Building Effective Safety Oversight of AIS and AIM

Day 2: Annex 15 and Surveillance Activities

Federal Aviation Administration

Objectives

Recap Day 1

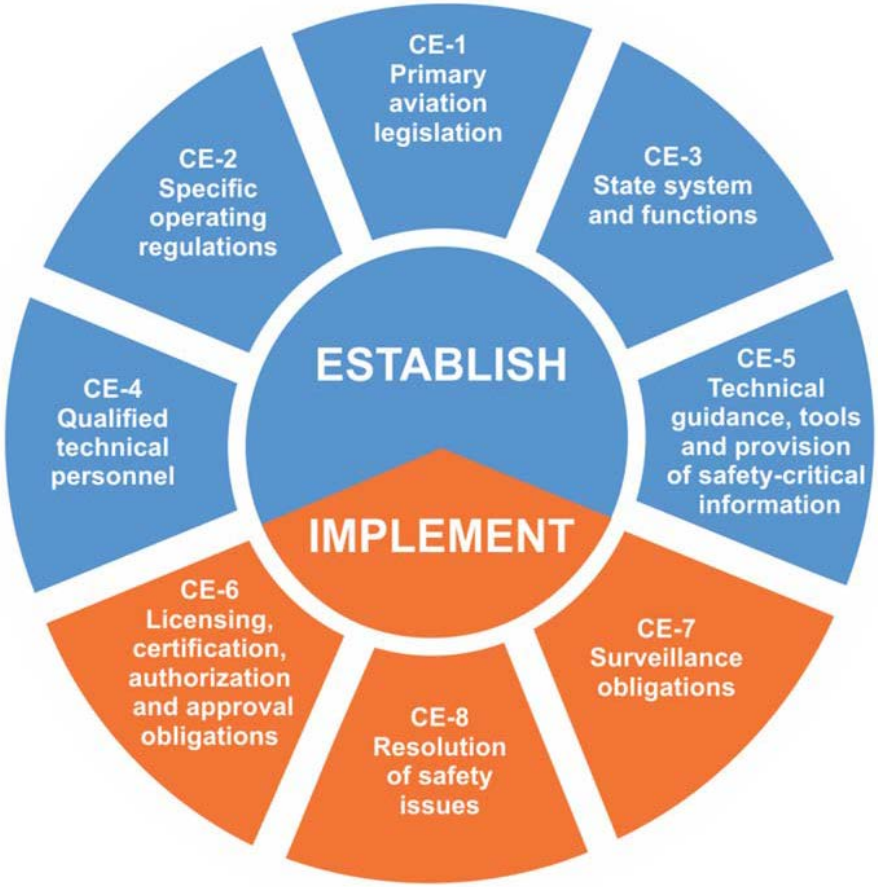
- Essential responsibilities of safety oversight
- Critical elements of state safety oversight

Introduce today's topics

Essential Responsibilities of Safety Oversight

- Establish rules
- Perform surveillance
- Resolve safety concerns

Critical Elements of State Safety Oversight



Today's Topics

- ICAO Annex 15 Requirements
- Variation in aeronautical products and services
- Overview of safety risk management - data risks and mitigations
- State safety oversight surveillance activities
- Develop an AIS audit
- Develop an audit proposal exercise

ICAO Annex 15 Requirements

Federal Aviation Administration

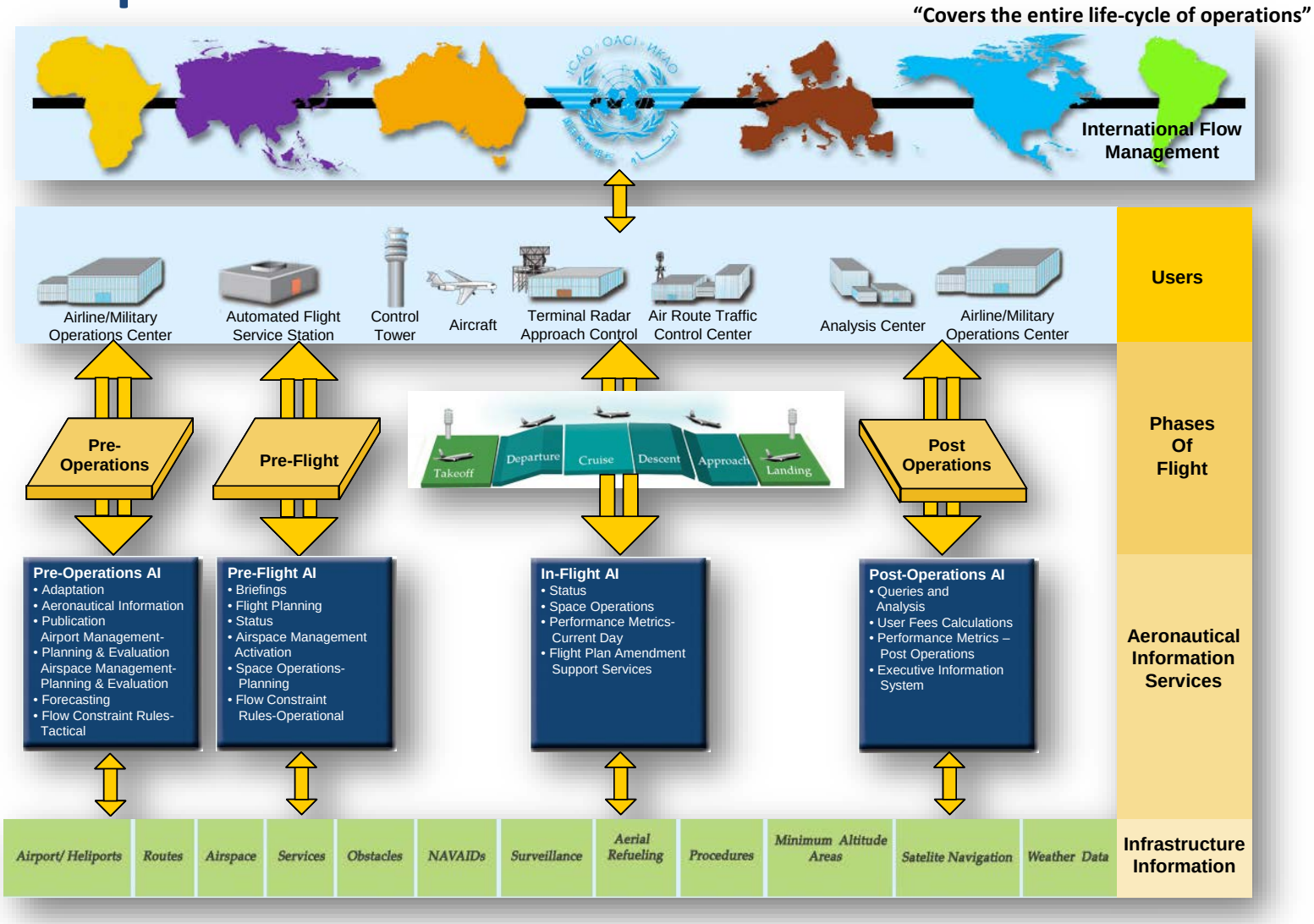
Module Objectives

- Review ICAO requirements contained in Annexes 15 and 4
- Review changes to Annex 15
  - Data quality specifications
  - Data origination
  - Aeronautical data catalog
  - Digital data sets
  - Aeronautical information products

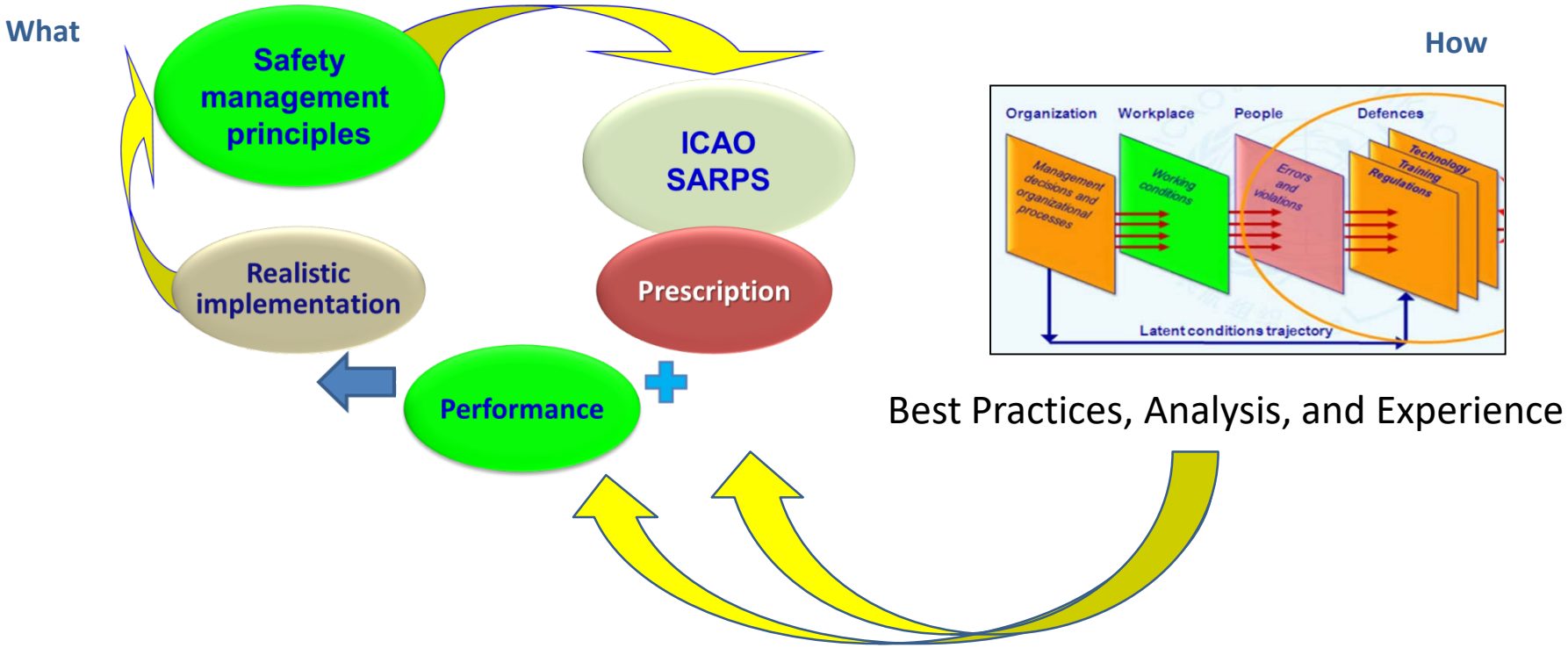
Information Challenge

How could we make the global airspace system perform like a seamless operation?

Operations-Oriented Services



How Does ICAO Drive Performance?



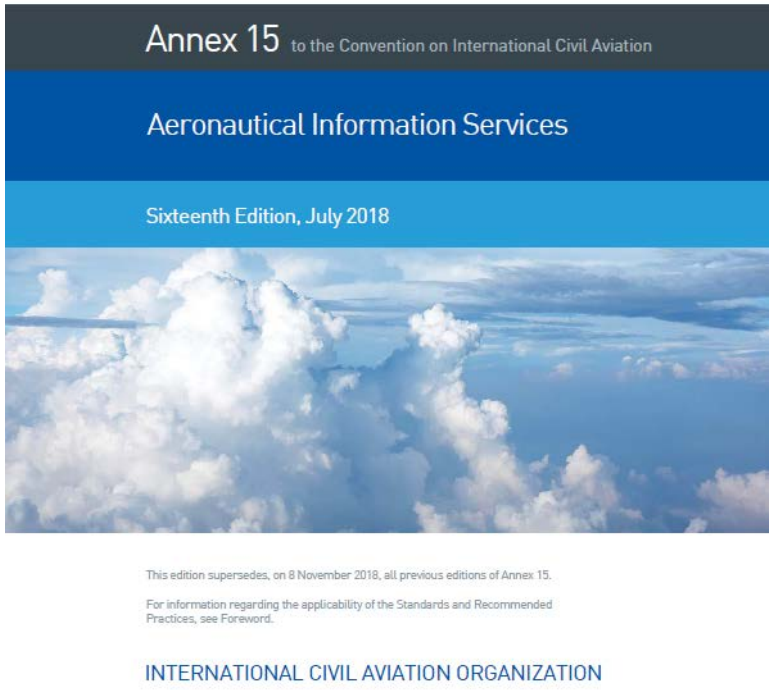
Resource: ICAO State Safety Program (SSP) Implementation Course, lessons 4 and 6

ICAO Data Requirements

- **Annex 14** • Aerodromes
- **Annex 15** • Aeronautical Information Services (Data Catalog)
- **Annex 11** • Air Traffic Services
- **Annex 4** • Charting

Annex 15 Standards

What are a State's obligations?



Aeronautical Information Service (AIS) Requirements

- Provide an AIS
- Receive, collate or assemble, edit, format, publish/store and distribute data and information of its own territory and those areas over the high seas where ATS is provided
- Establish formal arrangements between data originators and AIS provider
- Aeronautical data and information are complete, timely and of required quality
- Aeronautical data and information necessary are made available for the operational requirements of the ATM and flight operations communities
- Issue and receive Notice to Airmen (NOTAM) information by telecommunication

AIS Requirements (continued)

- Exchange aeronautical data and information with any ICAO Contracting State upon request at no charge
- Validation and verification procedures are in place
- Metadata is collected and maintained
- Aeronautical data and information is protected in accordance with data error detection, security, and authentication techniques
- Automation is introduced with the objective of improving the timeliness, quality, efficiency and cost effectiveness
- A quality management system (QMS) is implemented and maintained encompassing all functions of an AIS

AIS Requirements (continued)

Key products and services:

- Aeronautical Information Publication (AIP)
- AIP Amendments
- AIP Supplements
- Aeronautical Information Circulars (AIC)
- NOTAMs
- Pre-flight Information Service
- Post-flight Information Service
- Aeronautical Charts in accordance with ICAO Annex 4

Understanding Aeronautical Data

Aeronautical data: A representation of aeronautical facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing

- Data is used to make aeronautical information products and support services
- Aeronautical data is managed in a “chain” (data chain) from the originator through the AIS to the next intended user

Understanding Aeronautical Information

Aeronautical information: Information resulting from the assembly, analysis and formatting of aeronautical data

Aeronautical information management (AIM): The dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties

Data Quality Specifications

- Accuracy
- Resolution
- Integrity
- **Traceability**
- **Timeliness**
- **Completeness**
- **Format**

AIS vs. AIM

AIS is the organization that performs the service of providing aeronautical data and information in accordance with State responsibilities in Annexes 15 and 4

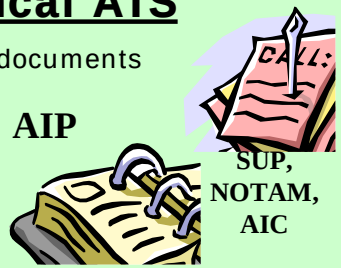
AIM is the management of aeronautical information requirements to support air traffic management

AIS to AIM

Managing Product

Classical AIS

- publish documents

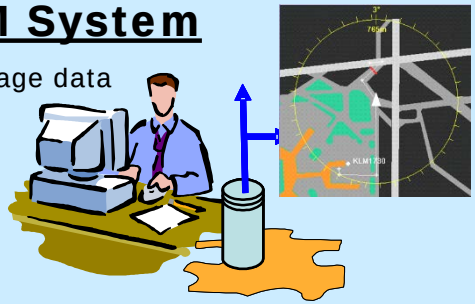


Document content and format is described by:

- ICAO Annex 15, Appendix 1 – AIP Content
- ICAO Annex 15, Appendix 6 – NOTAM format

AIM System

- manage data



Data managed in the system is described by models:

- Aeronautical Information Exchange Model (AIXM)
- AIXM Conceptual Model (AICM)
- Aeronautical Information Reference Model (AIRM)
- Electronic AIP (eAIP) – on-line presentation format

Managing Data

Source: EUROCONTROL

Current Amendment

Data Origination

- Data collection decoupled from defined end-products
- Allows end-users freedom to manage and combine data/information to create a final view (product) according to their needs
- Data/information decoupling is a fundamental principle in a System Wide Information Management (SWIM) environment

Current Amendment (continued)

Aeronautical Data Catalog

- General description of the AIM data scope
- Consolidates aeronautical data/information collection requirements maintained by an AIS into a “one stop shop” concept
- Facilitates
  - Authoritative source origination
  - Common data language
  - Formal arrangements
  - Data quality requirements

Current Amendment (continued)

Digital Data Sets

- Key enabler of a data-centric environment
- Fundamental principle of the SWIM environment
- Requires minimum set of metadata
- Required data sets
  - AIP
  - Terrain
  - Obstacle
  - Aerodrome mapping
  - Instrument flight procedure

Current Amendment (continued)

Aeronautical Information Products

- Replaces “Integrated Aeronautical Information Package” which was considered obsolete
- Encompasses
  - AIS deliverables
  - Digital data sets
  - Standardized presentation products

Current Amendment (continued)

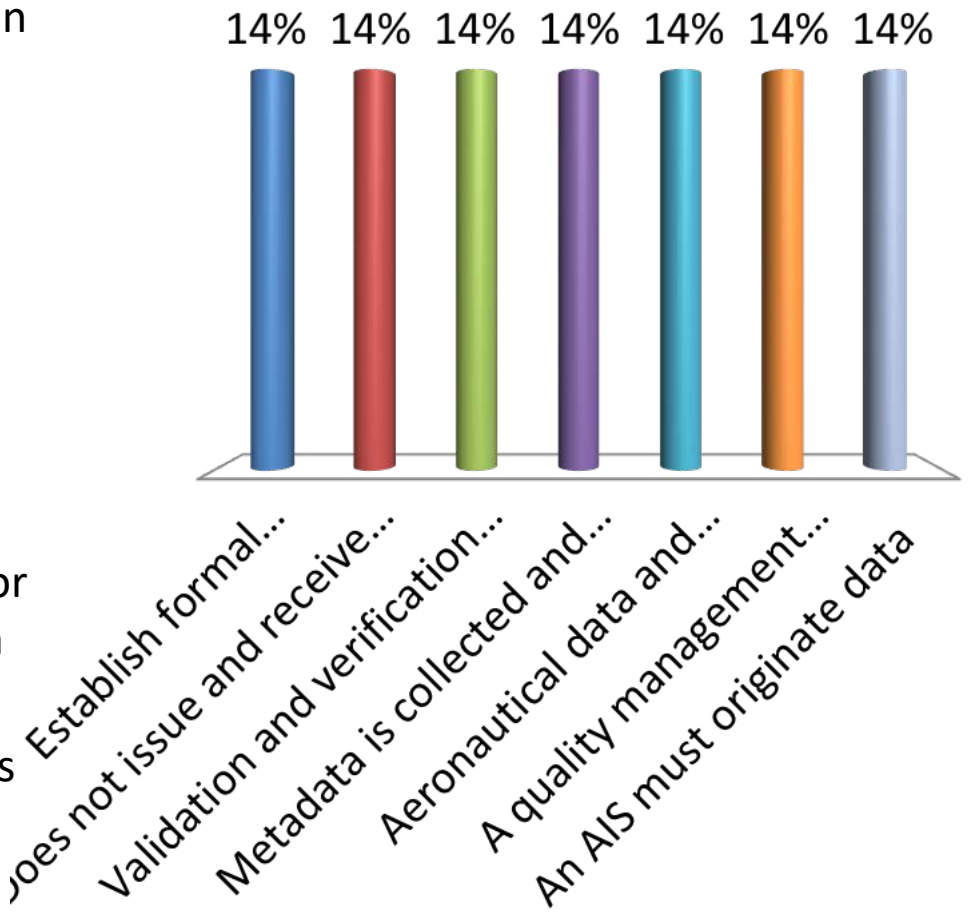
Data Quality Specifications

Aligns with industry standards EUROCAE ED-76A and RTCA DO-200B

- Accuracy
- Resolution
- Integrity
- **Traceability**
- **Timeliness**
- **Completeness**
- **Format**

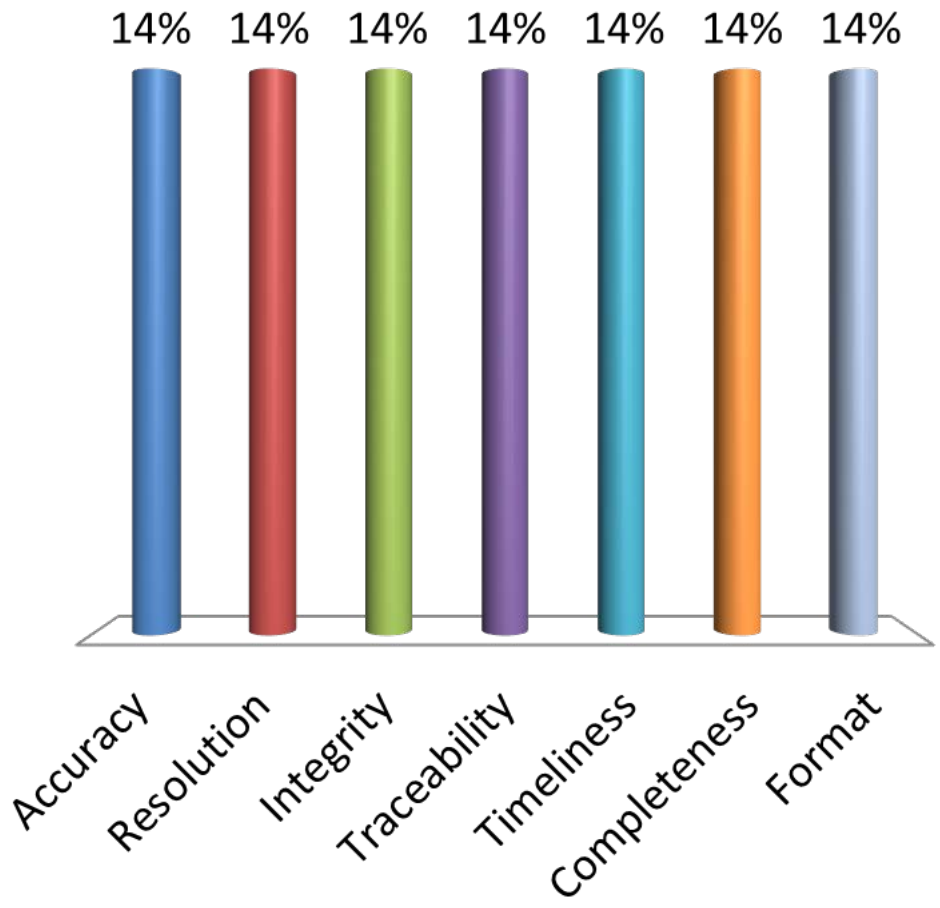
Which of the following are NOT AIS requirements?

