

**Electronic Aeronautical
Information Publications:
User requirements and usability
guidelines**

Document information

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1 Introduction

1.1 General

1.1.1 This document has been produced by Helios Technology Ltd for Eurocontrol as part of the Aeronautical Information Service Automation and Harmonisation of European Aeronautical Data (AIS AHEAD) programme. It is the result of a study to determine user requirements for presentation of Aeronautical Information Publications (AIPs) on websites or CD-ROMs.

1.2 Background

1.2.1 The International Civil Aviation Organisation (ICAO) adopted the Standards and Recommended Practices for Aeronautical Information Services on 15 May 1953. This resulted from developments by ICAO following the Chicago convention of 1944. The initial requirements were developed following consultation with the Air Navigation Committee from recommendations made by the Regional Air Navigation Meetings and published by ICAO as Procedures for International Notices to Airmen (PAN-NOTAM) in January 1947.

1.2.2 This publication was followed in 1949 by the Special NOTAM meeting, which reviewed and proposed amendments to the first issue. These changes were then issued as the Procedures for Air Navigation Services (PAN-AIS) and became applicable in 1951. Then in 1952 PAN-AIS was reviewed by the First Session of the Aeronautical Information Services Division, which recommended the adoption of the SARPS. This was accepted as Annex 15 to the Convention and became applicable on 1 April 1954. Annex 15 specifies the requirements for AIS to ensure consistency in the provision of aeronautical information for operational use by computerised navigation systems. Each state is responsible for providing an AIS covering aeronautical information relating to its own territory and any other areas in which it is responsible for providing air traffic control services.

1.2.3 Since this time Annex 15 has undergone numerous changes as the requirements and complexities of aviation operations have increased. The publication of AIP information by national states in accordance with Annex 15 ensures that provision of AIS information worldwide provides information necessary for the safety, regulation and efficiency of international air navigation.

1.2.4 The need for the exchange and interoperability of AIS information has become more important within the aviation industry, and Eurocontrol has been managing activities to harmonise and standardise the AIS operations within ECAC. However, as AIS is generally a global matter, the findings of Eurocontrol are expected to be proposed to ICAO for adoption.

1.2.5 The ATM 2000+ strategy calls for the harmonisation and integration of AIS services within Europe. Within Eurocontrol, the AIS AHEAD programme is aimed at improving the management, techniques and performance of AIS in Europe. Within AIS AHEAD, the Paperless AIS Project is aimed at standardising the use of automation in AIS by promoting electronic versions to replace the current paper-based versions. This project has developed an Electronic AIP (eAIP) in turn, demonstrating the basic principle of separating the content of the AIP from the presentation. This allows users to customise the AIP according to their requirements.

1.2.6 The eAIP project required an understanding of current usage of the AIP in order to determine the requirements of users for an eAIP. To this end, Eurocontrol

commissioned Helios Technology to develop a set of user requirements and guidelines on the presentation of an eAIP.

1.3 Scope of Study

1.3.1 The mandate of the study was to produce a set of guidelines for the usability requirements for presentation of an electronic AIP (eAIP) on a website or CD-ROM.

1.3.2 In order to determine user requirements, this study conducted a user survey of current AIP users and their perceived potential benefits of being able to access AIPs via website or CD-ROM. The survey was not a comprehensive survey but rather gathered the views of a representative sample covering most categories of users.

1.3.3 The study included sample organisations of as many user categories as was permissible within the timescales of the study. These included:

- National AIP providers;
- Information providers;
- Airlines;
- General Aviation pilots.

1.3.4 This sample of current AIP users provided a basis from which to determine their requirements for accessing the AIP and the information required in order to determine the features and facilities of a web or CD-ROM based service.

1.3.5 This document is an output of the study and presents draft requirements and guidelines for the production of an AIP on a website or CD-ROM.

1.4 Contents

1.4.1 Section 2 identifies AIP users and their requirements for accessing the AIP. It discusses the benefits that each user group could derive from access to a web or CD-ROM based AIP.

1.4.2 Section 3 provides the usability guidelines for meeting users' requirements.

1.4.3 Section 4 draws conclusions on the usability of an eAIP and will show the possible benefits that exist from using an eAIP in preference to the current paper based system.

1.4.4 Annex A provides acknowledgements.

1.4.5 Annex B describes the structure of the AIP.

2 Current AIP Use

2.1 Introduction

2.1.1 Current AIP usage can vary between organisations. This section describes the way the current AIP system operates. This includes the set-up of the AIP, how the current document is distributed to all the users and why these organisations or individuals make use of the AIP.

2.1.2 The section also discusses the limitations and issues associated with the paper-based system, the benefits offered by access to the AIP on website or CD-ROM and the role of a future web-based AIP service.

2.2 Service Provision

2.2.1 The provision of the AIP according to Annex 15 falls to the state. In each country this is therefore provided by the airspace authority, in the majority of cases this being the Air Traffic Service Provider. These ATSPs, in accordance with the guidelines of Annex 15, publish the AIP in a paper-based format, which is made available at a cost. This may occupy a number of volumes depending upon the level of detail and number of en-route sectors and aerodromes that are available within the AIP.

2.2.2 The current AIP is defined by ICAO Annex 15 Aeronautical Information Services. The AIP consists of three sections: General, En-route and Aerodrome.

- **General:** The General section (GEN) provides information relating to the contact information within the national air navigation facilities and the list of differences between the output of the national AIP and that recommended by ICAO.
- **En-route:** The En-route section (ENR) provides information on the rules and procedures, Air Traffic Services (ATS), ATS routes, radio navigation aids/systems, navigation warnings and charts.
- **Aerodrome:** The Aerodrome section (AD) details the characteristics of the aerodromes and heliports in terms of geographical features, handling capabilities, underlying communication, navigation and surveillance capabilities and procedures.

2.2.3 The general structure of each of these sections and the entire AIP can be seen in further detail in Appendix B.

2.2.4 Amendments, Supplements, Aeronautical Information Circulars (AIC) and NOTAMs complement and/or change the information contained within the AIP. These are detailed below:

- **Amendments:** Amendments detail permanent changes to the AIP. These are published with consecutive numbering marked by serial number and date.
- **Supplements:** Supplements are temporary changes of period of three months or longer that contain extensive text and/or graphics. As with the amendment, supplement issues are published marked by serial number that is based on the calendar date.
- **Circulars:** The AIC is issued whenever there is a need to publish information that does not qualify for publication in either a NOTAM or as part of the AIP. Information that may be published in the AIC includes forecasts or changes in

legislation, regulations, procedures, facilities or anything that is purely explanatory in nature that may affect the safety of flights. The AIC may also be technical or purely administrative in nature.

- **NOTAMS:** The NOTAM is issued whenever there is information that needs to be distributed of a temporary nature and short duration or when changes are made of an operationally significant nature at short notice. This does not include extensive text and graphics.

2.2.5 It is the responsibility of the end user of the AIP to ensure that all amendments are added to the AIP such that the AIP contains at all times the latest set of information. This is a manual task during which the end user must check which pages are being included in the update, check what changes are on the updated pages, add the updated pages from the AIP and remove the old pages. In each case the serial numbers and dates of the amendments must be checked to ensure consistency. This process must be completed for all updates to the AIP.

2.2.6 Most updates to the AIP are published following the AIRAC cycle. The AIRAC cycle follows a 28-day period between which all changes to the AIP are implemented. A notice of a significant change is announced two AIRAC cycles before the change is implemented, i.e. 56 days. At the end of this period, at the beginning of the third AIRAC cycle, the amendment becomes effective.

2.2.7 Occasionally there may be a need to publish a change out of sequence of the AIRAC cycle. This will occur in instances where the changes have significant operational impact and may affect the safety and efficiency of the airspace. In this instance the amendment will be notified through an NOTAM with the change then becoming an AIP amendment.

2.2.8 It is a requirement of Annex 15 that the all recipients receive notice of changes at least one AIRAC cycle before the change becomes effective and at least two AIRAC cycles when the amendment signifies a major change. In order to do this, it is a requirement that the AIP provider publish the amendment at least 42 days before the effective date so that the paper amendment may reach the recipient one AIRAC cycle before the effective date.

2.3 Reasons for use

2.3.1 The AIP document was intended to be used in flight, but this is no longer the situation. The AIP is used for primarily four purposes:

- Development of charts;
- Confirmation of information;
- Determining operational requirements/ability;
- Flight planning purposes.

2.3.2 The AIP contains most of the information required to develop the charts. Charts that are developed from AIP information include the following:

- En-route charts;
- Terminal Area charts;
- Approach charts;
- Departure charts;

- Radar Vectoring charts;
- Landing charts;
- Aerodrome charts;
- VFR charts;
- Visual Routes charts;
- Obstacle (Type A) charts.

2.3.3 The AIP is also accessed to confirm information relating to a particular flight. Queries may be in terms of routing information, aerodrome handling capabilities, en-route and terminal navigation, surveillance and communication facilities, all of which determine whether the facilities available meet the operational capability requirements of an airline.

2.3.4 For new routes to be opened by an airline all the operational requirements for that route must be researched. Requirements may include noise abatement procedures, designated flight levels available, SIDs and STARs, fire fighting capabilities, fuel availability and opening hours of the aerodrome. The AIP details all the requirements that must be adhered to for operations within the designated airspace to occur.

