Commercial Helicopter Operations

The **safety objective** (SO5.1) is to reduce the number of loss of control pre-cursor events.

Safety Action Plan:

Table 3.14-SP5 Safety Objective

Safety objective(s)	Action	Stakeholder(s)

SO5.1: Reduce the number of loss of control pre-cursor events	a. All air operators shall provide a training module (i.e. initial and recurrent) to include:
	  i. Upset recovery and preventive training
	  ii. Assessment/detection of wind shear
	  iii. Practice of stall recovery in landing configuration during approach with emphasis on speed control and thrust management (simulator training)
	  iv. Training for high altitude operation including speed management, knowledge of buffet margins, high altitude stall recovery
	b. Emphasis on stabilised approaches
	c. Laying down max. bank angle limits, monitoring of EGPWS call-outs in SSFDR and subsequent analysis of bank angle exceedences
	d. SOP to deal with windshear during take-off and landing
	e. Training of helicopter pilots on condition leading to IIMC, immediate actions on encountering IIMC and subsequent action for its safe recovery
	f. Helicopter operators are required to follow SOPs/limitation of RFM specially operating when engaged in off-shore/hill operations
		Air Operators

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 3.15-SP5 SPIs

SPI	Metrics	Stakeholder	Reported in 2017
5.1	Loss of control precursor events per 10,000 departures: • Actual stick-shaker and alpha floor • Low speed during approach events • Low speed during cruise events • Bank angle exceeding (maximum permitted) as per AFM for aircraft type • Windshear below 500 feet	CAO	0.64
5.2	Laser interference	CAO, CHO, ANSPs	0.16

Note: Low speed during approach event: V_{APP} – 5 knots at 100 feet
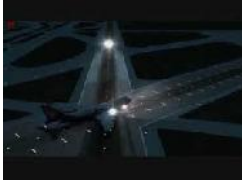
SP6: Runway Incursion and Ramp Safety

Ground collisions also result into numerous serious incidents. There was one reported fatality and numerous injuries in 2013, as such this remains one of the DGCA's safety priorities.

Table 3.16-SP6 Safety Measures Already in Place

DGCA References	Safety Measures Already in Place
CAR Section 4, Series X, Part I	Runway safety Programme and formation of Runway Safety Team
Air Safety Circular 04 of 2007	Guidance material issued for safety on the apron
Aerodrome Advisory Circular 04 of 2017	Guidance on establishment of Apron Management Service at an aerodrome
CAR Section 4, Series B, Part I	Aerodrome Design and Operations- Guidance on installation of Stop Bars

The **safety objectives** (SO 6.1, 6.2, 6.3 and 6.4) are to reduce the number of ground collisions between aircraft, ground collisions between vehicles and aircraft and the number of fatalities and serious injuries occurring on the ramp.

Safety Action Plan:

Table 3.17-SP6 Safety Objectives

Safety objective(s)	Action	Stakeholder(s)
SO6.1: Reduce the number of ground collisions between aircraft SO6.2: Reduce the number of ground collisions between aircraft and vehicles SO6.3: Reduce the number of ramp fatalities and serious injuries SO6.4 Reduce the number of runway incursions	a. Airlines and airport operators shall ensure training of vehicle drivers to follow speed control and know the sensitive areas b. Airport operators shall introduce and ensure the effective uttilization of ATC ground surveillance at all high density airports c. Airport operators shall introduce training to ATCOs on prevention of runway incursions d. Improved signage in accordance with ICAO SARPs e. Airport operators shall introduce Breathe Analyzer tests for all drivers & equipment operators on airport premises f. Operators shall review existing taxing and towing procedures and update them to include: • Adherence to SOPs on ramp • Adherence to SOPs for towing/taxiing • Utilization of wing walkers during pushback/taxi in/out	1. Air Operators 2. Airport Operators 3. ANS Providers

Safety objective(s)	Action	Stakeholder(s)
	g. All air operators shall develop training program to include: • Understanding the importance of signages, marking and lighting • Familiarization with operating aerodrome layout and taxi procedures specific to the aerodromes • Increased alertness levels amongst crew while taxiing • Following correct taxiways and speed limits • Clear and unambiguous RT between aircraft and ATC • Meticulous adherence to ground markings and awareness of works in progress at an airfield h. Intermediate holding position marking and lights at all high density airports i. All airport operators shall develop and introduce procedures to significantly reduce vehicular movements on the maneuvering area during LVP/bad weather j. All airport operators shall provide stop bars at airports with high intensity operations.	