A. Establish formal arrangements between data originators and AIS provider
B. Does not issue and receive Notice to Airmen (NOTAM) information by telecommunication
C. Validation and verification procedures are in place
D. Metadata is collected and maintained
E. Aeronautical data and information is protected in accordance with data error detection, security, and authentication techniques
F. A quality management system (QMS) is implemented and maintained encompassing all functions of an AIS
G. An AIS must originate data



What are the new data quality characteristics identified by Annex 15?

A. Accuracy
B. Resolution
C. Integrity
D. Traceability
E. Timeliness
F. Completeness
G. Format



Final Thoughts…

- Annex 15 describes State responsibilities for the provision of aeronautical data/information products and services
- The current Annex 15 provisions are the conceptual foundations for AIM environment
- The AIS to AIM transition equals major changes to processes and procedures which requires risk mitigation and oversight

References

- ICAO Annex 15
- ICAO Annex 4
- ICAO State Safety Program (SSP) Implementation Course, lessons 4 and 6
- EUROCONTROL
- EUROCAE ED-76A
- RTCA DO-200B

Questions and Discussion

Variation in Aeronautical Products/Services

Federal Aviation Administration

Module Objectives

- Discuss variations in regard to Annex 15
- Understand that every State has variations

What is Variation?

"the act, process, or accident of varying in condition, character, or degree"

"a different form of something"

Resource: Oxford Dictionary

What is an Aeronautical Information Publication (AIP)?

- AIPs satisfy:
  - Exchange of aeronautical information
  - Essential information for air navigation
  - When practicable, designed for use in flight
- AIPs contain material for permanent information and long duration temporary changes
- AIPs contain 3 parts:
  - General (AIP GEN), En-route (AIP ENR), Aerodrome/Heliport (AIP AD)

AIP GEN

General section answers the following:

- Responsible party for the information
- Contact information
- Differences that exist between the State and ICAO standards
- Conditions under which the services or facilities are available
- Units/standards used
  - Datum

AIP ENR

En-route section answers the following:

- Flight rules
- Description of airspace
  - Classifications, coordinates, altitudes
- Other regulated airspaces
- Description of the routes
  - ATS, RNAV, Helicopter
- List of stations providing radio navigation services
- Significant points
  - Name-code designators (fixes, waypoints)
- Prohibited, Restricted, Danger areas

AIP AD

Aerodrome/Heliport section answers the following:

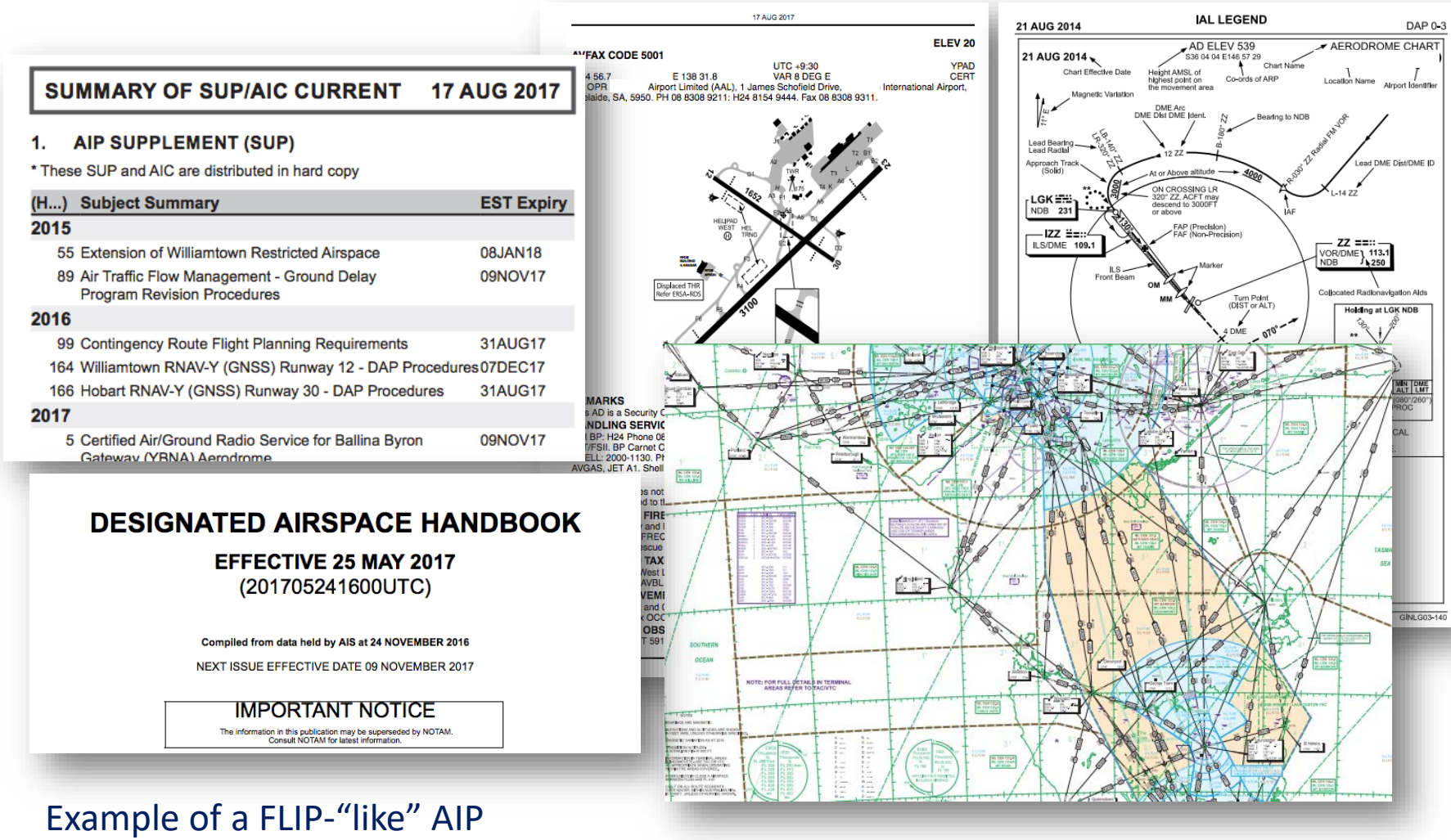
- Aerodrome/heliport information (i.e. name, hours, who runs it, etc.)
- Services available (i.e. passenger, emergency services, season information)
- Physical information for aprons/taxiways/runways
  - Runway strength, coordinates, name
- Obstacles
- Lighting
- Procedures
  - Approach, departure, instrument charts

AIP Variations

Four variations for providing aeronautical information worldwide:

1) 3 Part AIP
   - Current standard of ICAO
   - Is the most common worldwide
2) 7 Part AIP
   - Previous standard of ICAO Annex 15
   - Only 2 left in world (between military and civilian providers)
3) FLIP –"like"
   - These publications are designed more for users/operations
   - Have different publications for data/information groupings
   - There are only 3 civilian producers; primarily military data providers
4) FAA
   - FLIP-"like", but with many more publications than others

AIP Example



SUMMARY OF SUP/AIC CURRENT 17 AUG 2017

1. AIP SUPPLEMENT (SUP)

* These SUP and AIC are distributed in hard copy

(H...)	Subject Summary	EST Expiry
2015		
55	Extension of Williamtown Restricted Airspace	08JAN18
89	Air Traffic Flow Management - Ground Delay Program Revision Procedures	09NOV17
2016		
99	Contingency Route Flight Planning Requirements	31AUG17
164	Williamtown RNAV-Y (GNSS) Runway 12 - DAP Procedures	07DEC17
166	Hobart RNAV-Y (GNSS) Runway 30 - DAP Procedures	31AUG17
2017		
5	Certified Air/Ground Radio Service for Ballina Byron Gateway (YBNA) Aerodrome	09NOV17

DESIGNATED AIRSPACE HANDBOOK

EFFECTIVE 25 MAY 2017
(201705241600UTC)

Compiled from data held by AIS at 24 NOVEMBER 2016

NEXT ISSUE EFFECTIVE DATE 09 NOVEMBER 2017

IMPORTANT NOTICE
The information in this publication may be superseded by NOTAM.
Consult NOTAM for latest information.

17 AUG 2017

ELEV 20

UTC +9:30 YPAD
VAR 8 DEG E CERT

Displaced THR Refer ERSA-RDS

21 AUG 2014 IAL LEGEND DAP 0-3

21 AUG 2014 AD ELEV 539 AERODROME CHART

Chart Effective Date · Height AMSL of highest point on the movement area · Co-ords of ARP · Chart Name · Location Name · Airport Identifier · Magnetic Variation · DME Arc DME Dist DME Ident. · Bearing to NDB · Lead Bearing Lead Radial · Approach Track (Solid) · At or Above altitude · ON CROSSING LR 320° ZZ, ACFT may descend to 3000FT or above · FAP (Precision) FAF (Non-Precision) · Marker · Turn Point (DIST or ALT) · Lead DME Dist/DME ID · Collocated Radionavigation Aids · Holding at LGK NDB

LGK NDB 231 · IZZ ILS/DME 109.1 · ZZ VOR/DME NDB 113.1 250

GINLG03-140

Example of a FLIP-"like" AIP

What is Aeronautical Information Regulation and Control (AIRAC)?

- Establishment, withdrawal or significant changes on a common effective date, every 28 days
- Information shall not be changed for at least 28 days after the effective date
- Types of data/information covered:
  - Airspace
  - Routes
  - Danger, prohibited, restricted areas
  - Positions, frequencies, call signs, identifiers of navigation aids
  - Procedures
  - Aerodrome physical attributes (aprons/taxiways/runways)
  - Obstructions
  - Hours of operation

What is an AIP Amendment?

Permanent changes to the information contained in the AIP

AIP amendments come in two different versions:

- Regular amendment
- AIRAC amendment

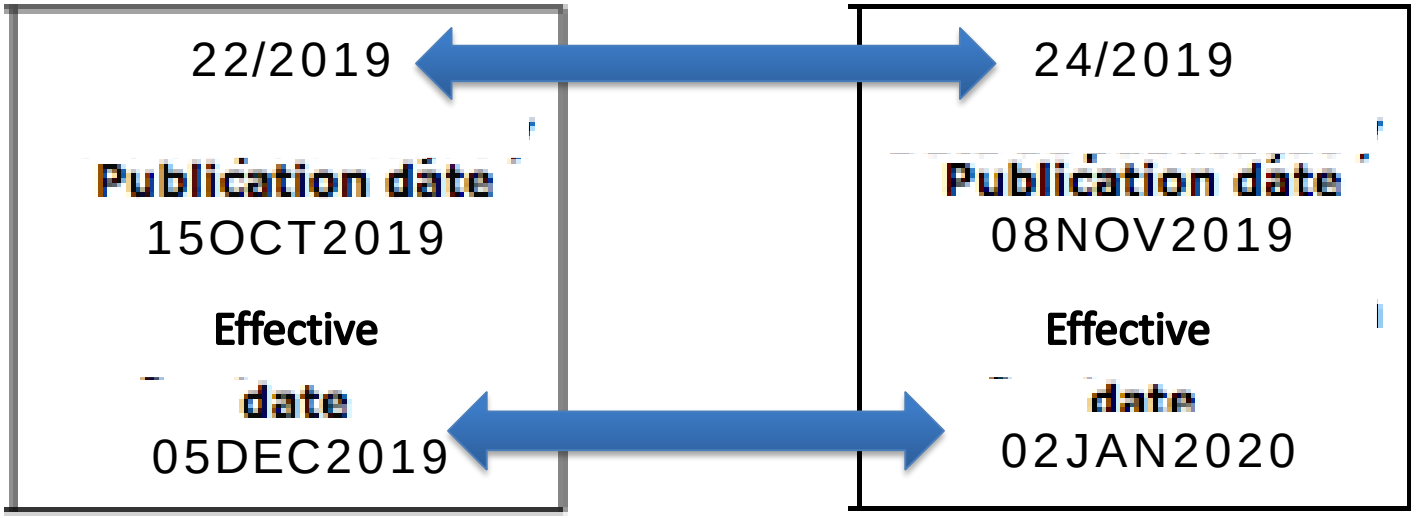
AIP Amendment

1. New or revised information contained in the AIP shall be identified
2. Each AIP Amendment shall be allocated a serial number, which shall be consecutive
3. Each AIP Amendment shall contain a publication date
4. Each AIRAC AIP Amendment shall contain an effective date
5. When an effective time other than 0000 UTC is used, the effective time shall also be indicated

AIP Amendment (continued)

6. When an AIP amendment is issued, it shall include references to the serial number of the AIP supplement or the series and number of the Notices to Airmen (NOTAM) which has been incorporated into the amendment
7. A brief indication of the subjects affected by the amendment shall be given on the AIP amendment cover sheet
8. Each amendment shall include a checklist giving the current date of each loose-leaf pace in the AIP, and shall provide a recapitulation of any outstanding manuscript corrections. The checklist shall carry both the page number and date

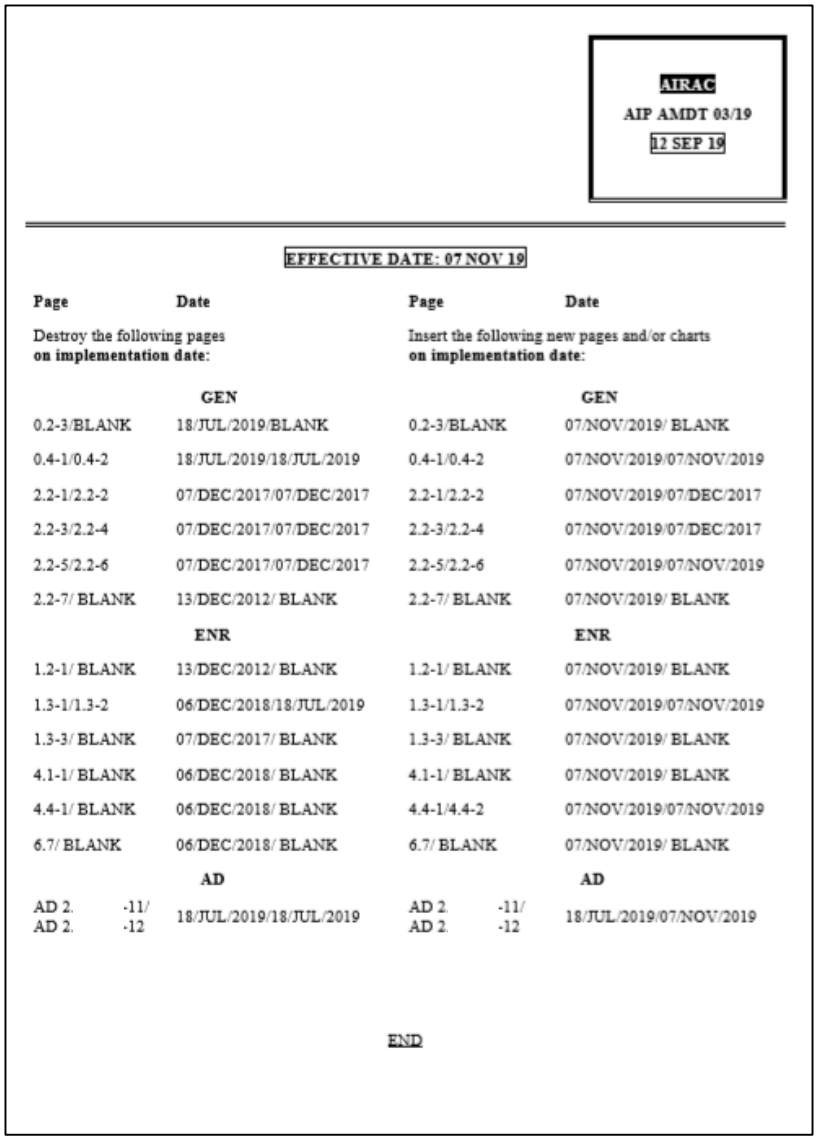
Variation in AIP Amendments



Were the amendments consecutive?

Variation in AIP Amendments (continued)

- Does this provide a summary of what the amendment is changing?
- What was incorporated by this amendment?



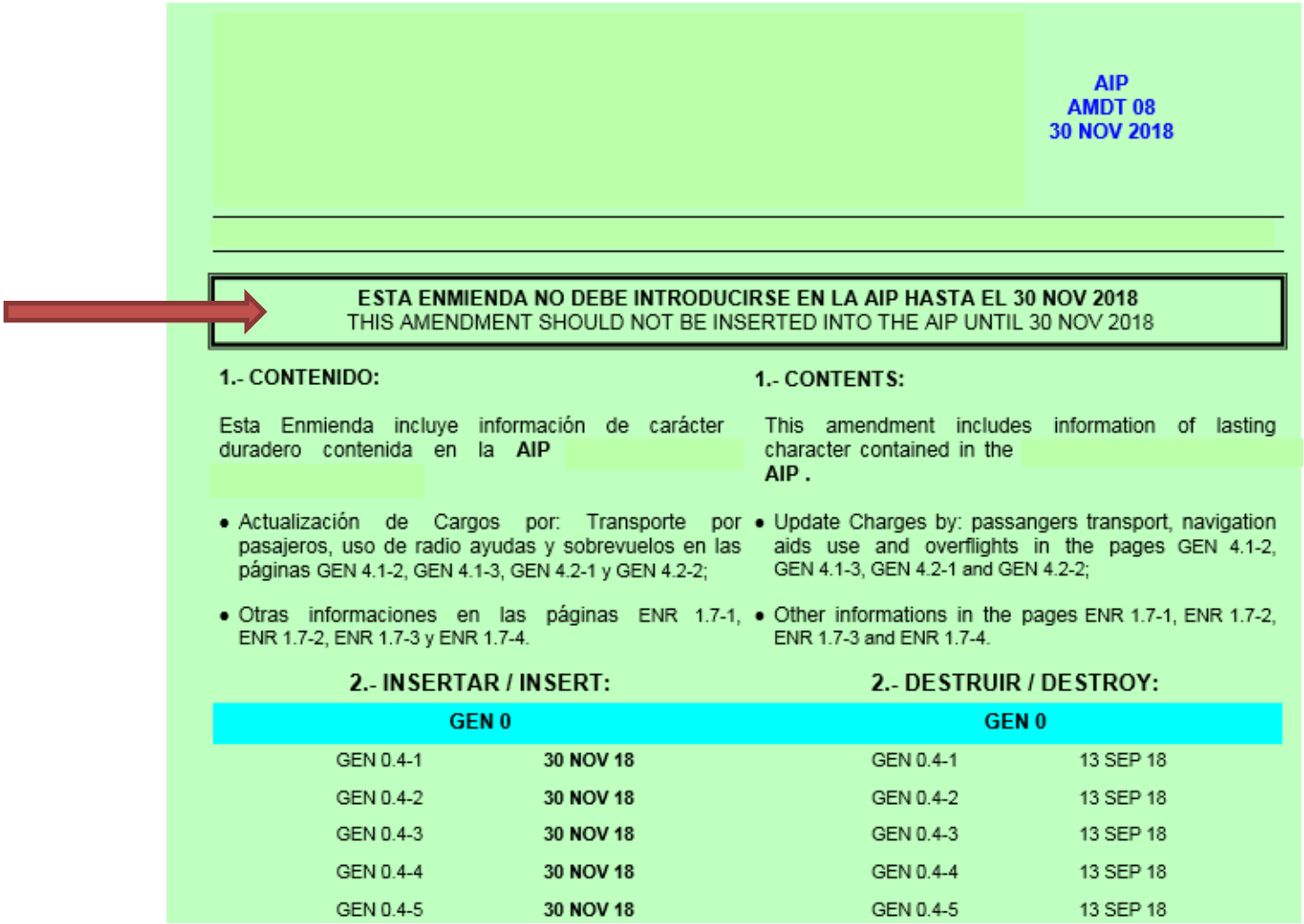
AIRAC
AIP AMDT 03/19
12 SEP 19

EFFECTIVE DATE: 07 NOV 19

Page	Date	Page	Date
Destroy the following pages on implementation date:		Insert the following new pages and/or charts on implementation date:	
	GEN		GEN
0.2-3/BLANK	18/JUL/2019/BLANK	0.2-3/BLANK	07/NOV/2019/ BLANK
0.4-1/0.4-2	18/JUL/2019/18/JUL/2019	0.4-1/0.4-2	07/NOV/2019/07/NOV/2019
2.2-1/2.2-2	07/DEC/2017/07/DEC/2017	2.2-1/2.2-2	07/NOV/2019/07/DEC/2017
2.2-3/2.2-4	07/DEC/2017/07/DEC/2017	2.2-3/2.2-4	07/NOV/2019/07/DEC/2017
2.2-5/2.2-6	07/DEC/2017/07/DEC/2017	2.2-5/2.2-6	07/NOV/2019/07/NOV/2019
2.2-7/ BLANK	13/DEC/2012/ BLANK	2.2-7/ BLANK	07/NOV/2019/ BLANK
	ENR		ENR
1.2-1/ BLANK	13/DEC/2012/ BLANK	1.2-1/ BLANK	07/NOV/2019/ BLANK
1.3-1/1.3-2	06/DEC/2018/18/JUL/2019	1.3-1/1.3-2	07/NOV/2019/07/NOV/2019
1.3-3/ BLANK	07/DEC/2017/ BLANK	1.3-3/ BLANK	07/NOV/2019/ BLANK
4.1-1/ BLANK	06/DEC/2018/ BLANK	4.1-1/ BLANK	07/NOV/2019/ BLANK
4.4-1/ BLANK	06/DEC/2018/ BLANK	4.4-1/4.4-2	07/NOV/2019/07/NOV/2019
6.7/ BLANK	06/DEC/2018/ BLANK	6.7/ BLANK	07/NOV/2019/ BLANK
	AD		AD
AD 2. -11/ AD 2. -12	18/JUL/2019/18/JUL/2019	AD 2. -11/ AD 2. -12	18/JUL/2019/07/NOV/2019

END

Variation in AIP Amendments (continued)



AIP
AMDT 08
30 NOV 2018

ESTA ENMIENDA NO DEBE INTRODUCIRSE EN LA AIP HASTA EL 30 NOV 2018
THIS AMENDMENT SHOULD NOT BE INSERTED INTO THE AIP UNTIL 30 NOV 2018

1.- CONTENIDO:

Esta Enmienda incluye información de carácter duradero contenida en la **AIP**

- Actualización de Cargos por: Transporte por pasajeros, uso de radio ayudas y sobrevuelos en las páginas GEN 4.1-2, GEN 4.1-3, GEN 4.2-1 y GEN 4.2-2;
- Otras informaciones en las páginas ENR 1.7-1, ENR 1.7-2, ENR 1.7-3 y ENR 1.7-4.