2.3.5 During flight planning the AIP is primarily referred to for confirmation purposes. However, when changes will affect the route then the AIP is the prime source of information that is included in the database for that flight. The AIP will list the waypoints that must be followed as part of a route and the flight level requirements for that route.

2.4 Current Users

2.4.1 General

2.4.1.1 The commercial pilot was intended as the original user of the AIP. The pilot was required to carry during flight an AIP for each country over which the aircraft would fly throughout the course of the flight. This is no longer practical and therefore, under present operations, the pilot generally uses information that has been extracted from the AIP either by the airline or from 3rd party products.

2.4.1.2 Different users of the AIP now exist. This section outlines these users and shows the purpose of the AIP in their operations.

2.4.2 Chart Producers

2.4.2.1 Chart producers primarily access the AIP to extract information to produce a variety of charts. Flight planners, recreational and commercial pilots use these charts to plan flights and routes. These charts include:

- En-route charts;
- Terminal Area charts;
- Approach charts;
- Departure charts;
- Radar Vectoring charts;

- Landing charts;
 - Aerodrome charts;
 - Visual Routes charts;
- 2.4.2.2 In addition to these charts, chart providers provide the documentation specific to regions, airports that provides the AIP information in a simple manner that is easy for the user to assimilate and in a sufficiently small volume that it may be carried on person and used whenever the case may arise. The information that these charts and documents provide may be amalgamated from different sections within the AIP that the casual user would spend time finding any other way.
- 2.4.2.3 In producing charts, the chart producers trawl through the information within the AIP extracting information that they feel would be beneficial to their customers. This produces an aid that has a specific selection of operationally significant material. The same applies to the amendments of the AIP. Chart producers are interested in all sections of the amendments that will require that a chart be updated.
- 2.4.2.4 Once a change has been identified, this change will be reflected in the database of charts that the organisation stores. The new edition of the chart will then be ready for printing as either a separate document, chart, or for inclusion in some other information publication.
- 2.4.2.5 In producing these charts and summary documents, the chart providers have to keep a resource of a number of AIPs. A single chart may require input from many different AIP, depending in which area and to what scale the chart or diagram is presented. The workload that is associated with maintaining such a volume of AIPs becomes a critical factor in the success of the chart producer's operations. This workload will vary with the volume of amendments, supplements, AICs and NOTAMs that the producer receives on a daily basis. Each of these sources must be check for relevant material and the associated AIP updated accordingly. Depending on the scope of the producers operations, this may require maintenance of a worldwide stock of AIP.
- 2.4.2.6 Not all the information that the chart producer uses will be obtained from the AIP. In some instances the information contained in the AIP may be out of date. In this case the producer utilises word-of-mouth techniques to check whether there have been any changes that should be reflected in the company's products. These include conversations with operators that use the producer's products and the airspace providers within the countries in question.
- 2.4.2.7 One of the main limitations for the chart producer about the current AIP system setup is the complex manual updating that is required for all the amendments, supplements, AICs and NOTAMs. Since some states may require reversion back to previously issued amendments, it becomes necessary to store previous amendments and maintain a complex catalogue of which updates have been delivered and executed.
- 2.4.2.8 It is a complex task identifying exactly those sections of the AIP that have been updated. Although the AIP amendments show those pages requiring updates, not all AIP providers show exactly which sections of the page have been updated. The chart providers are therefore required to examine thoroughly each relevant page to determine those changes that will affect their products. For example, the sole change on a chart may be a single waypoint or route identifier.

2.4.3 Navigation Database Providers

- 2.4.3.1 Navigation database providers supply members of the airline industry with the navigation databases for the aircraft flight management computers (FMC). The AIP information is crucial for these databases that store information relating to the entire flight profile of the aircraft as well as all the navigation aids en-route. The navigation database's integrity as the FMC's source of all information is therefore vital.
- 2.4.3.2 The database providers source all the information for the navigation databases from the AIP. The database providers are most interested in the ENR and AD sections of the AIP. The ENR section provides all information relating to flight levels, crossing procedures, navigation aids and frequencies while the AD section provides the SIDs and STARs relating to the relevant aerodromes.
- 2.4.3.3 As the navigation databases must follow the AIRAC cycle, like all other publications reflecting the AIP information, the database providers consult various AIP on a daily basis. The database that the aircraft carries must be a global database, given the extent of current aircraft operations. To build this database requires a vast array of AIP information and therefore the database provider must carry a complete stock of the world's AIPs. These must be maintained on a daily basis and the information derived from the updating sources filtered for the information that affects the aircraft operations through the navigation database.
- 2.4.3.4 The navigation database provider also relies to some extent upon word of mouth information to supplement the information derived from the AIP. Some AIP information may be out dated by the time that the database provider receives it.
- 2.4.3.5 A particular problem that the navigation database provider encounters is inaccuracies within the AIP itself. Waypoint information must be correct. When the latitudes and longitudes of the AIP waypoints are included in the navigation databases occasionally doglegs will appear in routes when they should not be there because of an error within the AIP. Testing by the database provider identifies these in the majority of cases before this is uploaded to the aircraft and the situation may be resolved through further consultation with the AIP and subsequently with the aviation administration in the country concerned.
- 2.4.3.6 Difficulties also lie with the units that different AIP use. Some countries will supply units in feet, others in metres. Navigation aids may be located by latitude and longitude while others may be located by range and bearings. Different units make it a difficult job to ensure that the information that is placed into the AIP is 100% accurate. Some vital information may also be missing from the AIP. For example, the altitude of DME stations which is needed to calculate slant ranges may be omitted. Glide path, local course widths and beam widths may also be missing from the AIP ILS information in the AD section.

2.4.4 Flight Planners

- 2.4.4.1 Flight planners utilise information from the AIP to file flight paths with the CFMU. Flight planning may be contracted out by the airline to a third party, done in house with third party software, or completed internally with internal systems.
- 2.4.4.2 Apart from only using the information contained in the AIP, flight planning can make use of the known weather conditions at the time and the known route congestions. The flexibility with which an aircraft operator will choose the required route will depend to a large extent on the type of operation.

- 2.4.4.3 When flight planning is being completed to fulfil flights to ad hoc destinations then the AIP will be consulted on a daily basis. The more scheduled operations will complete strategic and tactical planning which will decide a number of routes months in advance. These will be chosen as per the AIP information and modified as and when amendments are issued that will affect that operation.
- 2.4.4.4 Flight planners will generally stock AIPs for all states in which the aircraft will be operating on its flight. The level of stock will vary between organisations. When flight planning is conducted within an airline, it is not unusual for third parties to be contacted to share information or to clarify points of interest. It is this cooperative approach that means that the flight planner may not require a complete stock of AIPs.
- 2.4.4.5 Flight planners find that the main limitation with the current AIP is the effort required to update the AIP. This effort increases considerably when more AIPs are carried in stock.

2.4.5 Airline Operations Departments

- 2.4.5.1 Similarly to flight planners, airline operators also use the AIP, in some cases for flight planning. However, in the majority of cases the AIP is primarily used for confirmation purposes and for queries regarding possible openings for new routes.
- 2.4.5.2 The use of the AIP by the airlines varies considerably with some not stocking any AIP while others stock almost a complete supply to fulfil their operational requirements. The level of stocking of the AIP also depends to some extent on the amount of flight planning that is contracted out by the airline. The operator will use both the ENR and AD sections of the AIP, though will be predominantly interested in the AD section.
- 2.4.5.3 Of most importance are the Obstacle or Type A charts. In the majority of AIPs these are provided as part of the AIP though in some instances the AIP provider levels a charge for the required Type A charts and these are provided separately on a per airport basis. Some commercial organisations are now providing a Type A chart provision service to supplement this service. Type A charts are of particular importance for the operator to determine whether an aircraft has the performance characteristics to adhere to the flight profile that is required for operation at the airport.
- 2.4.5.4 Operators also make much use of the AD section of the AIP. Information that the operator may require includes: contact telephone numbers, airport opening times, fuel availability, runway lengths and widths, fire facilities. The answers to these queries will affect which aircraft can operate at the airport and whether the operator has the ability to operate at all.
- 2.4.5.5 The frequency of use of the AIP will vary within the operator's departments. When most of the flight planning is conducted externally the AIP will be consulted infrequently. Consultation will be on a daily basis when most flight planning is in house.
- 2.4.5.6 Operators again find that the prime limitation of the current issue of the AIP is the time that is required to complete updating the AIP.

2.4.6 Military

- 2.4.6.1 The military are a frequent user of the AIP. The military run worldwide transport operations and operate different aircraft to those used by the commercial sector.

These aircraft have different performance capabilities and are operated in off route flight. It is quite conceivable that the military pilots will make more use of the AIP than the commercial pilot since the military pilot will be planning off route flights.

2.4.7 Government

2.4.7.1 Governments use the AIP, specifically the AIC as a means of publishing information that cannot be published in any other way. As such the government is predominantly a provider of information that may affect the aircraft operator.

2.4.7.2 The number of times that the government may publish in this way is infrequent and there will be no issues associated with the use of the AIP.