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 3.18-SP6 SPIs

SPI	Metrics	Stakeholders	Reported in 2017
6.1	Number of runway incursions (aircraft) per 10,00,000 movements	ANSP, AERD, CAO, CHO	7.95
6.2	Number of runway incursions (vehicle) per 10,00,000 movements	ANSP, AERD	0.42
6.3	Number of runway incursions (person) per 10,00,000 movements	ANSP, AERD	1.67
6.4	Number of runway incursion incidents involving loss of situational awareness by pilots, non-familiarization with aerodrome layout, distraction per 10,00,000 movements	CAO, CHO	2.09
6.5	Number of ramp incidents that result in damage to aircraft, vehicles or loss of life/ serious injury to personnel per 10,00,000 movements	CAO, CHO, AERD	25.13

SP7: Deficient Maintenance

There are currently a large proportion of incidents that occur as a result of component failure. Understanding and addressing these is a key safety priority during this period.

Table 3.19-SP7 Safety Measures Already in Place

DGCA References	Safety Measures Already in Place
CAR M & CAR 145	Component failure
	Maintenance errors

The **safety objective** (SO 7.1) is to improve the maintenance of Indian registered passenger carrying aircraft, thereby reducing the number of incidents relating to maintenance issues.

Safety Action Plan:

Table 3.20-SP7 Safety Objective

Safety objective(s)	Action	Stakeholder(s)
SO 7.1: Improve the airworthiness of Indian registered passenger carrying aircraft	a. Review of qualifying requirements for licensing of technical personnel due to advancement of technology b. DGCA, with the support of relevant service providers, shall develop programmes to encourage voluntary reporting in technical work through a non-punitive approach c. Integration of avionic system training along with other airframe/ engine system d. Improve the qualifying requirement of senior technicians	1. DGCA 2. Air Operators

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 3.21-SP7 SPIs

SPI	Metrics	Stakeholder	Reported in 2017
7.1	Incident involving component/system failure per 10,000 flight hours	CAO and CHO	2.3
7.2	Number of Maintenance errors per 10,000 flight hours	CAO, CHO MRO	1.53

<u>Note</u>:   The maintenance errors may include the following:
- i)   Failure to follow published technical data or local instructions
- ii)   Using unauthorized procedure not referenced in technical data
- iii)   Supervisors accepting non-use of technical data or failure to follow maintenance instructions
- iv)   Failure to document maintenance properly in maintenance records, work package
- v)   Inadequate/unrecognised maintenance
- vi)   Incorrectly installed hardware on an aircraft/engine
- vii)   Performing an unauthorized modification to the aircraft
- viii) Failure to conduct a tool inventory after completion of the task
- ix)   Personnel not trained or certified to perform the task
- x)   Ground support equipment improperly positioned for the task

SP8: Aviation Procedures & Documentation

DGCA prepares Annual Surveillance Programme (ASP) based on experience gained during the past years comprising of safety oversight plan of all Directorates. The respective directorate carry out the audits and the surveillance activities as per plan. In the years 2016 and 2017, regulatory audits of various air operators carried out revealed the major deficiencies in the area of procedures, documentation and workplace manuals which almost contributed to the an average of 70% of the regulatory audit findings. Based on the data analyzed for two consecutive years, DGCA India has introduced a new State priority on the Aviation Procedures & Documentation.

Table 3.20-SP7 Safety Measures Already in Place

DGCA References	Safety Measures Already in Place
Civil Aviation requirements and Circulars	Regulations and guidance related to development and establishment of procedures, manual, documentation related to aviation are elaborately given in relevant CARs, Circulars, etc.

The **safety objective** (SO8.1) is to improve the regulatory compliances related to Procedures and Documentation amongst aviation service providers for ensuring safe operations.

Safety Action Plan:

Table 3.21-SP8 Safety Objective

Safety objective(s)	Action	Stakeholder(s)
SO8.1: Improvement in regulatory compliances related to Procedures and Documentation	1. Monitoring on Regulatory Documents on related websites to be current with new updates 2. Proper dissemination of information gathered to the concerned departments and affected personnel 3. Proper maintenance of data and records 4. Conduct internal surveys to check on the effectiveness of the above action points	Air Operators

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 3.22-SP8 SPIs

SPI	Metrics	Stakeholder	Reported in 2017 (%)
8.1	Regulatory audit findings related to Procedures (measured in terms of percentage of total findings)	DGCA	39
8.2	Regulatory audit findings related to Workplace Manual (measured in terms of percentage of total findings)		31
8.3	Regulatory audit findings related to Documentation (measured in terms of percentage of total findings)		10

<u>Note</u>:   Description of the events involved in the above mentioned factors are as follows:

1. **Procedure:** Non-compliance of agreed/ approved procedure by responsible person/ organization, system not established as per requirement, etc.
2. **Workplace manual:** Includes all manuals, procedure/SOPs/Manuals/ documents out of date/obsolete, procedure poorly defined, manual/ documents not easily available, etc.
3. **Documentation:** Lack of training records, safety surveys, etc.

