CIVIL AVIATION DEPARTMENT
MALDIVES

NOTICE OF PROPOSED RULE MAKING
NPRM NO: 2011-06

26 MAY 2011

MCAR 173

Instrument Flight Procedure Design

CONTENTS

1. Purpose of this NPRM

The purpose of this NPRM is to consult the industry before issuing Regulations for Instruments flight procedure designing.

2. Background to the Proposal

MCAR173 – Instrument Flight Procedure Design provides standards and requirements for the design and maintenance of instrument flight procedures (IFP). This is to ensure that all published IFP intended for use by aircraft operating under instrument flight rules (IFR) in Maldives Flight Information Region (FIR) meet ICAO requirements for instrument flight procedures.

3. Key Stakeholders

The following are identified by the CAD as key stakeholders in the proposed amendments to regulations contained in this NPRM:

- Maldives Airports Company Ltd

4. Submissions on the NPRM

4.1 Submissions are invited

Interested persons are invited to participate in the making of the proposed rules by submitting written data, views, or comments. All submissions will be considered before final action on the proposed rule making is taken.

4.2 How to make a submission

Comments on this proposal may be forwarded *(preferably by e-mail)*, using the NPRM Submission Form given in Appendix 1. The NPRM Submission Form is also available on the CAD website www.aviainfo.gov.mv.

Submissions may be sent by the following methods:

by mail: 11th Floor, Velaanaage
Ameerahmedmagu, Male', 20096,
Republic of Maldives

fax: + 960 3323039

e-mail: safety@aviainfo.gov.mv

4.3 Final date for submissions

Comments must be received before 15 Jun 2011.

4.4 Availability of the NPRM

Any person may obtain a copy of this NPRM from:
CAD website: www.aviainfo.gov.mv/regulations/nprm.php

or from:

11th Floor, Velaanaage
Ameerahmedmagu, Male', 20096,
Republic of Maldives

4.5 Further Information

For further information contact the Regulation Project Coordinator:

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5 Proposed Rule Amendments

Nil

CIVIL AVIATION DEPARTMENT MALDIVES

Hussain Jaleel
DEPUTY DIRECTOR GENERAL

NPRM No:	**Title:**
Date of your Submission:	**Comment Close-Off Date (as specified in NPRM):**

Please return this response sheet to the Civil Aviation Department by comment close-off date, by e-mail to safety@aviainfo.gov.mv, by post addressed to this Department, 11th floor, Velaanaage, Ameerahmed Magu, Male', or by fax to + 960 3323039

Please indicate your acceptance or otherwise of the proposal by ticking the appropriate box below. Any additional constructive comments, suggested amendments or alternative action will be welcome and may be provided on this response sheet or by separate correspondence.

☐ The proposal is **acceptable without change.**

☐ The proposal is **acceptable but would be improved if the following changes were made:**

☐ The proposal is **not acceptable but would be acceptable if the following changes were made:** (Please provide explanatory comment and use additional pages if required)

☐ The proposal is **not acceptable under any circumstance:** (Explanatory comment must be provided using additional pages if required)

Individual's Details (complete if your submission is on behalf of yourself)		**Organisation's Details (if your submission is on behalf of the organization you represent)**	
Your Name:		Organisation:	
Address:		Address:	
Phone:	Fax:	Phone:	Fax:
E-mail:		E-mail:	
Mobile:		Your Name and Position:	
Signature:		Signature:	

CIVIL AVIATION DEPARTMENT
Republic of Maldives

MALDIVIAN
CIVIL AVIATION REGULATIONS

DRAFT

MCAR-173

INSTRUMENT FLIGHT PROCEDURE DESIGN

Initial Issue

. LIST OF AMENDMENTS

Amendment No.:	Section and Page No.:	Issue date:	Date Inserted:	Inserted By:	Date Removed:	Removed By:
Initial Issue	All	01-07-11	01-07-11	CAD		

List of Effective Pages

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DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

Instrument flight procedure
A published procedure used by aircraft flying in accordance with the instrument flight rules which is designed to achieve and maintain an acceptable level of safety in operations and includes an instrument approach procedure, a standard instrument departure, a planned departure route and a standard instrument arrival.

