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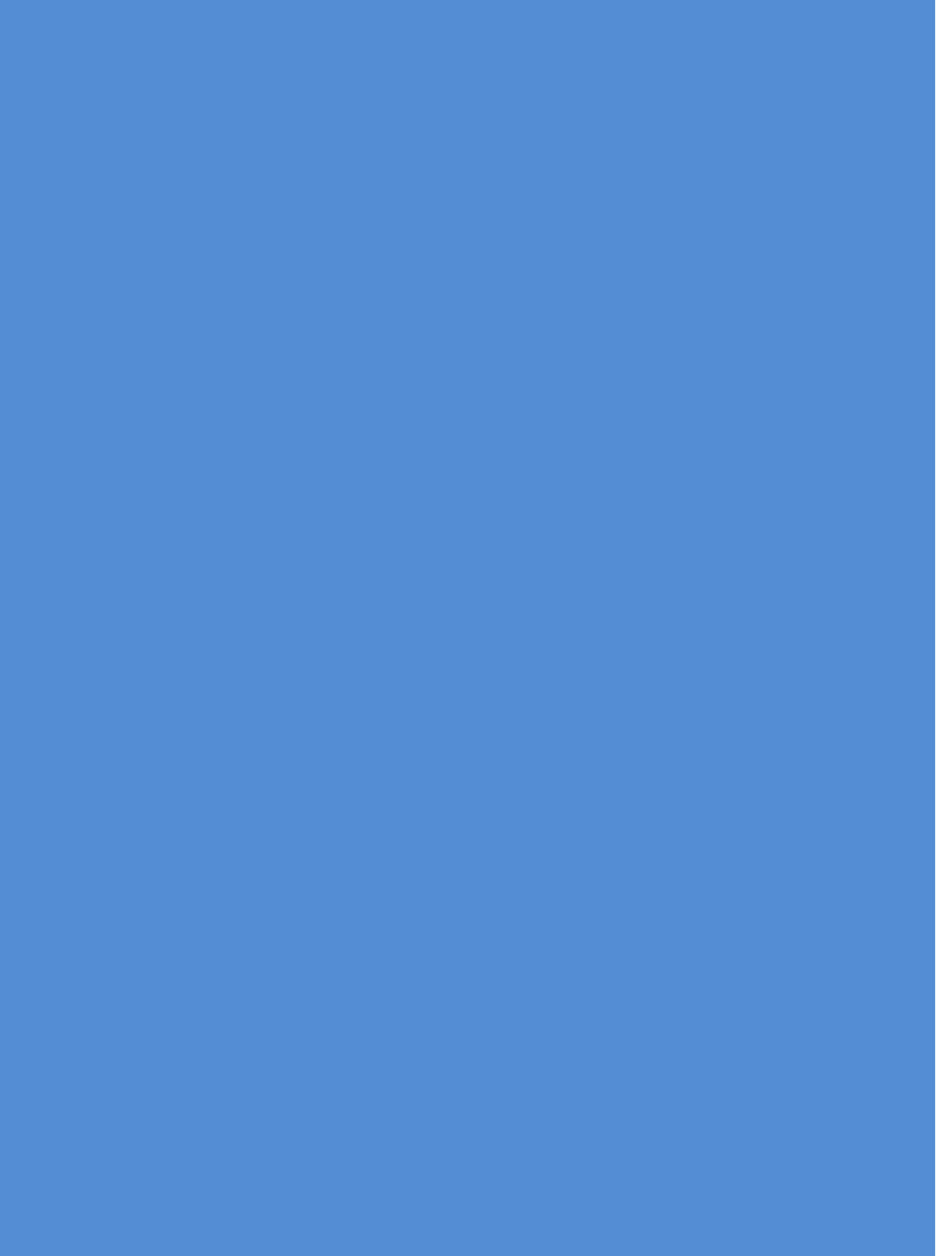
National Safety Programme (NSP)

Second Edition, February 2019

Issued and Published under the Authority of the Director General

SUDAN CIVIL AVIATION AUTHORITY
THE REPUBLIC OF SUDAN

(February 2019)





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INTRODUCTION – AUTHORITY TO PUBLISH

The Sudan National Safety Programme (NSP) has been developed with the aim of establishing and implementing a State safety programme that is fully compliant with international requirements and accepted global best practices although reflecting the size and complexity of the Sudan civil aviation system.

The Civil Aviation Act 2018 mandates the Director General to establish and maintain a State Safety Programme.

The Sudan civil Aviation Regulations on Safety Management (SUCAR 19) further sets the standards applicable to the National Safety Programme.

This NSP Manual, a high-level document, contains detailed information on the establishment and implementation of the NSP.

This Second Edition - Sudan NSP Manual (Doc PROG 001-001) fully describes the national programme for aviation safety in Sudan as is required by the Civil Aviation Act 2018, and SUCAR 19. Specific guidance material shall be published separately as and when required to assist services providers and technical staff from the Authority in the implementation of the safety management requirements.

The Sudan NSP Manual (Doc PROG 001-001) is published under my authority on the basis of the powers vested on me by the Sudan Civil Aviation Act 2018, as amended. It therefore constitutes the set of regulations and activities to be implemented in the civil aviation environment to continuously improve aviation safety in Sudan.

A handwritten signature in red ink, appearing to be 'Mostafa Said Ahmed Eldwahy'.

Capt. Mostafa Said Ahmed Eldwahy

Director General, SCAA

February 2019





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Abbreviations

ANRD	Air navigation Regulatory directorate
ASD	Aviation safety department
DASS	Directorate of Aerodromes safety & standards
DOC	Document management system
ECCAIRS	European Coordination Centre for Accident and Incident Reporting Systems
NSAC	National Safety Action Committee
NSP	National Safety Programme
NSRC	National Safety Review Committee
QMS	Quality Management System
SA	Safety Assurance
SCAA	Sudan Civil Aviation Authority
SCASPs	Sudan Civil Aviation Safety Publications
SMS	Safety management system
SPS	Safety Policy and Standards Directorate
SRM	Safety Risk Management
SSDCPS	Sudan safety data collection and processing system
SSMM	Sudan Safety management manual
SSP	State safety programme
SUCARs	Sudan Civil Aviation Regulations



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CHAPTER 1 – DEFINITION

1.1. Definitions

When the following terms are used in the Standards for safety management, they have the following meaning:

Accident. An occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

- a) a person is fatally or seriously injured as a result of:
 - being in the aircraft, or
 - direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
 - direct exposure to jet blast,
 - except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are
 - to stowaways hiding outside the areas normally available to the passengers and crew; or
- b) the aircraft sustains damage or structural failure which:
 - adversely affects the structural strength, performance or flight characteristics of the aircraft, and
 - would normally require major repair or replacement of the affected component,

except for engine failure or damage, when the damage is limited to a single engine, (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes), or for minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome); or
- c) the aircraft is missing or is completely inaccessible

Aeroplane. A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Authority. Sudan Civil Aviation Authority.