4

Emerging Safety Issues

In addition to the state safety priorities, this chapter addresses emerging safety issues as well as issues that could potentially emerge in the immediate or near future. The safety issues detailed are driven from operations or regulations that have not been fully deployed, and it provides a future platform for National Aviation Safety Plan.

4.1 Civil Drones (Unmanned Aircraft Systems)

Current Status
DGCA India has recently published Civil Aviation Requirements on "Operations of Civil Remotely Piloted Aircraft System" which will be effective from 1st December, 2018. India is expected to have huge number of RPAS by year 2021. Industries such as agriculture, construction, surveying, roads, railway, mining, aerial filming, forest and environment study, etc. would be stimulated to a great extent.

An Online/ web based single window system 'Digital Sky' for issue of Unique Identification Number (UIN), Unmanned Aircraft Operator Permit (UAOP), and day-to-day operation of RPAS is being developed. The RPASs will be embedded with encrypted firmware to receive permissions through 'Digital Sky Application' each time before take-off. The Digital Sky platform works on 'No Permission – No Take-off (NPNT)' concept.

Way Forward
- DGCA to monitor the effectivity of the published regulations in respect of RPAS.
- DGCA to coordinate with other agencies for safe and smooth operations of RPAS in the country.
- Harmonized regulations for small RPAS around the globe are required. Evidently, RPAS has huge potential to help create jobs, increase skill base and increase the efficiency of industries across the country and worldwide. This will also boost industries associated in the development of this technology. However, the need of the hour is to facilitate RPAS market with globally harmonized regulations even for small RPAS.

4.2 Emerging SPI in Airborne Conflict

4.2.1 Communication Errors

Current Status
There are large number of incidents occurred in the recent past which have been attributed to improper communication or miscommunication between air traffic controllers and pilots such as, incorrect phraseologies, inappropriate use of plain English, absence of read-back or absence of correction or acknowledgement to read-back, pilot's/controller's complacency, selective hearing and hearing expectancy.

These errors come to the notice only during the investigation of incidents. However there is a

possibility that the number of communication errors taking place, which have not resulted in any incidents, would go unnoticed.

Way Forward
As a preventive measure, DGCA has asked AAI to maintain database of such communication errors through voluntary reporting system so that necessary action may be taken to prevent such errors in future. Voluntary reporting of such errors which do not result in any incident should be treated as non-punitive so that pilots & controllers may report fearlessly and freely.

4.3 Emerging SPI in Loss of Control in flight

4.3.1 Laser Interferences

Cases where laser interference was perpetrated in India or where laser interference perpetrated against an Indian aircraft abroad was reported.

Current Status
A total of 39 (i.e. 0.16 per 10000 movements) cases of laser interferences have been reported in the recent past at major cities (Delhi and Mumbai) during landing and take-off. DGCA has issued Civil Aviation Requirements on Laser emissions which may endanger the safety of aircraft.

Way Forward
- Aiming a laser at an aircraft, especially during approach and landing, may blind the flight crew and lead to a loss of control during a critical phase of flight, potentially causing a serious incident/accident. Public awareness is essential for preventing the occurrence of such incidents.
- For further development of safety risk control in this aspect, it is required to monitor the emerging seriousness of this issue. All aerodrome operators need to maintain and report the data of such laser interferences.
- Based on the occurrences of laser interferences reported in the year 2018, targets and action plan for the upcoming years will be defined.

4.4 Emerging threat in Ground Handling Services

Ground handling activities include ground handling personnel, use of vehicles & GSEs, aircraft refueling, removal of FOD, restricted dangerous goods etc. They help in running commercial flight operations smoothly, and also play a major role in flight safety. Personnel/operators on ground in the Aircraft Restricted Area are in a better position to detect damages/leaks etc. on the aircraft because of their close vicinity to the aircraft till it departs.