Instrument flight procedure design organisation
Referring to an organisation responsible for the design and maintenance of instrument flight procedure.

Instrument flight procedure designer
A person who has acquired and maintained the required competency level to design instrument flight procedures in accordance with the applicable criteria.

Instrument approach procedure
A series of pre-determined manoeuvres by reference to flight instruments with specific protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply.

Standard instrument departure
A designated instrument flight rule (IFR) departure route linking the aerodrome or a specific runway of the aerodrome with a specified significant point, normally on a designated ATS route, at which the enroute phase of a flight commences.

Planned departure route
A notified instrument flight rule departure (IFR) route linking the aerodrome or a specific runway of the aerodrome with a specified significant point, normally on the boundary of controlled airspace associated with the aerodrome.

Standard instrument arrival
A designated instrument flight rule arrival (IFR) route linking a significant point, normally on an ATS route, with a point from which a published instrument approach procedure can be commenced.

ABBREVIATIONS

CAD	Civil Aviation Department
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
ATC	Air Traffic Control
ATS	Air Traffic Services
CRM	Collision Risk Model
FIR	Flight Information Region
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
MOS	Manual of Standards
OJT	On-the-Job Training
PANS-OPS	Procedure for Air Navigation Services – Aircraft Operations
MCAR	Maldives Civil Aviation Regulation

CHAPTER 1 INTRODUCTION

1.1 GENERAL

1.1.1 MCAR173 – Instrument Flight Procedure Design provides standards and requirements for the design and maintenance of instrument flight procedures (IFP). This is to ensure that all published IFP intended for use by aircraft operating under instrument flight rules (IFR) in Maldives flight information region (FIR) meet ICAO requirements for instrument flight procedures.

1.1.2 The IFP design organisation shall ensure that the quality and safety of the procedure design product are assured through the review, verification, coordination and validation at appropriate points in the process, so that corrections could be made at the earliest opportunity in the process.

1.1.3 In the interest of safety, the IFP design organisation shall implement the provisions in the MCAR173 – Instrument Flight Procedure Design and PANS-OPS in a consistent manner, using processes that will minimise the possibility of errors, identify errors that do occur before they impact safety, and provide for continuous improvement of the procedure design process in order to eliminate or reduce future errors.

1.2 MCAR 173 – INSTRUMENT FLIGHT PROCEDURE DESIGN

1.2.1 This Regulation should be read in conjunction with:

(a) ICAO Doc 8168 Volumes I and II - Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)

(b) ICAO Doc 9368 – IFP Construction Manual

(c) ICAO Doc 9371 – Template Manual

(d) ICAO Doc 9724 – CRM Manual

(e) ICAO Doc 9365 – All Weather Operations Manual

(f) ICAO Doc 9613 – Manual of Required Navigation Performance (RNP)

(g) ICAO Doc 9573 – RNAV Operations

(h) ICAO Doc 9674 – World Geodetic System 1984 (WGS 84) Manual

(i) ICAO Doc 8697 – Aeronautical Chart Manual

(j) MCAR 4 – Aeronautical Charts

(k) MCAR 5 –Units of Measurements to be used in Air Operations and Ground Operations

(l) ICAO Annex 6 – Aircraft Operations

(m) MCAR 14– Aerodromes

(n) MCAR 15 – Aeronautical Information Services

1.2.1 In this regulation, standards are preceded by the word “shall”, whereas recommended practices are preceded by the word “should”. The IFP design organisation shall comply with all standards at all times and should endeavour to comply with all recommended practices.

1.2.2 When the IFP design organisation is not able to comply with any standards specified or referenced in this Regulation, the IFP design organisation shall apply to CAD for exemption or deviation from the relevant standards. Applications shall be supported in writing with the reasons for such exemption or deviation including any safety assessment or other studies undertaken and where appropriate, an indication of when compliance with the current standards can be expected.