Board of Directors. The Board of Directors of Sudan Civil Aviation Authority established by the Civil Aviation Act.

Bulletin. A document issued and published under the authority of the Director General to relevant industry players and SCAA staff members to provide information that does not require action other than “to note”.

Civil Aviation Act .The Sudan Civil Aviation Act of 2018.

Circular.A document issued and published under the authority of the Director General to disseminate specialized information of interest to SCAA staff members and relevant industry players, such as: studies or notes based on statistics field, reproduction of, or extracts from documents submitted by industry, reports on implementation of Sudan Standards.

Competent Minister .The Minister designated by the President of the State to be in charge of civil aviation.

Convention.The Convention on International Civil Aviation, signed at Chicago on 7 December 1944, as amended.

Directive.A document issued and published under the authority of the Director General to govern the implementation of a Standard.

Director General.The Director General of the Sudan Civil Aviation Authority.

Guidance Material.A document issued and published under the authority of the Director General to guide SCAA technical staff members and relevant industry players to implement the requirements contained in the SUCARs, Advisory Circulars, Directives, Operational Policies, Orders, or Sudan Civil Aviation Safety Publications.

Handbook.A document issued and published under the authority of the Director General containing one or more operational processes, procedures and or checklist developed for the use of SCAA technical personnel and safety inspectors.

Hazard. A condition or an object with the potential to cause or contribute to an aircraft incident or accident.

Helicopter. A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

Incident. An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

Manual.A document issued and published under the authority of the Director General containing guidance and information concerning selected aspects of aeronautical activity or facilitating the uniform application of requirements contained in the SUCARs, Advisory Circulars, Directives, Operational Policies, Orders, or Sudan Civil Aviation Safety Publications.

National Aviation safety plan.The national strategic plan for safety management at the national level, for a set time period.

National Safety Programme. The procedures used to ensure the safety, regularity and efficiency of civil aviation activities in Sudan.

Operational personnel. Personnel involved in aviation activities who are in a position to report safety information.

Operational Policy.A document issued and published under the authority of the Director General to provide the SCAA technical staff or the relevant industry

players detailed technical or regulatory guidance on the implementation of the requirements contained in the SUCARs.

Order. A document issued and published under the authority of the Director General supplementing requirements contained in the SUCARs or providing new Safety Directives in support of safety in air navigation systems (this includes Advisory Directives and Safety Notices).

Procedure. A document issued and published under the authority of the Director General to provide guidance to the SCAA technical staff on how to process or evaluate an application or a document required under a SUCAR, Advisory Circular, Directive, Operational Policy, Order, or Sudan Civil Aviation Safety Publication.

Safety. The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

Safety Act. The Sudan Civil Aviation Safety Act of 2010 as may be amended or replaced.

Safety data. A defined set of facts or set of safety values collected from various aviation-related sources, which is used to maintain or improve safety.

Safety information. Safety data processed, organized or analyzed in a given context so as to make it useful for safety management purposes.

Safety management system (SMS). A systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.

Safety oversight. A function performed by a State to ensure that individuals and organizations performing an aviation activity comply with safety-related national laws and regulations.

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

Safety performance indicator. A data-based parameter used for monitoring and assessing safety performance.

Safety performance target. The State or service provider's planned or intended target for a safety performance indicator over a given period that aligns with the safety objectives.

Safety risk. The predicted probability and severity of the consequences or outcomes of a hazard.

SCAA. Sudan Civil Aviation Authority.

Serious injury. An injury which is sustained by a person in an accident and which:

- requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or
- results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
- involves lacerations which cause severe hemorrhage, nerve, muscle or tendon damage; or

- d) involves injury to any internal organ; or
- e) involves second or third degree burns, or any burns affecting more than 5 per cent of the body surface; or
- f) involves verified exposure to infectious substances or injurious radiation.

Service provider. An organization providing aviation products and/or services.

The term thus encompasses approved training organizations, aircraft operators, approved maintenance organizations, organizations responsible for type design or manufacture of aircraft, engines or propellers, air traffic service providers and other air navigation service providers and aerodrome operators.

Specifications. Standards and operational procedures provided in a SUCAR, Directive, Operational Policy, Order, or Sudan Civil Aviation Safety Publication.

Standard. Any specification for physical characteristics, configuration, material, performance, personnel or procedure recognized by the Authority as necessary for the safety or regularity of air navigation.

State of Design. The State having jurisdiction over the organization responsible for the type design.

State of Manufacture. The State having jurisdiction over the organization responsible for the final assembly of the aircraft.

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

State safety programme (SSP). An integrated set of regulations and activities aimed at improving safety.

SUCAR. A Sudan Civil Aviation Regulation, containing Standards for civil aviation-related operation throughout Sudan, issued and published under the authority of the SCAA Board of Directors with the consent of the Competent Minister.

Sudan Aeronautical Information Services. A unit mandated by the Director General for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

Sudan Civil Aviation Safety Publication. A document issued and published under the authority of the Director General containing material of factual information, references or supplementary to a SUCAR.

Surveillance. The activities of the Authority through which it proactively verifies through inspections and audits that aviation license, certificate, authorization or approval holders continue to meet the established requirements and function at the level of competency and safety required by the Authority.

Chapter 2 – NATIONAL SAFETY POLICY, OBJECTIVES AND RESOURCES

2.1. National Safety Programme Overview

2.1.1. The NSP is the integrated set of regulations and activities aimed at improving aviation safety in Sudan. For the establishment and maintenance of the NSP, the Sudan standards are structured into the following four components:

- a) National safety policy, objectives and resources;
- b) State safety risk management;
- c) State safety assurance; and
- d) State safety promotion.

2.1.2. Although the Civil Aviation Authority is designated as the entity responsible for its development and maintenance, the implementation of the NSP requires coordination among the entities responsible for the aviation functions of Sudan within and outside the Authority. Such entities include those responsible for:

- a) Accident & Incident Investigation,
- b) Meteorology, and
- c) Any entity specifically tasked by a Sudan Act or regulations to discharge duties closely related to, or that may have an impact on, aviation safety.

2.1.3. The implementation of the NSP does not alter the respective roles of the Sudan's aviation organizations or their normal interaction with one another. Rather, the NSP aims to leverage the collective safety functions and capabilities to further enhance safety within Sudan.

2.1.4. The NSP aims to:

- a) ensure Sudan has an effective legislative framework in place with supporting specific operating regulations;
- b) ensure safety risk management and safety assurance coordination and synergy amongst relevant Sudan's aviation entities;
- c) support effective implementation and appropriate interaction with service providers' SMS;
- d) facilitate the monitoring and measurement of the safety performance of the Sudan's aviation industry; and
- e) maintain and/or continuously improve the Sudan's overall safety performance.

