CIVIL AVIATION AUTHORITY OF VIET NAM

ADVISORY CIRCULAR AC 12-011

FLIGHT DATA ANALYSIS PROGRAM APPROVAL

SECTION 1- GENERAL

1.1 PURPOSE

This Advisory Circular (AC) provides oversight to air operators as well as to air operators performing commercial air transport operations with aeroplanes and helicopters.

1.2 STATUS OF THIS ADVISORY CIRCULAR

This is an original issuance of this AC.

1.3 BACKGROUND

A. Initially, the principal use of flight recorders was to assist accident investigators, especially in those accidents with no surviving flight crew members. As the tools to recover and analyse flight data became more affordable, it was recognized that analysis of the recorded data could be utilized to enhance the safety and efficiency of daily operations. By routinely analysing the recorded flight parameters, much could be learned about the safety of flight operations and the performance of airframes and engines. Additionally, analysis of this de-identified data can provide notice of emerging trends that allow proactive identification of safety hazards.

B. To capitalize on these benefits, a number of operators set up programmes to routinely analyse recorded flight data. The aviation industry is increasingly analysing recorded data from normal operations in support of organizations safety management systems (SMSs). Flight data analysis (FDA) provides another tool for proactively identifying safety hazards, and controlling and mitigating the associated risks.

1.4 APPLICABILITY

This AC is applicable to Vietnam AOC approved for functions in the Viet Nam aviation environment.

1.5 RELATED REGULATIONS

The following regulations are directly applicable to the guidance contained in this advisory circular

- VAR Part 6, Required Instruments and Equipment;
- VAR Part 12, Air Operator Certification and Administration;

1.6 RELATED PUBLICATIONS

For further information on this topic, individuals, instructors and examiners are invited to consult the following publications - International Civil Aviation Organization (ICAO)

- ICAO Annex 6 *(Twelfth Edition, July 2022)* - Part I - International Commercial Air Transport – Aeroplane;
- Annex 6 — Operation of Aircraft, Part III — International Operations — Helicopters, (Section II, Commercial Air Transport only);
- ICAO Annex13 (*Twelfth Edition, July 2022)* - Aircraft Accident and Incident Investigation for a description of operational personnel;
- Annex 19 — Safety Management;
- Doc 9824 - Human Factors Guidelines for Aircraft Maintenance Manual;
- Doc 9806 - Human Factors Guidelines for Safety Audits Manual;
- Doc 9966 - Manual for the Oversight of Fatigue Management Approaches;
- Doc 9756 - Manual of Aircraft Accident and Incident Investigation
- Doc 9365 - Manual of All-Weather Operations;
- Doc 9859 - Safety Management Manual (SMM);

1.7 ACRONYMS

1) ADRS Aircraft data recording system
2) ANSP Air navigation services provider
3) ATC Air traffic control
4) ATM Air traffic management
5) EAFDM European Authorities Coordination Group on Flight Data Monitoring
6) EASA European Union Aviation Safety Agency
7) FDA Flight data analysis
8) FDAP Flight data analysis programme
9) FDM Flight data monitoring
10) FDR Flight data recorder
11) FOQA Flight operational quality assurance
12) LOSA Line operations safety audit
13) MMO Max operating Mach number
14) QAR Quick access recorder
15) SARPs Standards and Recommended Practices
16) SMM Safety Management Manual
17) SMS Safety management system
18) SOP Standard operating procedure
19) SSP State safety programme
20) TAWS Terrain awareness and warning system
21) VFE Max flap extended speed
22) VLE Max landing gear extended speed
23) VLO Max landing gear operation speed
24) VMO Max operating speed

SECTION2 - INTRODUCTION

2.1. OBJECTIVES AND SCOPE

The objective of this AC is to provide:

1. A description of the relationship between SMS and FDAP;
2. An overview of FDAP elements;
3. Guidance for the establishment and implementation of an FDAP; and
4. Guidance to States on promoting and assessing FDAPs

2.2. FLIGHT DATA ANALYSIS PROGRAMME (FDAP)

A. The FDAP, sometimes referred to as flight data monitoring (FDM) or flight operational quality assurance (FOQA), provides a tool for the systematic, proactive identification of hazards. FDA is a complement to hazard and incident reporting and to a line operations safety audit (LOSA).

B. An FDAP may be described as a proactive programme for the routine collection and analysis of flight data to develop objective information for advancing safety, e.g. through improvements in flight crew awareness, training effectiveness, operational procedures, maintenance and engineering, and air traffic control (ATC) procedures.

C. FDA as a process of analysing recorded flight data in order to improve the safety of flight operations.

D. The FDAP involves:

1. Capturing and analysing flight data to determine if the flight deviated from a standard operating envelope;
2. Identifying trends; and
3. Communicating on findings and promoting action to reduce operational risks

E. Periodically, recorded flight data are transferred from the aircraft and analysed by the ground analysis system at a centralized location. This should be done as frequently as practicable, to ensure any events that may impact safety are detected quickly.

F. Deviations from certain predetermined threshold values, called “exceedances” or “FDA events”, generate “alerts” (triggers) and are evaluated. The FDA team will examine the FDA event and propose corrective actions. The FDA team also produces FDA event aggregation reports over time to identify and monitor trends. In addition to FDA events that are detected by an exceedance, the FDAP is also able to collect certain parameters from every flight, called “routine measurements” (e.g. monitoring landing weight or flap setting at touchdown for every flight).

Objectives of a flight data analysis programme

G. Successful FDAPs encourage adherence to standard operating procedures (SOPs), and can detect nonstandard behaviour, thereby improving safety performance. They can also detect adverse trends in any part of the flight and thus facilitate the investigation of events or incidents.

H. The FDAP can be used for identifying various operational issues, such as non-standard or deficient procedures, weaknesses in the ATC system or anomalies in aircraft performance. An FDA allows the monitoring of various aspects of the flight profile, such as the adherence to the prescribed take-off, climb, cruise, descent, approach and landing SOPs. Specific aspects of flight operations can be examined either retrospectively to identify problem areas, or proactively prior to introducing operational change, and subsequently to confirm the effectiveness of the change.

I. During incident analysis, flight data from the related flight can be compared with the fleet profile data, thereby facilitating analysis of the systemic aspects of an incident. It may be that the parameters of a flight with an incident vary only slightly from many other flights, possibly indicating a systemic issue that could be addressed by a change in operating technique or training. For example, it would be possible to determine whether a tail-scrape on landing was an isolated event, or symptomatic of a wider mishandling problem by comparing the piloting

technique during the incident landing with that performed by other crews landing the same aircraft type on the same runway.

J. Engine monitoring programmes may utilize FDAP data for reliability trend analysis and fuel efficiency. It is also possible to monitor other aspects of the airframe and systems.

K. In summary, an FDAP offers a wide spectrum of applications for safety management. Furthermore, the benefit of improved operational efficiency outweighs the investment needed. In particular, an FDAP can support the following objectives:

1. Determine operating norms;
2. Identify potential and actual hazards in operating procedures, fleets, aerodromes, ATC procedures, etc.;
3. Identify trends;
4. Monitor the effectiveness of corrective actions taken;
5. Provide data to conduct cost-benefit analyses;
6. Optimize training procedures; and
7. Provide actual rather than presumed performance measurement for risk management purposes.