1.2.3 When the IFP design organisation is not able to comply with any recommended practices specified or referenced in this Regulation, the IFP design organisation shall notify the CAD of the noncompliance or deviation with the supporting reason including any safety assessment or other studies undertaken, and where appropriate, an indication of when compliance with the current recommended practices can be expected.

1.2.4 Any exemption or deviation granted to the IFP design organization shall also be recorded in the operations manual. The operations manual shall also contain the details of the exemption or deviation, such as the reason that the exemption or deviation was requested and any resultant limitations or conditions imposed.

1.2.5 The IFP design organisation shall ensure that the units of measurement as specified in the Regulation of Standards – Units of Measurement to be used in Air and Ground Operations are used in the design of instrument flight procedures where applicable.

CHAPTER 2 INSTRUMENT FLIGHT PROCEDURE DESIGN ORGANISATION

2.1 ORGANISATION

2.1.1 The IFP design organisation shall maintain an appropriate instrument design office to enable the IFP designer to carry on design work in instrument flight procedures in accordance with the requirements set out in this Regulation

2.1.2 The IFP design organisation shall ensure that the designs of instrument flight procedure are in accordance with:

(a) applicable standards set out or referred to in ICAO Doc 8168; and

(b) applicable standards as set out in this Regulation.

2.1.3 The IFP design organisation shall make provisions for a person(s) trained in IFP design to check and verify independently the plans of each instrument flight procedure designed.

Note – A reference to verifying an instrument flight procedure is a reference to the process of checking the procedure (including all data, computations and drawings for the procedure) in accordance to the applicable standards set out in the MOS-IFP Design.

2.2 INSTRUMENT FLIGHT PROCEDURE DESIGN MANUAL

2.2.1 The IFP design organisation shall develop and maintain operations manual. The operations manual shall serve to demonstrate how the service provider will comply with the requirements set out in the MOS – IFP Design.

2.2.2 The contents of the operations manual shall include but not limited to the following:

(a) The information required of the IFP design organisation as mentioned in this Regulation; and

(b) A description of the IFP design office that shows the role, responsibilities and job functions of the IFP design office personnel who are responsible for ensuring the compliance of the organisation with the requirements in sub-paragraph (a).

2.2.3 The IFP design organisation shall:

(a) keep the operations manual in a readily accessible form;

(b) ensure that the IFP designer has ready access to the operations manual; and

(c) amend the operations manual whenever necessary to keep its content up to date

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2.2.4 The IFP design organisation shall submit a copy of the most current operations manual to Civil Aviation Department..

2.3 RESOURCE REQUIREMENTS

2.3.1 The IFP design organisation shall provide and maintain facilities for the design work on instrument flight procedures. This would include:

(a) having available equipment appropriate for the design, design verification, flight validation, and maintenance of the types of instrument flight procedures;

(b) access to relevant and current data including, but not limited to, aeronautical data, land contour data, and obstacle data for the design, design verification, flight verification, and maintenance of the instrument flight procedures; and

(c) ready access to copies of relevant documentation comprising technical standards, practices, and instructions, and any other documentation that may be necessary for the design, design verification, flight validation, and maintenance of the types of instrument flight procedure.

2.3.2 If an aeronautical database and aeronautical data is required for designing an instrument flight procedure, the IFP design organization shall ensure the integrity of the database and the data. The data used shall be current, traceable, and meets the required level of verifiable accuracy for the design.

2.4 DOCUMENTS AND RECORDS CONTROL SYSTEM

2.4.1 The IFP design organisation shall establish and put into effect, a system for controlling documents and records relating to the instrument flight procedures on which the designer carries on design work, including the policies and procedures for making, amending, preserving and disposing of those documents and records.

2.4.2 The IFP design organisation shall, at CAD's request, make the documents and records, or copies of them or extracts from them, available for inspection by CAD.