1.- CONTENTS:

This amendment includes information of lasting character contained in the **AIP .**

- Update Charges by: passangers transport, navigation aids use and overflights in the pages GEN 4.1-2, GEN 4.1-3, GEN 4.2-1 and GEN 4.2-2;
- Other informations in the pages ENR 1.7-1, ENR 1.7-2, ENR 1.7-3 and ENR 1.7-4.

2.- INSERTAR / INSERT:

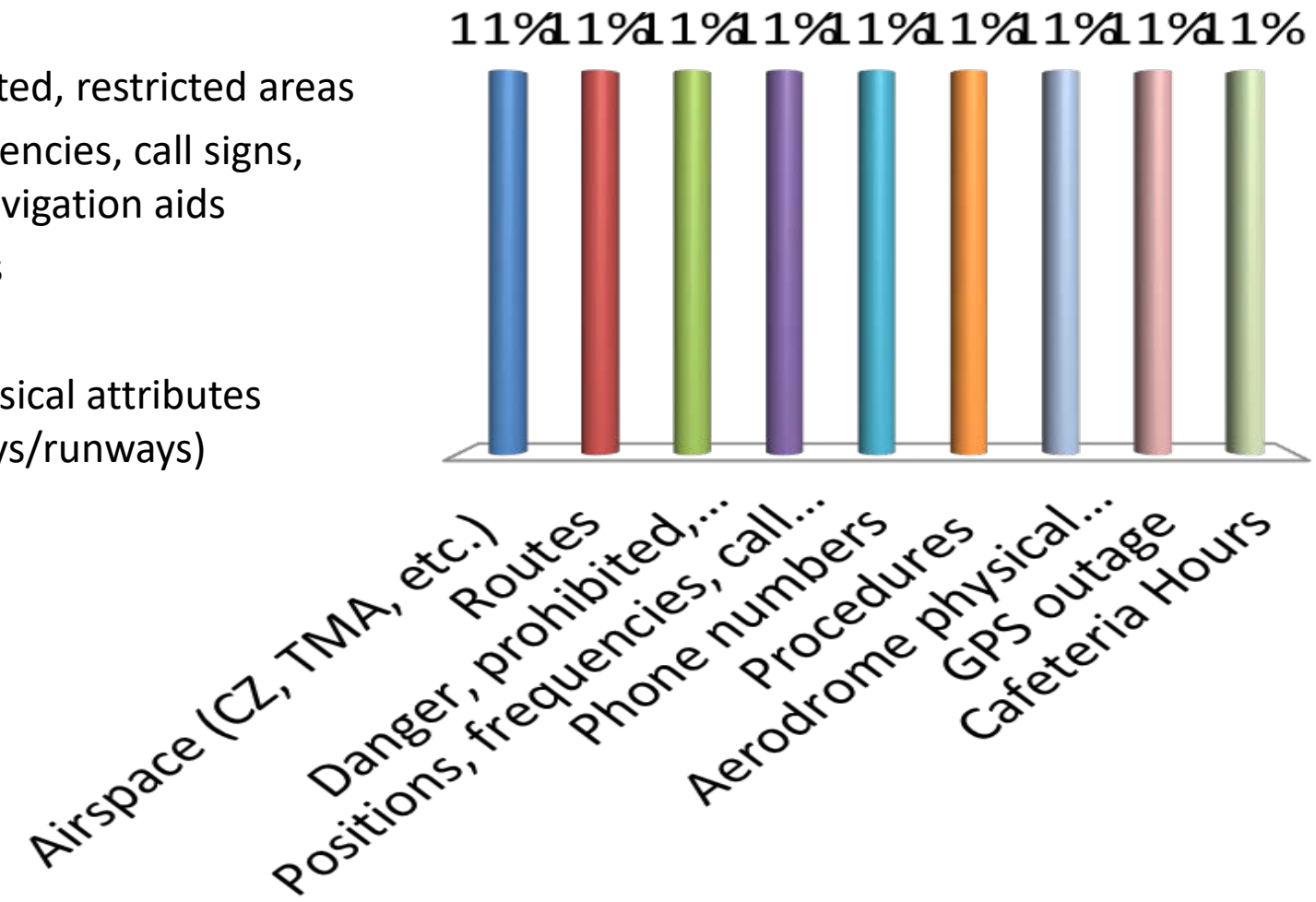
GEN 0	
GEN 0.4-1	**30 NOV 18**
GEN 0.4-2	**30 NOV 18**
GEN 0.4-3	**30 NOV 18**
GEN 0.4-4	**30 NOV 18**
GEN 0.4-5	**30 NOV 18**

2.- DESTRUIR / DESTROY:

GEN 0	
GEN 0.4-1	13 SEP 18
GEN 0.4-2	13 SEP 18
GEN 0.4-3	13 SEP 18
GEN 0.4-4	13 SEP 18
GEN 0.4-5	13 SEP 18

What kinds of changes to the AIP shall NOT be published as AIRAC Amendments?

A. Airspace (CZ, TMA, etc.)
B. Routes
C. Danger, prohibited, restricted areas
D. Positions, frequencies, call signs, identifiers of navigation aids
E. Phone numbers
F. Procedures
G. Aerodrome physical attributes (aprons/taxiways/runways)
H. GPS outage
I. Cafeteria Hours



What is an AIP Supplement?

Temporary changes to the information contained in the AIP which are provided by means of special pages

AIP supplements come in two different versions:

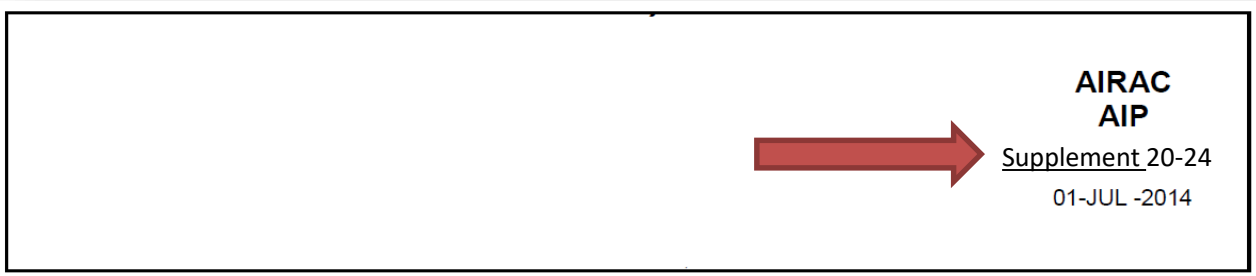
- Regular supplement
- AIRAC supplement

AIP Supplement

1. Each AIP supplement shall be allocated a serial number which shall be consecutive and based on the calendar year
2. Each AIP supplement shall be provided on distinctive pages allowing for easy identification from the regular AIP content
3. Whenever an AIP supplement is issued as a replacement of a NOTAM, a reference to the series and number of the NOTAM shall be included
4. A checklist of valid AIP supplements shall be issued at intervals of not more than one month as part of the checklist of NOTAM required by 6.3.2 and with distribution as for the AIP supplements
5. Each AIP supplement page shall show a publication date
6. Each AIRAC AIP supplement page shall show a publication date and an effective date

Variation in Aeronautical Supplements

What kind of change is this?



AIRAC
AIP
Supplement 20-24
01-JUL -2014

FECHA DE ENTRADA EN VIGOR: 24 de julio de 2014

SUP AIRAC 20/2014	AD TMA	AREA TERMINAL
SUP AIRAC 21/2014	AD LL-1, LL-2 Y LL-3	CARTAS DE LLEGADA POR INSTRUMENTOS
SUP AIRAC 22/2014	AD ILS-1, ILS,2, ILS-3	CARTAS DE APROXIMACION POR INSTRUMENTOS
SUP AIRAC 23/2014	AD R-1	CARTA DE APROXIMACION POR INSTRUMENTOS
SUP AIRAC 24/2014	AD VD-1 Y VD-2	CARTAS DE APROXIMACION POR INSTRUMENTOS

This amendment incorporates information that is published in the following AIP/SUP and NOTAM which is Cancelled hereby:

SUP	12/2014
SUP	13/2014
ANEXO 3 AL SUP	14/2014
SUP	15/2014
SUP	17/2014
SUP	18/2014

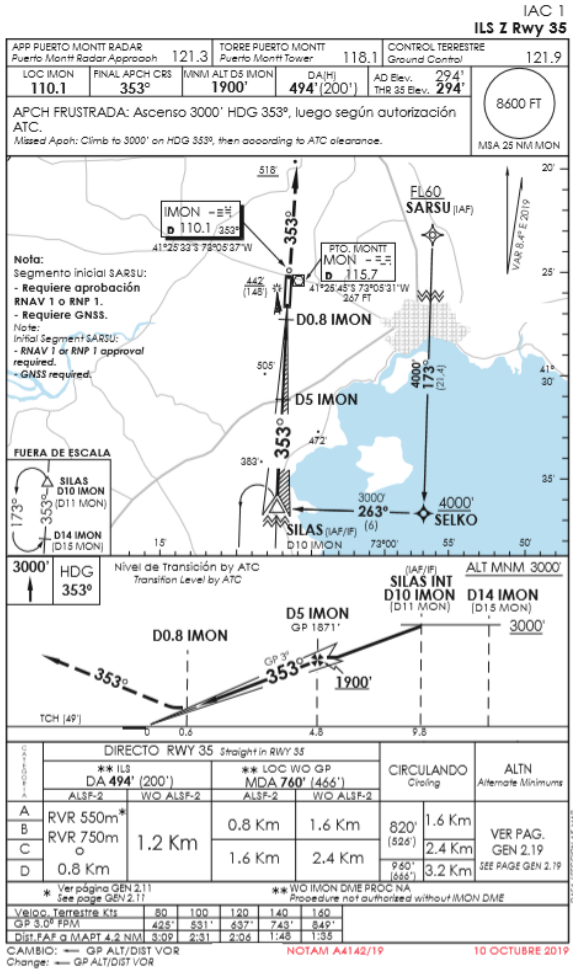
What is a NOTAM?

A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations

NOTAM Variation

A4143/19 REF AIP AMDT 82 DATED AUG 16TH 2018, IAC2 ILS YANKEE RWY 35 HAS BEEN MODIFIED.
REF AIP AMDT 82 DE FECHA 16 AUG 2018, IAC2 ILS YANKEE RWY 35 HA SIDO MODIFICADA.
GRAPHIC AND INFO AVBL AT:
WWW.. /SECCION/PROC/PAGINA/01. 10 OCT 00:00 2019
UNTIL PERM. CREATED: 11 SEP 16:53 2019

A4142/19 REF AIP AMDT 83 DATED AUG 15TH 2019, IAC1 ILS ZULU RWY 35 HAS BEEN MODIFIED.GRAPHIC AND INFO AVB AT:
REF AIP AMDT 83 DE FECHA 15 AUG 2019, IAC1 ILS ZULU RWY 35 HA SIDO MODIFICADA.
GRAPHIC AND INFO AVBL AT:
WWW.. /SECCION/PROC/PAGINA/01. 10 OCT 00:00 2019
UNTIL PERM. CREATED: 11 SEP 16:53 2019



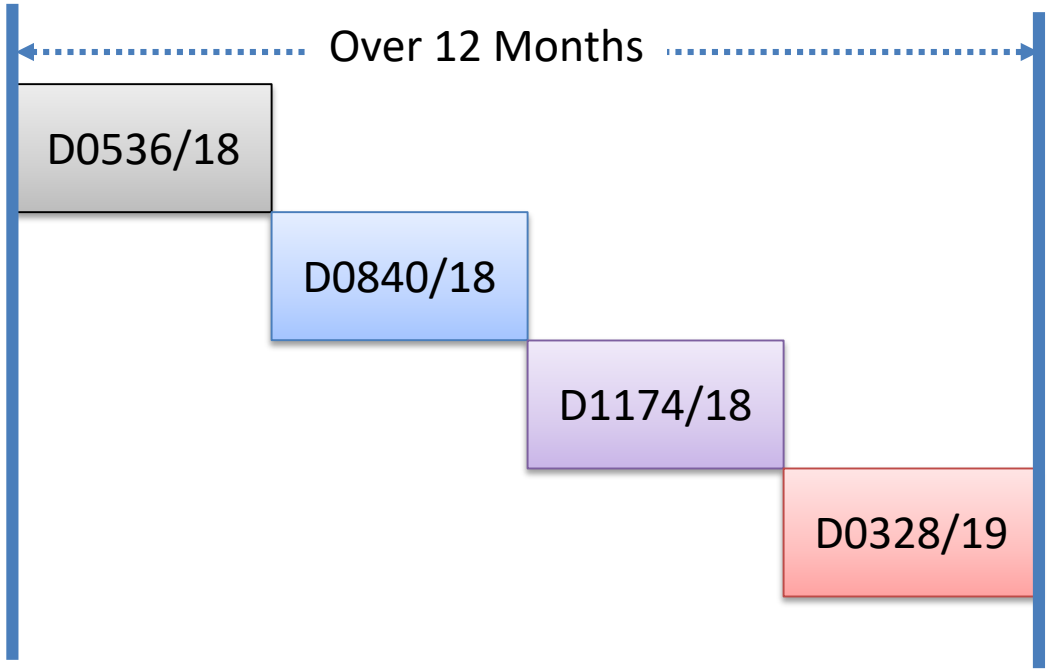
The procedure graphics were late ….
Is this an acceptable method to make AIP changes?

NOTAM Example

D0840/18 NOTAMR D0536/18
A) B) 1809300359 C) 1812312359 EST
E) CRANE ERECTED AT COORD 055748.42N 1160411.41E

D1174/18 NOTAMR D0840/18
A) B) 1812301306 C) 1903312359 EST
E) CRANE ERECTED AT COORD 055748.42N 1160411.41E

D0328/19 NOTAMR **D1174/18**
A) B) 1904010016 C) 1906302359 EST
E) CRANE ERECTED AT COORD 055748.42N 1160411.41E



NOTAM Example

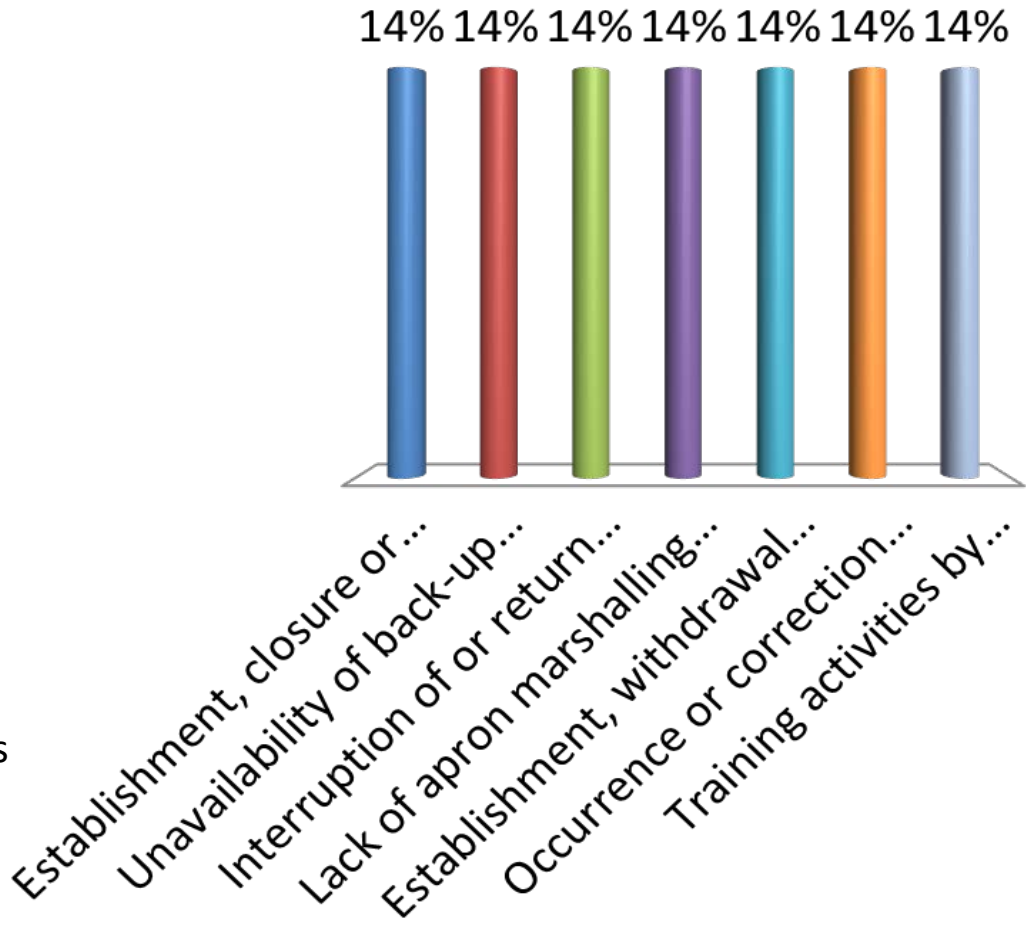
B0328/17 NOTAMN
Q) /QAFXX/IV/NBO/E /000/999/1216N12435E999
A) B) 1701270649 C) PERM
E) AIRAC AIP AMDT 061/16 WEF **02 FEB 17** CHANGED TO
02 MAR 17
CREATED: **27 Jan 2017** 06:49:00

NOTAM Example

A0035/17 NOTAMN Q) /QMRXX/IV/NBO/A/000/999/0139N00724E005
A) B) 1701051659 C) PERM
E) AD2.12 RWY PHYSICAL CHARACTERISTCS
DESIGNATIONS RWY NR RWY 18
TRUE AND MAG BRG: 180 GEO 171 MAG
DIMENENSIONS OF RWY(M): 1750X30
STRENGHT(PCN)AND SURFACE OF RWY AND SWY: LCN25 TONNES PCN 37
THR COORDINATES: **184629.930N/323237.943E**
THR ELEVATION AND HIGHEST ELEVATION OF TDZ OF PRECISION APP RWY APP RWY:173.940
RWY 36
TRUE AND MAG BRG: 360 GEO 351 MAG
DIMENENSIONS OF RWY(M): 1750X30
STRENGHT(PCN)AND SURFACE OF RWY AND SWY: LCN25 TONNES PCN 37
THR COORDINATES: **183094.730N/323237.943E**
THR ELEVATION AND HIGHEST ELEVATION OF TDZ OF PRECISION APP RWY APP RWY:177.170 SLOPE OF RWY

What kind of information should be distributed by NOTAM?

A. Establishment, closure or significant changes in operation of aerodrome(s) or heliport(s) or runways
B. Unavailability of back-up and secondary systems, having a direct operational impact;
C. Interruption of or return to operation of major components of aerodrome lighting systems
D. Lack of apron marshalling services and road traffic control
E. Establishment, withdrawal or significant changes to procedures for air navigation services
F. Occurrence or correction of major defects or impediments in the maneuvering area
G. Training activities by ground units



What is an Aeronautical Information Circular (AIC)?

A notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but relates to flight safety, air navigation, technical, administrative or legislative matters

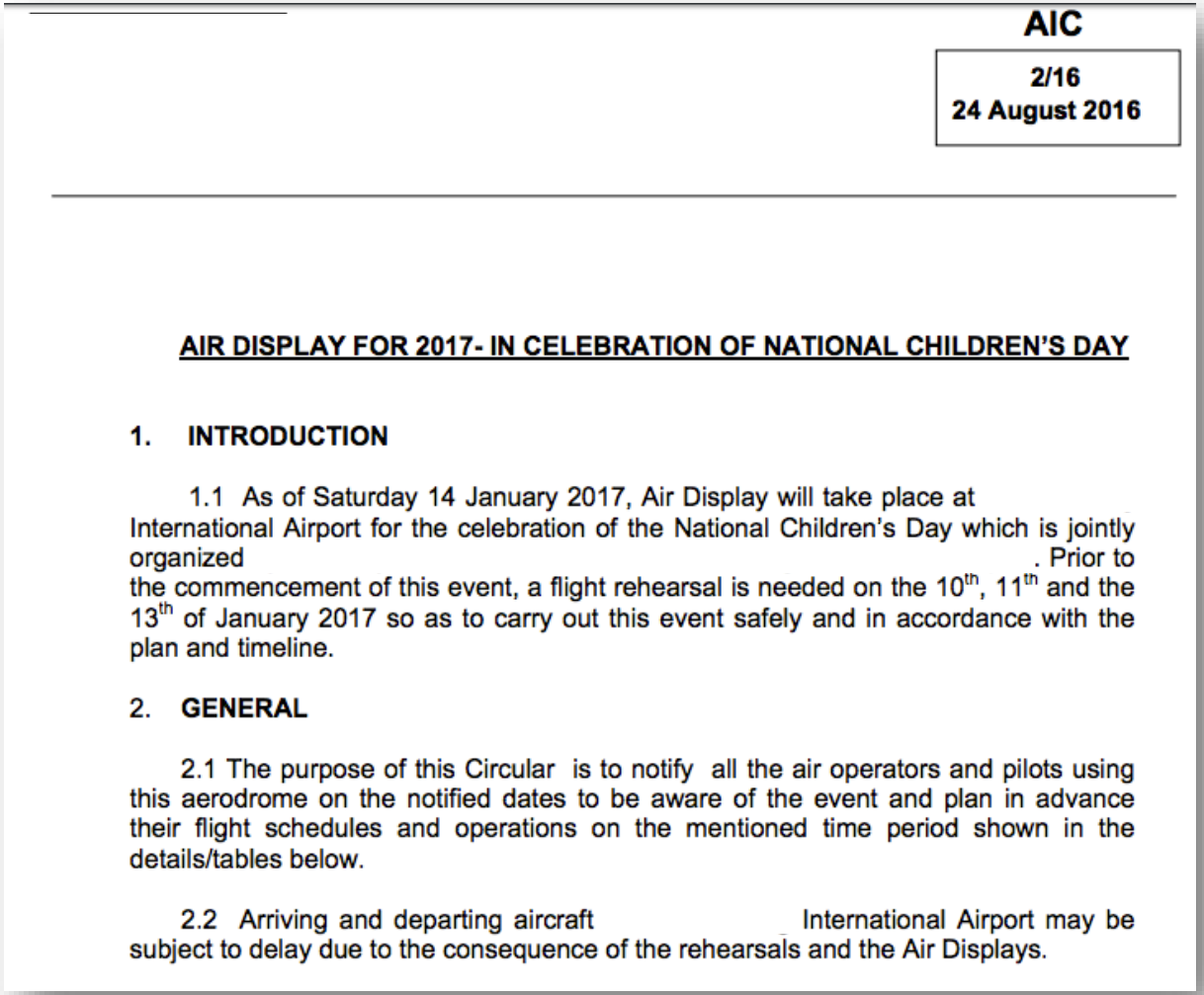
Aeronautical Information Circular (AIC)

An AIC shall be originated to promulgate:

- a long-term forecast of any major change in legislation, regulations, procedures or facilities;
- information of a purely explanatory or advisory nature liable to affect flight safety; and/or
- information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

Variation in AIC

- Does this belong in an AIC?
- If not, where should the information be published?