2.2. Primary aviation legislation

2.2.1 General – primary legislative framework

The Sudan primary aviation legislation is comprised of:

- a) The Sudan civil Aviation Act 2018, as amended, and
- b) The Sudan Civil Aviation Safety Act 2010, as amended.

2.2.1.1 Civil Aviation Act

The Civil Aviation Act, 2018, establishes the Sudan Civil Aviation Authority (SCAA) and empowers it to regulate civil aviation activities in Sudan, including the development, implementation and maintenance of the National Safety Programme. It also establishes an independent accident investigation unit to conduct investigations of accidents and incidents independently. The Act further specifies the rights and privileges of aviation safety inspectors as well as the respective roles of the Authority, and the Minister responsible for civil aviation in the development, issuance, and promulgation of specific operating regulations.

2.2.1.2 Civil Aviation Safety Act

The Civil Aviation Safety Act, 2010 specifies the high level standards applicable to the provision of civil aviation services in Sudan, responsibilities for issuance of aviation licenses and certificates, rules of the air, requirements for instruments and records, and sanctions and penalties in case of offences committed against civil aviation security or safety.

2.2.2 Enforcement Policy

The Director General issued and promulgated an enforcement policy that:

- a) supports and encourages a positive safety culture;
- b) describes how the Authority assures protection of safety data and safety information and related sources;
- c) specifies the conditions and circumstances under which service providers with an SMS are allowed to deal with and resolve events involving certain safety issues internally, within the context of their SMS and to the satisfaction of the Authority, provided that the SMS is in accordance with the SMS framework and shown to be effective and mature; and
- d) is to be revised periodically to take into account the progress of the implementation of the NSP by the Authority, and SMS by Sudan services providers.

The enforcement policy is available to all the Authority's staff and the current version downloadable from the NSP implementation software (GALIOT SSP).

2.3. Specific operating regulations

2.3.1 General – Authority to promulgate, publish regulations

Under article 22 of the Civil Aviation Act, 2018, the Board of Directors of the Authority is empowered to promulgate civil aviation specific operating regulations upon the consent of the Minister responsible for civil aviation.

2.3.2 Means of publication

In line with government regulations pertaining to publications of national regulations, the civil aviation specific operating regulations are published through the national gazette.

2.3.3 Rulemaking policy and process

The Authority has established and maintains a “Rulemaking Manual” that describes the steps from the initial proposal of new regulatory or guidance material, or amendment, until the promulgation, or amendment of civil aviation regulatory requirements, or issuance of guidance or information material.

2.3.4 Sudan Civil Aviation Regulations (SUCARs)

The specific operating regulations are referred to as Sudan Civil Aviation Regulations (SUCARs). They are issued and amended to take into account the provisions of the relevant annexes to the convention on international civil aviation and their amendment.

2.4. National Aviation system and functions

2.4.1 Organization responsible for coordinating the NSP

The Authority is responsible for the establishment, maintenance and coordination of the NSP as may be required.

2.4.2 NSP coordination and implementation groups and committees

The Authority will establish coordination and implementation groups and committees as and when required to support the coordination and implementation of the NSP.

2.4.3 NSP functions and activities

The Safety Policy & Standards (SPS) Directorate is established within the Office of the Director General tasked to carry out the activities related to the day-to-day planning and management of the implementation NSP.

The Directorate is the custodian of the NSP Manual, and, as such, is responsible to ensure, among other things, the effective and timely implementation of the processes and procedures contained herein. This role includes:

- a) developing, maintaining, and processing of the forms required in the implementation of the NSP and the work of the groups and committees that may be established,
- b) developing policies and procedures for the approval of the services provider’s SMS,
- c) establishing and maintaining, in coordination with the respective functional Directorates, a database of all industry stakeholders to include as a minimum the telephone number, and email address of the principal

contact person of each holder of: an air operator certificate, an aerodrome certificate, an approval of an aircraft maintenance organization, an approval of a training organization, air navigation services providers,

- g) review of proposed new or amendment of service provider's SMS
- h) Documentation,
- i) monitor implementation of service provider's SMS, and safety performance, and
- j) The Safety Policy & Standards (SPS) Directorate is responsible for the safety oversight of service provider's SMS.
- k) The role of the functional Directorate includes:
 - i. participate in the work of the NSP coordination and implementation groups and committees,
 - ii. maintain up-to-date information of, holders of authorizations, certificates, or permits, and provide SPS with such information to be included in the user's database

2.4.4 Sudan safety policy

The Director General issued and promulgated a safety policy that:

- a) addresses key practices that are essential for safety management and how senior management expects to deliver on their safety responsibilities,
- b) is clearly visible in the day-to-day practices of the Authority,
- c) demonstrate the safety intent of the Authority,
- d) is implemented as a protocol,
- e) reflects the acceptance of accountability for safe conditions and behaviours,
- f) promote a culture of safety leadership, collaboration, open communication, and
- g) is to be revised periodically to take into account changes in the complexity and size of the aviation system in Sudan.

The safety policy is available to all the Authority's staff, visible throughout all SCAA's offices, and the current version downloadable from the NSP implementation software (GALIOT SSP).

2.4.5 Sudan safety objectives

The Director General establishes and maintains safety objectives to support the identification of the State's SPIs and SPTs and the subsequent establishment of the acceptable level of safety performance (ALoSP).

The safety objectives work together as a package with SPIs and SPTs to enable the Authority to monitor and measure its safety performance.

The Director General reviews annually its progress toward achieving its safety objectives and their continued relevance, keeping in mind any reassessments of the current risks.

The current Sudan's safety objectives are available in the NSP

implementation software (GALIOT SSP), and their progress made towards their achievement monitored in the same system.

2.4.6 Sudan safety resources

The Authority has, through its own budget sufficient resources to carry out its mandate including the financial resources as well as human resources for the implementation of the NSP.

The Authority is funded by fees and charges collected from those participating in the aviation system and from those using services within the aviation system, as authorized by the Civil Aviation Act, 2018.

The allocation of financial resources takes into account the specific functions introduced by the NSP including Safety Risk Management, data collection and analysis, and safety promotion, continuous monitoring and review of the Authority's processes to manage risk, and re-training of inspectors.

2.4.7 National Aviation Safety Plan (NASP)

The Director General develops and maintains a national aviation safety plan that includes safety goals, targets and indicators in line with the NSP, as well as a series of safety enhancement initiative (SEIs) that will be carried out to address national operational safety risks identified through the State and industry's safety risk management processes. The plan shall address the identification and prioritization of safety issues across the different sectors of aviation, through the NSP implementation software (GALIOT SSP).

The Authority shall implement the SEIs contained in the plan through its existing safety management activities.