2.4.8 Airport Operators

2.4.8.1 All fully licensed aerodromes are required to have a copy of the national AIP and also AIPs for each country to which aircraft operate from the aerodrome. The airports also provide all the information regarding the aerodrome facilities that is included in the AIP. This information is updated when changes are made to the facilities at the aerodrome or the aerodrome has a change of applicable procedures.¹

2.4.8.2 While some of the changes that airports may wish implemented are operationally significant others are not, only serving to advertise those facilities that the airport may offer. Typical changes that the airport may wish to have registered with the AIP are: inclusion of additional forklifts, additional fire fighting capabilities, or changes of catering supplier.

2.4.8.3 In this example, additional forklifts may mean that some cargo operations can now use this airfield as a base and additional fire fighting facilities will enable larger aircraft to be handled at the airfield. These are important to the aerodrome as these additional features could mean an increase in revenue resulting from increased cargo handling or a change in the aircraft that are operating at the airfield.

2.4.9 Airspace Providers

2.4.9.1 The airspace provider in addition to being the AIP provider is also a user of the AIP. The airspace provider primarily uses the AIP as a reference source. The strategists and planners within the provider however tend to look at the AIP more from a providers viewpoint.

2.4.9.2 The AIP is also referenced frequently in response to queries arising from pilots, aircraft operators, chart producers and database providers. These organisations as indicated previously request further information from the AIP provider to ensure that the information that they are using in their operations is understood correctly. Points may also need to be clarified, for example, when a dog leg is discovered on an AIP route structure which, from the diagrams published within the AIP, should not be the case.

2.4.9.3 The most frequently accessed parts from the Airspace Provider tend to be the Departure and Approach procedure charts of the AD section. All other sections of the AIP do not tend to change as frequently.

¹ Information provided by NATS, UK.

2.4.9.4 The airspace providers main issue with the AIP is the amount of effort that is required to produce, publish and maintain paper based versions of the AIP. This effort requires a large work force and costs the AIP provider a great deal to produce. The number of sales that the AIP provider makes in an effort to recover the cost is also limited as there are not that many purchasers of the AIP.

2.4.10 Air Show Operators

2.4.10.1 Operators of air shows, or any event that will have large numbers of flying aircraft within an aerodrome's airspace should inform the airspace provider with sufficient time for the aviation community to be informed. This will be published either by AIC or NOTAM by the airspace provider to warn other aircraft from operating within this airspace. The notification of the air show may temporarily designate the airspace a restricted area for the duration of the air show.

2.4.10.2 The air show operator is considered a user of the AIP since the show operator must follow the guidelines given by the airspace provider for operation of an air show in that airspace. These will include the required communication, navigation and surveillance requirements.

2.4.11 General Aviation

2.4.11.1 General aviation as another user of airspace is also a user of the AIP. General aviation in this context includes all pilots and aircraft from the micro-light, glider, helicopters and light single engine aircraft up to the commercial type business jet operator. Use of the AIP will vary with each operator.

2.4.11.2 Although general aviation can be classified as an AIP user, the amount which general aviation utilises the AIP is unknown. A number of third party products are available to the general aviation community that provide information relating to aerodromes and routing. These include the charts and other documentation that is provided by the chart providers. Typical examples of which include Pooleys and Bottlang. These publications provide aerodrome layout charts, frequency information and general information on aerodrome amenities to the GA pilot. The publications are published annually and updates are made available throughout the year, similar to the AIRAC cycle.

2.4.11.3 Information published in these flight guides relates to VFR flights and aerodrome layouts and procedures. Amendments are published and supplied as per amendments with the AIP, though it is up to the pilot to subscribe to the update service.

2.4.11.4 In some countries a specific GA related publication is made available. This is a cut down version of the AIP by the AIP provider to provide the GA pilot with information that is specifically related to the GA flight envelope.

2.4.11.5 Commercial style operations and other GA operations following IFR procedures adhere more to the AIP. However, even in these situations third party products are referred to in preference to the AIP itself.

2.4.11.6 The GA users tend to rely on the third party products for aerodrome information. The problem with this is that a non-authoritative product is being used, and in the event of the user contravening a requirement of the AIP there is no recourse when faced with penalties. Additionally, GA users are unhappy about having to purchase a flight guide for an entire country or region when the user is not interested in all the aerodromes and will not be using them all. The flight guide is

bulky and in a number of instances only the relevant aerodrome charts that the pilot may need are taken on a particular flight.

2.4.12 Interested Parties

2.4.12.1 Interested parties include such categories as casual users and personnel operating in a non-aviation background utilising the AIP for information purposes. Typical users under this category include:

- Broadcasters;
- Construction;
- Police;
- Members of the public.

2.4.13 Air Traffic Controllers

2.4.13.1 Air Traffic Controllers use the AIP to remain aware of changes to the airspace regulations and to answer to queries by pilots.

2.4.13.2 In some states each controller is provided with their own copy of the AIP. All amendments, supplements and circulars are made available to the controller. However, it is not known to what extent these personal copies are kept up to date.

2.5 User Interaction

2.5.1 The flow of AIP information between users is a complex arrangement. The AIP users often share information, although the AIP is the primary source of information regarding airspace regulations and procedures, in general and en-route sectors, and also for aerodrome information. This information flow complements the AIP documentation and ensures that information that is received and acted on is accurate. The following diagram attempts to show the relationship between the various users.

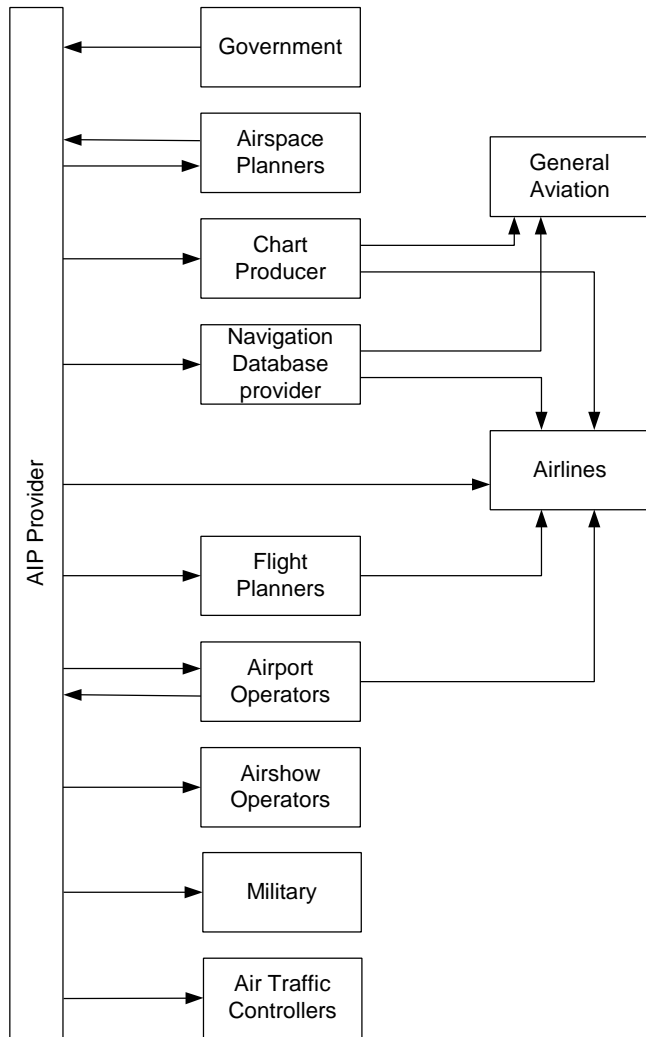


Figure 1: AIP information flow

2.6 Issues and Limitations of the Current AIP

2.6.1 The current paper based implementation of the AIP is subject to a number of limitations that can be summarised from the different users of the AIP. Limitations are due to the way the AIP is issued and handled as a paper based document. These limitations include:

- A time consuming manual updating method for the pages within the AIP;
- A requirement to maintain copies of previous releases of amendments for flexibility reasons in case of a need to revert to previous releases;
- A difficulty in distinguishing those portions of text that have changed as a result of an amendment, and in determining what the previous text said;
- A difference in the publishing methods and measuring units that are used in the various national AIPs.

2.6.2 Updating the AIP is a lengthy process under the current system. Each amendment requires pages to be replaced within the AIP. This requires a meticulous and time consuming approach to ensure that all the pages within the AIP are updated in the

correct order with the correct pages numbered in sequence. This is the prime limitation of the current system set up.

2.6.3 An amendment replaces previous requirements that were published in the AIP. For some users during operational use however, due to mistakes in the update issue, or a change in procedures, there may be a requirement to revert back to operations under a previous version. Maintaining copies of previous issues of the amendments saves in the time taken to re-introduce the operational procedures. However, this does require a large amount of storage space, and administrative overhead in maintaining copies of the previous versions.

2.6.4 The amendments or other documentation that is issued to show changes may not highlight the text within the replacement pages that has changed from the previous issue. In some instances all that may have changed could be a frequency listed within the page. The pages must be compared to ensure that the relevant changes are noticed and acted on. Using such a method of comparison, there is the possibility that some changes within the page(s) may be missed. In some documents, change bars may be used to aid identification of changes but the method of identification is the same. It is also noted that once the amendment has been inserted there it is not known what it previously said.