AIC

2/16
24 August 2016

AIR DISPLAY FOR 2017- IN CELEBRATION OF NATIONAL CHILDREN'S DAY

1. INTRODUCTION

1.1 As of Saturday 14 January 2017, Air Display will take place at International Airport for the celebration of the National Children's Day which is jointly organized . Prior to the commencement of this event, a flight rehearsal is needed on the 10th, 11th and the 13th of January 2017 so as to carry out this event safely and in accordance with the plan and timeline.

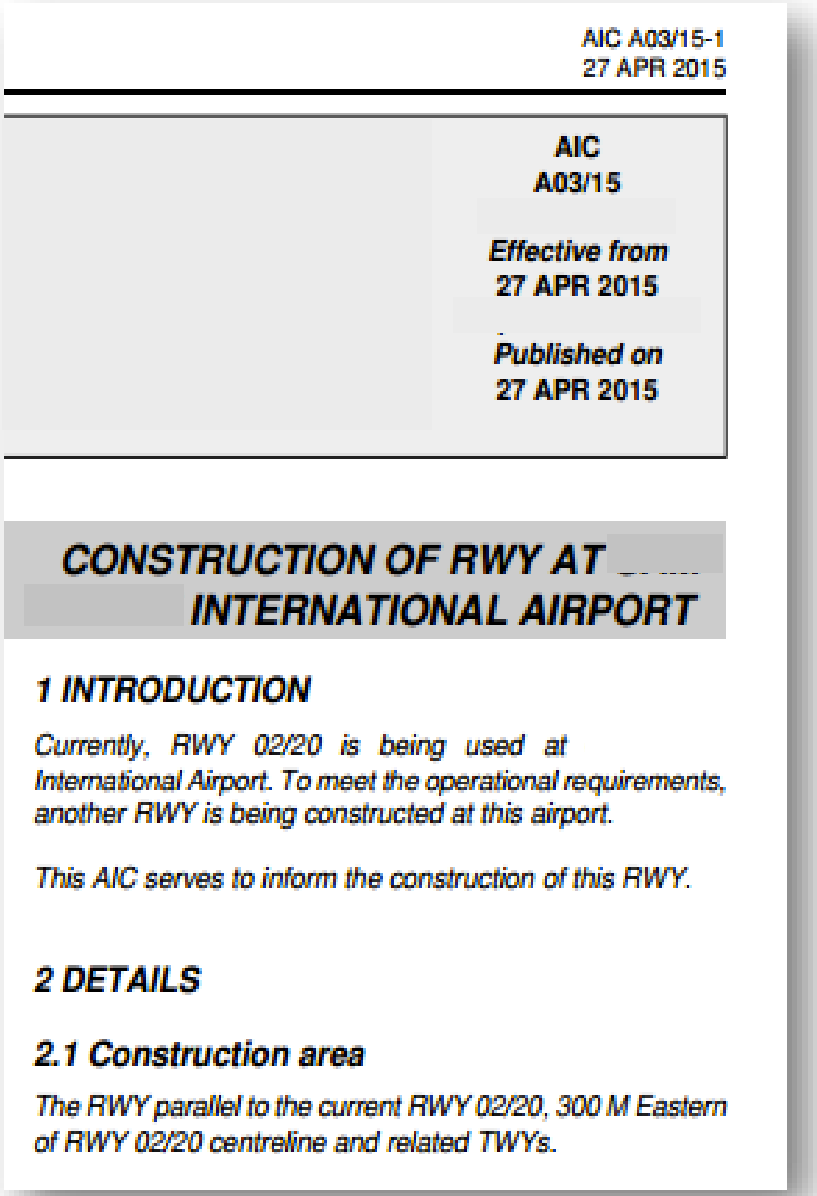
2. GENERAL

2.1 The purpose of this Circular is to notify all the air operators and pilots using this aerodrome on the notified dates to be aware of the event and plan in advance their flight schedules and operations on the mentioned time period shown in the details/tables below.

2.2 Arriving and departing aircraft International Airport may be subject to delay due to the consequence of the rehearsals and the Air Displays.

Variation in AIC (continued)

- Does this belong in an AIC?
- If not, where should the information be published?



AIC A03/15-1
27 APR 2015

AIC
A03/15

Effective from
27 APR 2015

Published on
27 APR 2015

CONSTRUCTION OF RWY AT [redacted] INTERNATIONAL AIRPORT

1 INTRODUCTION

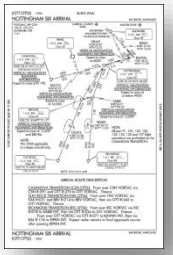
Currently, RWY 02/20 is being used at [redacted] International Airport. To meet the operational requirements, another RWY is being constructed at this airport.

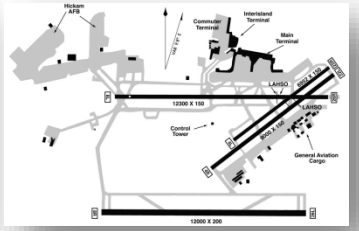
This AIC serves to inform the construction of this RWY.

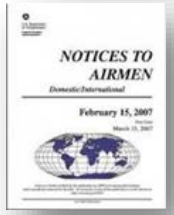
2 DETAILS

2.1 Construction area

The RWY parallel to the current RWY 02/20, 300 M Eastern of RWY 02/20 centreline and related TWYs.





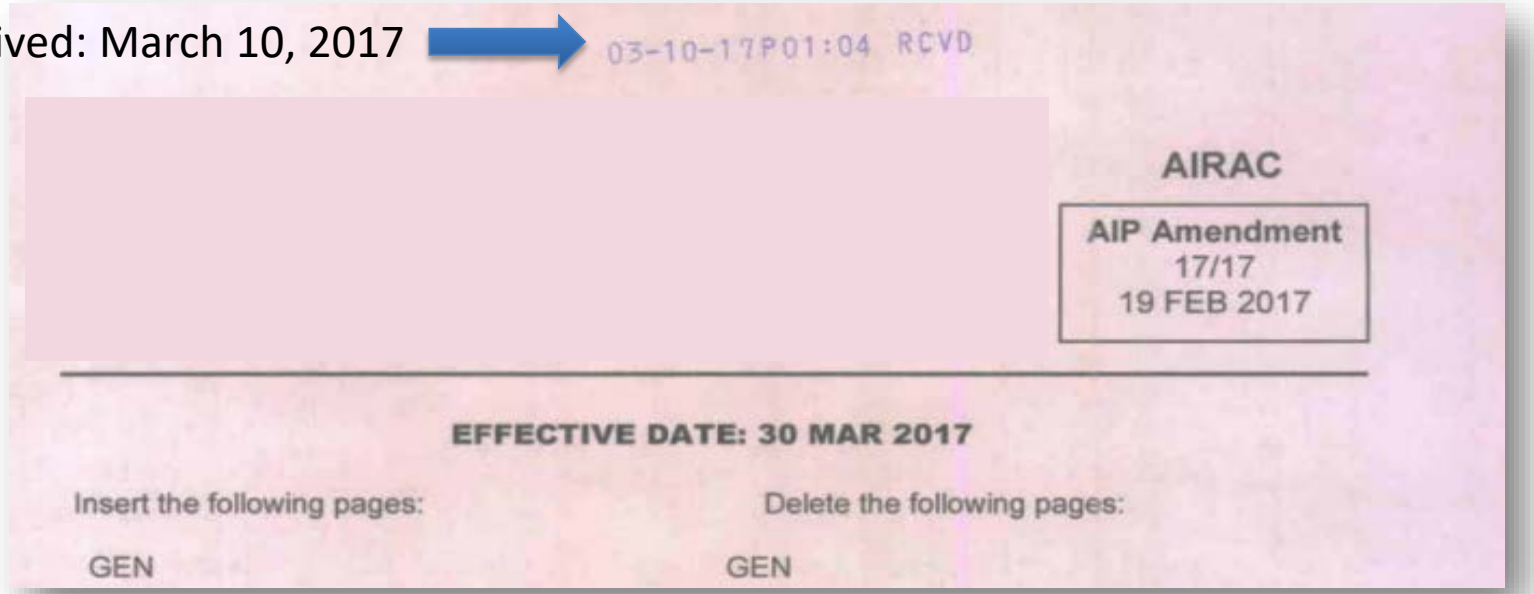


Variation in Aeronautical Products/Services

VARIATION IN DATA QUALITY

Is It Timely?

Received: March 10, 2017

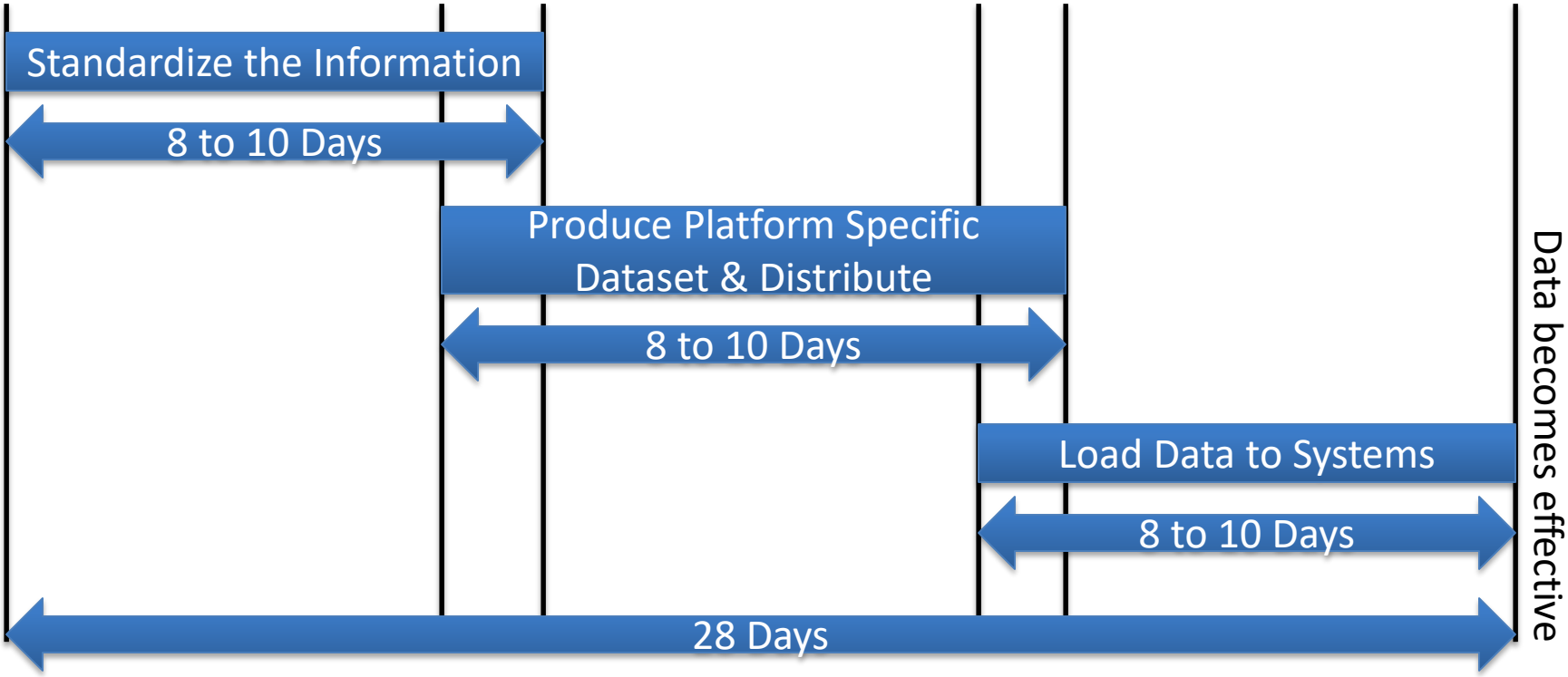


Was this AIRAC amendment timely?

Do you think the information was integrated into the aircraft?

Why Does Timeliness Matter?

Normal timeline for data inclusion into automated systems



Note: Production timelines may vary between data houses

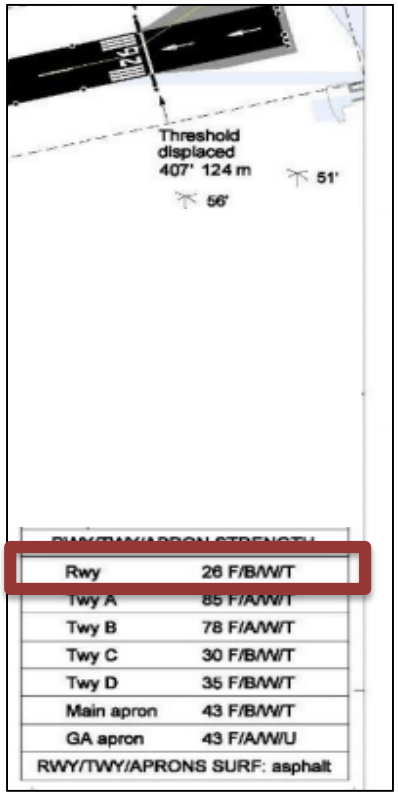
Is It Usable?

Can you read the minimum?

Is the Data Synchronized?

AD 2.12 RUNWAY PHYSICAL CHARACTERISTICS

Designations RWY NR	TRUE & MAG BRG	Dimensions of RWY (M)	Strength (PCN) and Surface of RWY and SWY	THR coordinates	THR elevation and Highest elevation of TDZ of Non-Precision APP RWY	
1	2	3	4	5	6	
08	076° GEO 080° MAG	2136 x 46	60/F/B/X/U Asphalt Grooved	191725.56N 812203.46W	THR 2.4 M/8 FT * see note	
26	256° GEO 260° MAG	2136 x 46	60/F/B/X/U Asphalt Grooved	191742.45N 812052.49W	THR 1.7 M/5 FT * see note	
Slope of RWY-SWY	SWY Dimensions (M)	CWY Dimensions (M)	Strip Dimensions (M)	OFZ	RESA	Remarks
7	8	9	10	11	12	13
Nil	Nil	150 x 150	2 256 x 150	Nil	NIL	
Nil	Nil	150x 150	2 256 x 150	Nil	90 x 90	** see note below



Note: Aerodrome Diagram

- What impact will this have?
- Would it affect the type of the aircraft operating at this airport?
- Will it call into question other data?

Is the Data Synchronized?

New York, NY
John F Kennedy Intl
ICAO Identifier KJFK

AD 2.2 Aerodrome geographical and administrative data

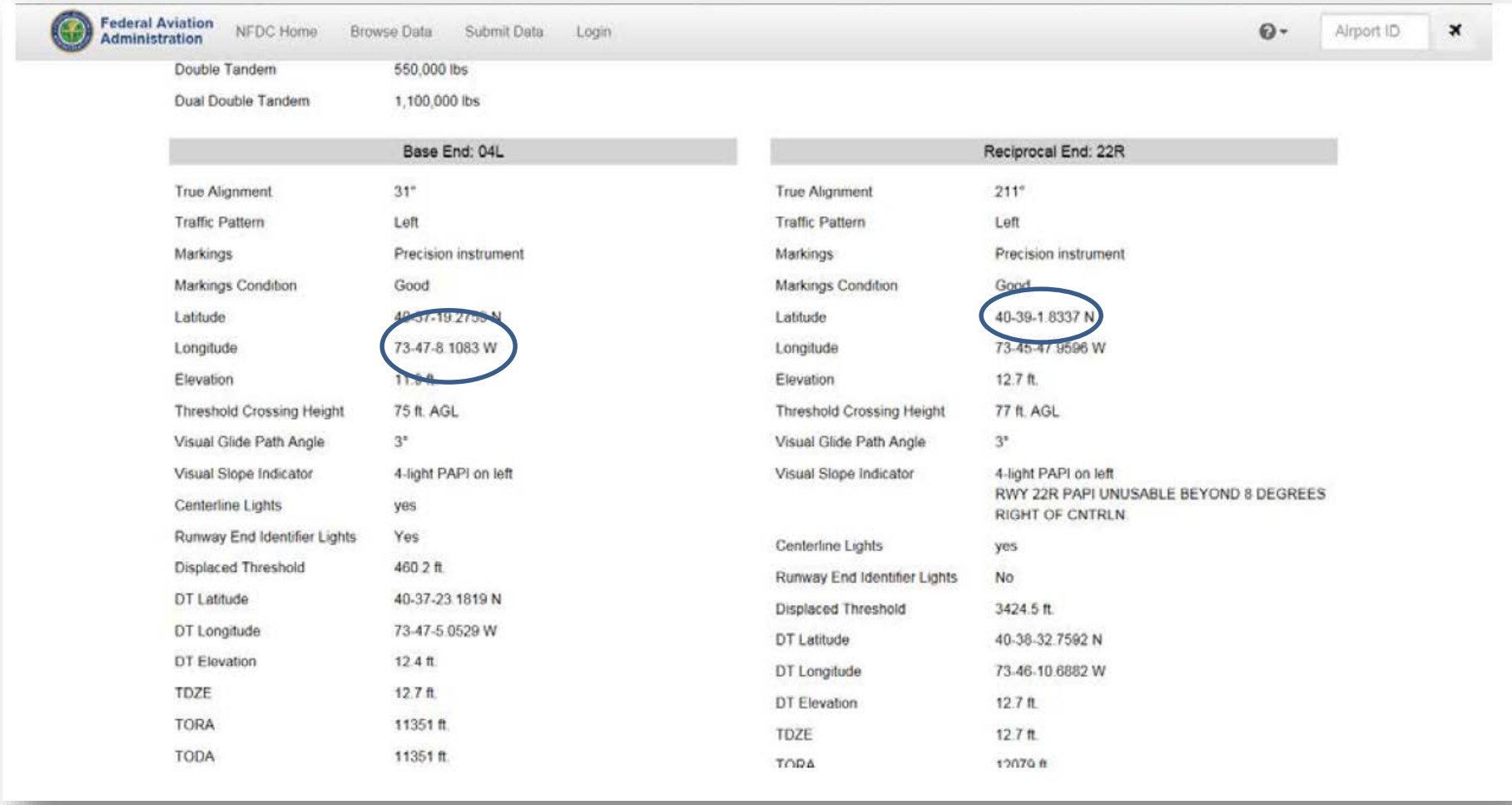
2.2.1 Reference Point: 40–38–23.73N / 73–46–43.30W
2.2.2 From City: 13 Miles SE Of New York, NY
2.2.3 Elevation: 12.7 ft
2.2.5 Magnetic variation: 14W (2000)
2.2.6 Airport Contact: Michael Moran
BLDG 14
Jamaica, NY 11430
(718) 244–3501
2.2.7 Traffic: IFR/VFR

AD 2.12 Runway physical characteristics

2.12.1 Designation: 04L
2.12.2 True Bearing: 31
2.12.3 Dimensions: 12079 ft x 200 ft
2.12.4 PCN: 90 R/B/W/T
2.12.5 Coordinates: 40–37–19.28N / 73–47–00.00W
2.12.6 Threshold elevation: 12 ft
2.12.6 Touchdown zone elevation: 13 ft

2.12.1 Designation: 22R
2.12.2 True Bearing: 211
2.12.3 Dimensions: 12079 ft x 200 ft
2.12.4 PCN: 90 R/B/W/T
2.12.5 Coordinates: 40–39–00.00N / 73–45–47.96W
2.12.6 Threshold elevation: 13 ft
2.12.6 Touchdown zone elevation: 13 ft

Is the Data Synchronized?



Federal Aviation Administration NFDC Home Browse Data Submit Data Login Airport ID

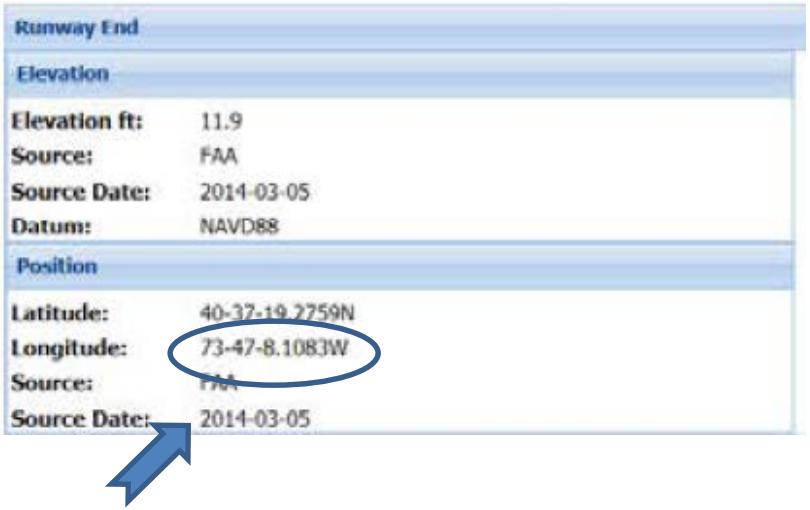
Double Tandem	550,000 lbs
Dual Double Tandem	1,100,000 lbs

Base End: 04L	
True Alignment	31°
Traffic Pattern	Left
Markings	Precision instrument
Markings Condition	Good
Latitude	40-37-19.2758 N
Longitude	73-47-8.1083 W
Elevation	11.5 ft.
Threshold Crossing Height	75 ft. AGL
Visual Glide Path Angle	3°
Visual Slope Indicator	4-light PAPI on left
Centerline Lights	yes
Runway End Identifier Lights	Yes
Displaced Threshold	460.2 ft.
DT Latitude	40-37-23.1819 N
DT Longitude	73-47-5.0529 W
DT Elevation	12.4 ft.
TDZE	12.7 ft.
TORA	11351 ft.
TODA	11351 ft.

Reciprocal End: 22R	
True Alignment	211°
Traffic Pattern	Left
Markings	Precision instrument
Markings Condition	Good
Latitude	40-39-1.8337 N
Longitude	73-45-47.9596 W
Elevation	12.7 ft.
Threshold Crossing Height	77 ft. AGL
Visual Glide Path Angle	3°
Visual Slope Indicator	4-light PAPI on left RWY 22R PAPI UNUSABLE BEYOND 8 DEGREES RIGHT OF CNTRLN
Centerline Lights	yes
Runway End Identifier Lights	No
Displaced Threshold	3424.5 ft.
DT Latitude	40-38-32.7592 N
DT Longitude	73-46-10.6882 W
DT Elevation	12.7 ft.
TDZE	12.7 ft.
TORA	12079 ft.