2.4.8 NSP Documentation

The NSP documentation is comprised of:

- a) The Sudan National Safety Programme Manual (this manual),
- b) The Sudan Safety Management Manual (SSMM),
- c) The safety policy,
- d) The safety enforcement policy,
- e) The safety objectives,
- f) The rulemaking manual,
- g) The document management system manual (technical library),
- h) The safety reporting system manual,
- i) The national aviation safety plan, and
- j) Additional documentation issued and published by the Director General, to complement, or govern the implementation of any of the above documents from a) to i).

The NSP documentation is kept up-to-date in the Document management component of the NSP implementation software (DOC) with relevant

credentials (user name, password, rights and privileges) given to the personnel as appropriate to facilitate a common understanding of the NSP.

2.5. Qualified technical personnel

The Authority develops and maintains the competencies required for effective implementation of NSP taking into account the roles and responsibilities under the NSP performed by its personnel. These competencies are in addition to those required for the conduct of compliance oversight and may be addressed by training existing staff on:

- a) enhanced leadership skills;
- b) understanding of business processes;
- c) experience and judgment required to assess performance and effectiveness;
- d) safety risk-based surveillance;
- e) safety data collection and analysis;
- f) safety performance measurement and monitoring; and
- g) Safety promotion activities.
- h) The individual qualifications requirements, assessment, and competency enhancement activities are kept up-to-date in the Performance Assessment and Competency Enhancement component of the NSP implementation software (PACE) including periodical individual assessments, identification of training needs, individual training plans, and records of implementation of approved training activities.

2.6. Technical guidance, tools and provision of safety-critical information

The rulemaking manual contains detailed information on the types of guidance material issued by the Authority and the processes for their development, promulgation and publication.

The SPS Directorate is the repository of the guidance material of general nature while each functional Directorate is responsible for the guidance material in its specific area.

The guidance material for the industry is published in the Authority's website while the guidance for the Authority's technical staff (procedures, forms and checklists) is kept up-to-date in Document management component of the NSP implementation software (DOC).

Chapter 3 –STATE SAFETY RISK MANAGEMENT

3.1. Service providers requirement to implement SMS

The SUCAR Part 19 requires service providers to implement SMS to manage and improve the safety of their aviation-related activities. The Sudan Safety Management Manual (SSMM) further provides guidance to the services providers on the development and implementation of SMS.

The requirements for implementation of SMS by services providers include the development and implementation of processes for hazard identification and the management of associated safety risks. The Authority reviews the SMS submitted by the service to determine the acceptability including that of the safety risk management processes. Also, during the surveillance activities, the Authority reviews the service provider's SMS to ensure that it remains effective. In doing so, the Authority's staff applies the procedures and makes use of the forms and the checklists developed and maintained by the Safety Policy & Standards (SPS) Directorate to that effect.

Authority shall also apply the principles of SRM to its own activities. These include activities such as the development of regulations and prioritization of surveillance activities based on assessed risk.

3.2. Licensing, certification and authorizations

3.2.1. The procedures and processes for licensing, certification, authorization and approval of aviation personnel and services providers are established in the relevant SUCARs and guidance material issued and amended from time to time by the Authority in line with 2.2 and 2.5.

3.2.2. Licensing, certification, authorization and approval obligations are important components of the Authority's safety risk control strategy. They provide the Authority with assurance that service providers and other pertinent industry representative organizations have achieved the required standards to operate safely within the aviation system.

3.2.3. Pursuant to the provisions of the relevant SUCARs, SUDAN may recognize or accept certificates, approvals and licenses issued by other States. Such arrangements do not absolve the holders of such certificates, approvals and licenses from its obligations under the Sudan regulations as applicable to the type of certificates, approvals and licenses.

3.3. Safety management system obligations

3.3.1. In accordance with SUCAR PART 19, service providers and international general aviation operators are required to implement SMS. The requirements address the SMS framework found in SUCAR Part 19, Appendix B and the supporting guidance found in the Sudan Safety Management Manual (SSMM).

3.3.2. The Authority has established and maintains a process for acceptance of the SMS of services providers that includes timelines and milestones that represents the required SMS implementation progress. Additional guidance

- for service providers about how to develop and perform an SMS gap analysis and implementation plan is provided in the SSMM.
- 3.3.3. The SMS regulatory requirements and SMS guidance material will be periodically reviewed to take into consideration: industry feedback, periodic review of the State safety risk profile, current status, and applicability of ICAO SMS SARPs and guidance material.
- 3.3.4. As part of their SMS, services providers establish safety objectives and identify safety performance indicators (SPIs), and safety performance targets (SPTs) to monitor and measure safety performance.
- 3.3.5. Safety objectives may be:
- process-oriented:** stated in terms of safe behaviors expected from operational personnel or the performance of actions implemented by the organization to manage safety risk; or
 - Outcome-oriented:** encompass actions and trends regarding containment of accidents or operational losses.
- 3.3.6. The contents of each SPI shall include:
- a description of what the SPI measures;
 - the purpose of the SPI (what it is intended to manage and who it is intended to inform);
 - the units of measurement and any requirements for its calculation;
 - who is responsible for collecting, validating, monitoring, reporting and acting on the SPI (these may be staff from different parts of the organization);
 - where or how the data should be collected; and
 - The frequency of reporting, collecting, monitoring and analysis of the SPI data.
- 3.3.7. The service providers SPIs must be:
- related to the safety objective they aim to indicate;
 - selected or developed based on available data and reliable measurement;
 - appropriately specific and quantifiable; and
 - realistic, by taking into account the possibilities and constraints of the organization.
- 3.3.8. Service providers' proposed SPIs are reviewed and accepted by Authority as part of the SMS acceptance. The acceptance of a service provider's SPIs is planned later in the implementation process. The Authority may be satisfied that the proposed SPIs are appropriate and pertinent to the individual service provider's aviation activities. Some of the service provider's SPIs and SPTs may link to the Sudan SPIs and SPTs for measuring and monitoring the ALoSP.
- 3.3.9. Safety performance targets (SPTs) define short-term and medium-term safety performance management desired achievements. They act as "milestones" that provide confidence that the service provider is on track to achieving its safety objectives and provide a measurable way of verifying

the effectiveness of safety performance management activities. The setting of SPTs shall be determined after considering what is realistically achievable for the associated aviation sector and recent performance of the particular SPI, where historical trend data is available.