2.7 Improvements offered by enabling access to AIPs via websites and CD-ROM

2.7.1 As indicated, the prime limitation of the current paper based AIP system is the effort required to maintain the document in an up to date format. This not only requires significant resources but also takes up considerable storage space. This has the effect of limiting the number of AIPs that a user organisation keeps at its own premises.

2.7.2 The immediate benefit of the web or CD-ROM-based service is the simplicity of operation. In a web-based format, the current AIP is displayed including all amendments. This can also be provided on a CD-ROM for offline access in the event that connection to the AIP system terminates.

2.7.3 However, AIP users such as the chart producer and navigation database provider must know what amendment have been issued in any one AIRAC cycle. An electronic issue of the AIP must be able to provide this information; both through a summary of which pages have been changed and highlighting of the relevant sections that have been changed.

2.7.4 Amendments, supplements and other documents that change the AIP have cross-references within them, or contain information that changes attributes of other pages. This particularly applies to NOTAMS. The user can find the task of identifying those components that have changed difficult. For example, an outage of a VOR may affect a number of routes and waypoints, or the change of frequency of a VOR may affect a number of other pages within the AIP. The eAIP will enable the user to search for similarly affected components throughout the AIP greatly simplifying and speed.

2.7.5 Electronic AIPs offer the benefit of improved quality of information. They reduce the possibility of out-of-date issues of the AIP being used.

2.8 Role of the wbesite/CD-ROM

2.8.1 Many third party products are currently in production and used as a reference source by the AIP users. The introduction of an web and CD-ROM based versions does not represent a replacement for these products, rather as an extra aid that

may encourage the further use of what has been described as "... an interesting document containing interesting information presented in an uninteresting way". The eAIP will make the information contained within the AIP more easily accessible and, by virtue of its media, easier to manipulate for custom solutions.

- 2.8.2 It must be noted that these third party products do not always provide all the information that is required by the AIP users for operational reasons. Those users that do not stock the AIP then have to find the information, either through contact with their third party supplier or through a call to the AIP provider. The availability of web and CD-ROM based versions will alleviate this situation, providing information as a backup source in the event of information being unavailable to the end user.
- 2.8.3 The web/CD-ROM version is not meant to provide a completely new source of guidelines for AIS information publication. In producing the web/CD-ROM version all the ICAO guidelines for the publication of AIS information will be followed where possible. This ensures that the is easily recognisable by current users of the AIP and is able to be used as a supplement to the paper based ICAO system. Though the website may vary formatting from the ICAO standard the information will still be presented following the ICAO structure as closely as possible.
- 2.8.4 However, while the eAIP may enable the exchange of information in a more cohesive manner, it does not guarantee that an eAIP will be available for each AIP issued. The eAIP will not initially replace the AIP but will be issued in addition to the AIP. In states that have a web based AIP facility, the eAIP will provide an alternative, easier source of information that will support more fully the activities of the AIP user.

3 Usability Requirements for an eAIP

'Recommendation – Automation in AIS should be introduced with the objective of improving the speed, accuracy, efficiency and cost effectiveness of aeronautical information services'

Annex 15 to the Convention on International Civil Aviation, Section 3.6.6

3.1 General

- 3.1.1 This section of the document specifies the requirements which electronic AIPs should follow to in order to be conformant with the 'standard' eAIP.
- 3.1.2 These requirements relate to electronic AIPs which can be consulted via web browsers. These may be available 'live' on websites, or 'disseminated' on media such as CDs.
- 3.1.3 Following these requirements will make different eAIPs more consistent in style, coherent in operation, and interoperable. This will simplify the use of eAIPs produced by different national air traffic service providers. Since the majority of AIP users are not limited to operating within a single national airspace, this is an important consideration for the effectiveness of electronic AIPs.
- 3.1.4 Requirements are characterised as 'inherited' requirements or 'functional' requirements:
- Inherited requirements are those deriving from the ICAO SARPS specified in Annex 15 (Aeronautical Information Services) of the Convention on International Civil Aviation,
 - Functional requirements are those deriving from the transition from paper-based to electronic media.
- 3.1.5 Also included are some recommendations on 'best practice', which are not requirements but which are suggested as beneficial guidelines.

3.2 Inherited Requirements

- 3.2.1 Electronic AIPs serve the same objectives and operate within the same constraints as paper AIPs. The requirements for Aeronautical Information Services set out by ICAO apply just as much to electronic AIPs as to paper-based AIPs.

3.2.2 Structure and Layout

The eAIP structure and layout must adhere to the guidelines for presentation as set out by ICAO.

- 3.2.2.1 The structure and layout of the eAIP should not change from the current recommendations as defined by ICAO in Annex 15 of the Convention, except where necessary through the transition to electronic medium.
- 3.2.2.2 Current AIP users – who will be the main users of the eAIP – are familiar with the existing structure and layout. Presenting the eAIP in a familiar way will ensure that the eAIP remains a productive publication that can be used immediately without any learning curve. It is also an established standard with which to ensure that different eAIPs remain coherent and compatible with each other.

- 3.2.2.3 The AIP is subdivided into three sections: General (GEN), En-route (ENR), and Aerodromes (AD). These are hierarchically subdivided into numbered subsections, with the exception of AD-2 (Aerodromes) and AD-3 (Heliports) which are divided by the 4-letter ICAO aerodrome codes before being further subdivided into numbered subsections.
- 3.2.2.4 Accompanying documents forming the full IAIP (Integrated AIP) are Amendments (AMDTs), Supplements (SUPs), Circulars (AICs), and NOTAMs (Notices to Airmen).
- 3.2.2.5 Layout is indicated by the specimen AIP incorporated in Annex 15. Some variations from this layout will be necessitated by the use of HTML, but it is not envisaged that variations would be significantly greater than those already occurring between national AIPs.

3.2.3 Update Cycle

The update cycle of the eAIP must adhere to the 28-day AIRAC cycle of updates.

- 3.2.3.1 The Aeronautical Information Regulation and Control (AIRAC) publication cycle ensures synchronicity and timeliness of data publication. The benefits of following the AIRAC cycle apply just as much to electronic AIPs as to paper-based AIPs.
- 3.2.3.2 The core AIP in eAIPs available on websites should be updated on the first day of each AIRAC cycle, so that information on websites is always up to date.
- 3.2.3.3 The core AIP in eAIPs available on CD media should be published on each AIRAC cycle, with clear indication of the applicability period.
- 3.2.3.4 Forthcoming Amendments may be updated on websites as soon as information becomes available; historical Amendments define what was changed in the core AIP in a given update cycle, and should never be altered.
- 3.2.3.5 Procedures for non-AIRAC amendments are to be determined.

3.2.4 Change Marking

All Amendments (alterations, additions and deletions) made to the eAIP in the last AIRAC cycle must be indicated.

- 3.2.4.1 Paper-based AIPs use change-bars, insertion and deletion arrows to indicate modifications made in the last AIRAC cycle. This is important information which must be indicated in the electronic AIP.
- 3.2.4.2 The features of the electronic delivery medium makes use of colour more appropriate for indicating modifications than change bars and arrows; see section 3.3.7 below.
- 3.2.4.3 The properties of the electronic delivery medium facilitate comparison of new and previous texts; see section 3.3.8 below.

3.2.5 Languages

The eAIP must be published in one of the standard four languages.

3.2.5.1 Publication of an AIP is currently required in one of four languages: English, Spanish, French or Russian. The AIP may also be published in the national language.

3.2.5.2 The same requirement applies to an electronic AIP.

3.3 Functional Requirements

3.3.1 The transition from paper-based media to electronic media creates opportunities to make AIPs more productive and easier to use. These opportunities revolve around easier access to information and reduced administrative procedures in managing updates. These benefits will be leveraged most fully if all electronic AIPs operate in broadly similar ways.

3.3.2 XML Format

The source format for the eAIP is an XML document, which must conform to the standard XML application.

3.3.2.1 XML (Extensible Markup Language) is a W3C-endorsed standard for document markup. It uses tags to indicate the semantic content of documents – that is, to indicate the meaning of individual elements within the document. Individual XML applications define what tags are used to mark up what content.

3.3.2.2 Whatever final form the eAIP is published as, the source document is an XML document validated against a standard eAIP DTD (Document Type Definition), which specifies the eAIP application.

3.3.2.3 Final-form presentations of the eAIP – website, CD, or paper – are generated from the XML.

3.3.3 SVG Format

Charts in the eAIP must be SVG (Scalable Vector Graphics) documents.

3.3.3.1 SVG is a W3C-endorsed standard used for encoding line drawings in XML, which facilitates printing of charts at the greatest resolution possible on printing devices available.

3.3.3.2 It is envisaged that SVG tools will ultimately enable zooming and conditional visibility of certain features (e.g. through controlling layer visibility).

3.3.3.3 Conventions for adding meta-data to SVG charts may be defined which will enable search facilities to be implemented for charts.

3.3.3.4 As SVG tools are not yet widely available, Adobe Acrobat PDF format may be used for charts as an interim measure.