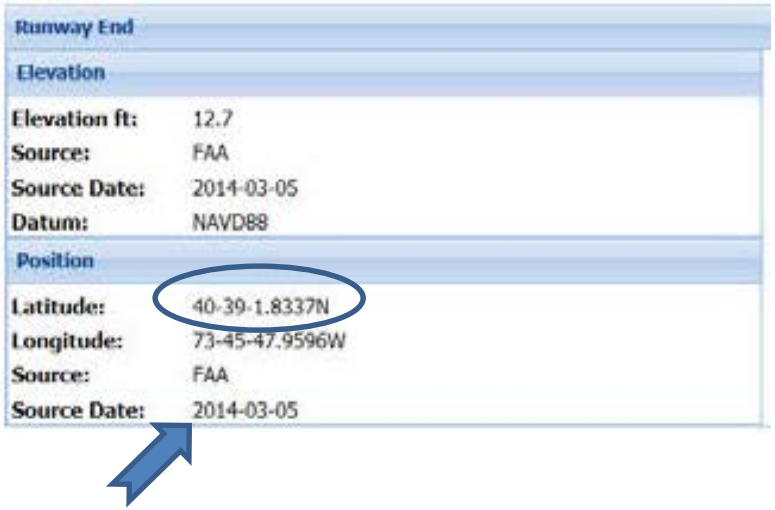
Is the Data Synchronized?

JFK 04L



Runway End	
Elevation	
Elevation ft:	11.9
Source:	FAA
Source Date:	2014-03-05
Datum:	NAVD88
Position	
Latitude:	40-37-19.2759N
Longitude:	73-47-8.1083W
Source:	FAA
Source Date:	2014-03-05

JFK 22R



Runway End	
Elevation	
Elevation ft:	12.7
Source:	FAA
Source Date:	2014-03-05
Datum:	NAVD88
Position	
Latitude:	40-39-1.8337N
Longitude:	73-45-47.9596W
Source:	FAA
Source Date:	2014-03-05

Is the Data Accurate?

TBL
GEN
2.6–5

CONVERSION TABLE – NM/ft										
NM	0	1	2	3	4	5	6	7	8	9
0	0	607	1215	1822	2430	3037	3645	4252	4860	5467
1	6075	6682	7289	7897	8504	9112	9719	10327	10934	11542
2	12149	12757	13364	13971	14579	15186	15794	16401	17009	17616
3	18224	18831	19439	20046	20653	21261	21868	22476	23083	23691
4	24298	24906	25513	26121	26728	27335	27943	28550	29158	29765
5	30373	30980	31588	32195	32803	33410	34017	34625	35232	35840
6	36447	37055	37662	38270	38877	39485	40092	40700	41307	41914
7	42522	43129	43737	44344	44952	45559	46167	46774	47328	47989
8	48596	49204	49811	50419	51026	51634	52241	52849	53456	54064
9	54671	55278	55886	56493	57101	57708	58316	58923	59531	60138

Is the Data Complete?

Aerodrome Obstacles

AD 2.10 Aerodrome obstacles
2.10.1.a. Runway designation: 22R
2.10.1.b Type of obstacle: Tree (70 ft). Not Lighted or Marked
2.10.1.c Location of obstacle: 37 ft from Centerline

2.10.1.a. Runway designation: 13L
2.10.1.b Type of obstacle: Pole (52 ft). Lighted
2.10.1.c Location of obstacle: 327 ft from Centerline

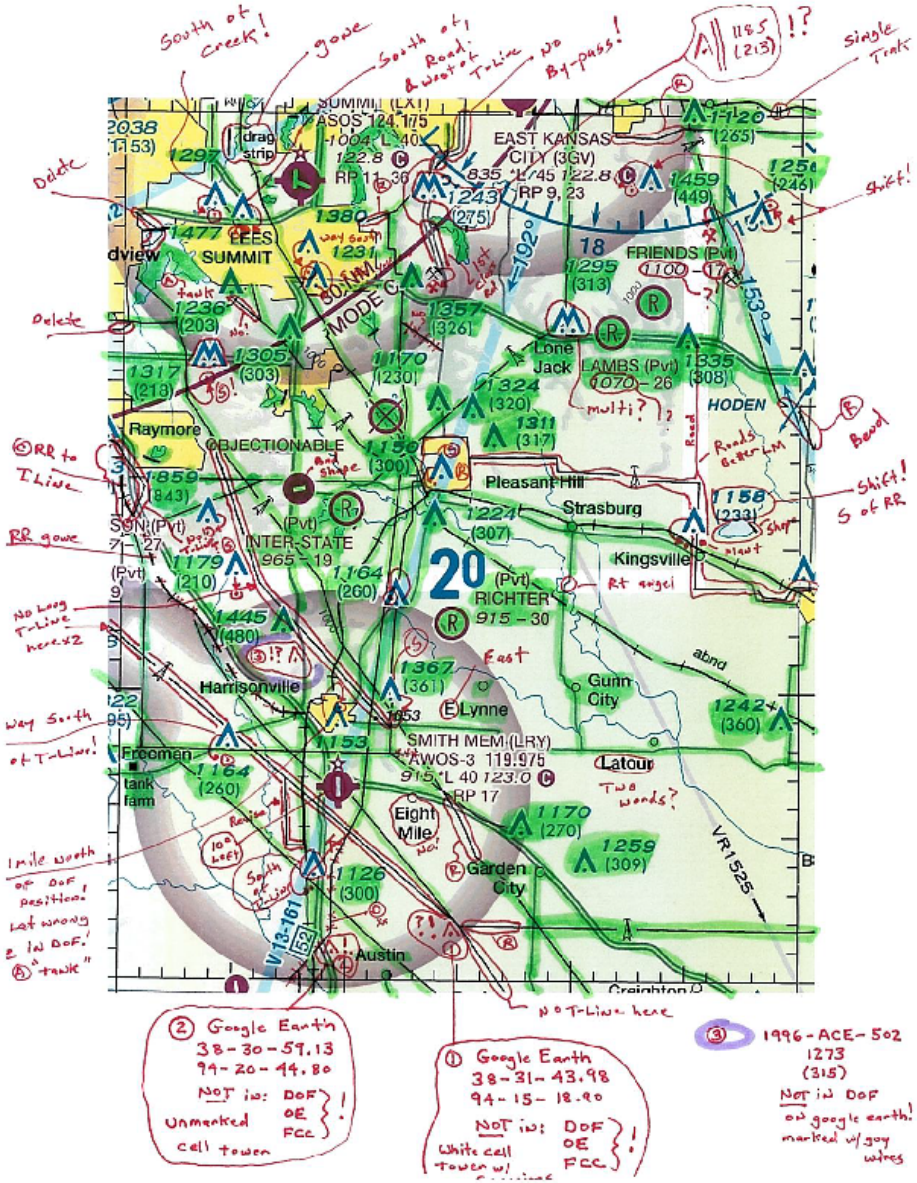
2.10.1.a. Runway designation: 31R
2.10.1.b Type of obstacle: Tree (79 ft). Not Lighted or Marked
2.10.1.c Location of obstacle: 392 ft from Centerline

2.10.1.a. Runway designation: 22L
2.10.1.b Type of obstacle: Tree (50 ft). Not Lighted or Marked
2.10.1.c Location of obstacle: 310 ft from Centerline

Where are the obstacles?

- Feet from centerline
- Straight out from centerline
- Left of centerline
- Right of centerline
- If left or right, how far from the runway end
- Latitude
- Longitude
- Above Ground Level (AGL) or Mean Sea Level (MSL) or above Runway (RWY)

An example of errors and variations



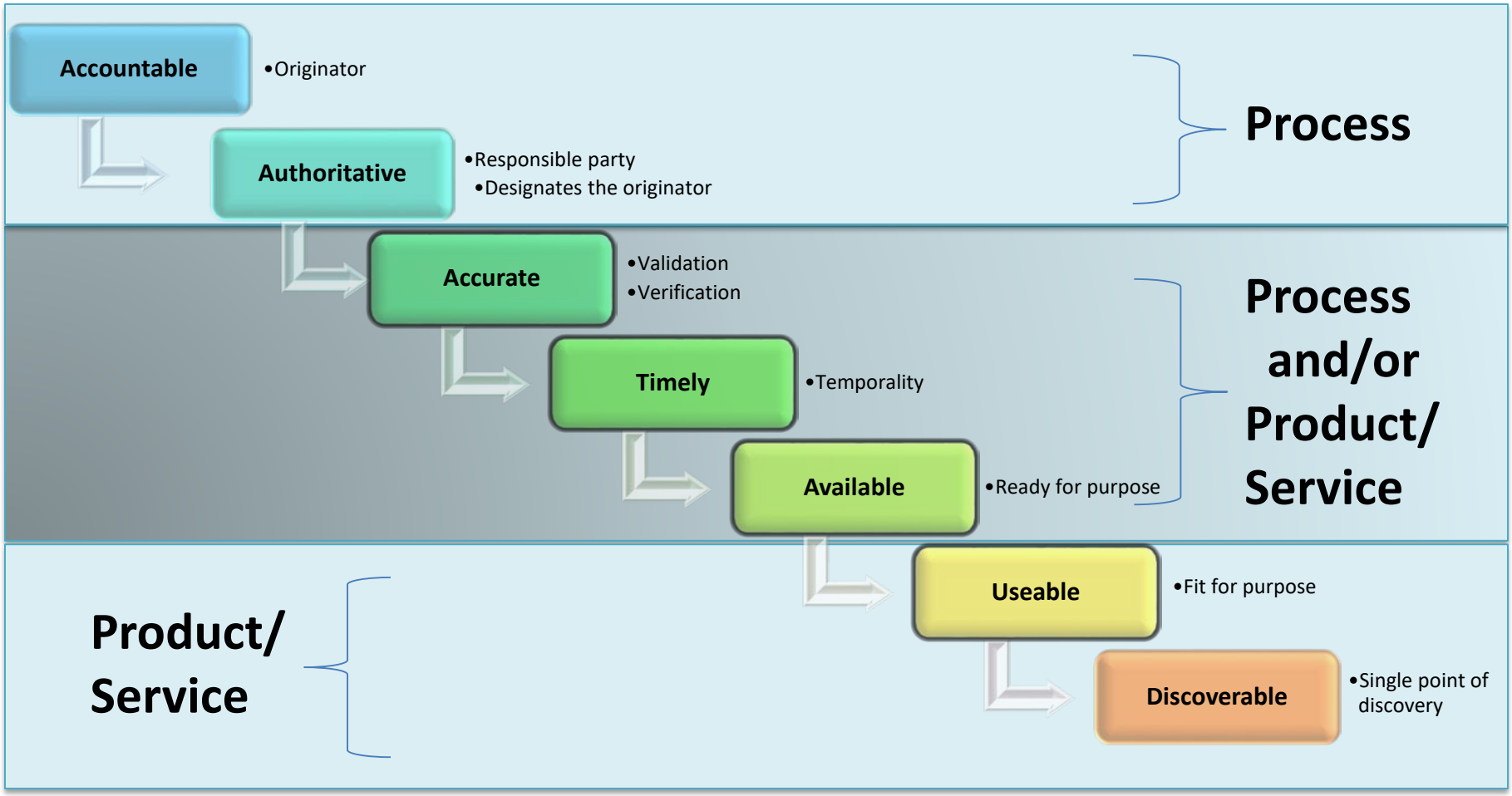
Reducing Variation

How can errors or variations be resolved?

- Plan for issues producing AIS products/services
- Address requirements/constraints to distribution
- Synchronize information across AIS products/services

What is the role of safety oversight to reduce variation?

Final Thoughts…



References

- ICAO Annex 15
- Oxford Dictionary

Questions and Discussion

Overview of Safety Risk Management (SRM)

Data Risks and Mitigations

Federal Aviation Administration

Module Objectives

- Understand the concepts of safety risk and safety risk management
- Think about the relationship between safety risk and aeronautical information products and services

What is Safety Risk Management (SRM)?

The objective of SRM is to assess the risks associated with identified hazards and develop and implement effective and appropriate mitigations

- SRM is a critical component of both a quality management system (QMS) and a safety management system (SMS)
- SRM establishes formal methods for identifying hazards, controlling, and continually assessing risk

Why Is SRM Important?

SRM ensures that organizational processes, procedures and behavior related to data and information management do not negatively impact safety

- Safety-related systems are becoming more data-intensive and data-centric
- Data-intensive, safety-related systems are often used as decision support or advisory systems which support a trained and experienced operator
  - Data is now so complex and of such a large volume it is increasingly unlikely that a user could spot the data errors

Resource: UK SCSC Data Safety Initiative Working Group, Data Safety Guidance

SRM Roles and Responsibilities

- The ANSP/AIS is responsible for establishing and implementing risk management processes to ensure controls are appropriately integrated into their SMS/QMS. The ANSP/AIS ensures that controls are being practiced as designed, and have the intended effect on safety risks
- The regulator is responsible for establishing mechanisms to ensure that the identification of hazards and the management of safety risks by the ANSP follows established regulatory controls (requirements, specific operating regulations and implementation policies)

SRM Key Concepts

SRM Safety Risk

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

- SRM encompasses the assessment and mitigation of safety risk
  - ANSPs' must establish safety risk tolerability criteria to assess safety risk
  - Controlling safety risks starts by assessing the probability that the consequences of hazards will occur

Resource: ICAO Doc 9859, Safety Management Manual

SRM Hazard

A hazard is a condition or an object with the potential to cause death, injuries to personnel, damage to equipment or structures, loss of material, or reduction of the ability to perform a prescribed function

- Hazards are an inevitable part of aviation activities
- In SRM, “hazard” should focus on conditions which could cause or contribute to unsafe operation of aircraft or aviation safety-related equipment, products and services

Resource: ICAO Doc 9859, Safety Management Manual

SRM Hazard (continued)

- A hazard is not a consequence or an outcome
  - A consequence is an outcome that can be triggered by a hazard
  - Possible consequences can be addressed through various mitigation strategies to contain the potential for a hazard to result in unsafe operation
- Hazards should be differentiated from errors
  - Errors are normal and unavoidable components of human performance

SRM Likelihood

- Likelihood is the estimated probability and/or frequency of a hazard's effect or outcome
- The determination of likelihood may be aided by the following questions:
  - Is there a history of similar occurrences?
  - What other equipment, components, or processes might have the same defect?
  - How many personnel are following, or are subject to, the procedures in question?
  - What percentage of the time is the suspect equipment or procedure in use?

Likelihood Table

Safety risk probability equals the likelihood or frequency a safety consequence or outcome might occur

Likelihood	Meaning	Value
Frequent	Likely to occur many times	5
Occasional	Likely to occur sometimes	4
Remote	Unlikely to occur, but possible	3
Improbable	Very unlikely to occur	2
Extremely Improbable	Almost inconceivable	1

Resource: ICAO Doc 9859, Safety Management Manual

SRM Severity

Severity is the extent of harm that might reasonably occur as a consequence or outcome of the identified hazard

- Consider existing controls when determining severity
- It is important to use the outcome yielding the highest severity, or worst credible impact (take into account the worst foreseeable situation)

Severity Table

What are the worst credible outcomes?

- How many lives may be lost?
- What is the likely extent of aircraft, property or equipment damage?

Severity	Meaning	Value
Catastrophic	• Equipment destroyed • Multiple deaths	A
Hazardous	• A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely • Serious injury • Major equipment damage	B
Major	• A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of conditions impairing their efficiency • Serious incident • Injury to persons	C
Minor	• Nuisance • Operating limitations • Use of emergency procedures • Minor incident	D
Negligible	• Few consequences	E

Resource: ICAO Doc 9859, Safety Management Manual

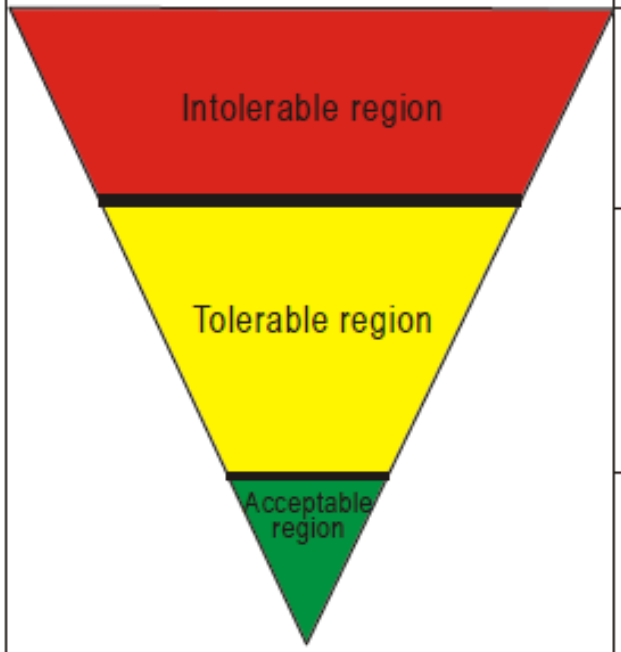
Safety Risk

Safety Risk Assessment Matrix

Risk probability		Risk severity				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

Resource: ICAO Doc 9859, Safety Management Manual

Safety Risk Tolerability

Tolerability description	Assessed risk index	Suggested criteria
	**5A, 5B, 5C, 4A, 4B, 3A**	Unacceptable under the existing circumstances
	5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	Acceptable based on risk mitigation. It may require management decision.
	3E, 2D, 2E, 1B, 1C, 1D, 1E	Acceptable

Resource: ICAO Doc 9859, Safety Management Manual

SRM Risk Mitigation

- Risk mitigation is the process of incorporating defenses or preventive controls to lower the severity and/or likelihood of a hazard's projected consequence
  - Most mitigation strategies against the safety risks of the consequences of hazards are based upon the strengthening of existing defenses or the development of new ones
- Risk mitigation includes taking measures to:
  - Reduce exposure to risk (likelihood)
  - Reduce severity of consequences associated with a hazard
  - Cancel operation/procedure if mitigation is not possible

SRM Safety Risk Controls

A control is an implemented mitigation that reduces a hazard's causes or effects

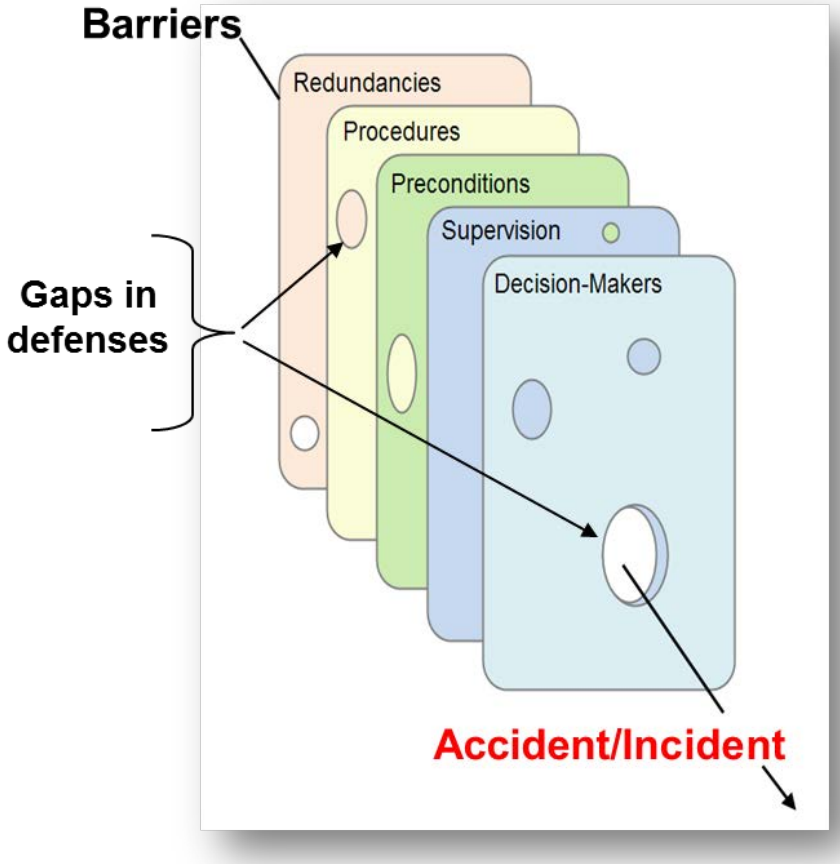
- Policies, procedures, hardware, software, or other tools can be considered controls if they have been demonstrated to be effective
- Certain controls may only be in place in certain operating environments or under certain system states

Failure of Controls

- Controls prevent hazards from causing harm (negative safety impact)