- 3.3.10. Targets are established with senior management agreeing on high-level safety objectives. The service provider then identifies appropriate SPIs that will show improvement of safety performance towards the agreed safety objective(s). The SPIs will be measured using existing data sources, but may also require the collection of additional data. The organization then starts gathering, analyzing and presenting the SPIs.
- 3.3.11. The acceptance of the service provider's SPTs may be addressed after the SPIs have been monitored over a period of time. This establishes the baseline performance.
- 3.3.12. The Authority and the services providers will review SPIs and associated SPTs to determine if they are providing the information needed to track the progress being made toward the safety objectives and to ensure that the targets are realistic and achievable.
- 3.3.13. When selecting SPIs and SPTs, services providers must consider the following:
- a) **Workload management.** Creating a workable amount of SPIs can help personnel manage their monitoring and reporting workload. The same is true of the SPIs complexity, or the availability of the necessary data. It is better to agree on what is feasible, and then prioritize the selection of SPIs on this basis. If an SPI is no longer informing safety performance, or been given a lower priority, consider discontinuing in favor of a more useful or higher priority indicator.
 - b) **Optimal spread of SPIs.** A combination of SPIs that encompass the focus areas will help gain an insight to the organization's overall safety performance and enable data-driven decision-making.
 - c) **Clarity of SPIs.** When selecting an SPI, it should be clear what is being measured and how often. SPIs with clear definitions aid understanding of results, avoid misinterpretation, and allow meaningful comparisons over time.
 - d) **Encouraging desired behavior.** SPTs can change behaviors and contribute to desired outcomes. This is especially relevant if achievement of the target is linked to organizational rewards; such as management remuneration. SPTs should foster positive organizational and individual behaviors that deliberately result in defensible decisions and safety performance improvement. It is equally important to consider the potential unintended behaviors when selecting SPIs and SPTs.
 - e) **Choosing valuable measures.** It is imperative that useful SPIs are selected, not only ones which are easy to measure. It should be up to the organization to decide what the most useful safety parameters are;

those that guide the organization to improve decision-making, safety performance management, and achievement of its safety objectives.

- f) **Achieving SPTs.** This is a particularly important consideration, and linked to the desired safety behaviors. Achieving the agreed SPTs is not always indicative of safety performance improvement. The organization should distinguish between just meeting SPTs and actual, demonstrable organizational safety performance improvement. It is imperative that the organization consider the context within which the target was achieved, rather than looking at an SPT in isolation. Recognition for overall improvement in safety performance, rather than an individual SPT achievement, will foster desirable organizational behaviors and encourage exchange of safety information that lies at the heart of both SRM and safety assurance. This could also enhance the relationship between the State and the service provider and their willingness to share safety data and ideas.

3.4. **Accident Investigation**

- 3.4.1. The accident investigation directorate is functionally independent from the Authority. It has established and maintains investigation procedures and Processes based on the requirements of SUCAR PART 13.
- 3.4.2. The accident investigations allow to identify contributing factors and any possible failure within the aviation system, and generate the necessary countermeasures to prevent recurrence. This activity contributes to the continuous improvement of aviation safety by discovering active failures and contributing factors of accidents/incidents and providing reports on any lessons learned from analysis of events. It also supports development of corrective actions decisions and corresponding allocation of resources and may identify necessary improvements to the aviation system.
- 3.4.3. There are many safety occurrences that do not require an official investigation in accordance with SUCAR PART 13. These occurrences and identified hazards may be indicative of systemic problems. These problems can be revealed and remedied by a safety investigation led by the service provider, as provided for in the SSMM.

3.5. **Hazard identification and safety risk assessment**

- 3.5.1. SPS is responsible, in close coordination with the ASD functional directorates to gather, aggregate and analyze available data to identify and document potential hazards as well as corresponding effects or consequences.
- 3.5.2. The hazard identification is conducted through the SSP component of the NSP implementation software (SSP) and a hazard register maintained and kept-up-to-date in the same system.
- 3.5.3. The methodologies for identifying hazards established are:

- a) **Reactive.** This methodology involves analysis of past outcomes or events. Hazards are identified through investigation of safety occurrences derived from the mandatory reporting system.
 - b) **Proactive.** This methodology involves collecting safety data of lower consequence events or process performance and analyzing the safety information or frequency of occurrence to determine if a hazard could lead to an accident or incident. The safety information for proactive hazard identification primarily comes from voluntary and confidential safety reporting systems of the Authority, and the services providers, and the safety assurance function, through the Authority's surveillance activities and self- inspections of services providers.
- 3.5.4. The systematic process developed in the SSP component of the NSP implementation software (SSP) to ensure effective hazard identification includes the following elements:
- a) access to the data sources necessary to support the management of safety risk in Sudan through the Sudan reporting system, services providers reporting systems, and reports of accident investigations, inspections;
 - b) safety analysis team within SPS and ASD functional Directorates with analytical skills and operational experience, and training and experience in a variety of hazard analysis techniques; and
 - c) hazard analysis tool(s), appropriate for the data being collected (or will be collected) and the scope of aviation activities in Sudan.
- 3.5.5. Hazard identification is initiated by SPS in close coordination with the ASD functional directorates in the following instances:
- a) **System design:** Hazard identification starts before the beginning of operations with a detailed description of the particular aviation system and its environment. The safety analysis team identifies the various potential hazards associated with the system as well as impacts to other interfacing systems.
 - b) **System change:** Hazard identification starts before introducing a change in the system (regulatory, operational or organizational) and includes a detailed description of the particular change to the aviation system. The safety analysis team then identifies the potential hazards associated with the proposed change as well as impacts to other interfacing systems.
 - c) **On demand and continuous monitoring:** Hazard identification is applied to existing systems in operation. Data monitoring is used to detect changes in the hazard situation. Continuous monitoring and analysis is established with notification thresholds based on a set of critical items of interest.
- 3.5.6. Safety risk assessments are conducted using bow-tie as built-in the SSP component of the NSP implementation software (SSP). Safety risk assessment includes the identification of potential consequences of hazard, determination of their respective probability and severity, and assigning a

safety risk index as per the matrix established in the NSP implementation software (SSP).

3.5.7. The safety risk are categorized as:

- a) **Intolerable:** Take immediate action to mitigate the risk or stop the activity. Perform priority safety risk mitigation to ensure additional or enhanced preventative controls are in place to bring down the safety risk index to tolerable.
- b) **Tolerable:** Can be tolerated based on the safety risk mitigation. It may require management decision to accept the risk.
- c) **Acceptable:** Acceptable as is. No further safety risk mitigation required.

3.5.8. Once a safety risk has been assessed, safety risk mitigations are developed to mitigate the risks identified. The safety risk mitigations consist of actions that often result in changes to operating procedures, equipment or infrastructure. Safety risk mitigation strategies fall into three categories:

- a) **Avoidance:** The operation or activity is cancelled or avoided because the safety risk exceeds the benefits of continuing the activity, thereby eliminating the safety risk entirely.
- b) **Reduction:** The frequency of the operation or activity is reduced, or action is taken to reduce the magnitude of the consequences of the safety risk.
- c) **Segregation:** Action is taken to isolate the effects of the consequences of the safety risk or build in redundancy to protect against them.