Current Status
DGCA through its CAR Section 1 Series C Part 1 on "Safety Management System" mandates implementation of SMS among sub-contractors through interface management. DGCA fixes the responsibility of oversight of implementation of SMS among sub-contractors i.e. ground handling agencies on aircraft operators.

Way Forward

Safety management of ground handling is one of the issues that still needs follow-up. It is essential to encourage safety reporting among the ground handlers to identify the serious threats to aircraft on ground. Based on the data analyzed, the following areas need attention with regard to ground handling:

- Reporting of hazards an threats in ground handling;
- Promotion of the safety culture;
- Implementation of the safety management system;
- Effective oversight on Ground handling agencies

5

Safety Risk Controls

5.1 Effective State Safety Oversight

Indian aviation is in a state of continuous change and will become increasingly automated and far more complex. Safety oversight will be based on predictive and proactive methodologies.

A key focus for the DGCA during the period of this Safety Plan will continue to be on ensuring that it remains fit-for-purpose and continues to provide an appropriate and effective level of regulatory and safety oversight that balances needs of the industry, travelling public and the international community.

The key **safety objectives** (SO9.1-9.4) and our proposed **action plan** are summarised below:

Table 5.1-Key Safety Objectives

Safety objective(s)	Action	Stakeholder (s)	Target date
SO9.1: Establish and maintain appropriate regulatory framework and approach to ensure effective oversight	DGCA shall conduct periodic reviews of all regulations to ensure applicability and compliance with best practice	DGCA	On-going
	DGCA shall develop new regulations in consultation with relevant service providers	1. DGCA 2. Service providers	On-going
	DGCA shall increase the level of compliance with ICAO SARPs and the EI of the CEs at the National Level	DGCA	On-going
SO9.2: Comply with international safety standards	DGCA shall routinely assess itself against ICAO and other requirements to ensure ongoing compliance	DGCA	On-going
SO9.3: Ensuring qualified and technical personnel	DGCA shall recruit, train and maintain a competent workforce to support regulatory oversight	DGCA	On-going
	DGCA shall identify the training requirements to implement the necessary oversight mandate	DGCA	On-going
SO9.4: Prepare for transition for a risk based approach for regulatory oversight	DGCA shall establish necessary processes to ensure availability and quality of data to enable it to progressively transition to risk-based approach for regulatory oversight	1. DGCA 2. Service providers	On-going

5.2 Effective Safety Management System

As part of State Safety Programme and National Aviation Safety Plan, major operators have developed their Safety Performance Indicators, associated targets and alert levels, which are congruent with the State SSP aggregate Safety Indicators and are also pertinent with the service provider's aviation activities.

The revised CAR Section1, Series C, Part 1 on "Safety Management System" provides guidance to applicable service providers on the phase-wise implementation of SMS as per ICAO Doc 9859.

Based on the guidelines of ICAO Annex 19, DGCA has published SSP Circular 03 of 2017 which provides further guidance to operators in general aviation category on implementation of SMS. Operators are encouraged to carry out safety risk assessments for any major change viz. operations to new airport, induction of aircraft etc. For review of the safety risk assessments submitted by service provider, dedicated group has been set up in DGCA.

The safety objectives (SO9.5 and 9.6) are for 100% implementation of SMS by service providers on or before December 2022.

The key **safety objectives** (SO9.5-9.6) and proposed **action plan** are summarised below:

Table 5.2-Effective Safety Management Systems - Action Plan

Safety objective(s)	Action	Stakeholder(s)	Target date
SO9.5: Number of service providers that have completed the implementation of SMS (as a percent of the total number) i.e. scheduled operators, non-scheduled, MROs, aerodrome operators and ANS service providers	DGCA shall formally assess the progress of each service provider and provide guidance in order to achieve full compliance	1. DGCA 2. Service providers	31 Dec 2019
SO9.6: Number of other applicable service providers that have completed the implementation of SMS (as a percent of the total number) i.e. flying training and aircraft design & production organizations	DGCA shall provide all applicable service providers with initial guidance and follow-up with an assessment of their progress and provide additional direction as necessary	1. DGCA 2. Flying training and aircraft design & production organizations	31Dec 2020

5.3 Progressive Adoption of Aviation Safety Culture

DGCA has adopted an appropriate safety culture, which has encouraged reporting and helped in reduce risk across the aviation sector which continues to be a major challenge.

Therefore, the safety objectives in this area (SO9.7 and 9.8), are aimed at progressing the development of a safety culture amongst all service

providers' staff, initially evidenced by increased reporting and a willingness to share more safety related information, and to develop a means of measuring the safety culture of an organisation.