3.3.4 Incorporated Documents

'Live access' versions of the eAIP (e.g. websites) must incorporate the core AIP (GEN, ENR, AD) and all accompanying

documents (AMDTs, SUPs, AICs, NOTAMs); ‘disseminated’ versions (e.g. CDs) will exclude NOTAMs, but must incorporate links to NOTAMs on a live website.

- 3.3.4.1 The accompanying documents form an integral part of the Integrated AIP, and must be incorporated as part of the eAIP.
- 3.3.4.2 The Amendments section will include forthcoming Amendments (28-day and 56-day), and historical amendments, suitably indexed.
- 3.3.4.3 The Supplements and Circulars sections will include current Supplements and Circulars only.
- 3.3.4.4 NOTAMs are distinguished from other accompanying documents in that they do not follow the 28-day AIRAC cycle. This means that NOTAMs can be made available on websites which can be updated with arbitrary frequency, but cannot be included on CDs which are disseminated according to the AIRAC cycle.
- 3.3.4.5 CDs should have links which facilitate access to websites where NOTAMs are published.
- 3.3.4.6 ‘Permanent’ NOTAMs may be included in CD versions at the discretion of AIP publishers.

3.3.5 Table of Contents

The Table of Contents is the main navigation tool into the eAIP document; it must be simple, fast and effective to use.

- 3.3.5.1 For most users, the table of contents is the main route into the document, so a table of contents should be used to link into the body of the document. The table of contents should be simple, fast, and effective to use.
- 3.3.5.2 A full table of contents for a complete AIP is itself a large and complex document, so it is recommended that the eAIP uses a combination of drop-down menus indexing a table of contents window which links into the main document, as in the sample eAIP.

3.3.6 Locator cues within AIP

Every section header and paragraph in the document should be clearly labelled with its section number.

- 3.3.6.1 The AIP is a large, complex and highly structured document, and the electronic version is not divided into pages, so section numbering cannot be incorporated into page headers/footers. This can make locating oneself within the document more difficult than with paper-based versions.
- 3.3.6.2 To counter this limitation, all section headers and paragraphs should be clearly labelled with the section number, so that even if only a small part of the document is being viewed, its location within the overall document is always clear.

3.3.7 Highlighting Amendments within core AIP

- **Sections modified in the last update cycle will be indicated by being displayed in red text.**
- **Sections inserted in the last updated cycle will be indicated by being displayed on a green background.**

- **Sections deleted in the last update cycle will be indicated by a red (dashed?) horizontal rule indicating where the deleted section appeared.**

- 3.3.7.1 This colour-coding convention will make it immediately evident to users of the AIP which sections have been updated.
- 3.3.7.2 These colour conventions should not be used for other purposes within the AIP.
- 3.3.7.3 Having consistent conventions used in all AIPs will make it easier for users who make use of different AIPs.
- 3.3.7.4 The main AIP document will contain just the current AIP – facilities for comparing versions will be located in a separate Amendments document which will show only amended paragraphs; see 3.3.9.
- 3.3.7.5 Since eAIPs are not page-based in the same way as paper-based AIPs, there is no concept of a ‘changed page’. Amendments will relate purely to (numbered) sections in the document which are affected by the change. In most cases, this will be a single paragraph, but in some cases it might be a higher-level section containing a number of sub-sections.

3.3.8 Linking between Amendments and the AIP

Amendments must link to the amended sections of the AIP; amended sections of the AIP must link to the relevant Amendment.

- 3.3.8.1 It is important to be able to move between Amendments and the sections of the AIP they update.
- 3.3.8.2 Each Amendments updates a single section of the AIP, and will contain a link which takes the user directly into that part of the AIP.
- 3.3.8.3 Each section of the AIP amended in the last update cycle will link to the Amendment which updated it.

3.3.9 Viewing Amendment Modifications

Where Amendments modify text, there must be some provision for comparing the previous and modified versions

- 3.3.9.1 Where Amendments modify information already present in the AIP, it is often important to be able to compare the new text with the previous text. The eAIP should provide some mechanism to facilitate this.
- 3.3.9.2 This facility should appear within the Amendments section, not within the core AIP document. This will enable the core AIP document to be read as a self-contained complete document; if comparisons against previous and future documents are required, they will be isolated in the Amendments section and not interfere with the reading of the main AIP.
- 3.3.9.3 It is recommended that new/inserted text should be displayed on a green background, and deleted text should be displayed as red text with strikethrough.

3.3.10 Viewing Amendment History

Amendments must be retained for at least one year after they become effective; their links into the AIP will remain active, but the AIP will not retain links to historical Amendments

- 3.3.10.1 The electronic medium makes it easy to retain Amendments which have already been incorporated into the AIP.
- 3.3.10.2 These Amendments could be browsable by AIRAC cycle date, and could also be searchable, but will not have links to them from the body of the AIP.

3.3.11 Viewing effective date and source

It must be possible to verify the date on which each section became effective, and the source of the information if relevant

- 3.3.11.1 Amendments made in the last update cycle are highlighted in the AIP, but it can often be valuable to know when any given section came into effect. The source of the update may also be useful to indicate.
- 3.3.11.2 It is recommended that on-screen this should appear as a pop-up when the mouse is 'hovered' over relevant section numbers; on printed copies, the source and effective date should be printed against each paragraph/section.
- 3.3.11.3 The date indicated should be the date on which the AIRAC cycle commenced; the month should be displayed as a name rather than as a number, to avoid confusion between European and American date formatting conventions.
- 3.3.11.4 When extracts are made of the AIP, either for printing or e-mailing, the effective date and source of each paragraph should be available in the same way as they are for the complete document.
- 3.3.11.5 The publication date of the AIP should also be apparent for such extracts (for instance by including it in the <title> of the HTML document, so that it is printed on each page or extract).

3.3.12 Linking between Supplements and Circulars and the AIP

Supplements and Circulars may contain links to the AIP if they affect identifiable sections of the AIP.

- 3.3.12.1 Where Supplements and Circulars have direct relevance to specific sections of the AIP, they may contain links to those sections.
- 3.3.12.2 Where sections are affected by such Supplements and Circulars, they may contain links back to the relevant Supplements and Circulars.
- 3.3.12.3 Not all Supplements and Circulars will affect specific sections of the AIP, so the use of such links is optional.

3.3.13 Linking between NOTAMs and the AIP

NOTAMs may contain links to the AIP if they affect identifiable sections of the AIP.

- 3.3.13.1 The structure and form of NOTAMs means that only a minority of NOTAMs can be linked directly to individual sections of the AIP. Such NOTAMs may have links to the AIP, and be linked to from the AIP, at the discretion of the AIP publisher.

3.3.14 Keyword search / indexing

The eAIP must have a facility for searching for all instances of a given word in the body of the AIP, and accompanying documents. The search results will have links into the appropriate sections of the body of the document.

- 3.3.14.1 After the table of contents, the most common way of locating information in a document is through an index, or a keyword search (which are functionally equivalent in that they both present a list of places where a given word occurs in the text). This could be presented as a pre-generated list of words, as in a classical index, or an interactive search facility where the required word is typed into a field and a search button selected (or both).
- 3.3.14.2 For searches within the AIP, the keyword search results should show the section number, section title, and optionally some or all of the text of the section where the keyword was located. The search results will link directly to the relevant parts of the AIP.
- 3.3.14.3 For searches within accompanying documents, the keyword search results should show the document title, publication date, and optionally some or all of the text of the section where the keyword was located.
- 3.3.14.4 The search facility should search all words appearing in the body of the document; it is optional whether text in section titles are searched, but the search facility should indicate whether or not titles are searched.
- 3.3.14.5 Further investigation is required to determine whether single keyword searching is sufficient, or whether a facility is required to search for multiple keywords. If so, these requirements should specify whether Boolean operators (AND/OR) can be used, or whether web-search style operators '+' (enforced inclusion) and '-' (exclusion) can be used. If multiple keyword searching is made available, it will be important for consistency that all eAIPs operate in the same manner.

3.3.15 'Core' search facilities

A core set of search facilities must be implemented, including searches for: Route designators; Waypoints; Navaid IDs; FIR boundaries; ...

- 3.3.15.1 Certain search facilities will be regularly performed by the majority of AIP users, and should be implemented in all electronic AIPs.
- 3.3.15.2 Having a core set of search facilities available in all eAIPs will simplify switching between AIPs when different AIPs have to be used.
- 3.3.15.3 This core set of search facilities is still to be defined. Also to be defined is the information to be displayed against search matches (eg lat/long, etc).
- 3.3.15.4 Further investigation is required to determine whether 'monatomic' searches are sufficient, or whether facilities are required for search criteria to be combined – if so, the methods and interfaces should be specified (eg whether combinations produce inclusive ('OR') or exclusive ('AND') results).

3.3.16 'Criteria-based' search facilities

Search facilities may also be provided based on conditional criteria (e.g. runways above certain length; aerodromes with

particular cargo-handling facilities; NOTAMs close to a given location).

- 3.3.16.1 Criteria-based searching may be one of the key benefits of electronic AIPs over paper-based AIP.
- 3.3.16.2 Further investigation is required to determine whether there might be a 'core' set of criteria-based searches which could be recommended or considered mandatory.
- 3.3.16.3 Further investigation is required to determine whether recommendations should be made as to operation of search facilities (eg methods of combining multiple criteria).