3.5.9. A full range of possible control measures must be considered to find an optimal solution. The effectiveness of each alternative strategy must be evaluated before a decision is made. Each proposed safety risk mitigation alternative shall be examined from the following perspectives:

- a) **Effectiveness.** The extent to which the alternatives reduce or eliminate the safety risks. Effectiveness can be determined in terms of the technical, training and regulatory defenses that can reduce or eliminate safety risks.
- b) **Cost/benefit.** The extent to which the perceived benefits of the mitigation outweighs the costs.
- c) **Practicality.** The extent to which mitigation can be implemented and how appropriate it is in terms of available technology, financial and administrative resources, legislation, political will, operational realities, etc.
- d) **Acceptability.** The extent to which the alternative is acceptable to those people that will be expected to apply it.
- e) **Enforceability.** The extent to which compliance with new rules, regulations or operating procedures can be monitored.
- f) **Durability.** The extent to which the mitigation will be sustainable and effective.
- g) **Residual safety risks.** The degree of safety risk that remains subsequent to the implementation of the initial mitigation and which may necessitate additional safety risk control measures.

- h) **Unintended consequences.** The introduction of new hazards and related safety risks associated with the implementation of any mitigation alternative.
- i) **Time.** Time required for the implementation of the safety risk mitigation alternative.

3.5.10. Corrective action needs to take into account any existing defenses and their (in)ability to achieve an acceptable level of safety risk. This may result in a review of previous safety risk assessments that may have been impacted by the corrective action. Safety risk mitigations and controls will need to be verified/audited to ensure that they are effective. Another way to monitor the effectiveness of mitigations is through the use of SPIs.

3.6. Management of safety risks

- 3.6.1. The Authority established and maintains procedures for the conduct of safety inspection and audits with the objective of identifying non-compliances and other safety issues and for their effective and timely resolution.
- 3.6.2. Safety issues identified by the Authority include, but are not limited to, the following:
 - a) non-compliances and other deficiencies identified by the safety inspection and audits;
 - b) analyses of reported safety events;
 - c) negative safety trends; and
 - d) results (including safety recommendations) of aircraft accident and incident investigations.
- 3.6.3. All stakeholders of the Sudan aviation community are required to report all the safety events that they are aware of, through the mandatory reporting system established by the Authority.
- 3.6.4. Data collected from the various stakeholders is recorded in the SSDCPS which is a component of the NSP implementation software in the ECCAIRS format.
- 3.6.5. Each functional directorate is responsible for the implementation of the approved procedures that are aimed to take appropriate actions, up to and including enforcement measures, to resolve identified safety issues, as documented in their respective manuals.
- 3.6.6. The functional directorates ensure that identified safety issues are resolved in a timely manner using the Audit & inspection management component of the NSP implementation software (QMs) to receive, approve corrective actions submitted by services providers to resolve such issues, monitor and record progress of their implementation.
- 3.6.7. Should the surveillance activities reveal that the service provider has failed or is unable to meet or maintain the required standards, the functional directorate shall:

- a) Promptly advise the service provider of the deficiency observed using the approved finding form.
 - b) Provide deadlines for the submission of the corrective action plan to be taken by the service provider.
 - c) Verify that corrective actions and related timeframes are appropriate, before formal acceptance of the corrective action plan.
 - d) Initiate appropriate follow-up to verify the effective implementation of the corrective actions.
- 3.6.8. Additional inspections may also be conducted whenever problems repeatedly occur in a particular area.
- 3.6.9. Effective and timely actions taken by the industry should result in the effective resolution of safety issues. However, in the absence of a resolution, the Authority shall take the appropriate enforcement measures, such as the imposition of limitations, the suspension or revocation of certificates/licences/ approvals, or the imposition of financial penalties as provided for in the primary aviation legislation, and applicable regulations.
- 3.6.10. If, after careful review of all circumstances involved and coordination within the functional directorate, there is a need to suspend or revoke the license/rating/certificate/approval holder's privileges, the Director General officially informs the license/rating/certificate/approval holder in writing, summarizing both the proposed action and the reasons for said action.
- 3.6.11. The Authority has established and implements clear, comprehensive and detailed enforcement policies and procedures for use by its staff. Such policies and procedures are aimed to enable an effective, proportional, gradual and consistent approach to enforcement within the Authority.
- 3.6.12. If the license/rating/certificate/approval holder does not correct the deficiency within the established deadlines, the Authority may take appropriate and progressive enforcement measures to ensure prompt correction of deficiencies.
- 3.6.13. The Authority established and implements a structured process for follow-up of the recommendations. This process includes, among other things:
- a) coordination between the Authority's functional directorates and the accident and investigation directorate;
 - b) communication process with the entity or entities affected by the recommendation;
 - c) indication of timelines; and
 - d) procedures to monitor the progress of the actions taken in response to the safety recommendation until their full implementation, with documented traceability.
- 3.6.14. The Authority established and implements an evaluation of the effectiveness of safety control measures using the evaluation tool in the Safety Risk Management element of the NSP implementation software.
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Chapter 4 – NATIONAL SAFETY ASSURANCE

4.1. Surveillance activities

- 4.1.1. ASD establishes and maintains surveillance programme manuals outlining the surveillance activities for each functional directorate to oversee and guide operators in their respective areas of responsibilities, and provide a standardized guidance for coordinating the preparation of safety surveillance activities.
- 4.1.2. The general ASD surveillance programme manual covers the general methodology/procedures, and guidance on how the types of surveillance activities and how they are conducted, starting from the notification of the service provider to the closure of the deficiencies identified during the activities.
- 4.1.3. The surveillance programme manuals specific to each functional area contain the details of the surveillance activities for each area, to include:
- a) the types of surveillance activities (e.g. audits, inspections, tests, safety events analyses);
 - b) the timeframe or frequency of the activities;
 - c) items to be covered or scope of the activities; and
 - d) specific methodology/procedures, job aids and guidance on how the activity is to be conducted.
- 4.1.4. Each functional Director will submit to the approval of the Director, ASD an annual surveillance plan covering certified and uncertified service providers. The plan shall be submitted by 30 November for the following year and include for each service providers:
- a) a summary of outcomes of safety inspections and audits for the year to date,
 - b) a highlight of the areas of great safety concern,
 - c) a proposal of scope of inspection on the basis of a) and b), including prioritization of surveillance activities, and
 - d) tentative dates and duration of the annual, follow-up or special inspections.
- 4.1.5. The surveillance activities shall include an annual review of each service provider's SPIs and SPTs taking into consideration the performance and effectiveness of each SPI and SPT. The review may show the need to make adjustments to support the continuous safety improvement.
- 4.1.6. Records of surveillance activities are maintained in the inspection & audit management component of the NSP implementation software (QMS) and include:
- a) assignment of Authority's inspectors and services provider's representatives,
 - b) completed checklists, evaluation reports and associated documentation, including, as applicable, safety assessments;
 - c) minutes of meetings conducted as part of surveillance;

- d) findings on deficiency and non-conformities to the established regulatory requirements,
- e) approved corrective action plans to address identified deficiencies, and
- f) proof of implementation of corrective action plans.