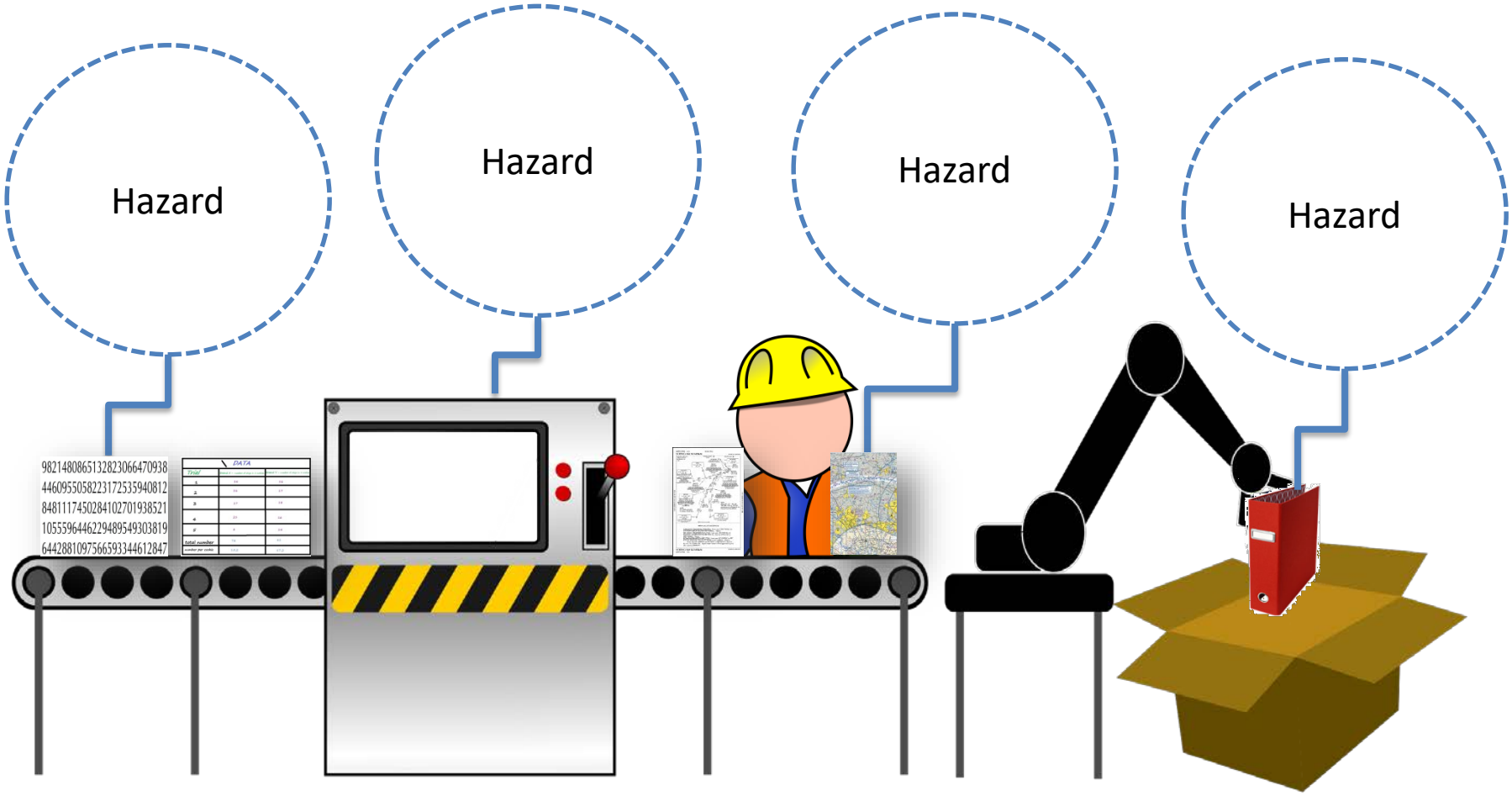
BUT

- Controls are never 100% effective!
  - Each control has weaknesses



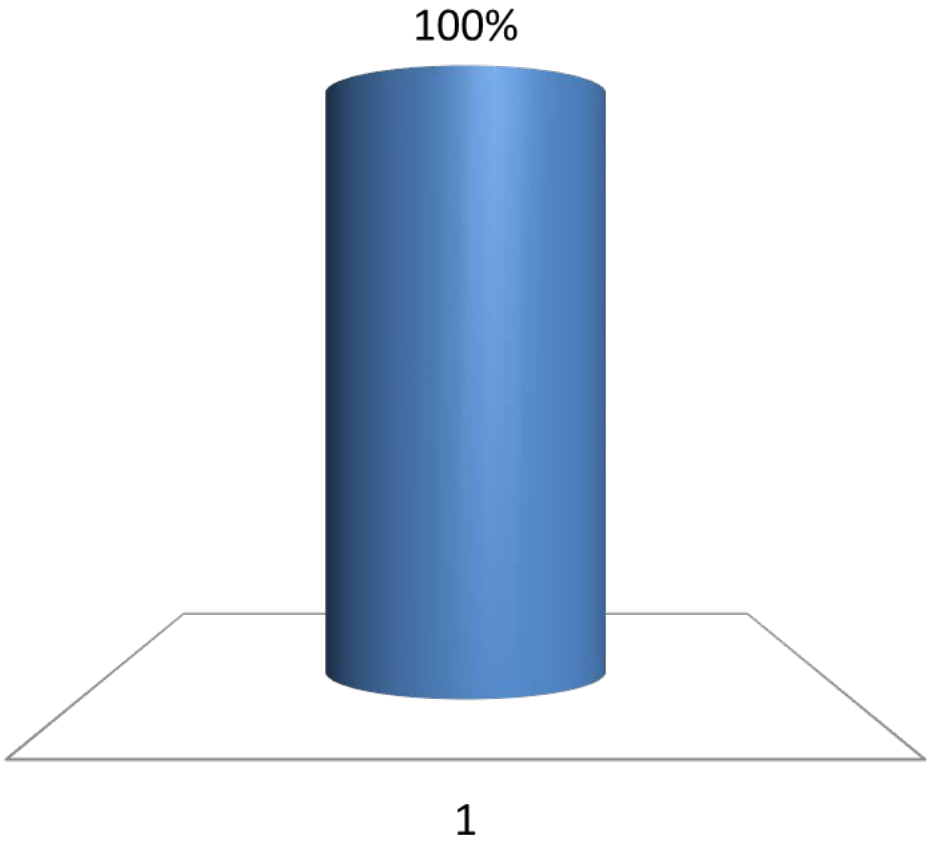
What Could Go Wrong?

The AIS Information Factory



What do you think could go wrong in the "information factory"?

Rank	Responses
1	
2	
3	
4	
5	
6	Other



Hazards and Risk in the AIS Information Factory

How does an ANS safety oversight organization know whether the AIS provider is in control of its operations and producing reliable information products and services?

- Understand what can go wrong (Hazards)
- Understand what risk looks like (Variation)
- Understand what processes and systems are in place to prevent things from going wrong (Controls/Barriers)
- Understand whether controls are working (Safety Oversight Activities)

Bow Tie Methodology

A bow tie diagram is an illustration of a hazard and potential outcomes, and the controls put in place to minimize the risk

- Visual explanation of a risk
- Differentiates between proactive and reactive risk management

Resource: CGE Risk Management Solutions, The Bowtie Method (www.cgerisk.com/knowledge-base/risk-assessment/thebowtiemethod)

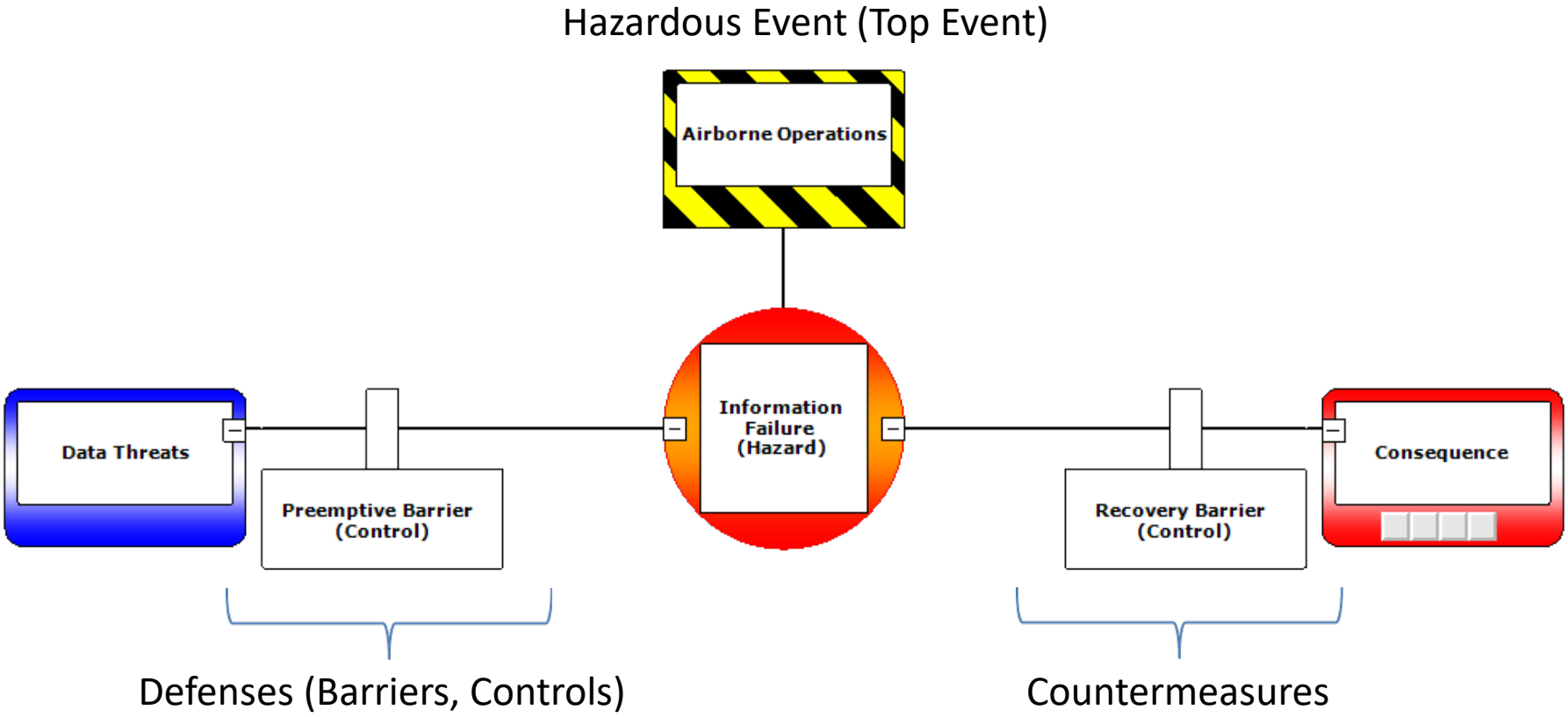
Bow Tie Diagram

A bow tie diagram includes:

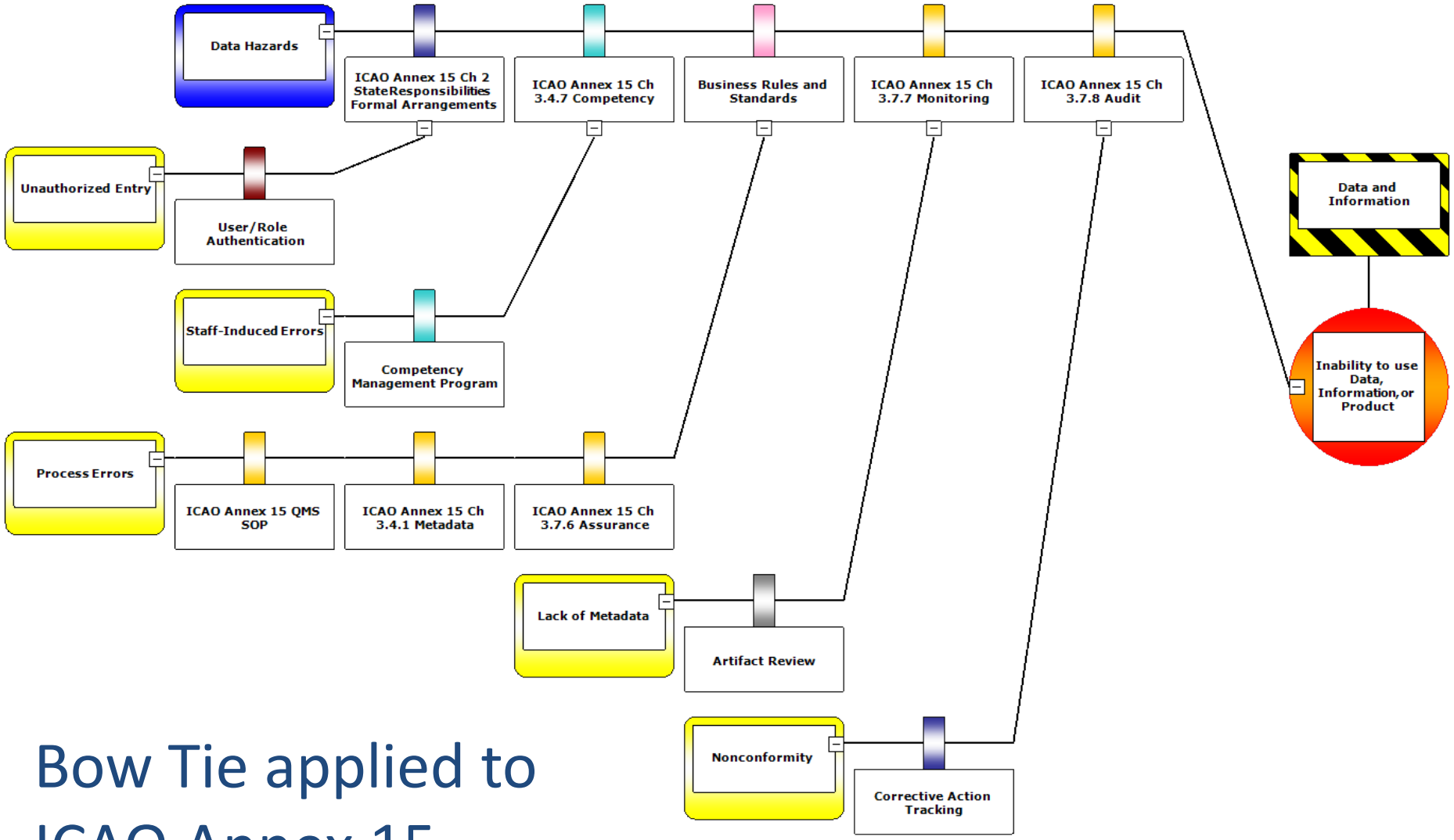
- Hazard: condition with potential to cause harm
- Hazardous event (top event): loss of control over the hazard
- Threats: causes of hazardous event
- Consequences: results from the hazardous event
- Barriers (controls)

Resource: CGE Risk Management Solutions, The Bowtie Method (https://www.cgerisk.com/knowledgebase/The_bowtie_method)

Bow Tie Diagram



Resource: CGE Risk Management Solutions, The Bowtie Method (https://www.cgerisk.com/knowledgebase/The_bowtie_method)



Bow Tie applied to ICAO Annex 15

Final thoughts…

- SRM includes the identification of hazards, assessment of risk associated with the hazards, and implementation of mitigations
- Safety risk controls are implemented mitigation measures that are demonstrated to be effective
- Hazards, barriers/controls (defenses and countermeasures) may be illustrated in a bow tie diagram

References

- ICAO Annex 19
- ICAO Safety Management Manual, Doc 9859
- UK Data Safety Initiative Working Group, Data Safety Guidance (SCSC-127B)
- SKYbrary: Bow Tie Risk Management Methodology
- CGE Risk Management Knowledge Base/CGE Academy (https://www.cgerisk.com/knowledgebase/Main_Page)

Questions and Discussion

State Safety Oversight Surveillance Activities

Federal Aviation Administration

Module Objectives

- Review Surveillance Obligations (Universal Safety Oversight Audit Program (USOAP)* Critical Element 7)
- Discuss the components of a surveillance program
- Review integration between USOAP Critical Elements 7 and 8
- Understand common surveillance techniques
- Identify safety oversight surveillance topics in Annex 15 requirements

Resource: ICAO Safety Oversight Manual (Doc 9374) Universal Oversight Audit Programme (USOAP) Audits

Surveillance Obligations
(Critical Element 7)

- The regulatory authority must develop a continuous surveillance program to ensure an ANSP's capability and competency are equal to or exceed those required at the time of original certification (the baseline)
- Surveillance of ANSPs should be appropriate for the size and complexity of the aviation system
  - This includes the surveillance of designated personnel who perform safety oversight functions on behalf of the Civil Aviation Authority (CAA)

Surveillance Program

A surveillance program is a system to ensure continuing:

- Competency of:
  - Organizations (certificate/approval holders)
  - Individuals (license/rating holders)
    - Includes ensuring continuing validity of licenses/ratings/certificates/approvals
- Capacity to maintain a safe and regular operation

Source: Concepts discussed in ICAO Safety Oversight Manual, Doc 9734-A

Surveillance Program (continued)

A surveillance program should:

- Be continual or on-going
- Be thorough
- Ensure an ANSP's capability and competency are equal to or exceed those required at the time of original certification
- Require the ANSPs' demonstrate operations and maintenance are conducted in accordance with requirements, including a comprehensive and conclusive assessment of competencies

Resource: Concepts discussed in ICAO Safety Oversight Manual, Doc 9734-A

Roles and Responsibilities

State

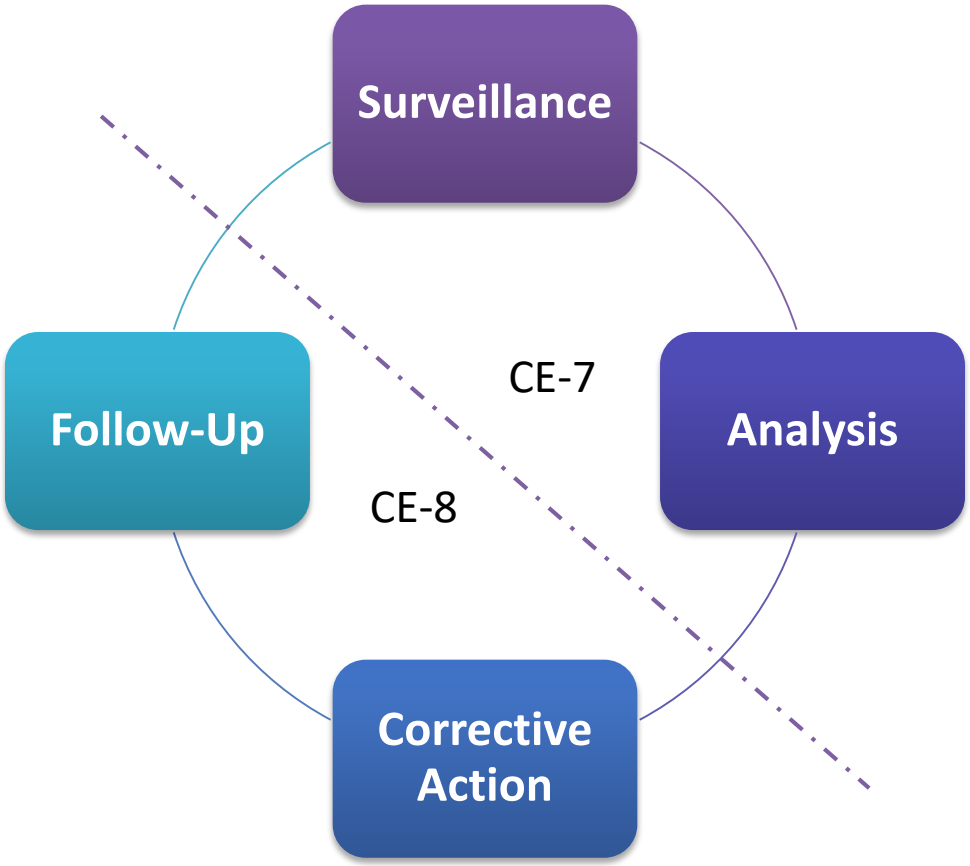
Surveillance activities over an ANSP/AIS are conducted by the regulator to meet its oversight responsibilities

- Safety oversight is conducted though surveillance activities, designed to determine compliance with ICAO SARPS, State regulations, orders, policies and directives

Operator

An ANSP/AIS is responsible for quality assurance and quality management of its products and services, including compliance with applicable ICAO Annex 15 requirements

Surveillance Program Components CEs 7 and 8



CE-7

- Surveillance
  - Collect data about ANSP/AIS operation
- Analysis
  - Review data to measure the degree of compliance with requirements and processes

CE-8

- Corrective Action
  - ANSP/AIS develops, implements, and monitors corrective actions to identified deficiencies as a result of surveillance and analysis
- Follow-Up
  - Ensure ANSP/AIS corrective actions have been implemented

Source: FAA/DOT Continuing Analysis and Surveillance System (CASS) Description and Models (http://www.tc.faa.gov/its/worldpac/techrpt/ar03-70.pdf)

Surveillance Techniques

Common safety oversight surveillance techniques include:

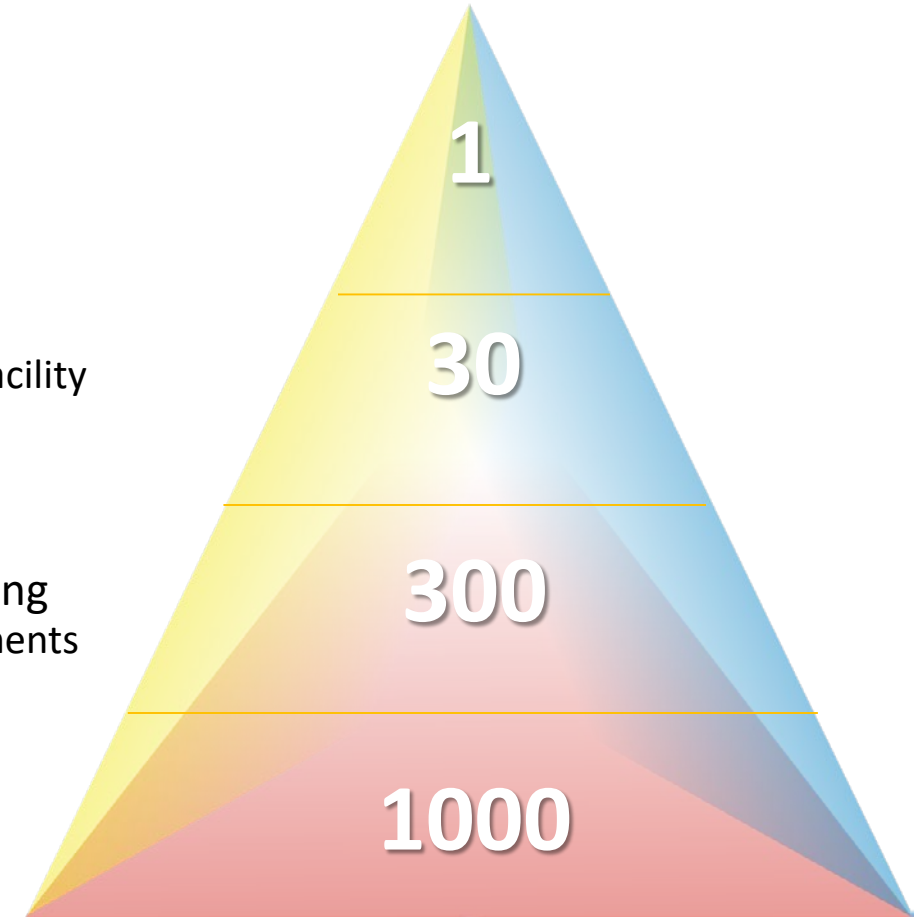
- Investigations
- Inspections
- Audits
- Assessments
- Continuous monitoring

Surveillance Techniques (continued)

Investigate
Cause(s) of a single safety occurrence

Inspect
Compliance with a specific standard(s) at a single facility (or small group of facilities)

Audit/Assessment/Continuous Monitoring
Systemic evaluation of compliance to requirements



Source: Heinrich's Triangle

Surveillance Techniques (continued)

- Investigations are conducted to determine the cause(s) of a safety occurrence. The objective of an investigation is to prevent future occurrences
  - Investigations may:
    - Help to understand the events leading up to an occurrence
    - Be used to make safety recommendations
- Inspections are conducted to evaluate compliance with a specific standard(s)
  - Inspections may be shorter and less formal than audits

Resource: SKYbrary: Safety Occurrence Investigation (http://www.skybrary.aero/index.php/Safety_Occurrence_Investigation)

Surveillance Techniques (continued)

- Audits are conducted to determine the degree of compliance with applicable safety regulatory requirements and procedural provisions of a safety management system (SMS)
  - Audits are systematic evaluations of collected data and analysis of objective evidence
- Assessments result from the identification of weak requirements and data, variations or gaps in safety controls

Resource: SKYbrary: Safety Audits (http://www.skybrary.aero/index.php/Safety_Audits)

Surveillance Techniques (continued)