L. It is important that adequate safeguards are provided to protect the source(s) of the data.

An FDA in support of safety management systems

M. An FDAP aims to continuously improve the overall safety performance of an operator and should be implemented in support of the safety risk management component and the safety assurance component of the operator's SMS. Ideally, where multiple systems are utilized to identify hazards and manage risk, they should be integrated to maximize their combined effectiveness, to ensure resources are being distributed appropriately across the systems and, where possible, to reduce duplicated processes for greater system efficiency. Therefore, an operator that already has a mature SMS should be able to readily adopt, integrate and understand the fundamental processes of an FDAP;

N. For example, in support of safety assurance processes of an operator's SMS, an FDAP will have identified indicators or parameters chosen for measuring and monitoring the operator's safety performance and validating the effectiveness of safety risk controls, including those based on "operational events". These events may be classified as low consequence indicators (deviation, non-compliance event trends) or high consequence safety performance indicators (accident and serious incident rates);

O. The safety assurance processes would also have procedures for corrective or follow-up action to be taken when targets are not achieved and/or triggers are breached;

P. The safety trigger levels for a particular safety performance indicator serve to start actions such as evaluations, decisions, adjustments of taking remedial action. The safety performance target setting is the threshold for desired achievement monitored by a safety performance indicator. A safety performance target can also be set for an operational improvement as a defined milestone during a future monitoring period. With such defined safety trigger and1-4 Manual on Flight Data Analysis Programmes (FDAP) target settings, it becomes apparent that a measurement of the safety performance can be derived at the end of any given monitoring period. This can be done by counting the number of trigger breaches and/or the number of targets achieved/not achieved for the associated safety performance indicators. Moreover, the caveats on setting safety triggers and targets and the appropriate use should be considered, as a triggered safety performance indicator is not necessarily an indication of failure and there may be some safety performance indicators that are better to be used without a target setting. Further guidance on safety trigger and safety performance target setting can be found in the Safety Management Manual (SMM)(Doc 9859)

Q. FDAP results could be easily integrated into existing databases or sources for identifying hazards and assessing associated safety risks, measuring and monitoring safety performance, and supporting the management of change and continuous improvement of the SMS. Such cross-communication between an FDAP and an SMS would increase the robustness of the processes and help achieve greater effectiveness in safety and quality of the system/programme.

R. The degree of interactions between an operator's SMS and its FDAP will depend on many factors, including maturity as well as operational, organizational and regulatory considerations.

- *Note 1.— Information from other SMS data sources gives context to the flight data which will, in return, provide quantitative information to support analysis that otherwise would be based on subjective reports. Air safety reporting, avionic and systems maintenance, engine monitoring, ATC and scheduling are just a few of the areas that could benefit.*
- *Note 2.— Guidance on safety management systems and their integration to other systems is provided in the Safety Management Manual (SMM) (Doc 9859)*

SECTION 3 - FDAP DESCRIPTION

3.1. FDAP OVERVIEW

The quality and capability of an operator's FDAP will be dependent on the selection and availability of flight parameters, and the means to record and recover flight data from the operator's aircraft. The quality and capability is also dependent upon the personnel and tools that perform safety analysis and provide robust, useable outputs that can identify hazards in the system, supporting the assessment of safety risks and contributing to a positive operating environment. The selected flight parameters should be relevant and appropriate to reflect the safety, quality or its level of risk providing support to the monitoring of safety performance. It is important to note that the programme description herein provides baseline components according to the risk acceptability. Therefore, depending on availability of resources, technology, complexity, size and type of operation, the programme will need to be modified to suit the needs of the operator.

3.2. FDA EQUIPMENT

A. FDAPs generally involve systems that capture flight data, transform the data into an appropriate format for analysis, generate reports and allow for visualization to assist in assessing the data. The level of sophistication of the equipment can vary widely. Typically, however, the following equipment capabilities are required for effective FDAPs;

1. An on-board device to capture and record data on a wide range of flight parameters. These flight parameters should include, but not be limited to, the flight parameters recorded by the flight data recorder (FDR) or aircraft data recording system (ADRS). The flight parameter performance (range, sampling rate, accuracy, recording resolution) should be as good as or better than the performance specified for FDR parameters;
2. A means to transfer the data recorded on board the aircraft to a ground-based processing station. In the past, this largely involved the physical movement of the memory unit from the quick access recorder (QAR). To reduce the physical effort required, more modern transfer methods utilize wireless technologies;
3. A ground-based computer system (using specialized software) to analyse the data (from single flights and/or in an aggregated format), identify deviations from SOPs, generate reports to assist in interpreting the read-outs, etc.; and
4. Optional software for a flight animation capability to integrate all data, presenting it as a simulation of in-flight conditions, thereby facilitating visualization of actual events for analysis and flight crew debriefing.

Airborne equipment

B. Modern glass-cockpit and fly-by-wire aircraft are equipped with the necessary digital data-buses

from which information can be captured by a recording device for subsequent analysis. Older, non-digital, aircraft are capable of capturing a limited set of data, but may be retrofitted to record additional parameters. Nevertheless, a limited parameter;

C. The flight parameters recorded by the FDR or ADRS may determine a minimum set for an FDAP. In some cases, the flight parameters and FDR/ADRS recording duration required by Annex 6 provisions and State regulations to support accident and incident investigations may be insufficient to support a comprehensive FDAP. Thus, it may be advisable to rely on other airborne recording systems which offer additional capacity and are capable of being easily downloaded for analysis;

D. QARs are optional non-crash protected recorders installed on aircraft and record flight data in a low-cost removable medium. They are more accessible and record flight parameters for a longer duration than the FDR. New technology QARs and new flight data acquisition systems offer the possibility to capture and record thousands of flight parameters. They also allow for increasing the sampling rate or the recording resolution of specific flight parameters to values appropriate for advanced flight data analysis. The expanded data frame greatly increases the resolution and accuracy of the output from ground analysis programmes. However, the data frame definition is one of the more difficult parts of setting up an FDAP. In a mixed fleet, it can be very expensive to obtain the necessary capability to read different data sets.

E. An increasing number of aircraft are being fitted with light-weight flight recorders as standard equipment; these units will provide a source of flight data for operators of smaller aircraft. Some light-weight recorders make use of low-cost removable memory cards which may simplify the process to download and analyse the flight data. This will enable such operators to implement and benefit from an FDAP, even if there are no provisions requiring them to institute FDAPs;

F. To eliminate the task of moving the data from the aircraft to the ground station by physically removing the recording medium of the QAR, newer systems automatically download the recorded information via secure wireless systems. Fleet composition, route structure and other considerations will determine the most cost-effective method of removing the data from the aircraft.

Ground-based computer system for flight data analysis

G. Flight data are downloaded from the aircraft recording device into a ground-based computer system incorporating flight data analysis software. The computer system must be configured to securely protect this sensitive information; further guidance on the protection of safety data, safety information and related sources can be found in Annexes 6, 19 and the Safety Management Manual (SMM) (Doc 9859). Such computer systems are commercially available; however, the computer platform will require appropriate front-end interfaces to cope with the variety of recording inputs available today.

H. FDAPs process large amounts of data, in specific formats, and therefore require specialized analysis software. The analysis software facilitates the routine analysis of flight data in order to identify situations that may require corrective action.