4.2. State safety performance

4.2.1. The Authority establishes the acceptable level of safety performance (ALoSP) to be achieved through:

- a) implementation and maintenance of the NSP and;
- b) implementation and maintenance of SPIs and SPTs showing that safety is being effectively managed.

4.2.2. The SPIs and SPTs are established and maintained in the Safety assurance element of the NSP implementation software (SSP) based on the information collected from the service providers through the SSDCPS.

4.2.3. The Authority's monitoring and measurement strategy include a set of SPIs that encompass all areas of the aviation system for which the Authority is responsible and reflect both outcomes (e.g. accidents, incidents, regulatory violations) as well as functions and activities (operations where the safety risk mitigations in place performed as expected) reflecting two distinct types of safety risks:

- a) **Operational safety risks** focus on conditions that could lead to an unwanted outcome linked to services providers' SMS. These are the conditions associated with accidents, incidents, failures and defects. Operational safety risk is essentially a by-product of the delivery of services.
- b) **Process implementation safety risks** focus on the means and resources necessary for operational safety risk to be managed. Management of safety risk from a process implementation perspective starts with the evaluation of ICAO SARPs implementation status (safety-related national laws and regulations), the implementation of SMS processes within the industry, and the implementation of SSP at the State level (which includes effective oversight and monitoring of the industry). If improvements in any of the above are necessary, the activities to achieve them are planned, implemented and monitored, and adequate resources should be allocated for these activities. SPIs are then developed that allow tracking of the planning, implementation and/or effectiveness of the changes.

4.2.4. SPIs for both the operational and process implementation safety risks are a key part of the Authority's safety assurance process. The aggregation of operational safety risk SPIs and process implementation safety risk SPIs are the for establishing the ALoSP for Sudan.

4.2.5. The SPIs are reviewed at least annually based on operational safety issues and processes as derived from, among other sources, the outcomes of

safety inspections and audits.

- 4.2.6. The responsibility for establishing the ALoSP rests with the Director General, and will be expressed through the set of SPIs for the State, sectors and service providers under their authority.
- 4.2.7. The ALoSP represents the agreement between the Authority and services providers of the expected level of safety performance including, but is not limited to, the expectations for safety performance for each sector and service provider.
- 4.2.8. SPS continually reviews the ALoSP to determine its continued appropriateness and make recommendations to the Director General. The periodic review of the ALoSP focuses on:
- identifying critical safety issues within aviation sectors, ensuring inclusion of SPIs that allow safety performance management in these areas;
 - identifying SPTs that define the safety performance level to be maintained or the desired improvement to be achieved for relevant SPI in each sector, with a view to enhance safety performance management throughout the entire Sudan's aviation system;
 - identifying triggers (if appropriate) when an SPI reaches a point that requires some action; and
 - reviewing SPIs to determine whether modifications or additions to existing SPIs, SPTs and triggers (if appropriate) are needed to achieve the agreed ALoSP.
- 4.2.9. The Sudan's safety performance as indicated by the established SPIs and SPTs demonstrate that the ALoSP achieved. If any of the SPTs are not met, SPS will conduct an evaluation to better understand why and to determine what actions should be taken. It could be because:
- the targets were not achievable or realistic;
 - the actions taken to achieve the target were not appropriate or deviated from the original intent (practical drift);
 - changes in other safety risk priorities diverted resources away from meeting a particular target; or
 - emerging risks occurred that had not been considered when the targets were set.
- 4.2.10. For the targets that were not met, there will be a need to understand why and for a management decision on whether the safety improvement is sufficient even if it has not met the target and what further actions are required. SPS will conduct additional analysis to identify some risk factors that were not addressed or maybe some risk mitigations in place that are not effective, and submit recommendation to the Director General.

4.3. Management of change

- 4.3.1 The Authority shall conduct an impact assessment of changes in the aviation system to proactively identify the safety impact of such changes

before they are implemented, and plan and execute proposed changes in a structured way.

- 4.3.2 Changes that require an impact assessment include, but are not limited to:
- a) reorganization of the Authority (including downsizing);
 - b) changes in the SSP processes, including changes in methodology such as surveillance, SRM and safety assurance processes.
 - c) changes in the regulatory environment, such as changes in existing safety, enforcement policies, programmes, and regulations;
 - d) changes in the operational environment, such as introduction of new technologies, changes in infrastructure, equipment and services;
 - e) rapidly changing industry (expanding, contracting, morphing) and its potential impact on the Authority's oversight and performance monitoring capabilities.
- 4.3.3 The impact assessment of the proposed changes is an appraisal of the positive and negative effects of such changes on the existing aviation systems and shall include an identification of:
- a) the safety impact: integration of the changes into the existing regulatory system, development of new, or revision of guidance material, certification, and surveillance activities, as well as SPIs, and SPTs,
 - b) the financial impact: resources required in terms of staff, training, increase/reduction of certification, or surveillance activities
 - c) the efficiency impact: appropriate level and type of change, practicability and sustainability, consistency with existing regulatory requirements, standardization or harmonization of existing activities, or additional tasks to existing staff, and
 - d) the potential challenges and negative effects resulting from the implementation of the anticipated changes.
- 4.3.4 The Authority shall inform effected personnel within the Authority and affected service provider(s) of the change, its timing and impacts.
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Chapter 5 – NATIONAL SAFETY PROMOTION

5.1. Internal communication and dissemination of information

5.1.1. The Authority shall include in its internal communication and dissemination:

- a) NSP documentation, policies, and procedures;
- b) SPIs;
- c) sector safety performance information;
- d) communication of system safety responsibility;
- e) lessons learned from accidents and incidents; and
- f) concepts and best practices of safety management.

5.1.2. The following are the means of communication to be used by the Authority for internal communications and dissemination of information on the NSP:

- a) semi-annual newsletter on the progress of implementation of the NSP, including the overall State's SPIs, and SPTs, and aviation sector's SPIs, and SPTs,
- b) additional bulletins, as and when required to provide information that does not require action other than "to note",
- c) circulars to disseminate specialized information of interest on specific items of the NSP such as: studies or notes based on statistics filed, reproduction of or extracts from documents submitted by industry, reports on implementation, etc.
- d) seminars to engage in discussion on specific subjects of the NSP with the aim of providing insight information on the subject, to be scheduled at least once every quarter, and
- e) meetings of focus groups to review implementation of the NSP in each specific area (aerodromes, flight operations, training organisations maintenance organisations, air traffic services, etc)

5.2. External communication and dissemination of safety information

5.2.1. The Authority shall include in its external communication and dissemination:

- a) guidance material for the implementation of SMS;
- b) importance of reporting; and
- c) identification of available safety training for the aviation community.

