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Safety Performance Indicators and Targets of AAI

1 Introduction

Safety Management System (SMS) framework consist four components which includes twelve elements, representing minimum requirements for SMS implementation. Safety Assurance is one of the component to be implemented in fourth phase of SMS implementation.

Safety assurance consists of processes and activities undertaken by the service provider to determine whether the SMS is operating according to expectations and requirements. The service provider continually monitors its internal process as well as its operating environment to detect changes and deviations that may introduce emerging Safety risks or degradation of existing risk controls.

DGCA CAR Section 1, Series C Part I, dated 20th July, 2010 on "Establishment of a Safety Management system (SMS)" para 11, set forth that – 'A service provider shall as a part of SMS Safety assurance activities, develop and maintain the necessary means to verify the Safety performance of the organization in reference to the Safety Performance Indicators (SPIs) and Safety Performance targets (SPTs) of the SMS and to validate the effectiveness of safety risk controls'.

2 Purpose

The purpose of this Circular is to create awareness in the AAI owned airports and ANS locations about the Safety Performance Indicators (SPIs) and Safety Performance Targets (SPTs) set by AAI, as mandated by DGCA, for measuring safety performance of AAI as a whole and individual airport / ANS locations. Further, this circular also highlights the requirement and importance of data collection, pertaining to the SPIs, by the airport / operational unit and the constant monitoring of the SPIs by analyzing the safety data.

The individual airports / ANS locations, in accordance to local conditions, may also set their own additional low consequence Safety Performance Indicators (SPIs) for enhancing the safety performance.

3 Scope

The contents of this circular are applicable to all personnel of AAI working at AAI owned airports and ANS (Air Navigation Services) locations.

4 References

- DGCA CAR Section 1, Series C Part I , dated 20th July, 2010 on *Establishment of a Safety Management System (SMS)*
- C-SMS Manual –Version 3, Issue 2
- ICAO DOC 9859 *Safety Management Manual* (3rd edition-2013)

5 Definitions

5.1 **Acceptable level of safety performance (ALoSP)** – The minimum level of safety performance of civil aviation in a State, as defined in its State safety programme, or of a service provider, as defined in its safety management system, expressed in terms of safety performance targets and safety performance indicators.

5.2 **High-Consequence Indicators** – Safety performance indicators pertaining to the monitoring and measurement of high consequence occurrences, such as accidents or serious incidents. High consequence indicators are sometimes referred to as reactive indicators.

5.3 **Lower-consequence indicators** – Safety performance indicators pertaining to the monitoring and measurement of lower consequence occurrences, events or activities, such as incidents, non-conformance findings or deviations. Lower consequence indicators are sometimes referred to as proactive/predictive indicators.

5.4 **Safety performance –** A State's or service provider's safety achievement as defined by its safety performance targets and safety performance indicators.

5.5 **Safety performance indicators (SPIs) –** A data-based safety parameters used for monitoring and assessing safety performance.

5.6 **Safety performance targets (SPTs) –** The planned or intended objective for safety performance indicator(s) over a given period.

5.7 **Safety performance** – A State's or service provider's safety achievement as defined by its safety performance targets and safety performance indicators.

5.8 **State Safety Programme (SSP) -** An integrated set of regulations and activities aimed at improving safety.

6 Regulatory Requirements

6.1 Airports Authority of India shall use the information generated through its safety reporting system to measure its safety performance.

6.2 There are two types of safety reporting systems:

- Mandatory incident reporting system
- Voluntary incident reporting system

6.3 Other sources of safety information to support safety performance monitoring and measurement may include:

- Safety studies
- Safety reviews
- Safety survey
- Safety audits
- Internal investigations

6.4 The final output of a safety performance monitoring and measurement process is the development of safety performance indicators based on analysis of data collected through the source mentioned above.

6.5 Identification of safety critical operational sectors of AAI and define safety performance indicators for these sectors.

6.6 Safety Performance Indicators shall be in harmonization with State (DGCA) SSP aggregate safety indicators.

6.7 Safety Performance Indicators (SPIs) shall provide comprehensive insight into safety performance of all aspects of operational activities of AAI and should consist of both high level and low level consequence Indicators.

6.8 Define corresponding Safety Performance Target (SPTs) for each Safety Performance Indicators (SPIs), taking into consideration recent historical data, so that desired improvement is realistic & achievable.

6.9 Define Alerts level of each Safety Performance Indicators (SPIs) by using standard deviation principle & average value of preceding historical data.

6.10 Update Performance outcome of each SPIs and track SPT & Alert level for each SPI for respective performance status.

6.11 Compile a consolidated summary of overall SPTs & Alert level performance outcome of complete SPI package and aggregate for given monitoring period i.e. yearly basis.