3.3.17 Chart searches

Searches within charts may be incorporated.

- 3.3.17.1 Some information would be useful to search for within charts; examples include SIDs/STARs.
- 3.3.17.2 Such facilities would require SVG charts with established conventions for inclusion of relevant identification information by means of SVG 'metadata' elements. Such conventions are not covered by these requirements.

3.3.18 Internal cross-referencing

Cross-references within the body of the text (e.g. 'See section ...') will be implemented as links.

- 3.3.18.1 It is a normal feature of HTML documents that cross-references are implemented as hyperlinks which the user can follow by clicking on the reference.
- 3.3.18.2 While the most common convention for indicating hyperlinks is underlined and coloured text, the method of indication is not specified, except that it must be clear and consistent (and not used for other purposes).

3.3.19 'Dynamic' charts

Charts in the eAIP must be scaleable, zoom-able and display configurable content

- 3.3.19.1 In contrast to paper-based media, where quality and resolution is fixed by the publisher, electronically delivered documents may be viewed or printed at variable quality and resolution.
- 3.3.19.2 To address this issue, charts in the eAIP must have facilities where users can both zoom-in on areas of interest, and control what types of information are displayed.
- 3.3.19.3 Being able to zoom-in on an area of interest may make detail legible which was not legible with the full chart displayed. It may also facilitate printing out the chart in multiple parts on personal (A4) printers.
- 3.3.19.4 Restricting the types of information displayed on a chart may improve clarity when large quantities of information are being presented on small or low-resolution devices.
- 3.3.19.5 How zooming and controlling content is achieved is not specified.

- 3.3.19.6 This requirement will not apply to Adobe Acrobat PDF charts used in lieu of SVG charts (see section 3.3.3 above).

3.3.20 Bookmarking

Users must be able to 'bookmark' frequently accessed parts of the eAIP

- 3.3.20.1 Users will have certain parts of the eAIP which they consult regularly. It should be possible to 'bookmark' sections in the browser so that users can return to them easily.
- 3.3.20.2 This requirement implies that a frame-based approach to building a website would not be possible, as no current browsers facilitate bookmarking individual pages within a frameset.

3.3.21 Logging of Access

A facility may be provided whereby logs can be maintained of access to the eAIP

- 3.3.21.1 It is a requirement that a record be kept of all material that the pilot has read or had access to prior to departure. In other situations, it may also be useful to record what access has been made to the eAIP.
- 3.3.21.2 Such logs could record either the time at which someone commences a consultation of the eAIP, or they could record every page viewed.
- 3.3.21.3 Given current technology constraints, such logs are unlikely to be legally allowable evidence of consultation of an eAIP, but may be a useful record for informal or statistical purposes.

3.4 Best Practice

- 3.4.1 This section lists general recommendations as to best practice in designing documents to be viewed in web browsers. It does not set out requirements, but following these suggestions will ensure greater consistency in 'look' between different eAIPs, to complement the consistency in 'feel' provided by the recommendations above.

3.4.2 'Fluid' page layout

- 3.4.2.1 HTML pages are viewed on differently sized screens with different resolutions, and are best allowed to resize with the browser size the user prefers. Allow the text to fill the width of the browser, perhaps with margins, but don't use fixed-width tables which might leave lots of unused space to the right of the text, or even worse lose some of the right-most text.
- 3.4.2.2 It may be appropriate to control the 'normal' text size (through the `font-size` property), but allow users to enlarge or reduce the text they see in the browser by setting font sizes with relative values such as %, `em`, or `small`, `large`, etc, rather than with absolute values such as point (pt).

3.4.3 Fonts

- 3.4.3.1 Use sans-serif fonts: while there is much debate and inconclusive research about the benefits of serif fonts for legibility for paper documents, there is little question that sans-serif fonts are more legible on low-resolution devices such as screens.

- 3.4.3.2 Use widely available fonts: if documents depend on non-standard fonts, many users will not take the trouble to install such fonts, and will not see the documents as intended. A typical font list might be

```
{ font-family: Verdana, Arial, Helvetica, sans-serif; }
```

- 3.4.3.3 Use widely available characters: for special symbols used in the AIP, it is preferable to use commonly implemented Unicode characters which appear in most widely-available fonts. The following characters are in WGL4 so available in standard Windows fonts since W95/NT4: ? (↑), ? (↓), ? (▲), ? (∆), ° (°), ? (◊), – (–). A character to be avoided is the ‘white up-pointing triangle’ (△ or △) – this only implemented in a small number of specialised Unicode fonts.

3.4.4 Colours

- 3.4.4.1 Avoid excessive colour contrasts: use of a limited range of softer colours generally gives greater legibility than highly-contrasting colours.

3.4.5 Gridlines

- 3.4.5.1 Avoid excessive use of gridlines: careful use of horizontal rules or horizontal background highlighting can guide the eye across rows of a table; over-use of gridlines can distract the eye and reduce legibility.

3.4.6 Page sizes

- 3.4.6.1 Use balanced page sizes: pages that are too small require excessive ‘clicking-through’ to move between related pieces of information; pages that are too large require excessive scrolling. A balanced page size will also often represent a logical ‘chunk’ of information to print in one go.

3.4.7 Navigational elements

- 3.4.7.1 Placement of navigational elements: conventional usage places these at the top and/or left of pages – following such conventions will minimise confusion for users.

3.4.8 Indication of hyperlinks

- 3.4.8.1 Underlining and use of alternate coloured text are still the main conventions for indicating hyperlinks, though these conventions are ever more frequently being broken. Whatever convention is used, make it consistent and make sure things which are not hyperlinks don’t look like hyperlinks and cause confusion for users. The presence of hyperlinks should hopefully be clear but not intrusive. It is good practice to incorporate hyperlinks within the normal flow of text and avoid ‘click here’ instructions.

3.4.9 Indication of acronyms

- 3.4.9.1 If pop-up texts are used to expand acronyms when the mouse is hovered over them, make sure the indication of this is not obtrusive, so that the reader is not distracted as they read through the text. W3C recommend styling acronyms as

```
font-variant: small-caps; letter-spacing: 0.1em;
```

in their sample CSS stylesheet; often this will be enough to prompt users to hover the mouse over the acronym.

3.4.10 Identify and validate against target platforms



















































































3.4.10.1 In contrast to mass-market websites, eAIPs can specify which target browsers they will work with, as a 'system requirement' for use of the eAIP. However, users should be clearly informed of the target browsers the eAIP has been designed for, and the eAIP should be well tested against all target browsers quoted. Variations in behaviour between browsers range from subtle to staggering.

3.5 User requirements mapping

3.5.1 The following table provides a mapping of between the identified user requirements and the categories of users that they are most likely to be applicable. Shaded cells in the table indicate user requirements that are applicable to all categories of users.

| | User categories | | | | | | | | | |
|------------------------------------|-----------------|-------------------------------|-----------------|--------------------------|--|------------------|----------|-------------------|------------|--------------------|
| Requirement | Chart producers | Navigation database providers | Flight planners | Airline operations depts | Airspace providers/air traffic controllers | General aviation | Military | Airport operators | Government | Interested parties |
| Inherited requirements | | | | | | | | | | |
| Structure and layout | | | | | | | | | | |
| Update cycle | | | | | | | | | | |
| Change marking | | | | | | | | | | |
| Languages | | | | | | | | | | |
| Functional requirements | | | | | | | | | | |
| XML format | | | | | | | | | | |
| SVG format | | | | | | | | | | |
| Incorporated documents | | | | | | | | | | |
| Table of contents | | | | | | | | | | |
| Locator cues within AIP | | | | | | | | | | |
| Highlighting amendments | | | | | | | | | | |
| Linking between amendments and AIP | | | | | | | | | | |

| Requirement | Chart producers | Navigation database providers | Flight planners | Airline operations depts | Airspace providers/air traffic controllers | General aviation | Military | Airport operators | Government | Interested parties |
|---|-----------------|-------------------------------|-----------------|--------------------------|--|------------------|----------|-------------------|------------|--------------------|
| Viewing amendment modifications | | | | | | | | | | |
| Viewing amendment history | | | | | | | | | | |
| Viewing effective date and source | | | | | | | | | | |
| Linking between supplements and circulars and the AIP | | | | | | | | | | |
| Linking between NOTAMs and the AIP | | | | | | | | | | |
| Keyword search/index | | | | | | | | | | |
| 'Core' search facilities | | | | | | | | | | |
| 'Criteria-based' search facilities | | | | | | | | | | |
| Chart searches | | | | | | | | | | |
| Internal cross referencing | | | | | | | | | | |
| 'Dynamic' charts | | | | | | | | | | |
| Bookmarking | | | | | | | | | | |

| Requirement | Chart producers | Navigation database providers | Flight planners | Airline operations depts | Airspace providers/air traffic controllers | General aviation | Military | Airport operators | Government | Interested parties |
|--|--|--|--|---|---|--|--|--|--|--|
| Logging of access | | | |  | | | | | | |
| Best practice | | | | | | | | | | |
| 'Fluid' page layout |  |  |  |  |  |  |  |  |  |  |
| Fonts |  |  |  |  |  |  |  |  |  |  |
| Colours |  |  |  |  |  |  |  |  |  |  |
| Gridlines |  |  |  |  |  |  |  |  |  |  |
| Page sizes |  |  |  |  |  |  |  |  |  |  |
| Navigational elements |  |  |  |  |  |  |  |  |  |  |
| Indication of hyperlinks |  |  |  |  |  |  |  |  |  |  |
| Indication of acronyms |  |  |  |  |  |  |  |  |  |  |
| Identify and validate against target platforms | | | | |  | | | | | |

4 Conclusions

4.1 Introduction

4.1.1 At present the majority of AIPs are available in paper form only. However an increasing number of AIP providers are making AIPs available on websites and CD-ROMS. These electronic AIPs are generally facsimiles of the paper AIP in .pdf format. These suffer from limited navigation capabilities and, in the case of web-based versions, long download times.