I. The analysis software can perform checks of the downloaded flight data for recording abnormalities. The exceedance detection typically includes a large number of trigger logic expressions derived from a variety of sources such as flight performance curves, SOPs, engine manufacturers' performance data, airfield layout and approach criteria. Trigger logic expressions may be simple exceedances such as redline values. The majority, however, are composites which are defined by a certain flight mode, aircraft configuration or payload-related condition and one or more flight parameters. Analysis software can also assign different sets of rules dependent on aerodrome or the aircraft position. For example, noise sensitive aerodromes may use steeper than normal glide slopes on approach paths over populated areas. The set of trigger logic expressions is normally user-defined and can be tailored to an operator's SOPs.

J. FDAP events and routine measurements can be displayed on a ground computer screen in a

variety of formats. Recorded flight data are usually shown in the form of color-coded traces and associated engineering listings, charts, cockpit simulations or animations of the external view of the aircraft.

3.3. PROCESSING FLIGHT DATA ANALYSIS DATA

Routine measurements

A. Output data from each recorded flight, not just those producing significant events, can be retained. This output data is known as "routine measurements", and when a sufficient sample is available to characterize each flight, a comparative analysis of a wide range of operational statistics can be made. Depending on the skills of the analysts, emerging trends may be detected before the trigger levels associated with FDAP events are reached.

Examples of routine measurements

1. Autopilot status at touchdown;
2. Bank angle and pitch angle at touchdown;
3. Configuration at 1 000/500 ft, maximum vertical speed below 1 000 ft, airspeed at 1 000/500/50 ft. final flaps settings in relation to the operator's stabilized approach criteria;
4. Fuel remaining at touchdown;
5. Go-around altitude;
6. Landing weight;
7. Margin to max operating speed (VMO), max operating Mach number (MMO), never exceed speed (VNE), max flap extended speed (VFE), max landing gear operation speed (VLO), max landing gear extended speed (VLE), etc.
8. h) Maximum pitch rate during take-off;
9. i) Normal acceleration during flight and at touchdown;
10. j) Thrust reverser mode (full vs other); and
11. k) Wind values at certain altitude gates during the approach.

Examples of comparative analyses:

1. autobrake mode at touchdown vs stopping distance;
2. slats/flaps selection versus altitude or airspeed;
3. normal acceleration at touchdown versus landing technique; and
4. use of thrust reverse vs stopping distance, engine RPMs and temperatures during reverse thrust operation.

FDAP events detection

B. FDAP events such as deviations from flight manual limitations, SOPs or good airmanship can be detected by an appropriately configured programme. A set of core FDAP events and related parameters should be defined by the operator at the beginning of the programme. The FDAP event set may be customized based on the operator and industry experience.

Examples:

1. airborne collision avoidance system resolution advisory;
2. dual input detection (for aircraft with independent sidesticks);
3. exceedance of maximum operating altitudes for the airframe, landing gear, slats/flaps;
4. exceedance of VMO, MMO, VNE, VFE, VLO, VLE, etc.;
5. excessive bank angle to detect deviation from specific envelope, procedures or manuals;
6. fast/slow rotation rate at take-off to detect deviation from type specific rotation technique;
7. flaps retraction in final approach to detect possible incorrect selections;

8. flaps extension at low altitude to detect deviation from specific procedures;
9. excessive tailwind at certain altitude gates to detect deviation from specific limitations or procedures;
10. gear down selection at low altitude to detect deviation from specific procedures;
11. go around below the decision height/decision altitude;
12. terrain awareness and warning system (TAWS) events to detect proximity to the ground, significant
13. deviation from the glideslope, sink rate, etc.;
14. high/low on glide slope, left/right of localizer, high vertical speed, too fast and/or too high at gates set by
15. the operator to detect possible deviation from specific procedures;
16. high rate of descent to detect deviation from specific procedures;
17. high positive or negative normal acceleration (G-load with flaps extended or retracted) to detect deviation from specific envelope;
18. rejected take-off;
19. smoke warning (lavatory, cargo, etc.); and
20. stall events to detect deviation from specific envelope.

Note.— The examples above are not necessarily undesirable events but instead should be the trigger to start the analysis of the related flights in a comprehensive way (e.g. a go around could be a barrier to a more serious outcome like runway excursions on landing).

C. Operators should ensure that their FDAP events are adequate to account for unique situations, unique type of operations and their own SOPs applicable to the aircraft types. If required, the operator should customize the FDAP events/threshold values accordingly.

D. Following the implementation of any changes to procedures, operators may also be interested in checking their effect on safety by setting or adapting specific FDAP events.

Examples:

1. low drag approaches and delayed flaps extensions;
2. single engine taxi; and
3. validation of navigation procedures.

Use for operational reports

E. FDAP information provides factual information which complements operations/operational reports from flight crew, ground crew or ATC. Benefits of FDAP information are also covered in 2.3.A to 2.3.E.

Examples:

1. violation of noise abatement procedures; and
2. jet blast events.

Incident investigation

F. FDAPs provide valuable information for incident investigations and for follow-up of other technical reports. Quantifiable recorded data have been useful in adding to the impressions and information recalled by the flight crew. FDA data also provide an accurate indication of system status and performance, which may help in determining cause and effect relationships.

Examples of incidents where recorded flight data could be useful:

1. abnormal and emergency conditions such as:
2. high-speed rejected take-offs;

3. flight control problems;
4. engine and system failures;
5. gear problems; and
6. fuel starvation;
7. activation of TAWS due to proximity to terrain;
8. loading error (shift in Centre of Gravity (CofG), excessive trim, etc.);
9. precursors of loss of control in-flight and on the ground;
10. low performance during take-off; and
11. severe wake vortex and turbulence encounters.

Continuing airworthiness

G. Both routine measurements and FDA events can be utilized to assist the continuing airworthiness function. For example, engine-monitoring programmes look at measures of engine performance to determine operating efficiency, predict impending failures and assist in maintenance scheduling. Effective use of the data can potentially provide significant savings in operating costs and dispatch reliability.

Examples of continuing airworthiness uses:

1. auxiliary power-unit monitoring;
2. assessment of brake wear in relation to brake application and use of thrust reverser;
3. bleed air/valve issues (packs);
4. engine health trend monitoring (EPR, N1, N2, fuel flow, ITT/EGT, vibration for thrust level);
5. system reliability through trend analysis;
6. determining the extent of a conditional inspection following an operational event (e.g. hard landing, heavy turbulence);
7. early detection of quality problems affecting parameters sent for recording to the FDR or ADRS; and
8. airspeed exceedances (VMO, MMO, VNE, VFE, VLO, VLE, etc.) to evaluate if a maintenance inspection/check is required and the type.

Integrated safety analysis

H. Findings gathered from the FDAP should be considered as safety data and safety information sources in support of the operator's SMS in order to obtain a more complete understanding of safety issues. Automatic data capture systems and safety reporting systems work complementarily in terms of safety data and safety information collection and processing to support safety management. Adequate procedures and protections should be in place to safeguard the confidentiality of FDA data when linking to identifiable data, like a safety report (see Section 4)

Example:

1. an airworthiness event and the respective report, like a hard landing or flap placard speed exceeded, can be described more accurately using FDA data;
2. FDA data can be used as a basis for retrospective reports in cases where the flight crew overlooked the occurrence (e.g. altitude deviation, navigation error);
3. safety issues found based on the FDAP (after an investigation including flight crew contacts) can be fed back to the SMS to allow the development/improvement of procedure and training or to start an awareness campaign (e.g. regular non-compliance with SOPs, misinterpretation of the operator's procedures, lessons learnt from specific events, failure in correctly executing procedures or manoeuvres); and

4. changes in training or procedures can be monitored by FDAPs and SMS to determine the operational effect and thereby provide effective feedback to both crews and management.