CHAPTER 3 INSTRUMENT FLIGHT PROCEDURE DESIGNER QUALIFICATIONS AND TRAINING

3.1 IFP DESIGNER QUALIFICATIONS

3.1.1 The IFP design organisation shall ensure that a person designing or amending a flight instrument procedure demonstrates required competency level for flight procedure design. IFP designers shall acquire and maintain this competency level through training and supervised on-the-job training (OJT). This is to ensure that the quality assurance in the procedure design process and its output, including the quality of aeronautical information/data, meets the requirements of MCAR 4 – Aeronautical Charts and MCAR 15 – Aeronautical Information Services.

3.2 TRAINING FOR IFP DESIGNERS

3.2.1 The training for IFP designers shall include an initial training and recurrent training at periodic intervals.

3.2.2 The IFP design organisation shall ensure that the IFP designer is able to demonstrate a basic level of competency through initial training that includes at least the following elements:

(a) overview of ICAO Standards and Recommended Practices (SARPs) relating to IFP design and promulgation;

(b) knowledge of information contained in ICAO Doc 8168 –PANS-OPS, and other related ICAO provisions relevant to procedure designs;

(c) general criteria in IFP designing;

(d) non-precision approach design;

(e) precision approach design;

(f) instrument departure designs;

(g) criteria for RNAV, GNSS and RNP; and

(h) practical exercises in the design of procedures.

3.2.3 The IFP design organisation shall ensure that the IFP designer is able to demonstrate a basic level of competency through recurrent training that includes at least the following elements:

(a) knowledge about updates in ICAO provisions and other provisions pertaining to procedure design; and

(b) Maintenance and enhancement of knowledge and skills in the design of procedures.

3.2.4 OJT is aimed at permitting the new IFP designer to integrate his basic knowledge with actual practice. The IFP design organisation shall ensure that new IFP designers undergo an adequate, supervised OJT.

3.2.5 The competency of the IFP designer shall be subject to periodic verification by CAD to ensure continued compliance with the requirements in this regulation.

3.2.6 The IFP design organisation shall maintain training records for their IFP designers.

CHAPTER 4 PROCEDURE DESIGN INFORMATION ACQUISITION

4.1 INFORMATION ACQUISITION

4.1.1 Current and complete survey data and information is crucial to the design of safe IFP. The IFP design organisation shall ensure that the survey and subsequent IFP design activities are controlled and monitored by a person(s) trained in procedure design.

4.1.2 In the obstacle survey for procedure design, the IFP designer shall consider that:

(a) all obstacles be accounted for. Items, such as trees and heights of tall buildings shall be accounted for either by physical examination of the site or by addition of a suitable margin above terrain contours; and

(b) the accuracy of the vertical and horizontal data obtained may be adjusted by adding an amount equal to the specified survey error to the height of all measured obstructions and by making a corresponding adjustment for specified horizontal error.

4.1.3 The procedure design information shall be coordinated with all relevant stakeholders. As input for the procedure design process the following aspects need to be assessed:

(a) airport, navigation aid, obstacle, terrain coordinate and elevation data, based on verified surveys and complying with MCAR 11, 14 and 15 requirements;

(b) airspace requirements;

(c) user requirements – the needs of Air Traffic Service provider and operators who will use this procedure;

(d) airport infrastructure such as runway classification, lighting, communications, runway markings, and availability of local altimeter setting;

(e) environmental considerations; and

(f) any other potential issue associated with the procedure.

CHAPTER 5 INSTRUMENT FLIGHT PROCEDURE DESIGN PROCESS

5.1 INTRODUCTION

5.1.1 The Instrument Flight Procedure Design process (see Appendix 1) encompasses the acquisition of data, design and promulgation of procedures. It starts with compilation and verification of the many inputs and ends with ground and/or flight validation of the finished product, and documentation for publication.

5.1.2 IFP shall be accompanied by a narrative, which describes the procedure in textual format.

5.2 PROCEDURE DESIGN

5.2.1 Procedures shall be designed according to ICAO Doc 8168 – PANSOPS criteria. Coordination with all concerned parties shall continue throughout the procedure design and validation process to ensure that the procedure meets the needs of the user and the community.