4.1.2 This study has discussed requirements for access to AIPs via websites or CD-ROMs with a range of user and provider organisations including representatives of:

- Airlines;
- Information providers;
- General aviation;
- Regional airlines;
- AIP publishers.

4.2 Benefits of AIP websites

4.2.1 A number of clear benefits of provision of AIPs on CD-ROM or website have been identified:

- Resource savings in handling paper updates;
- Cost savings in producing paper copies;
- Reduction in the potential for out-of-date information to be used;
- Efficiency improvements in use of AIPs through provision of effective navigation facilities, links and search facilities.

4.3 Role of AIP websites

4.3.1 There are a number of different applications identified for AIPs.

- Data re-use: information providers such as Thales Avionics and Jeppesen use AIPs for generating data for flight management systems and for compiling tailored documents and charts;
- Flight planning: airlines and flight planning companies (eg LIDO, AirData), tend to use AIPs directly for flight planning purposes. Business pilots and GA pilots tend to rely more on third party products with information derived from the AIP;
- Air traffic control: air traffic controllers make regular use of AIP information relating to the relevant airspace sector;
- Strategic purposes: various users might consult operational AIP information for strategic purposes (eg route planning, fleet utilisation). Other users consult administrative information (procedural, regulatory, legislative).

4.3.2 It is important to note that websites or CD-ROM editions will not be a replacement for websites. The AIP providers will still be obliged to publish the AIP in paper

version and whilst the paper version is still in use, the format of the AIP will need to adhere to the existing ICAO guidelines.

- 4.3.3 Despite these limitations, there are clear benefits to provision of AIPs on websites and CD-ROM. The guidelines provided in this document provide a framework for ensuring that users achieve the greatest benefits as AIP providers migrate to provision of the AIP in electronic format.

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B AIP Structure

B.1 As discussed in Section 2, this annex details the structure of the current format of the AIP.