3.4. ANALYSIS AND FOLLOW-UP

A. Overviews and summaries of FDA data should be compiled on a regular basis, usually monthly or bi-monthly, while significant FDAP event detections would be expected to be made a priority. All data should be reviewed to identify specific exceedances and undesirable trends and to disseminate the information to the appropriate personnel.

B. Considering that the FDAP effectively provides quantitative information (the facts) but does not provide any qualitative information or context (the reasons), it is sometimes necessary to contact the flight crew, engineering or other operational staff to obtain a clearer understanding of the event. Understanding the contributing and/or causal factors is essential for deriving meaningful safety information from the event detection. In this case, the process for contacting the flight crew should be clearly defined both when a flight crew report is available and when it was not submitted, and this process should also consider specific national laws. The FDAP should contain clear guidance and process to inform all the participants about the scope and aim of the contact. Clear understanding of the purpose of the contact will build trust and support the objective to promote safety improvement through frank and open conversation. Consideration of appointing a "flight crew contact person" (see 5.3) could be valuable to build confidence with staff that the programme promotes a "positive safety culture". The aim is to clarify the circumstances involving the findings from the FDAP, obtain feedback about operational factors that have contributed to the situation (including, but not limited to, operation of the aircraft, deficiencies in the operating manuals, misunderstandings with ATC, crew resource management issues, fatigue or other human factors events) and, in some cases, give advice to avoid reoccurrence. For certain types of events, such as unreported events detected by the FDAP, these contacts may also be used to remind the flight crew of their responsibilities or obligations under State regulations.

C. All FDAP event detections should be archived in a database. The database is used to store, sort, validate and display the data in easy-to-understand management reports. Over time, this archived data can provide a picture of emerging trends and hazards which would otherwise go unnoticed.

D. Lessons learned from an FDAP may warrant inclusion in the operator's safety promotion activities. Care is required, however, to ensure that any information acquired through the FDAP is de-identified before using it in any training or promotional initiative unless permission is given by all personnel involved.

E. A proper trigger logic expression should be programmed in each FDAP event and designed to include an acceptable buffer that will disregard minor deviation, spurious events, as well as introduce an adequate operational margin to fly the aircraft through SOPs, instead of leading the flight crew to focus on FDAP parameters in order to avoid deviations.

F. As in any closed-loop process, follow-up monitoring is required to assess the effectiveness of any corrective actions taken. Flight crew feedback is essential for the identification and resolution of safety issues and could include answering the following example questions:

1. Were the corrective actions effective in achieving the intended impact?
2. Are the risks mitigated to an acceptable level, or unintentionally transferred to another part of the operations?
3. Have new safety hazards been introduced into the operation as a result of implementing corrective actions?

G. All successes and failures should be recorded, comparing planned programme objectives with expected results. This provides a basis for review of an FDAP and the foundation for the

continuous improvement of the programme.

SECTION 4 - PREREQUISITES FOR AN EFFECTIVE FDAP.

4.1. PROTECTION OF FDA DATA

Overall approach

A. The operator's management, flight crews and the State of the Operator have legitimate concerns regarding the protection of FDA data, which include:
   1. disclosure or use of data for disciplinary, civil, administrative and criminal proceedings;
   2. disclosure to the media and the general public under the provisions of State laws regarding access to information; or
   3. use for any purposes other than maintaining or improving safety.

B. Annex 19 — Safety Management, Appendix 3 establishes "Principles for the protection of safety data, safety information and related sources". As a principle "safety data" and "safety information" are not to be used in a way different from the purposes for which they were collected, unless a principle of exception applies. The protection also applies to individuals identifiable from recorded flight data. Hence, use of FDA data or FDA-derived information, obtained from a safety promotion initiative for oversight purposes, is not advisable. Appendix 3 aims at assisting States to enact and adopt national laws and regulations to protect safety data and safety information gathered from safety data collection and processing systems (SDCPS), while allowing for the proper administration of justice and necessary actions for maintaining or improving aviation safety. Guidance on the protection of safety data, safety information and related sources is provided in the Safety Management Manual (SMM) (Doc 9859).

   Note.— When an investigation under Annex 13 — Aircraft Accident and Incident Investigation has been instituted, accident and incident investigation records listed in paragraph 5.12 of Annex 13 are subject to the protections accorded therein instead of the protections accorded by Annex 19.

C. The integrity of an FDAP rests upon appropriate protection and safeguards for the data that is collected. Any disclosure which does not follow the principles for the protection of safety data, safety information and related sources outlined in Annex 19 may inhibit the future availability of such data and information, with a significant adverse effect on safety. In effect, it can compromise the cooperation of the affected flight crew, engineering or other operational staff in clarifying and documenting an FDAP event. Preventing the misuse of FDA data should be of common interest to the State, the operator and the flight crews:

D. The following can help build trust in the protection of FDA data:
   1. developing and adhering to an agreement, for appropriate interaction/contact and use of FDA data, between the operators' management and the flight crews, engineering and operational staff;
   2. establishing protocols that limit data access to selected individuals;
   3. maintaining tight control to ensure that data identifying a specific flight are kept secure;
   4. ensuring that operational problems are promptly addressed by management; and
   5. to the extent possible, non-reversible de-identification of the flight data files after a time appropriate for their analysis.

Policy on retention of data

E. Because of the large volumes of data involved, it is important that a strategy for data access, both online and offline, is carefully developed to meet the needs of FDAP users.

F. The most recent flight data are normally kept readily available to allow fast access during the

initial analysis and interpretation stages. When this process is completed, it is less likely that additional data from the flights will be required so the flight data can be archived. FDAP event detections and routine measurements are usually kept online for a much longer period to allow trending and comparison with previous events.

De-identification policy and procedures

G. A policy on FDA data de-identification is an absolutely critical area that should be carefully written down and agreed to before it is needed in extreme circumstances. Management assurance on the nondisclosure of individuals should be very clear and binding. Also, explanation by the flight crew is often helpful for the analysis of FDAP event detections, therefore whatever the channel used, flight crew feedback requested after an FDAP event detection should benefit from the implementation of Annex 19 SARPs related to the protection of safety data, safety information and related sources. The only exception is when the operator/flight crew have considered an FDAP event and believes that there is a continuing unacceptable safety risk if specific action is not taken. In this case, a principle of exception outlined in Appendix 3 to Annex 19 may apply. Subject to the latter, an identification and follow-up action procedure, previously considered and agreed to in the documented de-identification process, can be exercised. Guidance on the application of the principles of exception is provided in the Safety Management Manual (SMM) (Doc 9859).

H. There should be an initial stage during which the data can be identified to allow confidential follow-up by the flight crew contact person agreed to by the operator and the flight crews. Strict rules of access should be enforced during this period. In the case of an accident or incident, any data retained by the FDAP may not be de-identified or removed from the system until confirmation that it is not required for the accident or incident investigation. This will allow the accident or incident investigators access to all relevant information in accordance with Annex 13 — Aircraft Accident and Incident Investigation.

Set authorized access levels

I. The FDA ground-based computer system should have the ability to restrict access to sensitive data and also control the ability to edit data. For example, the FDAP flight crew contact person could have access to identified flight data, while operations management may only have access to de-identified data.