5.2.2 Each new or revised procedure shall be verified by a person(s) trained in procedure design other than the one who designed the procedure, to ensure compliance with applicable criteria.

5.2.3 Published procedures shall be subject to periodic review to ensure that they continue to comply with changing criteria, and meets user requirements. The maximum interval for this review is five years.

5.3 PROCEDURE DESIGN DOCUMENTATION

5.3.1 The documentation provided by the IFP designer is divided into three categories and includes:

(a) documentation required for publication in the AIP in accordance with MCAR 4 and 15;

(b) documentation required to maintain transparency concerning the details and assumptions used by the IFP designer, which should include supporting information/data used in the design, such as:

(i) controlling obstacle for each segment of the procedure;

(ii) effect of environmental considerations on the design of the procedure;

(iii) infrastructure assessment;

(iv) airspace constraints;

(v) for modifications or amendments to existing procedures, the reasons for any changes; and

(vi) for any deviation from existing standards, the reasons for such a deviation and details of the mitigations applied to assure continued safe operations.

(c) additional documentation required to facilitate ground and flight validation of the procedure.

5.3.2 All calculations and results of calculations shall be presented in a manner that enables the reader to follow and trace the logic and resultant output. A record of all calculations shall be kept in order to prove compliance to or variation from the standard criteria.

5.3.3 Formulae used during calculation shall be the standard formulae as stated in ICAO Doc 8168 and related ICAO publications. Units of measurement and conversion factors between such units shall be in accordance to MCAR 4, 5 and ICAO Annexes 6.

5.3.4 Rounding of results shall follow the standard guidelines in ICAO Doc 8168 and related ICAO publications. Rounding shall only be made at the publication stage to facilitate usable figures on maps and charts. Where rounding is required at earlier stages rounding shall be made to the pessimistic consideration, i.e. obstacles heights rounded up, speeds rounded up, turn altitudes rounded down etc.

5.3.5 All documentation shall undergo a final verification for accuracy and completeness prior to validation and publication.

5.3.6 All documentation shall be retained to assist in recreating the procedure in the future in the case of incidents and for periodic review and maintenance. The periodic retention shall not be less than the operational lifetime of the procedure.

5.4 GROUND AND FLIGHT VALIDATION

5.4.1 Validation

5.4.1.1 Validation is the necessary final quality assurance step in the procedure design process, prior to publication. The purpose of validation is the verification of all obstacle and navigation data, assessment of fly ability of the procedure. Validation normally consists of ground validation and flight validation.

5.4.1.2 Ground validation shall always be undertaken.

5.4.1.3 When ground validation can verify the accuracy and completeness of all obstacle and navigation data considered in the procedure design, and any other factors normally considered in the flight validation, then the flight validation requirement may be dispensed with.

5.4.2 Ground Validation

5.4.2.1 Ground validation is a review of the entire instrument flight procedure package by a person(s) trained in procedure design and with appropriate knowledge of flight validation issues. It is meant to arrest errors in criteria and documentation, and evaluate on the ground, to the extent possible, those elements that will be evaluated in a flight validation. Issues identified in the ground validation should be addressed prior to any light validation.

5.4.2.2 The ground validation would also determine if flight validation is needed for modifications and amendments to previously published procedures.

5.4.3 Flight Validation

5.4.3.1 Flight validation of instrument flight procedures should be carried out as part of the initial record and should also be included as part of the periodic quality assurance programme. It shall be accomplished by a qualified and experienced flight inspector.

5.4.3.2 The objectives of the flight validation of instrument flight procedures are to:

(a) provide assurance that adequate obstacle clearance has been provided;

(b) verify that the navigation data to be published, as well as that used in the design of the procedure, is correct;

(c) verify that all required infrastructure, such as runway markings, lighting, and communications and navigation sources, are in place and operative;

(d) conduct an assessment of fly ability to determine that the procedure can be safely flown; and

(e) evaluate the charting, required infrastructure, visibility and other operational factors.