7 Process & Procedure

7.1 Safety Performance Indicators (SPIs) and SPTs of AAI for 2015 have been established with the consent of DGCA. The Safety Performance Indicators (SPIs) are defined to commensurate with all aspects of operational activities of AAI in ATM, CNS and Operations Directorates. See Annexure-1 for package of SPIs of AAI.

7.2 Safety Performance Target (SPTs) are to be defined of corresponding SPIs, for which historical data is available. For rest of SPIs data is to be collected for setting SPTs in future.

7.3 Three Alert levels are also to be established based on the preceding period's performance, namely average and standard deviation (SD). Three Alert lines are average + 1SD / 2SD / 3SD. An alert trigger (abnormal/unacceptable trend) is indicated if any of the conditions below are met for current monitoring period:

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

7.4 When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

7.5 Respective directorate should issue separate instruction to all AAI airports for collection & compilation of the safety data pertaining to all Safety Performance Indicators (SPIs).

7.6 Detail guidance for setting of SPTs & Alert level for corresponding SPIs, based on preceding year performance is explained in SPI booklet, uploaded in AAI website.

7.7 Annexure-2 is a format for annual SMS performance summary. It provides a summary of all SMS safety indicators, with respective alert and target level. The performance outcome of all SPIs is to be annotated in the form. Such summary may be compiled at the end of each monitoring period (i.e. yearly) by 31st January of every year, to provide an overview of the annual SMS performance of AAI.

7.8 For more quantitative performance summary, appropriate numerical value may be assigned to each Yes / No outcome for each Target and Alert level outcome. This may allow a summary score (or percentage) to be obtained to indicate the overall SMS safety performance at the end of any given monitoring period.

7.9 The numerical value will be assigned as follows (high weightage for high consequence indicators & low weightage for low consequence indicators):

High consequence Indicators:	Target achieved:	[Yes (4); No (0)]
	Alert Level not breached:	[Yes (3); No (0)]
Low consequence Indicators:	Target achieved:	[Yes (2); No (0)]
	Alert Level not breached:	[Yes (1; No (0)]

7.10 Safety data collected from various sources shall be used only for the purpose of improvement of aviation safety and shall have restricted accessibility.

7.11 The compiled safety data after analysis should preferably be stored in Safety Library in electronic data base.

7.12 Monthly Safety data pertaining to Safety Performance Indicators (SPIs), shall be reported quarterly to Aviation Safety Directorate, by all AAI airports, in a standard format as given in Annexure-3.

7.13 Aircraft movement data, which include departures, arrivals and overflying, should be extracted from Airport Information Management Systems (AIMS).

7.14 Safety occurrence reports pertaining to Safety Performance Indicators (SPIs), should be collected from various sources, like control room messages, reports from field airports, AFTN message and information from various reporting forms submitted by operational officials e.g. pilots, controllers, ATS-in-charge, other Air Navigation Service Provider (ANSPs).

8 Clarifications

Requests for clarifications to this circular may be addressed to Executive Director (Aviation Safety) at edas@aai.aero or forwarded to following address:

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Airports Authority of India
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15.9.2015

Distribution: As per standard list

Annexure-1

Safety Performance Indicators for Airports Authority of India (2015)

High Consequence Indicators			Lower consequence Indicators		
Safety Performance Indicator (SPI)	**Target Level Criteria**	**Alert Level Criteria** (3 Target levels=Average+ 1/2/3 SD)	**Safety Performance Indicator (SPI)**	**Target Level Criteria**	**Alert Level Criteria**
Aerodrome Operations					
Number of Runway Excursions per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year 2015.	To be defined in 2016	Number of reported ground incidents per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Number of reported bird strikes per 10,000 arrivals & departures	**2.73** i.e. 5% improvement from mean rate of last year (2014)	Avg.+1SD=**4.87** Avg.+2SD=**6.87** Avg.+3SD=**8.87**	Number of reported incident of Foreign Object Debris (FOD) in the movement area of major aerodrome per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Number of reported wildlife strikes per 10,000 arrivals & departures	**0.34** i.e. 5% improvement from mean rate of last year (2014)	Avg.+1SD=**0.64** Avg.+2SD=**0.92** Avg.+3SD=**1.2**			
Air Traffic Services					
Number of infringement of separation minimum per 100,000 aircraft movements	**0.90** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)	Avg.+1SD=**1.15** Avg.+2SD=**1.35** Avg.+3SD=**1.55**	Number of level bust per 100,000 aircraft movements	To be defined in 2017 after collection of 2 years data 2015 & 2016	To be defined in 2017
Number of runway incursions per 10,000 arrivals and departures	**0.17** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)	Avg.+1SD=**0.21** Avg.+2SD=**0.24** Avg.+3SD=**0.27**	Number of safety occurrences due Communication errors (SOCE) per 100,000 aircraft movements	To be defined in 2017 after collection of 2 years data 2015 & 2016	To be defined in 2017
Communication Navigation Surveillance Services					
Mean time between failures (MTBF) of Landing/Navigational aids per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016	Number of VCCS (VHF) failures per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Mean time between failures (MTBF) of Surveillance aids (ADS/MSSR/TAR/RSR/ ASMGCS) per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016	Number of degradation in ATS Automation system per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016