4.2. INVOLVEMENT OF FLIGHT CREWS

As with successful safety reporting systems, the professional relationship and trust established between State authorities, operators, flight crews, engineering and operational staff are the foundation for a successful FDAP. For most operators, this will be accomplished through an association, while for others, the State authority may be the custodian of flight crew involvement under the limitation of the due “duty of care”. Here it is incumbent upon management to provide assurance of the FDAP intent, conditions of use and protection given to its employees. This professional relationship and trust can be facilitated by:

1. early participation of the flight crew/industry representatives and/or authority representatives in the design, implementation and operation of an FDAP; and
2. a formal agreement between management and the flight crews, and/or State authority identifying the regulation and procedures for the use and protection of data.

4.3. SAFETY CULTURE

Consistent and competent programme management characterizes not only successful FDAPs but also positive safety culture, in support of the operator’s SMS. Indications of a positive safety culture of an operator include:

3. top management's demonstrated commitment to promoting a positive safety culture;
4. the cooperation and accountability of all organizational levels and relevant personnel representatives, meaning that anyone believing to have identified a hazard should feel able to report and expect followup action to be considered to address related safety risks. From the line pilot to the fleet manager all have responsibility to act;
5. a written policy for the protection of safety data, safety information and related sources that covers FDA and makes clear that the main objective of an FDAP should be to maintain and improve safety, and not for disciplinary, civil, administrative and criminal proceedings against employees, operational personnel or organizations;
6. an identified safety manager whose role and functions are defined following the recommendations of the Safety Management Manual (SMM) (Doc 9859);
7. dedicated staff under the authority of the safety manager and involvement of persons with appropriate expertise when identifying hazards and assessing the associated safety risks. For example, flight crews experienced on the aircraft type being analysed are required for the accurate diagnosis of operational hazards emerging from FDA analyses;
8. a focus on monitoring fleet trends aggregated from numerous operations. The identification of systemic issues adds more value for pro-active safety management;
9. a well-structured de-identification system to protect the confidentiality of the data; and
10. an efficient communication system, to permit timely safety action, for disseminating information on the prevention of consequences of hazards identified and subsequent safety risk assessments internally and to other organizations.

SECTION 5 ESTABLISHING AND IMPLEMENTING AN FDAP

Note.— Historically, bearing in mind the time required to obtain flight crew/management agreements and develop relevant procedures, an operator with no FDAP experience would not likely achieve an operational FDAP in less than 12 months. Another year may be required before any safety and cost benefits appear. Improvements in the analysis software, or the use of outside specialist organizations, should shorten these timeframes to ensure FDAP coverage during the safety-critical period of introduction to service. Recognition that a significant level of commitment in time, money and personnel resources is required to implement an operational FDAP is needed.

5.1 IMPLEMENTATION PLAN

A. Typically, the following steps should appear in the FDAP implementation plan.
1. pre-assessment of the technical feasibility of the FDAP, including the number and quality of flight parameters, the availability and correctness of the data frame layout documentation, identifying changes to the aircraft necessary to retrieve flight data quickly (e.g. is there already a flight data acquisition? Can a QAR be easily installed?). This would help in roughly evaluating, for each aircraft fleet, what benefit can be expected from including that aircraft into the FDAP and what efforts will be needed to get there;
2. management approval of the programme;
3. implementation of a formal agreement between management and flight crews;
4. identification of an FDAP implementation team, including the future FDA team members, or as a minimum, a project leader and flight crew representation; this team should be involved in all of the following steps;
5. development of a business plan, including processes, software and hardware and assignment of adequate resources;
6. establishment and verification of operational and security procedures; if a third party analyses FDA data, an agreement should be defined between the service provider and the

operator;

7. development of an FDAP procedures manual;
8. assessment of possible interfaces between an FDAP and other safety data sources and the interactions of an FDAP with the operator's SMS;
9. selection of equipment (airborne, ground-based computer system, interface with other data sources and the SMS);
10. selection, recruitment and training of the FDAP team members, according to their respective roles;
11. testing of data transfer; testing of the ground-based computer system (including data acquisition, definition of trigger logic expressions, data analysis and visualization, data de-identification, final storage of data);
12. testing of data security, including security procedures;
13. identification of areas of interest that should be first considered in the data;
14. checking of the proper decoding and of the quality of flight parameters used by an FDAP; and
15. start of data analysis and validation, focused on key areas in operation.

Note.— FAA Advisory Circular 120-82 and UK CAA CAP739 provide each an example of an FDAP implementation plan. Industry best practices for the implementation of an FDAP can be found in the documents published by the European Operators Flight Data Monitoring (EOFDM) forum.

5.2 STARTING THE FDAP

A. Once the FDAP has been established, a phased implementation is recommended so that the foundations are in place for possible subsequent expansion into other areas. Using a building block approach will allow expansion, diversification and evolution through experience.

Example:

With a modular system, begin by verifying recorded parameters versus on-board parameters available to flight crew. Initially, set up FDAP events based on flight manual limitations and basic safety-related issues only. After having gained experience, add further FDAP events based on industry safety issues and best practices. Evaluate the possibility to interface the various organization databases. When the organization has adequate safety culture, configure and share animations of significant events.

B. A staged set of objectives, starting from the first week's replay and moving through early production reports into regular routine analysis, will contribute to a sense of achievement as milest

Examples:

Short-term goals:

1. ensure that the FDAP events account for unique situations, unique type of operations and the SOPs applicable to the aircraft types;
2. establish data download procedures, test analysis software and aircraft parameters, set up basic FDAP events;
3. establish procedures and protocols for the protection of FDA data;
4. validate and investigate FDAP event detections; and
5. establish a user-acceptable routine report format to create statistics and unde;

Medium-term goals:

1. produce periodic reports to support safety management decision making and improvement

— including, but not limited to, safety performance monitoring and measurement;

2. consolidate the definition of FDAP events and measurements (e.g. analyse why FDAP events are not captured by safety reporting processes; investigate those FDAP events which are never triggered; assess if all scanned flights are correctly identified and split into flight phases by the analysis software);
3. produce periodic reports for safety promotion for the benefit of flight crews;
4. add further events based on industry safety hot spots, accident/incident investigations and organization issues identified by safety sources;
5. customize animations;
6. plan for the next fleet to be added to the programme; and
7. network FDA information across all the operator's internal safety communication systems in support of the operator's SMS.

Long-term goals:

1. ensure FDA provision for any proposed advanced training programme; and
2. use of FDAP to support utilization and condition monitoring to enhance operational efficiency, such as dispatch reliability enhanced through engine monitoring.

C. Initially focusing on a few known areas of interest will help prove the system's effectiveness. are met.

Examples:

1. exceedances of flight manual limitations; and
2. unstabilized approaches.

Analysis of such known problem areas may generate useful operational confidence leading to the analysis of other areas.

5.3 THE FDAP TEAM

A. Experience has shown that the "team" required to run an FDAP can vary in size from one person for a small fleet, to a dedicated section for large fleets. However, it is recommended that the FDAP be managed by a dedicated staff with a high degree of specialization and logistical support. The descriptions below identify various functions to be fulfilled, not all of which need a dedicated position.