5.4.3.3 Flight validation should be apart from flight inspection. Flight inspection of IFP is required to assure that the appropriate radio navigation aids adequately support the procedure. This is carried out as part of a formal flight inspection programme and is performed by a qualified flight inspector using an appropriately equipped aircraft.

5.4.3.4 The IFP designer shall be the originator of all data applicable to conduct a flight validation provided to the flight inspection operations activity. The IFP designer should be prepared to provide briefings to the flight inspection crews in those cases where flight procedures have unique application or special features.

5.4.3.5 The IFP designer may participate in the initial validation flight to assist in its evaluation and obtain direct knowledge of issues related to the procedure's design from the flight inspection pilot and/or inspector.

CHAPTER 6 SAFETY ASSESSMENT

6.1 SAFETY ASSESSMENT

6.1.1 The IFP design organisation shall carry out a safety assessment in respect of proposals for new flight procedure designs or any significant changes in a revised procedure. Proposals shall be implemented only when the assessment has shown that an acceptable level of safety will be met.

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6.1.2 The safety assessment shall consider relevant factors determined to be safety-significant, including but not limited to:

(a) types of aircraft and their performance characteristics, including navigation capabilities and navigation performance;

(b) traffic density and distribution;

(c) airspace complexity; ATS route structure and classification of the airspace;

(d) aerodrome layout

(e) type and capabilities of ground navigation systems

(f) any significant local or regional data (e.g. obstacles, infrastructures, operational factors, etc).

6.1.3 Safety risk control/mitigation process shall include hazard/consequence identification and safety risk assessment. Once hazards and consequences have been identified and safety risks assessed, the effectiveness and efficiency of existing aviation system defences relative to the hazards and consequences should be evaluated. As a consequence of this evaluation, existing defences shall be reinforced, new ones introduced, or both.

6.1.4 As part of the safety assurance, the risk control/ mitigation process shall include a system of feedback. This is to ensure integrity, efficiency and effectiveness of the defences under the new operational conditions.

6.1.5 The IFP design organisation shall ensure that the results and conclusions of the safety assessment and mitigation process of a new or changed procedure are specifically documented, and that this documentation is maintained throughout the life of the instrument flight procedure.

CHAPTER 7 DESIGN PUBLICATION

7.1 PUBLICATION OF INSTRUMENT FLIGHT PROCEDURES

7.1.1 The IFP design organisation shall ensure that instrument flight procedures designs/charts, are provided to the Aeronautical Information Service (AIS) provider for publication in the AIP.

7.1.2 The intended effective date for operational use of the IFP shall be included in the document narrative.

7.1.3 The designs/charts published in the AIP shall be produced in accordance with the provisions contained in the documents listed below:

(a) MCAR 4 – Aeronautical Charts

(b) ICAO Doc 8168 Volumes I and II - Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)

(c) ICAO Doc 8697 – Aeronautical Chart Manual

(d) MCAR 15 – Aeronautical Information Services

7.1.4 The aeronautical charts included in the AIP shall be kept up-to-date by means of replacement sheets where necessary. Significant amendments or revisions in the IFP shall be clearly indicated in the revised charts.

CHAPTER 8 PROCEDURE DESIGN AUTOMATION

8.1 GENERAL

8.1.1 Procedure design automation tools have the potential to reduce errors in the procedure design process, as well as to standardise the application of the PANS-OPS criteria.