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Annexure-2

SMS Performance Summary – 2015

High Consequence SPIs

SPI Description	SPI Target Level Criteria	Target Achieved [Yes(4)/ No(0)]	SPI Alert Level Criteria	Alert Level not breached [Yes(3)/ No(0)]
Aerodrome Operations				
Number of reported bird strikes per 10,000 arrivals/departures	**2.73** i.e. 5% improvement from mean rate of last year (2014)		Avg.+1SD=**4.87** Avg.+2SD=**6.87** Avg.+3SD=**8.87**	
Number of reported wildlife strikes per 10,000 arrivals/departures	**0.34** i.e. 5% improvement from mean rate of last year (2014)		Avg.+1SD=**0.64** Avg.+2SD=**0.92** Avg.+3SD=**1.2**	
Air Traffic services(ATS)				
Number of infringement of separation minimum per 100,000 aircraft movements	**0.90** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)		Avg.+1SD=**1.15** Avg.+2SD=**1.35** Avg.+3SD=**1.55**	
Number of runway incursions per 10,000 arrivals & departures	**0.17** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)		Avg.+1SD=**0.21** Avg.+2SD=**0.24** Avg.+3SD=**0.27**	
Communication, Navigation & Surveillance (CNS)				
Mean time between failures (MTBF) of Landing/Navigational aids per year	To be defined in 2016	-	To be defined in 2016	-
Mean time between failures (MTBF) of Surveillance aids (ADS/MSSR/TAR/RSR/ASMGCS) per year	To be defined in 2016	-	To be defined in 2016	-

Low Consequence SPIs				
SPI Description	**SPI Target Level Criteria**	**Target Achieved [Yes(2) / No(0)]**	**SPI Alert Level Criteria**	**Alert Level not breached [Yes(1) / No(0)]**
Will be assessed next year (2016) due to lack of quality data.				

Safety Performance Indicators Data Reporting Form

Annexure - 3

Year	
Name of Airport	
ICAO Location Indicator	

S. No	Data Heading	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.	Total number of arrivals												
2.	Total number of departures												
3.	Total number of overflying movements												
Aerodrome Operations													
	High Consequence Indicators												
a)	Number of Runway Excursions												
b)	Number of reported bird strikes												
c)	Number of reported wildlife strikes												
	Lower consequence Indicators												
a)	Number of reported ground incidents												
b)	Number of reported incident of Foreign Object Debris (FOD) in the movement area												
Air Traffic Services													
	High Consequence Indicators												
a)	Number of infringement of separation minima												
b)	Number of runway incursions												

Safety Performance Indicators Data Reporting Form

S. No	Data Heading	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Lower consequence Indicators												
a)	Number of level bust												
b)	Number of safety occurrences due Communication errors (SOCE)												
Communication Navigation Surveillance Services (CNS)													
	High Consequence Indicators												
a)	**Landing/Navigational aids (ILS/DME-LP/VOR-DVOR/DME-HP/ NDB-LOCATOR-MARKER**												
	ILS												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	DME-LP												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	VOR/DVOR												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	DME-HP												
(i)	Total hours of operation												

Safety Performance Indicators Data Reporting Form

S. No	Data Heading	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	NDB/LOCATOR/MARKER												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
b)	**Surveillance aids (ADS/ASR/ARSR/ASMGCS)**												
	ASR (MSSR)												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	ARSR (MSSR)												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	ASMGCS												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												

Safety Performance Indicators Data Reporting Form

S. No	Data Heading	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	ADS-B												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	Lower consequence Indicators												
a)	Number of VCCS (VHF) failures												
b)	Number of degradation in ATS Automation system												
Engineering Services													
Electrical													
a)	Total Hours of AGL operations												
b)	Total number of failures of AGL												
c)	Total hours of failure/unserviceability of AGL												
d)	Total hours of planned shutdown												
Note													
	1. For Clarification & Definitions refer SPI booklet 2. **Failure:** Capture all types of failures including degraded performance, unserviceability of a single unit in case of redundant system e.g. (main/standby), or of a sub unit.												