1. Team leader. It is essential that the team leader earns the trust and full support of both management and flight crews. The team leader acts independently of others in line management to make recommendations that will be seen by all to have a high level of integrity and impartiality. The individual requires good analytical, presentation and management skills. They should be the safety manager or placed under the authority of the safety manager.
2. Flight operations interpreter. This person is usually an experienced pilot in the type and operation who knows the operator's route network and aircraft. This team member's in-depth knowledge of SOPs, aircraft handling characteristics, airports and routes will be used to place the FDA data in a credible context.
3. Technical interpreter. This person interprets FDA data with respect to the technical aspects of the aircraft operation and is familiar with the power plant, structures and systems departments' requirements for information and any other engineering monitoring programmes in use by the operator.
4. Flight crew contact person. This person may be the safety manager, agreed flight crew representative or a mutually acceptable substitute, and is usually assigned by the operator for confidential discussion with flight crews involved in events highlighted by the FDAP. The flight crew contact person may be the only person permitted to connect the identifying data

with the event. The position requires integrity, good judgement, interpersonal skills and a positive attitude toward safety education to foster the trust of both flight crew members and managers. In addition, the flight crew contact person will need to be conversant with FDAP policy and procedures, and may need to be trained to use the FDAP tools.

5. Engineering technical support. This person is usually an avionics specialist, involved in the supervision of FDR serviceability. Indeed, an FDAP can be used to monitor the quality of flight parameters sent both to the FDR and to the FDAP/QAR recorder, and thus ensure the continued serviceability of the flight data recording system. This team member should be knowledgeable about FDAP and the associated systems needed to run the programme.
6. Air safety coordinator. This person cross-references FDAP information with other safety data sources (such as the operator's mandatory or confidential incident reporting programme and LOSA) and with the operator's SMS, creating a credible integrated context for all information. This function can reduce duplication of follow-up investigations.
7. Replay operative and administrator. This person is responsible for the day-to-day running of the system, producing reports and analyses. Methodical, with some knowledge of the general operating environment, this person keeps the programme moving. Operators may utilize the services of a specialist contractor to operate an FDAP.

B. All FDAP team members need appropriate training or experience for their respective area of data analysis and should be subject to a confidentiality agreement.

C. Each team member should be allocated a realistic amount of time to regularly spend on FDA tasks. With insufficient human resources, the entire programme will underperform or even fail.

5.4 CONTINUOUS IMPROVEMENT

A. New safety issues identified and published by other organizations, such as safety investigation reports, safety bulletins by the aircraft manufacturer or safety issues identified by aviation authorities, should be assessed for inclusion in a corresponding monitoring activity of an FDAP.

B. The FDAP processes and procedures will need to be amended when an FDAP matures and each time there are changes in operations, the internal organization of the operator or the interface with other data sources and processes.

C. In order to assess the general effectiveness of an FDAP, a periodic review or an audit may be beneficial. Such a review could determine:

1. if anticipated safety benefits are being realized;
2. if the FDAP procedures reflect the actual operation of an FDAP, and if they have been followed;
3. whether the information provided to FDAP users is accurate, timely, and useable; and
4. if the tools employed to collect and present data are still adequate and if other technology would be more effective.

SECTION 6 - PROMOTING AND ASSESSING FDAPs

6.1. OBJECTIVES

A. This chapter is meant to be used by States to foster the enhancement of FDAPs.

B. Many FDAPs are not fully effective, and States can play an important role in ensuring the expected performance of FDAPs. A better understanding of the safety issues identified by operators' FDAPs can also be beneficial to complement the State safety programme (SSP) and the safety management system of other aviation stakeholders.

C. This chapter aims to.

1. encourage States to promote FDAPs to operators to benefit from an FDAP even if not

required by national regulations;

2. advise States on how to ensure the FDAPs implemented by their air operators are effective (with thorough effective oversight and/or FDAP promotion activities);
3. encourage States to connect the individual FDAPs of its national air operators with State safety objectives to support State safety risk management; and
4. provide ideas on how FDAP outputs could be used to better assess the management of change or an alleviation submitted by an air operator.

6.2. FDAP PROMOTION

General conditions for promoting an FDAP

A. Promotion of an FDAP includes activities to foster the enhancement of existing programmes implemented following regulatory requirements developed in response to ICAO SARPs. FDAP promotion may also involve activities to promote the voluntary adoption of FDAP by air operators which are not required to do so. In either case, the safety benefits of these initiatives are well recognized and States are encouraged to invest the appropriate resources to develop a positive safety culture within their industry.

B. As highlighted in 3.3, a positive safety culture and the protection of FDA data and related sources are important prerequisites for a fully effective FDAP. Therefore, States need to promote a positive safety culture to complement efforts in promoting the implementation of an FDAP.

C. Also, for FDAP promotion to be successful, it is important that the air operators can trust that the information or data they provide are treated in confidence and for the purpose of safety promotion. Clearly identified project manager(s) at the State authority and terms of reference could help in building a professional working relationship based on trust.

D. It is also recommended that the promotion of an FDAP be clearly supported by the SSP. The FDAP promotion can be established as a tactical objective to improve the effectiveness of the SMS of the national operators.

Promoting the voluntary implementation of FDAPs

E. Before promoting the voluntarily implementation of FDAPs, a clear path should exist for approval and installation of flight data recording equipment. The State may implement a flight data recording equipment policy through the use of the type certification procedures for a product, a technical standard order programme, a parts manufacturer approval programme, or field approval to streamline certification and airworthiness approval of flight data recording equipment. Whether flight data recording equipment is required or not, it is recommended that a State's aviation authority be flexible with its certification and airworthiness approval policy to reduce the burden on the equipment installer and operator. Installation of flight data streaming equipment may also be considered as a solution for collecting FDA data. It should be noted that an effective FDAP requires the continuous collection of a dedicated set of flight parameters.

F. A flexible approach allowing each operator to define an individualized FDA programme is advisable, in particular when considering voluntary FDAP.

G. Promotion of a voluntary FDAP should highlight the challenges of implementing an FDAP for an air operator. Indeed, starting an FDAP means immediate equipment and staffing cost, while safety benefits may take several months to materialize. Here a State could demonstrate that an FDAP can be instrumental in monitoring operational risks by systematically tracking specific events and allowing for more efficient analysis of incidents.

H. An effective tool for promoting an FDAP is the organization of dedicated conferences or seminars. Seminars can be used to demonstrate, with practical examples from peers, the benefits of an FDAP. Because a State normally has a more neutral role in commercial competition, it can

host a variety of vendors and operators to participate in such events:

Promoting the exchange of industry good practice

I. The data collected by the FDAP are primarily of benefit to the operator, but sharing lessons learnt among the aviation community is a powerful means to enhance the SSP. Sharing information could be done via a dedicated FDAP forum which would gather the State, operators and others stakeholders. This forum would allow:

1. to improve and promote the implementation of FDAPs with the objective to bring safety benefits to participating operators;
2. the participants to gain additional experience about analysis techniques, statistical knowledge, data mining principles, data processing schemes and also knowledge in the interactions between FDAPs and the operator's SMS and with the flight crew training programme; and
3. the State authority to better understand previously known or new safety risks identified by operators' FDAPs, to better achieve its national safety objectives and, therefore, to better manage its SSP.