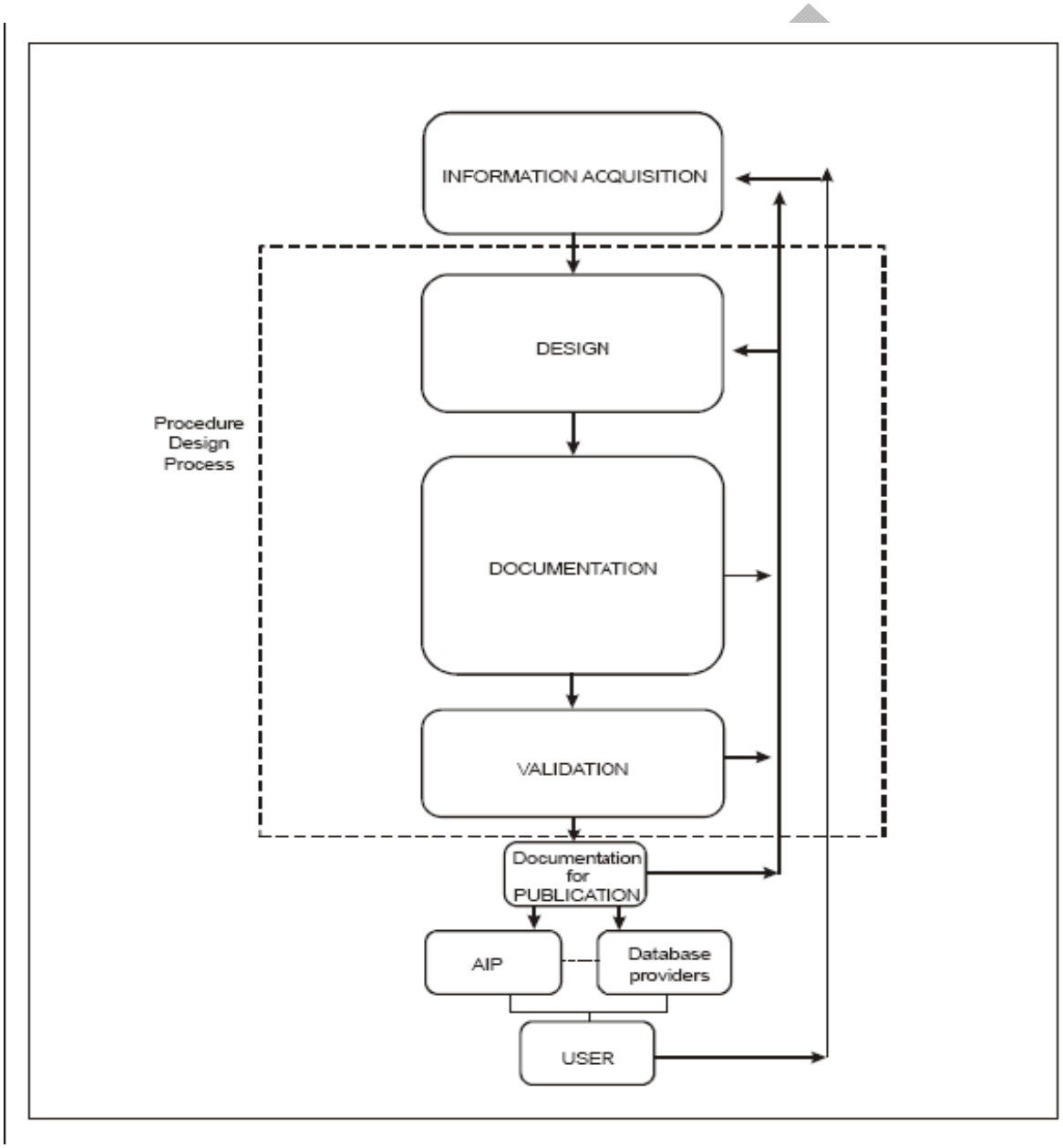
8.1.2 ICAO produces several tools automating elementary portions of the procedure design criteria, where the consequences of error are particularly significant to safety. Included in these tools are the PANSOPS Obstacle Assessment Surface (OAS) Software and the PANSOPS Software (CD-101), providing a means to evaluate the total risk of impact with an obstacle or the ground on precision approaches.

8.2 PROCEDURAL DESIGN AUTOMATION

8.2.1 The IFP design organisation shall ensure that the software packages used in the design of procedures have been validated. A description of the procedures to be used to ensure that all equipment, including software is operated in accordance with the manufacturer's operating instructions and manuals, shall be made readily available to the IFP designer.

CHAPTER 9 APPENDIX 1

INSTRUMENT FLIGHT PROCEDURE DESIGN PROCESS



Instrument Flight Procedure Design Process