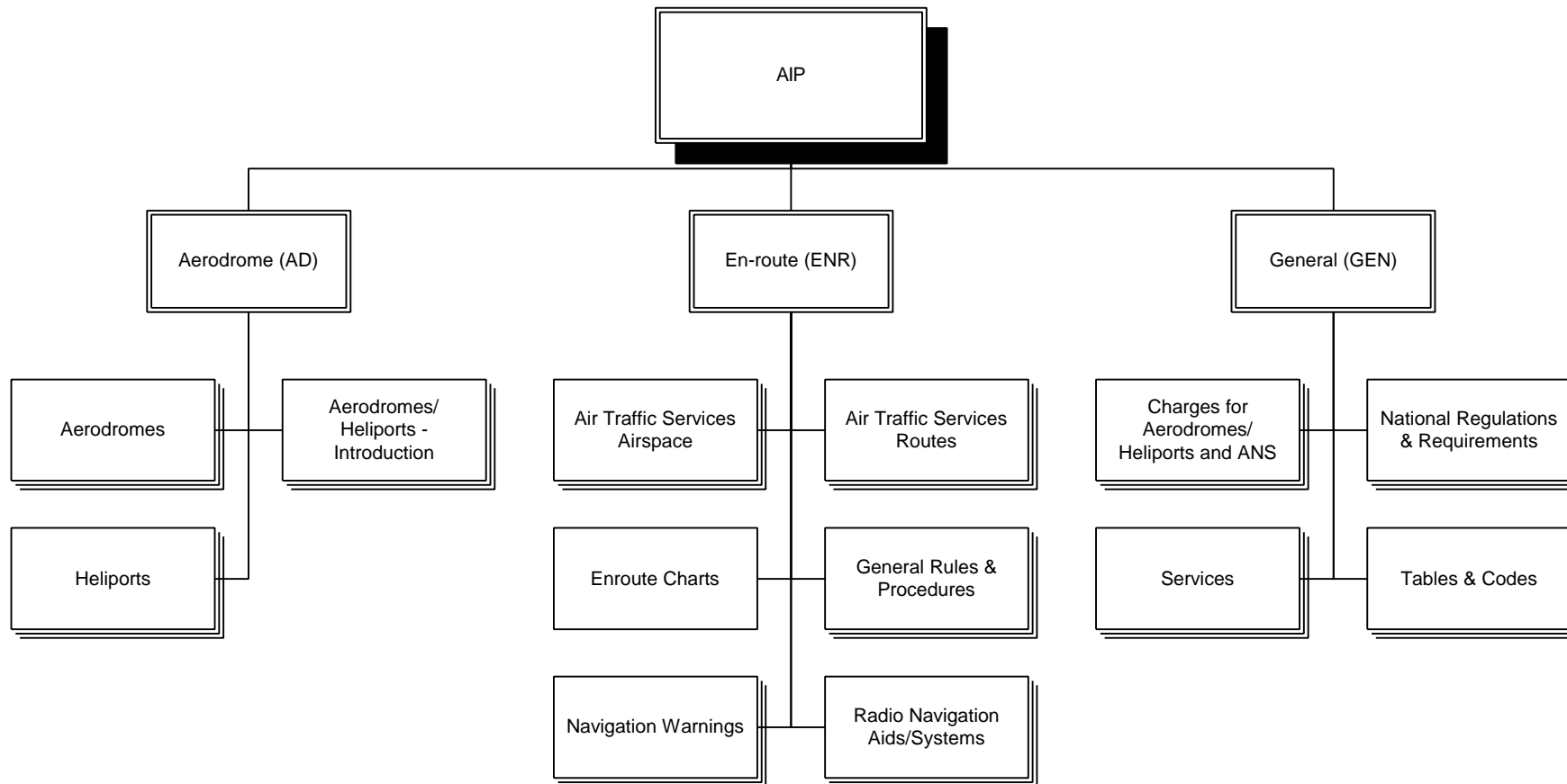


Figure 2: Structure of the AIP

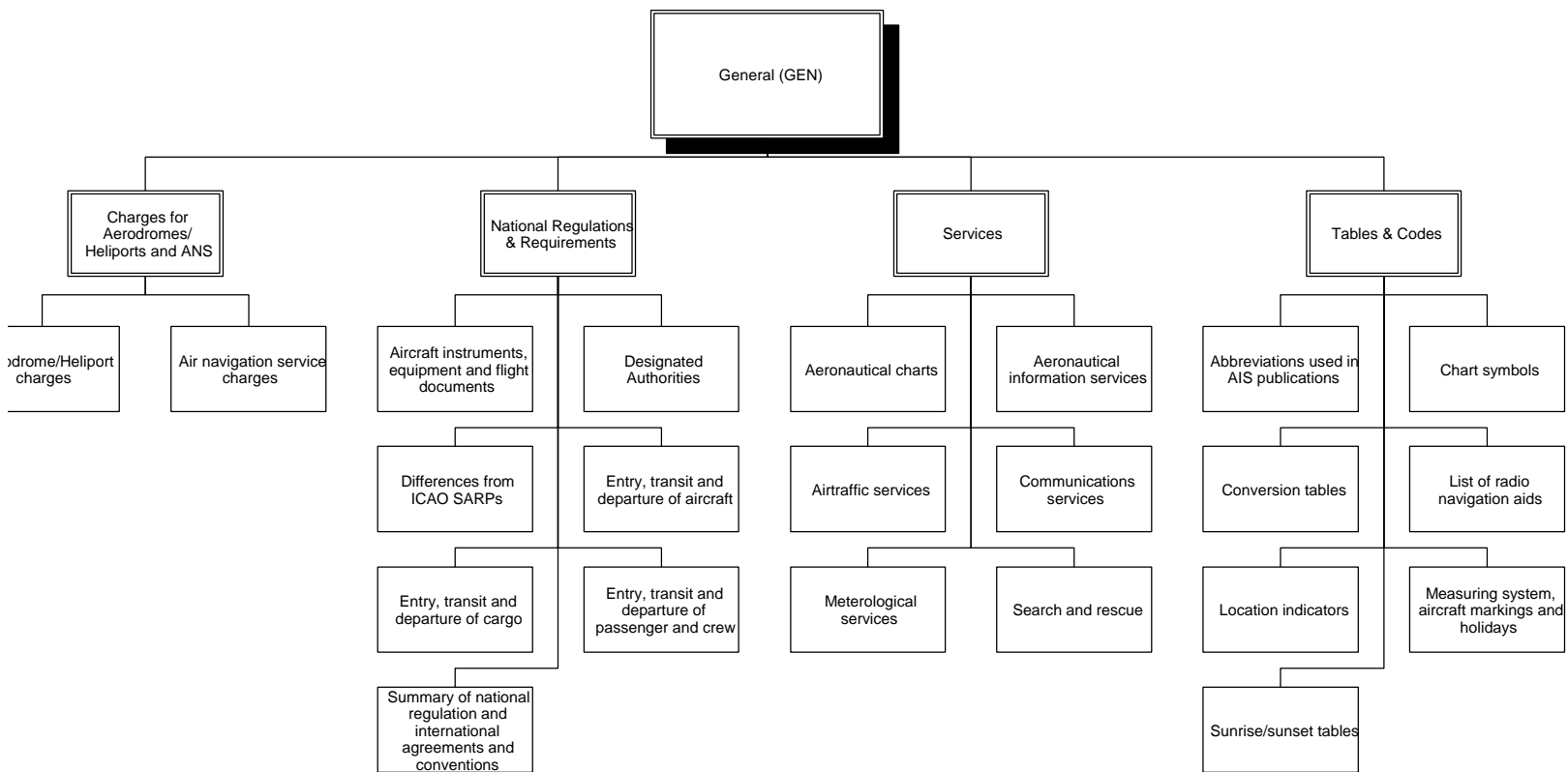


Figure 3: Structure of the General Section of the AIP

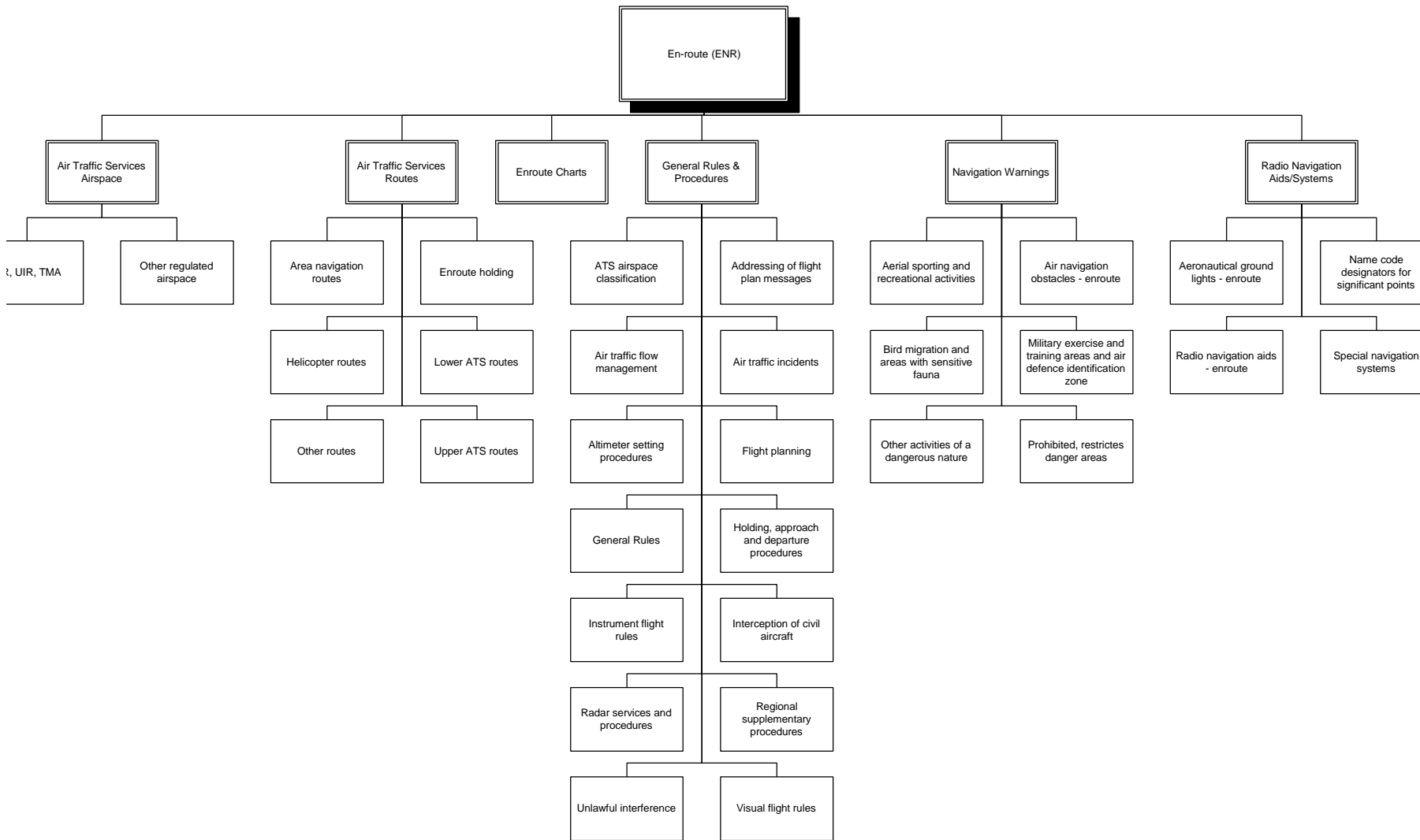


Figure 4: Structure of the En-route section of the AIP

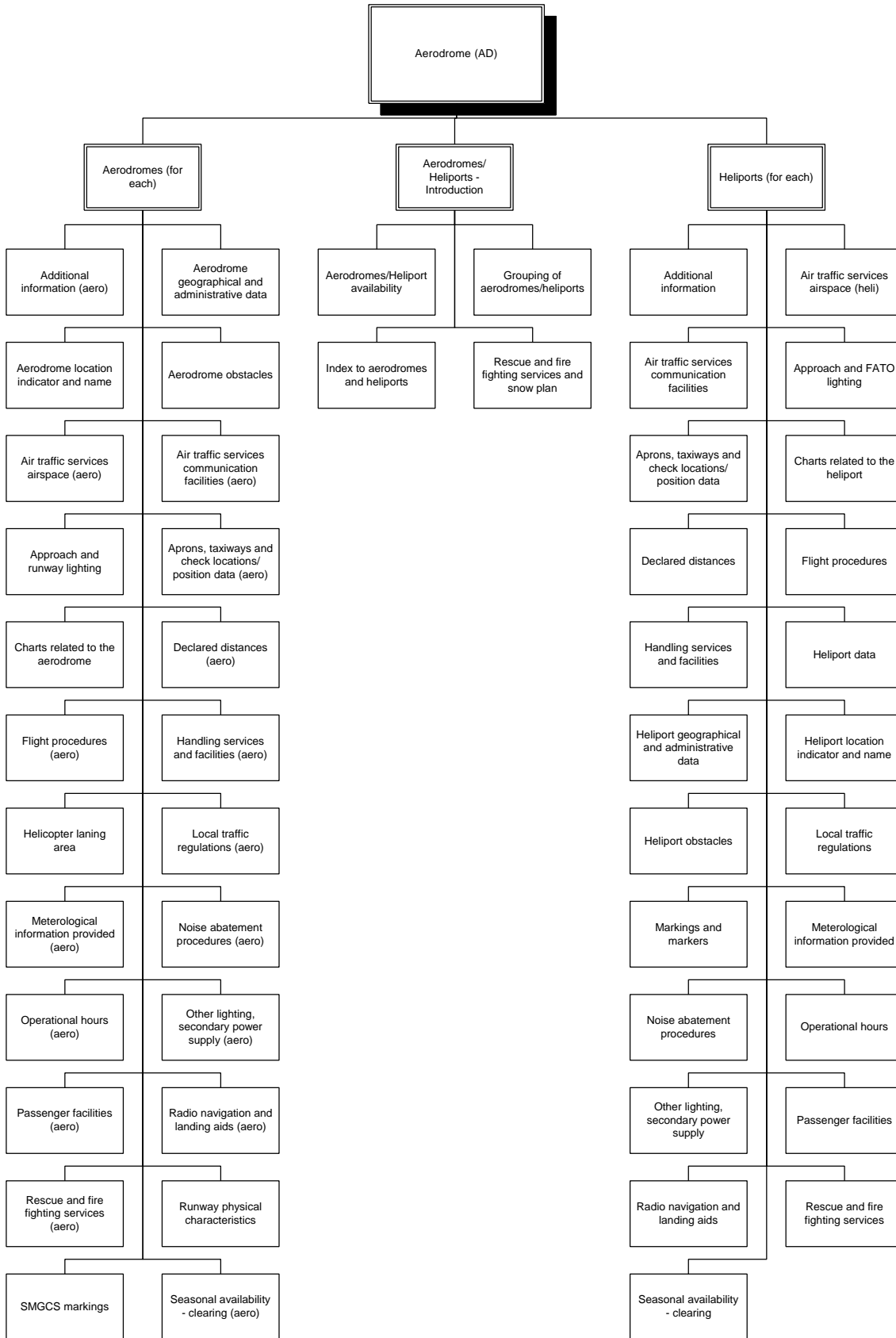


Figure 5: Structure of the Aerodrome section of the AIP