Continuous monitoring is a surveillance activity that enables a safety oversight organization to:

- Follow-up on resolution of compliance issues identified through system surveillance activities (audit)
- Identify changes or inconsistencies in ANSP/AIS activities or processes (variation)
- Determine future risk-based surveillance activities

Surveillance Techniques (continued)

Analysis

The purpose of safety risk analysis is to determine shortfalls in ANSP/AIS processes through review of data and objective evidence obtained through surveillance

- Evaluating data enables safety oversight to identify gaps and weaknesses, failures, trends and variation to be addressed by the ANSP/AIS

Surveillance Techniques (continued)

Corrective action

Corrective action is the responsibility of the ANSP/AIS, not safety oversight. ANSP/AIS maintains the effectiveness of its programs by developing and implementing corrective action(s) as a result of surveillance findings and analysis

- Prioritize findings to ensure critical ones are addressed in an expeditious manner

Surveillance Techniques (continued)

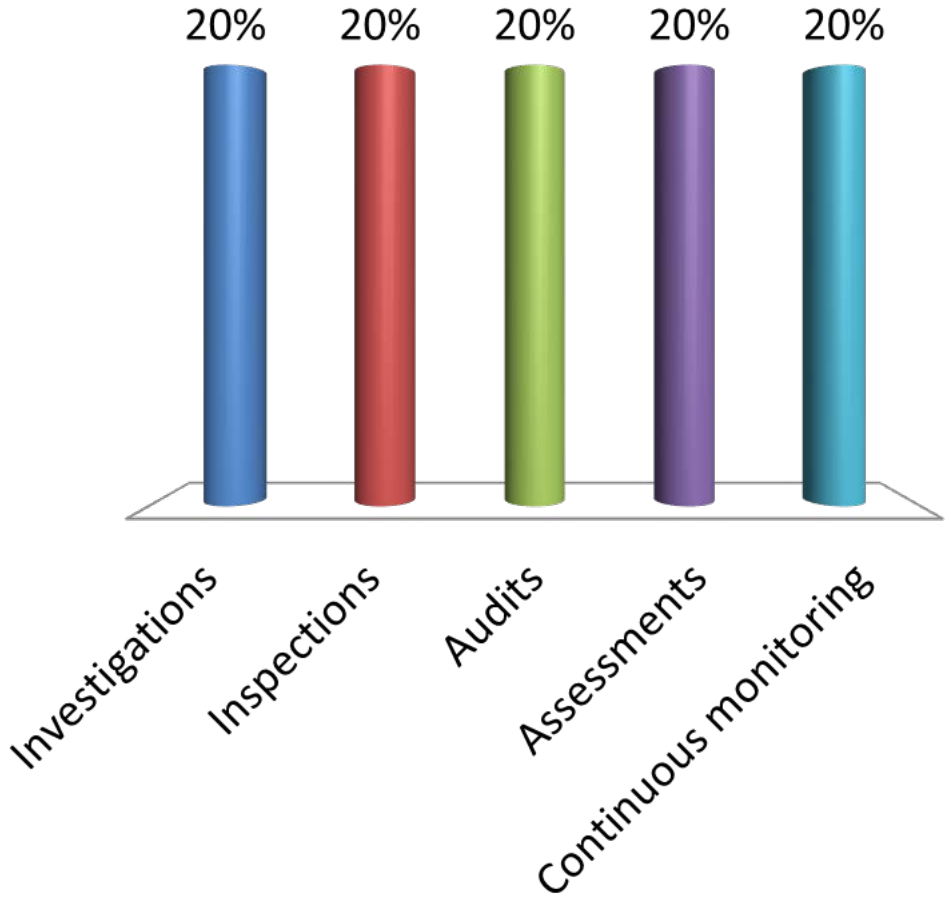
Follow-up

Safety oversight should have a system in place to follow-up on the corrective actions to surveillance findings. This ensures the corrective actions have been effectively implemented

- Closes the loop between the initial finding and the development and implementation of corrective actions through follow-up surveillance activities including, but not limited to, continuous monitoring

What are the common safety oversight surveillance techniques?

A. Investigations
B. Inspections
C. Audits
D. Assessments
E. Continuous monitoring

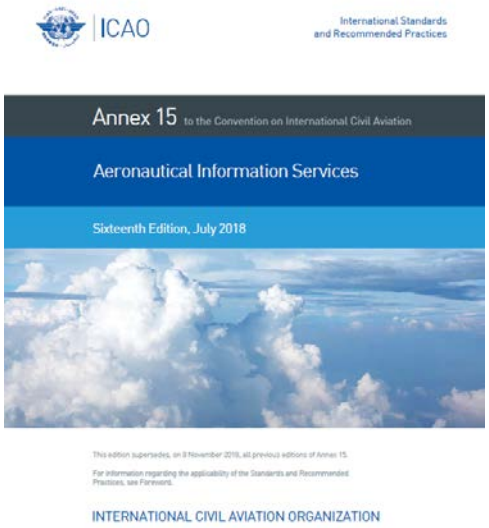


AIS Surveillance Objective

The ANSP safety oversight organization carries out a program of ongoing surveillance of AIS service providers to determine compliance with aeronautical data and information requirements

- Surveillance identifies safety concerns and deficiencies
- Surveillance includes regular monitoring of AIS provider activities

ICAO Annex 15 AIS Oversight Areas



- Requirements
- Products/Services
- Data/Information

Each area can be subdivided into detailed subjects

ICAO Annex 15 Requirements

- Information Management
- Data Quality
- Validation and Verification
- Data Error Detection
- Automation
- Quality Management
- Human Factors
- AIRAC (implied)

ICAO Annex 15 Products/Services

Products

- Aeronautical Information Publication (AIP)
  - Terminal Procedures
  - Aeronautical Charts
  - Data Sets
- AIP Amendments
- AIP Supplements
- Aeronautical Information Circulars

ICAO Annex 15 Products/Services (continued)

Services

- NOTAMs
- Pre-flight Information
- Post-flight Information
- Distribution

ICAO Annex 15 Products/Services (continued)

Data/Data Sets

- Aerodrome/Heliport
- Terrain and Obstacles
- NAVAIDS
- Airspace
- Routes
- Points (fix/waypoint)
- Terminal Procedures

Final Thoughts…

Safety oversight surveillance activities include oversight of ANSP/AIS requirements, products/services and data/information.

Surveillance should:

- Be continual or on-going
- Be data and objective evidence-based
- Identify and address safety risks

References

- ICAO Annex 15
- ICAO Safety Oversight Manual, Doc 9734-A
- FAA/DOT Continuing Analysis and Surveillance System (CASS) Description and Models SKYbrary: Safety Occurrence Investigation (http://www.skybrary.aero/index.php/Safety_Occurrence_Investigation)
- (http://www.tc.faa.gov/its/worldpac/techrpt/ar03-70.pdf)
- SKYbrary: Safety Audits (http://www.skybrary.aero/index.php/Safety_Audits)
- Heinrich's Triangle
  - The Accident Pyramid, July 22, 2008 By: James Roughton Category: Culture, Leadership, Management, Motivation

Questions and Discussion

Develop an AIS Audit

Federal Aviation Administration

Module Objectives

Understand the process used by the FAA Air Traffic Safety Oversight Service to develop an ANSP/AIS audit

What Is An Audit?

- A systematic, independent, documented and repeatable process for obtaining data/information and objective evidence and analyzing it to determine the extent to which certain criteria are met
  - Collect, analyze and document data/information and objective evidence
- Risk-based to focus on activities or changes that pose the greatest risk to safety

Types of Audits

- Activity types
  - On-site
    - Scheduled or unscheduled
  - Desk (virtual)
- Audit Types
  - New audit (Initial)
  - Replication audit
    - Re-creates or modifies a previous audit
  - Follow-up audit
    - Addresses a compliance issue or condition noted in an observation
  - Facility-specific

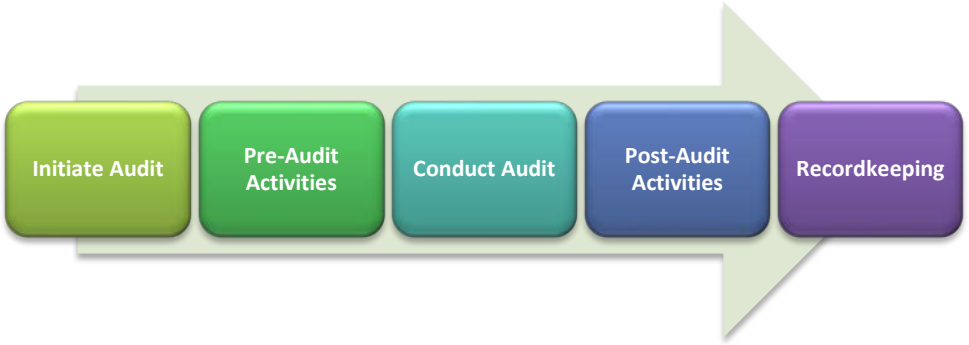
Roles and Responsibilities

- State regulator is responsible to:
  - Develop, conduct and document a meaningful, targeted audit and focus areas
  - Identify data/information and objective evidence required from the ANSP
  - Notify the service provider of the upcoming audit, as applicable
- ANSP is responsible to:
  - Provide safety oversight inspectors requested data/information and objective evidence, and access to facilities
  - Take corrective action to address identified safety concerns

Regulating as Problem-Solving

Stages	FAA Solution
1. Nominate potential problem	Audit topic initiation
2. Define the problem	Audit plan
3. Determine assessment measures	Audit checklist
4. Develop solutions	Audit report
5. Implement the plan, perform periodic monitoring, review and adjust	Compliance and Follow-up Audits
6. Close Audit and perform continuous monitoring and maintenance	

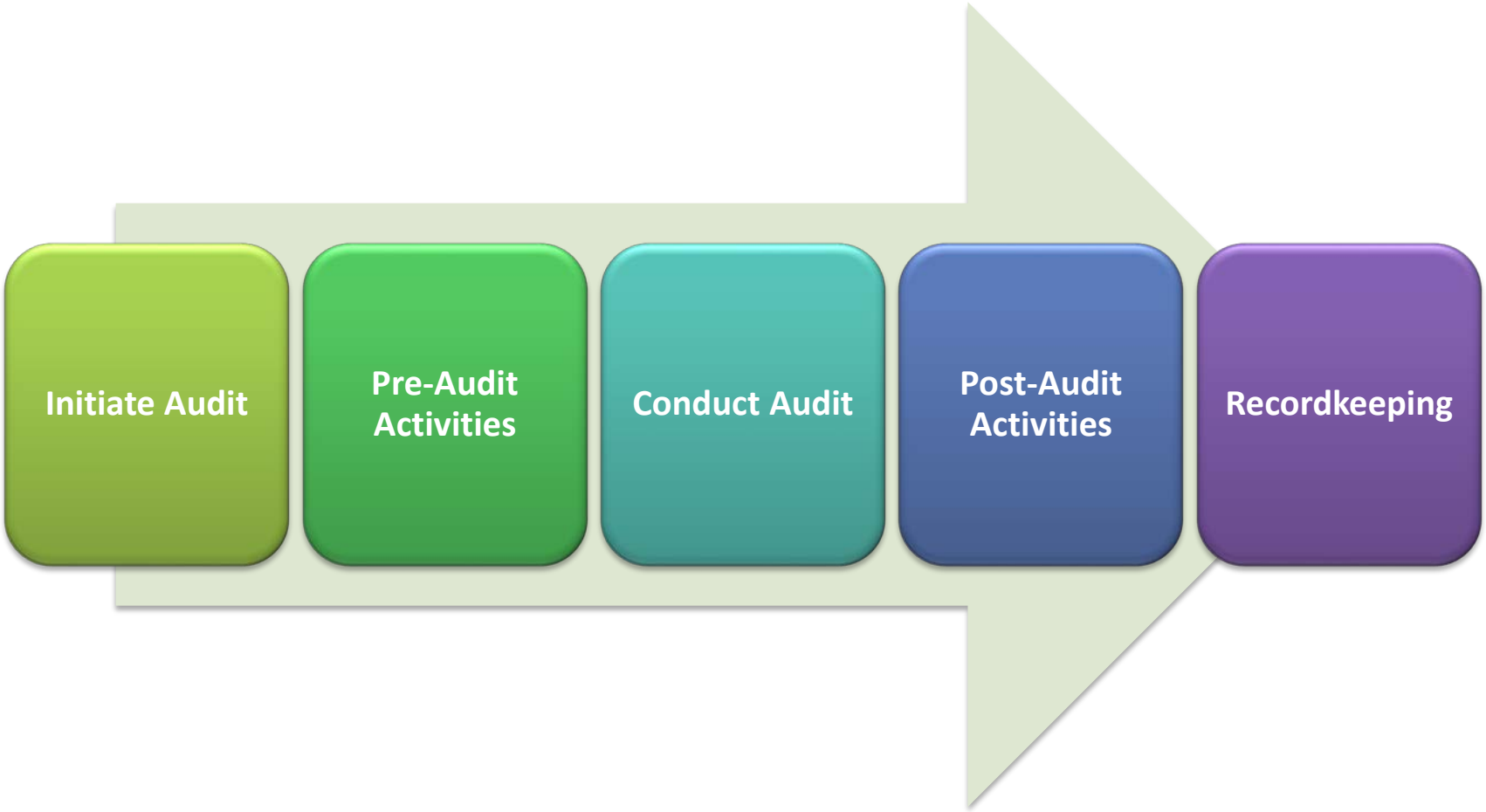
Resource: *The Regulatory Craft*, by Malcolm Sparrow



Audit Phases

AUDIT PROCESS

The Audit Process



Initiate Audit

- Develop topic
- Develop and document an audit proposal and timeline
- Determine audit locations (facilities)
- Determine audit team composition and structure

Pre-Audit Activities

- Conduct audit research to identify applicable requirements
- Develop objective, scope and focus areas
- Develop audit plan, requirements checklists, datasheet(s) and interview sheet(s)
- Confirm audit schedule including timeline
- Conduct audit team meetings and confirm team roles and responsibilities
- Conduct status and pre-audit briefings with management
- Develop and transmit audit notification to ANSP

Conduct the Audit

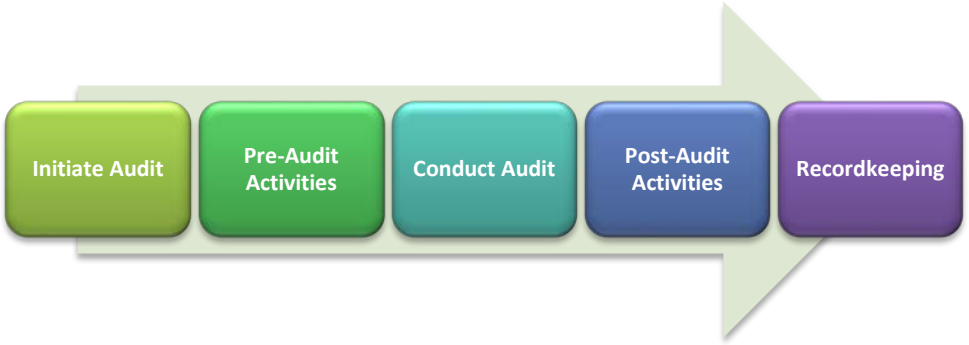
- Initiate initial contact with facility
- Conduct opening meeting
- Collect and verify requested data/information and objective evidence
- Highlight observations
- Conduct closing meeting

Post-Audit Activities

- Final data/information review
- Audit observations and validation
- Prepare audit report and transmittal letter to ANSP
- Final audit activities

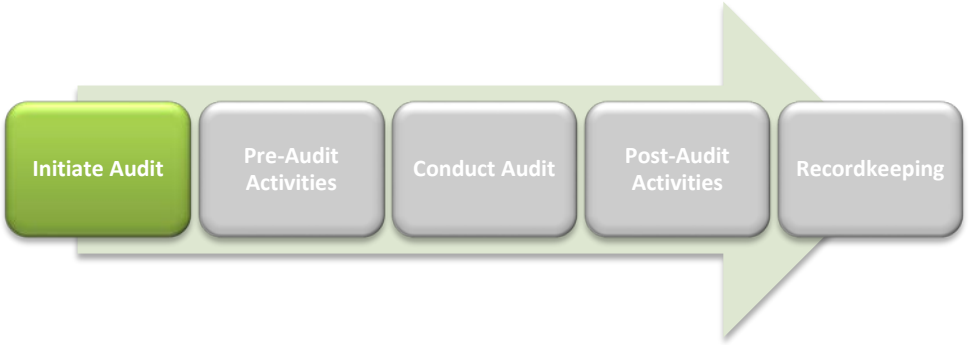
Recordkeeping

- Audit portfolio
- Records management



In depth details on audit process and related artifacts

AUDIT PROCESS DETAILS



Phases of audit process

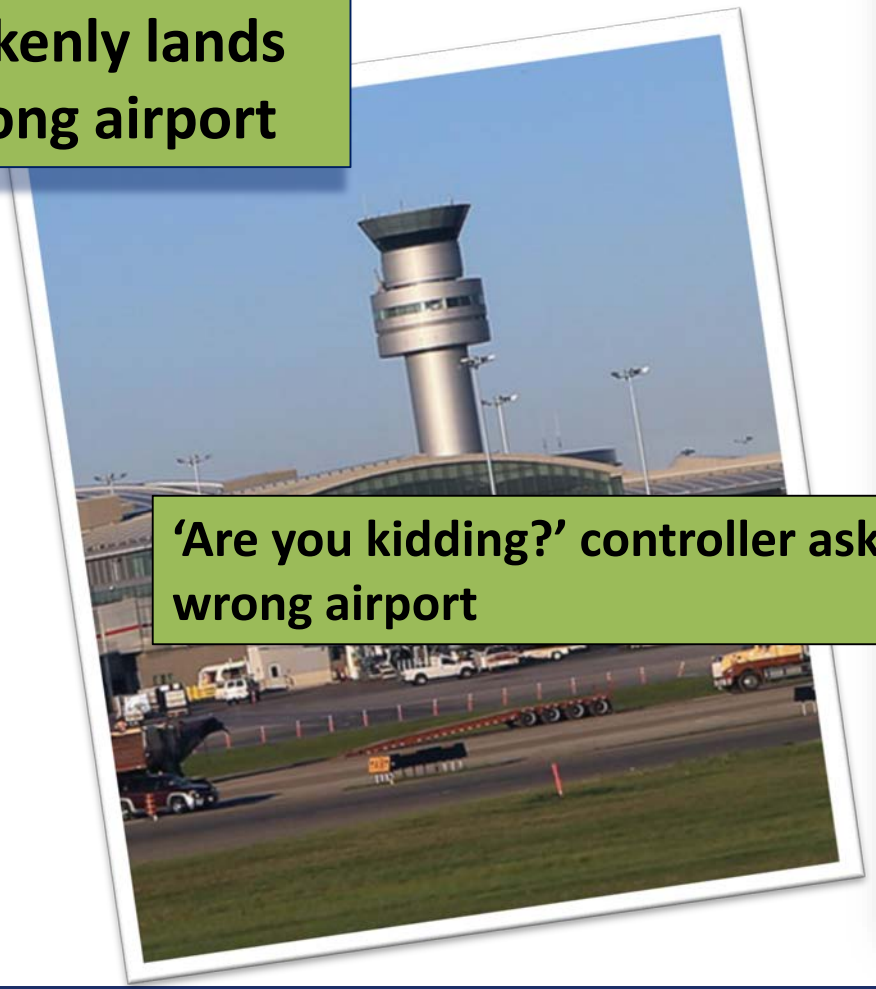
INITIATE AUDIT DETAILS

Develop an Audit Topic

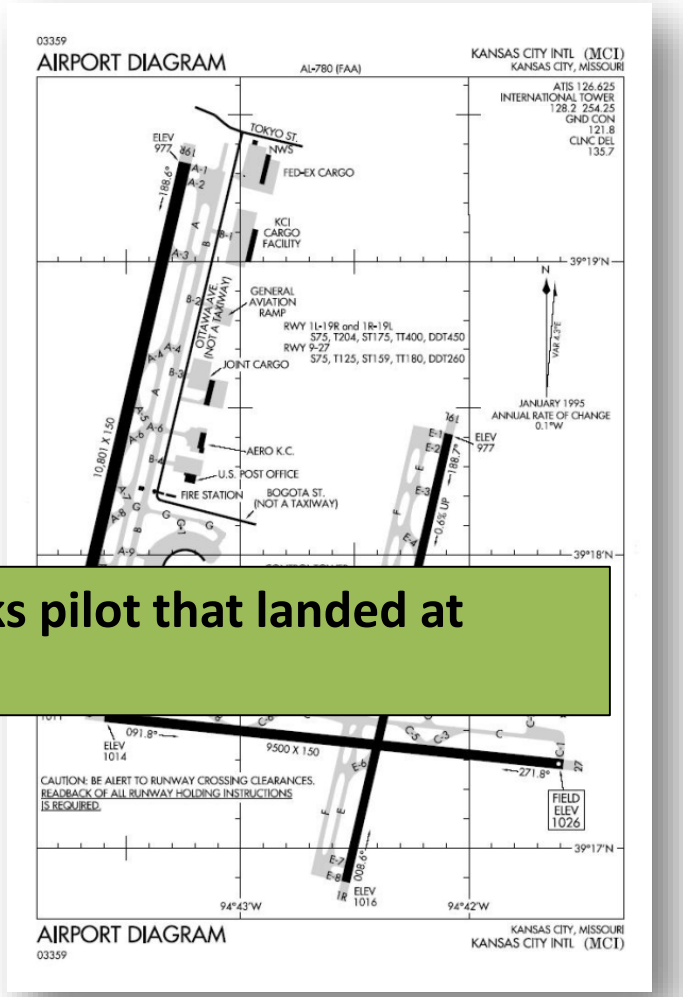
- Can be done at any time; on-going effort
- May be triggered by:
  - Routine surveillance of ANSP
  - Requests by management
  - Changes to requirements and automation
  - Non-compliance to requirements
  - Accident, incident or other occurrence
  - Investigations