Note.— Guidance on promoting FDAP good practices can be found in the documents published by the European Union Aviation Safety Agency's (EASA) European uthorities Coordination Group on Flight Data Monitoring (EAFDM)

J. The FDAP forum may be moderated by one or several designated staff members of the State authority (may be co-moderated together with an operator). As the trust and cooperation of operators is essential, the position of the project manager, with regard to State oversight function, needs to be clearly defined in order to guarantee that information shared will not be used for oversight purposes. If the sharing is considered an exceptional circumstance that will lead the data to be used for punitive or disciplinary action, this should be made compliant to the principles of exception as per Annex 19 and be clearly stated, or participation in any future forum will be impacted.

K. FDA data are sensitive. Indeed, the different methods and techniques used may have been developed internally or by FDAP vendors and are consequently proprietary property. In addition, the results of FDA data provide relevant information on operators' SMS level of safety performance. Hence, the documents and data exchanged inside the forum should be protected by a confidentiality agreement signed by all parties and as a condition to their participation in the group.

L. The typical participants of an FDAP forum could be:

1. Air operators. These could be operators required to have in place an FDAP or operators voluntarily running an FDAP.
2. Flight crew associations. It is usually recommended that flight crew representatives take part in the definition and implementation of an operator's FDAP. In the same manner, flight crew associations should be invited to appoint a representative to the forum.
3. State staff. The participation of State experts in the field of aircraft performance, flight crew training, airworthiness, air traffic management (ATM) procedures and weather would be beneficial in certain discussions. The participation of a staff member of the State team responsible for the SSP is also recommended, as the forum is expected to contribute to the SSP. However, State personnel involved in the oversight of air operations may have a conflict of interest between their duties and the confidentiality agreement under which the FDAP forum takes place. This should be addressed. It is advised that confidentiality agreements running the FDAP forum be endorsed at the highest appropriate level of the State, in order to reinforce their value and to prevent any conflict with professional obligations for the State staff participating in the forum.

4. Aircraft manufacturers. The participation of experts of aircraft manufacturers may be beneficial, adding expertise in the operation and maintenance of aircraft models, the source and performance of flight parameters, and FDAP techniques.
5. Other organizations. Participation from additional organizations such as air navigation service providers (ANSPs), airport operators and maintenance organizations may also be beneficial, and may lead to an increased awareness of safety issues.

M. Discussions, tutorials and demonstrations of analytical methods, process development and regulatory environment should be combined with the exchange of safety issues. This will form the basis of an evolving, productive activity for all participants. Experience has shown that a wide range of topics can usefully be discussed at an FDAP forum. Some suggestions include:

1. implementation and administration issues

Examples:

FDAP interactions/interfaces with the operator's SMS (including, but not limited, to internal safety reporting system), role of flight crew representatives, technical issues and solutions with FDA data capture.

2. continuous improvement

Examples:

Development of FDAP events definitions (e.g. arising from accident investigation reports and other sources), development of skills and competences of the FDAP team, development and optimization of routine processes (in order to free resources for tasks with a greater added value), and new technologies.

3. outcomes of FDAP

Examples:

Aggregated FDA data overviews, safety issues discovered through an FDAP (environmental, technological, design-related, human factors related), and specific case studies - for example resulting in or from SOP changes.

4. analytical methods

Examples:

Flight data validation, reliability and interpretation, event severity classification, examples of FDAP events, and statistical techniques.

5. regulatory environment

Examples:

Regulations and advisory material, oversight methods, and ensuring a functioning positive safety culture.

6.3. LINKING FDAPs WITH NATIONAL SAFETY PRIORITIES

Guiding FDAPs toward taking into account national safety priorities

A. While an individual air operator should be responsible for establishing and monitoring its own safety priorities in the frame of its SMS, there can be common operational hazards identified by the State at the national level (through a national incident reporting system, safety statistics, investigation reports, etc.) that would require monitoring by all air operators. However, these common operational hazards might be processed or monitored inconsistently between air operators.

B. To address this, a State could promote a shortlist of common operational hazards to be monitored with an FDAP, hereafter called "common areas of interest for an FDAP", affecting main State safety risks and SSP objectives. It could also help in defining solutions for monitoring the common areas of interest for an FDAP so that they could be more easily implemented in FDAPs.

C. For this approach to be effective, it is essential that the common areas of interest for an FDAP be based on reliable information and a sound process to analyse this information. This requires a system to get reliable safety data (as a minimum on accidents and incidents subject to mandatory reporting) and a safety analysis capability. An ability to obtain safety information from the industry may also be useful to take a more proactive approach to the management of safety risks.

D. The variety of operational contexts and the primary responsibility of an air operator with regard to managing its safety should be recognized, and it is not advised that a State rigidly prescribes the FDAP events to be monitored. More safety benefits are to be expected if the State limits its action to indicating those common areas of interest for an FDAP and to offering implementing solutions. Also, it is preferable that the State concentrate efforts on a shortlist of higherpriority risks for the type of operation considered. Indeed, the monitoring of common areas of interest for an FDAP claims resources at air operators, and this has to be balanced against the expected safety benefits. The definition of implementing solutions requires competence in FDAP and being able to validate the solutions on actual data. Therefore, this could typically be a topic for a State/industry initiative, such as an FDAP forum (see 6.2.I to 6.2.L).

Exchange and collection of data from FDAPs

E. The collection of safety information derived from air operators' FDAPs could be useful for the State when performing targeted safety studies or (re) assessing safety risks. This safety information does not need to be FDA data or FDA statistics of individual operators, it could also be higher-level information.

F. Prior to this, a framework should be established to prevent safety information derived from an FDAP which is submitted to the State from being misused. Principles of protection for safety data, safety information and related sources applicable to a State-managed voluntary safety reporting system (refer to Annex 19, Chapter 5, 5.3) should apply to the protection of FDAP-derived information. For example, the national legislation could contain provisions which define conditions under which the use of FDA data for enforcement purposes is prohibited, as well as conditions under which the State would not be obliged to disclose entrusted FDA data in response to a request invoking a Freedom of Information Act or similar "right to know" laws.

G. Annex 13, however, prescribes that in case of an aircraft accident or an incident subject to an official investigation, the investigator-in-charge of the State conducting the investigation "…shall have unhampered access to the wreckage and all relevant material, …" (Annex 13, Chapter 5, 5.6). This may encompass, according to some national legislation, all the safety data pertaining to an air operator. In addition, depending on the national legislation of a State, its judicial authorities may have access to safety data retained by a State and then decide to share or disclose this information, considering the balancing test as per Annex 13, Appendix 2. These eventualities need to be carefully considered and appropriate regulations developed to encourage positive safety culture benefits by implementing the SARPs included in Annex 13, Appendix 2. Further information related to the protection of accident and incident investigation records may be found in the Manual on Protection of Safety Information (Doc 10053, Part I – Protection of Accident and Incident Investigation Records)

Bringing FDA data together with data of other stakeholders

H. In order to address a particular safety issue, it may be helpful for a State to bring together data from several stakeholders, including air operators, but also ANSPs, airport operators, weather services, etc. A typical case is when recurrent incidents of a similar nature occur in the vicinity of a given airfield, or in a given zone of the airspace

I. For such an activity to be possible, the cooperation of several stakeholders is required. This

cooperation should not be limited to just providing the data, since correctly interpreting and relating data from different sources often require expertise and the support of the data provider. Hence, a group representing the various data providers andstakeholders would typically need to be established to produce a solid and useful analysis. Adequate protection of FDAderived data would need to be ensured early in such activity. Annex 13, Appendix 2 and Annex 19, Appendix 3 refer.