The key safety objectives **(SO9.7-9.8) and our proposed** action plan **are summarised below:**

Table 5.3-Aviation Safety Culture - Action Plan

Safety Objective(s)	Action	Stakeholder(s)	Target date
SO9.7: Service providers will develop an appropriate organisation safety culture	DGCA shall provide guidance to all service providers	DGCA	On going
	Service providers shall develop and implement safety promotion and plan for all staff	Service Providers	On going
SO9.8: To be able to effectively measure safety culture maturity	a. DGCA, while working with other stakeholders shall develop a means to measure and assess safety culture maturity b. ICAO checklist for assessment of safety culture will be used	DGCA	31 Dec 2020

The effectiveness of actions will be assessed by tracking the following SPIs:

Table 5.4 SPIs

SPI	Indicator
9.1	Number of MORs received
9.2	Number of voluntary or confidential reports received through State Voluntary Reporting System

5.4 Safety Information Exchange
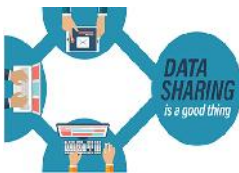
The sharing and exchange of safety information is a prime component of State objectives. In order to enhance the sharing and exchange of information, DGCA communicates and disseminates safety information as well as safety analysis both internally and externally which identifies and mitigates safety risks.

Therefore, the final safety objective (SO9.9) is aimed at sharing and exchange of information which is already in place and included in DGCA Procedures Manual.

The protection of safety information is significant to the sharing and exchange of safety information initiatives, and the guidance related is included in DGCA Civil Aviation Requirements on "Safety Management System".

Table 5.5-Sharing and Exchange of Information

Safety Objective(s)	Action	Stakeholder(s)	Target date
S08.9 Sharing and exchange of information	a) DGCA shall carry out internal training, communication and dissemination of safety information. b) DGCA shall carry out external training, communication and dissemination of safety information.	DGCA	Ongoing

5.5 Safety Management System Implementation by Operators

Following performance indicators (Table 5.5) will be monitored in future for which relevant data is being collected.

Table 5.6 SPIs

SPI	Indicator
10.1	Number of service providers that have completed the implementation of Phase- I of SMS as per CAR Section 1, Series C, Part I
10.2	Number of service providers that have completed the implementation of Phase- II of SMS as per CAR Section 1, Series C, Part I
10.3	Number of service providers that have completed the implementation of Phase- III of SMS as per CAR Section 1, Series C, Part I
10.4	Number of service providers that have completed the implementation of Phase- IV of SMS as per CAR Section 1, Series C, Part I

Glossary

Acronym	Definition
ACAS	Airborne Collision Avoidance System
AERD	Aerodrome Operators
AFM	Airplane Flight Manual
AIRPROX	Air Proximity incident
ALA	Approach and Landing Accidents
ALAR	Approach and Landing Accidents Reduction
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Control Officers
CAO	Commercial Aeroplane Operators
CAR	Civil Aviation Requirement
CBT	Computer Based Training
CE	Critical Element
CFIT	Controlled Flight Into Terrain
CHO	Commercial Helicopter Operators
CRM	Crew Resource Management
DGCA	Directorate General of Civil Aviation
EGPWS	Enhanced Ground Proximity Warning System
EI	Effective Implementation
GASP	Global Aviation Safety Plan (ICAO)
GPWS	Ground Proximity Warning System
GSE	Ground Support Equipment
ICAO	International Civil Aviation Organization
LVP	Low Visibility Procedure
MET	Meteorology
MORS	Mandatory Occurrence Reporting System
MRO	Maintenance Repair and Overhaul
MSA	Minimum Safe Altitude

Acronym	Definition
MSAWS	Minimum Safe Altitude Warning System
NSOPs	Non Scheduled Operator Permit
RA	Resolution Advisory
RASG-APAC	Regional Aviation safety Group- Asia Pacific
RFM	Rotary Flight Manual
RPAS	Remotely Piloted Aircraft System
RT	Radio Telephony
SARPs	ICAO Standards and Recommended Practices
SEI	Safety Enhancement Initiatives
SMS	Safety Management System
SO	Safety Objective
SOPs	Standard Operating Procedures
SPI	Safety Performance Indicator
SSFDR	Solid State Flight Data Recorder
SSP	State Safety Programme
TCAS	Traffic Collision Avoidance System
UAOP	Unmanned Aircraft Operator Permit
UIN	Unique Identification Number
VFR	Visual Flight Rules