5.2.2. The means of communication to be used by the Authority for external communications and dissemination of information on the NSP are the same as those listed in 5.1.2

Chapter 6 – NSP IMPLEMENTATION

6.1. System description

- 6.1.1. Aviation regulatory framework : The Authority is the entity in charge of the regulation and supervision of civil aviation activities in Sudan. The accident and incident investigation directorate is functionally independent from the Authority.
- 6.1.2. Safety management roles and accountabilities: Figure 6-1 depicts the safety management and accountabilities within the Authorities. The SPS Directorate acts as safety manager and is responsible for the implementation of the NSP on behalf of the Director General, including maintenance of the NSP documentation. Under the direction of the Director, ASD, the functional directorates implement the regulations in their respective areas, conduct certification and surveillance activities, and initiate the resolution of safety issues.

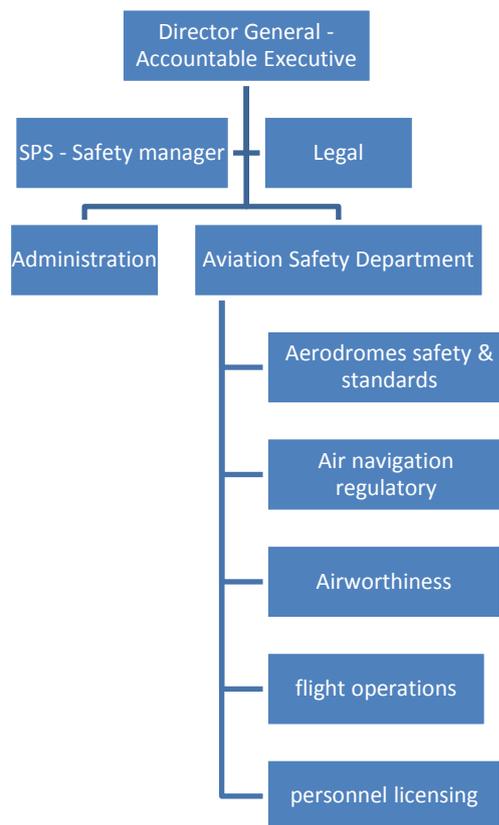


Figure 6-1 – safety management and accountabilities

6.1.3. Mechanism for coordination of the NSP :

- 6.1.3.1. A high level national safety review committee (NSRC) is comprised of :
- The Director General, Chairman,
 - The Director, SPS, secretary,
 - The Director, Accident & incident investigation,
 - The Director, ASD,

- e) The legal adviser, and
- f) The Director of Administration.

The mandate of the NSRC is to:

- a) Approve NSP documentation,
- b) establish and review safety policy, safety enforcement policy, and safety objectives;
- c) approve, review and monitor implementation of the national aviation safety plan,
- d) establish and monitor achievement of ALoS;
- e) monitor safety performance and the achievement of safety targets;
- f) receive reports from the safety action group on the performance and implementation of NSP,
- g) allocate appropriate resources for the implementation of the NSP related activities, and
- h) monitor :
 - i. the effectiveness of the NSP,
 - ii. timely response of necessary safety risk control actions;
 - iii. safety performance against the NSP's safety policy and objectives; and
 - iv. effectiveness of the NSP's safety management processes.

6.1.3.2. A tactical national safety action committee (NSAC) is comprised of :

- a) The Director, ASD, Chairman,
- b) The Director, SPS, secretary, and
- c) The functional Directors.

The mandate of the NSAC is to:

- a) make recommendation to the NSRC on NSP documentation;
- b) advise the NSRC on safety objectives, and ALoSP,
- c) submit reports to the NSRC on the implementation of the NSP, and progress towards achievement of ALoSP;
- d) monitors operational safety performance within the functional areas of the Authority and ensures that approved SRM activities are carried out; including the approval of services providers' SMS, SPIs, and SPTs
- e) reviews available safety data and identifies the implementation of appropriate safety risk control strategies and ensures employee and services providers feedback is provided;
- f) assesses the safety impact related to the introduction of regulatory, operational changes or new technologies;
- g) coordinates the implementation of any actions related to safety risk controls and ensures that actions are taken promptly; and
- h) reviews the effectiveness of the safety risk controls.

6.1.4. Internal review mechanism: The NSAC meets once a month, while the NSRC meets once every quarter. NSP documentation including safety objectives and safety management processes are reviewed by the NSAC and submitted to the approval of the NSRC. The review is conducted once

annually and whenever there is a major change in the operational, regulatory environment, or technologies.

6.2. Gap Analysis

- 6.2.1. A gap analysis is conducted and kept dynamically up-to-date in the SSP Component of the NSP implementation software (SSP). It identifies the gaps between the existing structures and processes within the Authority, and those required for an effective NSP implementation. The elements or processes identified as requiring action form the basis of the NSP implementation plan.
- 6.2.2. The data collected through the ICAO Universal Safety Oversight Audit Programme (USOAP) is also used to identify deficiencies in the foundation of the NSP. The first step in implementing the NSP consists of addressing any unsatisfactory USOAP protocol questions related to issues that are linked to effective NSP implementation such as reporting systems, safety data collection and processing.

6.3. Implementation Plan

- 6.3.1. An NSP implementation is developed and kept dynamically up-to-date in the SSP component of the NSP implementation software (SSP). It prioritizes and documents the tasks/subtasks in an action plan. The NSP implementation plan, together with the NSP top-level exposition document (this manual), provide the “blueprints” which guides the Authority’s journey toward effective NSP, and continuous improvement of safety performance. These two key documents are made readily accessible to all relevant personnel in the document management component of the NSP implementation software (DOC) to ensure everyone involved is aware of the NSP and its plans for implementation.

6.4. NSP maturity assessment

- 6.4.1. The assessment of the NSP’s maturity is conducted using the internal audit functions of the audit and inspection management component of the NSP implementation software (QMS). The tool is based on a series of questions that are used by the Authority to assess the effectiveness of the NSP.
- 6.4.2. Once the basic aspects of the NSP are installed an assessment of the documentation will be conducted. The assessment aims to discover whether or not the compliance and performance expectations of the NSP are present and suitable. At a later stage, the NSP will be assessed to understand how well it is operating and how effective it is at achieving its objectives. The schedule of the assessments is included in the NSP implementation plan.
- 6.4.3. The internal audit functions of the audit and inspection management component of the NSP implementation software (QMS) will be continually



used to assess the effectiveness of NSP during ongoing monitoring and continuous improvement and identify changes to the aviation system

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