J. The following are examples of collaborative use of FDA data, together with other sources to address safety issues:

1. A study was performed by a State on unstabilized approaches, which was using data from ANSPs, FDA data from several national operators, and involving other entities such as the national safety investigation authority. This study resulted in recommendations to stakeholders and the creation of an implementation plan.
2. A State developed a tool aimed at detecting potentially unsafe landings at an airfield using ground surveillance data. The tool could be developed and tested with operators' FDA data (for comparison purpose). The State shared the results of this tool with all interested air operators.
3. A State, in cooperation with an aircraft manufacturer and an air operator, attempted to use flight data to assess the correlation between operational runway condition reports and the actual aircraft deceleration as recorded in the flight data.
4. A joint safety initiative between a State and industry performed a study on the safety issues related to area navigation (RNAV) procedures. The study team used data from operators and ANSP voluntary safety reporting programmes merged with ATM data. An analysis of these data detailed the broad range of factors that contribute to RNAV departure events and led to a new understanding of how they impact the pilot, air traffic controller or aircraft performance. This analysis ultimately produced strategies to reduce or manage the safety issues related to RNAV procedures.

6.4. FDAPs AND OPERATOR OVERSIGHT

Assessment of an FDAP

A. According to Annex 6, Part I, Attachment D, Section 4, some States provide for approval or acceptance of certain critical documents, records or procedures, such as those related to FDAPs.

B. Therefore, it is proposed in this section to give some guidance to States that would like the implementation of an FDAP to be assessed by an air operator.

C. In order to verify compliance with the principles stated for FDAPs in Annex 6, Part I, Chapter 3, a few checks are proposed (the list is illustrative and non-exhaustive):

1. statement of the objectives of the FDAP signed by the accountable executive (see Note 1);
2. the FDAP is under the supervision of the safety manager (see Note 3);
3. statement on the general condition of use and protection of the FDA data;
4. evidence that the flight data from all aeroplanes with maximum certificated take-off mass of over 27 000 kg are scanned and analysed on a regular basis;
5. evidence of inclusion of the FDAP into the processes of the SMS (see Note 4). For example, evidence that the FDAP is used as a tool to identify hazards and safety risks, that flight data use is subject to the principles of protection contained in Annex 19 (see Note 2), and that the output of the FDAP are appropriately considered and acted upon in the framework of the SMS; and
6. in case operation of the FDAP is contracted to another party, a clear scope of the support provided by this party and agreement or policy covering the protection of FDA data by this party.

Note 1.— Annex 19, Appendix 2 states that the accountable executive is accountable on behalf of the organization for the implementation and maintenance of an effective SMS; therefore, the statement of objectives of the FDAP, which is integral part to the SMS, is logically to be approved by the accountable executive.

Note 2.— Cases such as gross negligence or wilful conduct may be in part demonstrated by FDA data; however, any assessment is to be made within the SMS framework and subject to safety information protection provisions in Annex 13, Appendix 2 and Annex 19, Appendix 3.

Note 3.— Annex 19, Appendix 2 prescribes that any organization (including air operators) "shall appoint a safety manager who is responsible for the implementation and maintenance of the SMS". The FDAP being an integral part to the SMS is, therefore, also subject to safety manager supervision.

Note 4.—The Safety Management Manual (SMM) (Doc 9859) contains guidance on the components and processes of an SMS.

D. Other aspects worth being assessed to obtain a complete view of the implementation of an FDAP are, for example:

1. FDAP analysis techniques used (FDAP events, routine measurements, incident statistics);
2. FDAP events and routine measurements tailored to the standard operating procedures;
3. tools for analysis, assessment and process control (FDA software, links with other safety databases, etc.);
4. dissemination of FDAP derived information inside the operator and used for education purposes;
5. link with the internal incident reporting system;
6. FDA data recovery strategy sufficient to maintain complete and up-to-date overview of operations;
7. FDA data retention strategy adequate for short-term needs (such as investigation of events and assessing corrective actions) and for longer term usage (such as trend monitoring, training, etc.);
8. FDA data access and security policy restricting access to clearly identified persons;
9. procedure to prevent disclosure of flight crew identity, including the method to obtain flight crew de-identified feedback, the conditions under which the confidentiality may be withdrawn for reasons of gross negligence or significant continuing safety concern, the policy for publishing the findings resulting from FDM; and
10. airborne systems and equipment used to obtain FDA data.

Note.— Examples of checks related to these aspects can be found in the documents published by EAFDM.

E. There should be a mutual understanding of the respective objectives and constraints of the FDAP oversight and the FDAP promotion for a State to manage both activities in an effective manner. A two-way communication is needed, while safeguarding the confidentiality. In practice:

1. the general results of safety promotion initiatives may be helpful for inspectors to perform effective oversight of FDAPs. However, the provisions applicable to the protection of safety information stated in Annex 19 are of particular relevance for FDA data. Annex 19, Appendix 3 states that as a principle "safety data and safety information will not be used in a way different from the purposes for which they were collected, unless a principle of exception applies". Hence, direct use of FDA data or FDAP-derived information obtained from a safety promotion initiative for oversight purposes is usually not advisable. One possible method is to integrate de-identified and generic findings from the FDAP promotion initiative into the SSP so that they are addressed as required1.

2. Findings related to an FDAP and operational safety issues and made by inspectors may also be useful to focus FDAP promotion on higher-priority issues.

Using FDA data for assessing other schemes

F. The competitive and dynamic nature of the aviation environment requires air operators to continuously adapt to changes. This requires considering the safety impact of changes affecting fuel policies, new routes and operational procedures, training schedules, etc. It is essential to manage such changes effectively to ensure that existing safety margins are not compromised. The management of change is, therefore, an essential process within an operator's SMS (Annex 19, Appendix 2) and air operators should make use of all their sources of safety data for this purpose2. In particular, an FDAP can be a very useful source of information to support the management of change.

G. At the State level, aviation authorities should ensure operators have established and are applying management of change processes to safely implement changes. In many cases, the outputs of an FDAP (together with other safety data sources) can contribute to the identification of hazards and ensure that direct and indirect consequences are fully understood by the State and the operator well before the change is implemented.

H. The following is an example of use of FDA data to support the management of change:

1. An air operator would like to reduce operating costs by recommending new cost indices to their flight crew members and modifying their fuel policy. Changes to fuel policy require prior approval by the State authority.
2. Before the new fuel policy is approved, the State authority requests that flight data analysis is used in conjunction with tech log entries for fuel and, where applicable, safety reports to analyse the actual fuel consumption in the last six months of operation. The analysis should assess the impact of the new fuel policy (combined with new cost indices) on the fuel reserve. This includes an investigation of those flights where according to flight data analysis, the left-over quantity of fuel seems to have been below safety margins, in order to identify trends (frequent diversion from a given destination airfield due to local bad weather conditions, frequent deviations from the planned flight levels in a given airspace, long taxiing time due to congestion at an airfield, etc.).
3. A few months after the new fuel policy is introduced, the State authority requests that the operator produce another analysis on the actual fuel consumption since the new fuel policy was introduced. This new analysis should again be supported by flight data analysis and safety reports. Depending on the results, the State authority may request an adjustment to the new fuel policy.

Note.— FDAP may not always be a relevant source of data for assessing the effect of a change. For instance, there is no scientifically established relationship between the frequency of FDA events and flight crew fatigue; therefore, the use of FDA to support changes to flight crew rostering is questionable.