Trigger Example

Boeing 747 mistakenly lands at wrong airport



'Are you kidding?' controller asks pilot that landed at wrong airport

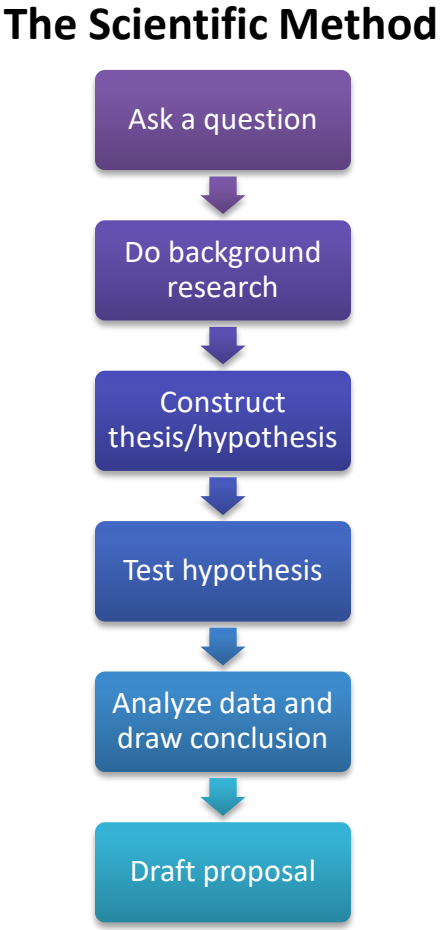


Trigger Example

“Pilot killed in plane crash was sent to defunct runway, authorities say”

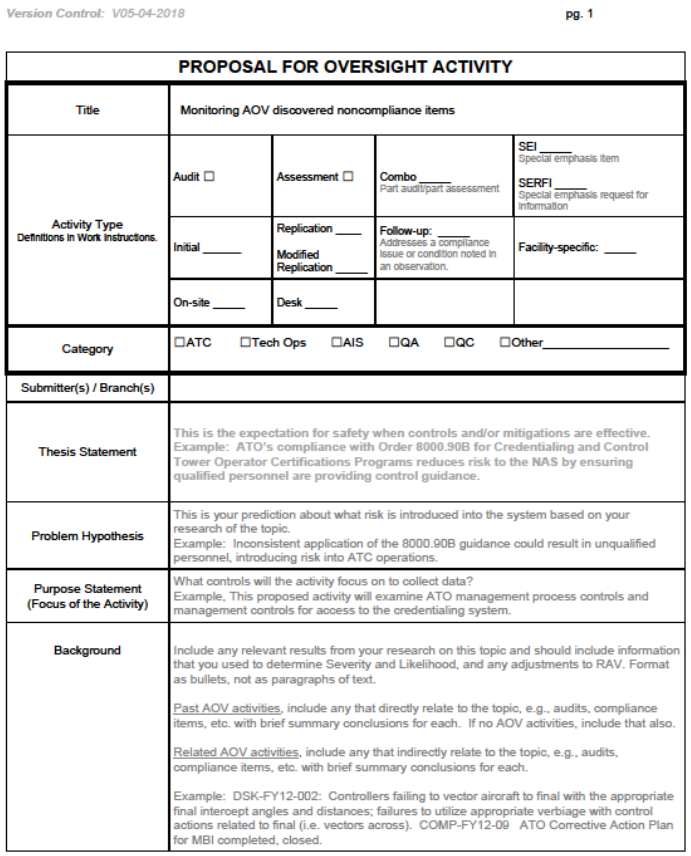
Develop Topic

- Ask a question
- Conduct analysis/research
- Develop thesis statement (purpose) and test hypothesis
- Create proposal for oversight



Develop and Document Audit Proposal

- Develop thesis and hypothesis (purpose)
- Establish methodology
- Document requirements
- Conduct management reviews and obtain management approvals



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PROPOSAL FOR OVERSIGHT ACTIVITY

Title	Monitoring AOV discovered noncompliance items			
Activity Type Definitions in Work Instructions.	Audit ☐	Assessment ☐	Combo _____ Part audit/part assessment	SEI _____ Special emphasis item SERFI _____ Special emphasis request for information
	Initial _____	Replication ____ Modified Replication ____	Follow-up: _____ Addresses a compliance issue or condition noted in an observation.	Facility-specific: _____
	On-site _____	Desk _____		
Category	☐ATC ☐Tech Ops ☐AIS ☐QA ☐QC ☐Other_____			
Submitter(s) / Branch(s)				
Thesis Statement	This is the expectation for safety when controls and/or mitigations are effective. Example: ATO's compliance with Order 8000.90B for Credentialing and Control Tower Operator Certifications Programs reduces risk to the NAS by ensuring qualified personnel are providing control guidance.			
Problem Hypothesis	This is your prediction about what risk is introduced into the system based on your research of the topic. Example: Inconsistent application of the 8000.90B guidance could result in unqualified personnel, introducing risk into ATC operations.			
Purpose Statement (Focus of the Activity)	What controls will the activity focus on to collect data? Example, This proposed activity will examine ATO management process controls and management controls for access to the credentialing system.			
Background	Include any relevant results from your research on this topic and should include information that you used to determine Severity and Likelihood, and any adjustments to RAV. Format as bullets, not as paragraphs of text. Past AOV activities, include any that directly relate to the topic, e.g., audits, compliance items, etc. with brief summary conclusions for each. If no AOV activities, include that also. Related AOV activities, include any that indirectly relate to the topic, e.g., audits, compliance items, etc. with brief summary conclusions for each. Example: DSK-FY12-002: Controllers failing to vector aircraft to final with the appropriate final intercept angles and distances; failures to utilize appropriate verbiage with control actions related to final (i.e. vectors across). COMP-FY12-09 ATO Corrective Action Plan for MBI completed, closed.			

Develop and Document Audit Timeline

- Ensures transparency and accountability
- May be adjusted as the audit proceeds

Audit Notification	Opening Window Date	Start Date	End Date	Closing Window Date	Validation Briefing	Report/ Transmittal Letter Due to ANSP
Sent to ANSP at least 10 business days prior to the Start Date for scheduled audits.	Determined by Safety Oversight management.	When the audit team begins collecting data.	When data collection, observation, and interviews are complete.	Typically set for the end of the third week following the Opening Window Date of the audit.	Typically targeted at 5 business days after the audit Closing Window Date. It may be adjusted based on circumstances.	Typically scheduled for 25 business days after the Validation Briefing date.

Determine Audit Locations (facilities)

Key questions to consider in choosing facilities to audit:

- Do the selected facilities use or maintain the system or procedure in question?
- What is the likelihood and severity of accidents or incidents associated with the system or procedure?
- How many incidents have been reported that are related to the system or procedures?

Determine Audit Team Composition

Qualifications of audit lead and team members should be considered

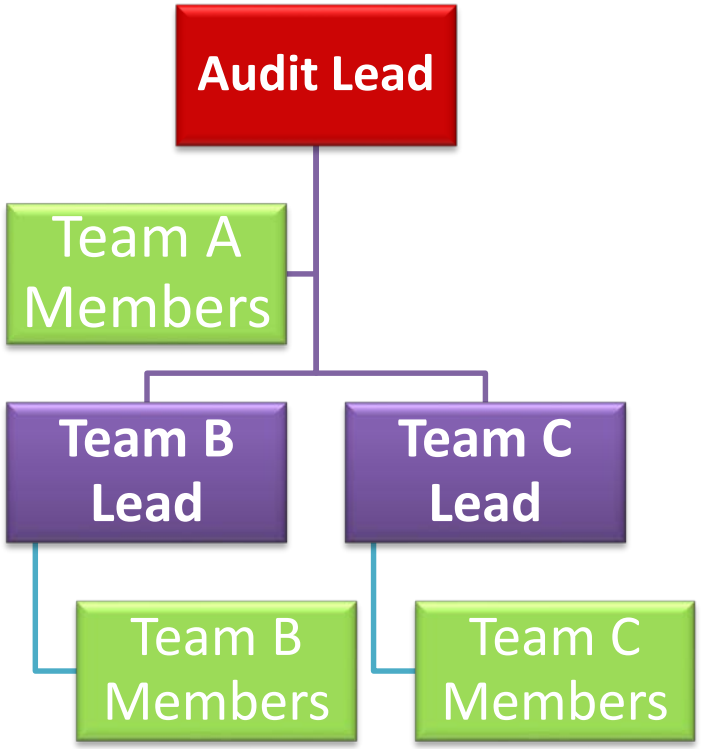
- Safety oversight inspectors should be familiar with the audit topic and applicable requirements
  - Inspector diversity (multi-disciplinary), with varying knowledge, skills and abilities, may improve the audit
- Subject matter experts should have advanced knowledge of the audit topic
- Avoid conflicts of interest

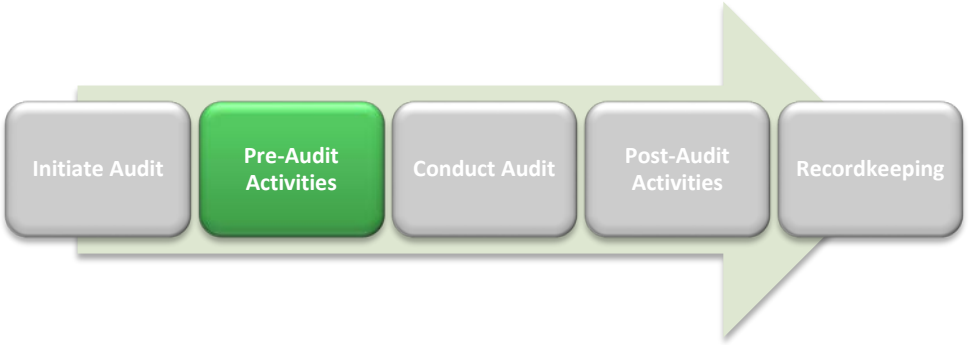
Determine Audit Team Structure

Audit teams may be structured accordingly by the Project Manager:

Single Team

Multiple Teams





Phases of audit process

PRE-AUDIT ACTIVITIES DETAILS

Conduct Audit Research

Key considerations of the audit topic:

- Triggers
- Relevant past or related activities
  - Audits and/or compliance, investigations, special interests (congressional, executive, etc.)
- Outstanding corrective actions
- Current state of the system related to this topic
- Requirements applicable to the topic
- Risk tolerance (severity and likelihood)

Develop Audit Objective, Scope and Focus Areas

- Objective
  - Describes the orders, requirements and other controls the auditors plan to examine
- Scope
  - Describes the specific procedure(s) the auditors plan to surveil
- Focus Areas
  - Describe the specific topics on which the auditors plan to concentrate

Objective and Scope Example

- Objective
  - To determine ANSP compliance with requirements relating to radar video maps
- Scope
  - The audit will examine processes pertaining to the verification and validation of data displayed on radar video maps
- Focus Area
  - ANSP/AIS management controls

Objective and Scope Example (continued)

Radar Video Map

Objective and Scope Example (continued)

"Pilot killed in plane crash was sent to defunct runway, authorities say"

Pitfalls to Avoid

Scope too broad

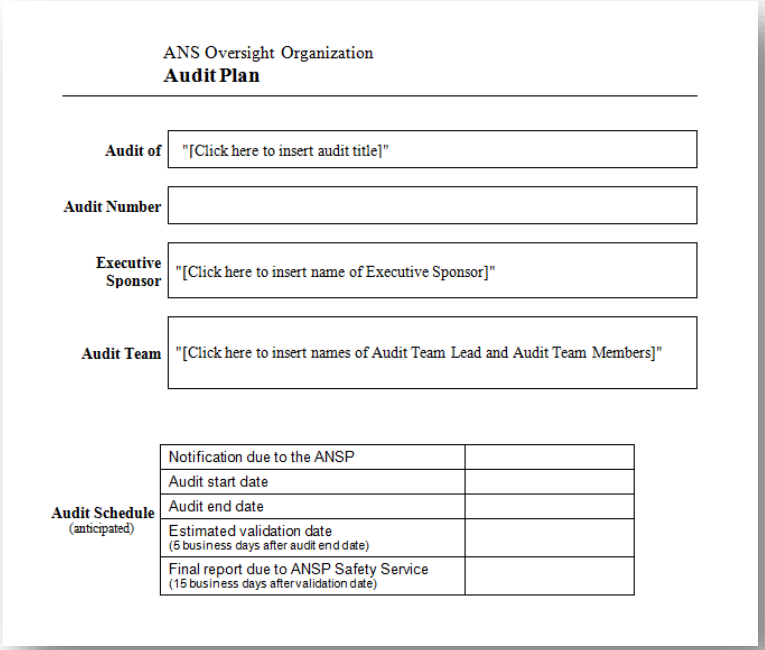
Hearsay

Preconceived ideas

Develop Audit Plan

The Audit Plan summarizes essential information about the audit, including:

- Objective and scope
- Focus areas
- Requirements
- Schedule
- Justification
- Locations
- Resources
- Review and approval authorization



ANS Oversight Organization
Audit Plan

Audit of	"[Click here to insert audit title]"
Audit Number	
Executive Sponsor	"[Click here to insert name of Executive Sponsor]"
Audit Team	"[Click here to insert names of Audit Team Lead and Audit Team Members]"

Audit Schedule (anticipated)	Notification due to the ANSP	
	Audit start date	
	Audit end date	
	Estimated validation date (5 business days after audit end date)	
	Final report due to ANSP Safety Service (15 business days after validation date)	

Develop Requirements Checklists

What is a checklist?

- A checklist is a listing of critical activities needed to complete the process or operation successfully
- It is used as a real-time verification that the critical process step has been completed

Checklists can be an effective control tool when designed, used, and supported properly

Develop Requirements Checklists

Why create checklists?

- Checklists:
  - Ensure we accomplish the critical elements of an activity
  - Help reduce inadvertent errors
  - Help standardize results when the “human factor” is a significant source of variation
  - Are useful when observing/reviewing processes that are complex or involve repetitive tasks
- Checklists should reference applicable requirements

Develop Requirements Checklists

How to create a checklist:

- Locate the requirement
  - Regulation, Directive, Order, etc.
- Copy the requirement into the checklist
- Turn the requirement into a question
  - Address one issue per question
    - Break requirements into separate questions if needed
  - Questions should be answerable in “YES/NO” format

Sample Checklist

Requirement:

Checklist Questions	Compliance verified? (yes or no)	Evidence and/or Observations
1.		
2.		
3.		
4.		
5.		

Audit Sampling Methods (where to look and how many to look at, find, discuss or interview)

Additional Comments (use additional pages as needed)

Requirements Checklist Example (Annex 15)

3.3.2 An AIS shall establish verification and validation procedures which ensure that upon receipt of aeronautical data and aeronautical information, quality requirements are met.

Annex 15 Checklist Example

3.3.2 An AIS shall establish verification and validation procedures which ensure that upon receipt of aeronautical data and aeronautical information, quality requirements are met.

Requirement:

Checklist Questions	Compliance verified? (yes or no)	Evidence and/or Observations
1. Have validation procedures been established?		
2. Have verification procedures been established?		
3.		
4.		
5.		
Audit Sampling Methods (where to look and how many to look at, find, discuss or interview)		
Additional Comments (use additional pages as needed)		

Develop Datasheets

- Datasheets are informal worksheets designed by the audit team to ensure enough information is collected during the audit to answer checklist questions
- Tips for developing datasheets:
  - Consider each checklist question individually
    - What do you need to ask/observe/read/review to answer the question?
  - Count something
    - Example: number of ATC operations observed
  - Review samples of the data you will be collecting, if possible
    - Review datasheets from previous audits

Sample Datasheet

Requirement:

3.3.2 An AIS shall establish verification and validation procedures which ensure that upon receipt of aeronautical data and aeronautical information, quality requirements are met.

	Have verification procedures been established?		Have validation procedures been established?	
Facility	**Yes**	**No**	**Yes**	**No**
Terminal A	√		√	
Terminal B	√		√	
…	√			√

Develop Interview Sheets

Interview sheets are designed to facilitate a discussion with the ANSP on the topic of the audit

- Traditional requirements checklist questions are turned into a logical series of conversational questions to get beyond a yes/no answer
- The resulting interview questions create a relaxed audit environment enhancing responses and the conversation may prompt additional questions previously not considered

Annex 15 Interview Sheet Example

INTERVIEW SHEET – Annex 15	
Office Symbol	Name
1. Has your organization developed procedures to verify data included on radar video maps? 2. If yes, can you show me a copy of these procedures? 3. If yes, can you walk me through your verification process? 4. If yes, can I get a copy of these procedures? (Checklist 1, question 1)	
1. Has your organization developed procedures to validate data included on radar video maps? 2. If yes, can you show me a copy of these procedures? 3. If yes, can you walk me through your validation process? 4. If yes, can I get a copy of these procedures? (Checklist 1, question 2)	

Confirm Audit Schedule

Item	Date
Audit Notification	Send to ANSP at least 10 business days prior to the audit start date
Opening Window Date	Determined by Safety Oversight management
Start Date	When the audit team begins collecting data
End Date	When data collection, observations, and interviews are complete
Closing Window Date	Typically set for the end of the third week following the opening window date of the audit
Estimated validation Briefing	Typically targeted at 5 business days after the audit closing window date
Final report/transmittal letter due to ANSP	Typically scheduled for 25 business days after the validation briefing date

Conduct Audit Team Meetings

- Audit teams should meet regularly, including all team members
- The following should be met but not limited to:
  - Exchange information relative to the audit
  - Ensure common understanding of audit scope
  - Confirm audit locations
  - Review audit methodology
  - Confirm time frame for conducting audit

Conduct Audit Team Meetings (continued)

A pre-departure team meeting should be conducted at least one day prior to the start of the audit. Items to be considered include:

- Protect materials and documents
  - Maintain sensitive materials in a secure area and never leave them unattended
  - Do not remove original documents from a facility
- The act of noting and recording observation
  - Take detailed notes during the audit prior to analysis and findings during audio, visual, interactive portions of the audit
- Leave the facility as you found it

Conduct Audit Team Meetings (continued)

Emphasis, at the pre-departure meeting, should also address professionalism while on-site conducting the audit:

- Dress appropriately
- Act professionally
  - Leave behind any issues or team conflicts
  - Do not disturb staff or get distracted from duties (personal interactions/communications on laptops and phones)
- Avoid confrontations with ANSP
  - If ANSP personnel become uncooperative, audit team lead to contact management

Audit Team Roles and Responsibilities

- Audit Lead
  - Ensure all phases of the audit are completed in accordance with requirements
  - Act as an audit team lead as required
  - Prepare all required audit documents
  - Collect and compile all records from the audit team(s)
  - Brief management on audit observations

- Team Lead
  - Lead audit team as directed by audit lead
  - Conduct opening and closing meetings with ANSP personnel
- Team Member
  - Follow direction of audit/team lead
  - Carry out assigned tasks
  - Collect and verify data
  - Document and report all observations
  - Keep audit/team lead informed
  - Offer audit/team lead assistance as needed
  - Be present at opening and closing meetings

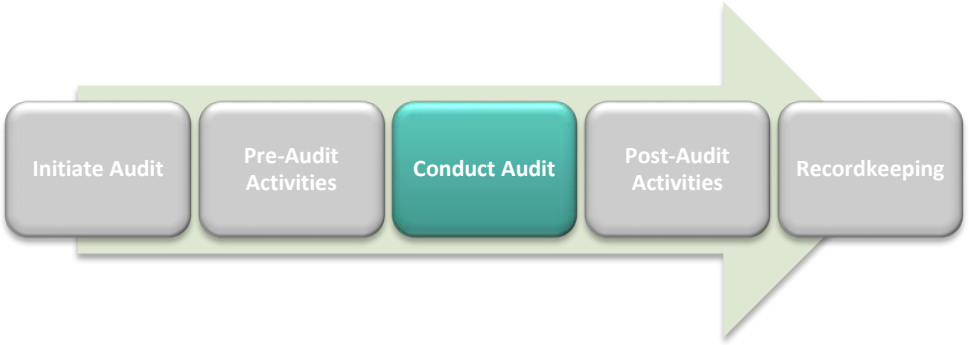
Conduct Briefings with Management

- Status briefing – the purpose is to allow the safety oversight executives to verify and make suggestions/give direction to the audit team as they progress toward a successful audit

- Pre-Audit briefing – the purpose is to get safety oversight executive approval of the audit plan, notification and audit checklists prior to sending the notification or beginning the audit

Develop and Transmit Notification to ANSP

- The Audit Notification is a memorandum or letter transmitted to the ANSP containing the audit dates, topic, and facilities to be visited
  - Notifications request ANSP to provide points of contact at each facility
    - Sent to the ANSP at least 10 business days prior to the audit start date
    - May also include request for information (data request)
- Unscheduled audits do not require notification



Phases of audit process

CONDUCT AUDIT DETAILS

Initiate Initial Contact With Facility

- Audit lead to contact each facility prior to the audit for point of contact (POC) information
- Relay following information to POC
  - Arrival, opening and closing meeting times
  - Logistics
    - Room locations, technical support, equipment, etc.
    - Parking, security, general protocols, etc.
  - Access to appropriate facility personnel

Conduct Opening Meeting

- Introduce audit team to facility personnel
  - Ensure that everyone signs attendance sheet
- State audit objective and scope
- Discuss how the audit will be conducted
  - Review requirements, conduct management interviews, make observations, take notes and gather objective evidence
- Inform that facility specific results will be provided at the closing meeting

Conduct Opening Meeting (continued)

- Inform that suspected safety critical observations will be elevated immediately
- Confirm audit timeline and other logistics as appropriate
- Confirm POC
- Identify on-site safety, emergency and security procedures
- Share checklist (optional)

Collect and Verify Requested Data/Information

Audit team use checklists and interview sheets to record data/information regarding compliance with the applicable requirements

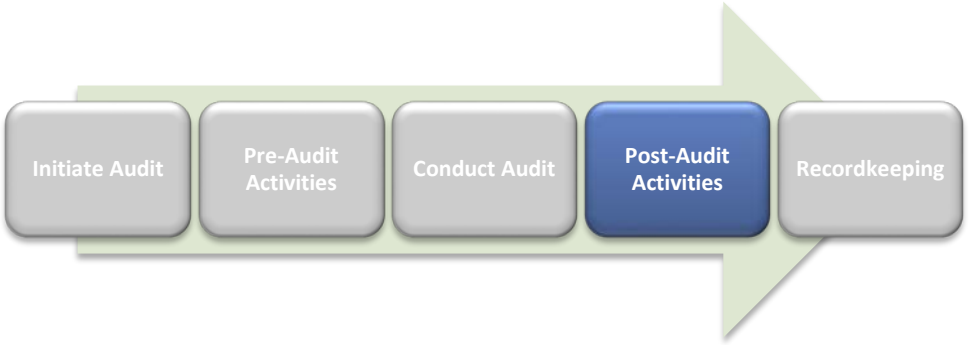
- Observe operations
- Conduct management interviews
- Review documentation
- Gather objective evidence
- Take notes

Highlight Observations

- Review positive aspects of the audit
- Explain any potential location specific observation or safety critical issue
  - Suspected safety critical observations will be elevated immediately
- Identify observations likely to be included in the audit report
- Data from all audit locations will be consolidated
- Typically facilities will not be mentioned in regard to the observations in the audit report

Conduct Closing Meeting

- Express appreciation to facility personnel for their cooperation and assistance
  - Ensure that everyone signs attendance sheet
- Reiterate audit objective and scope
- Describe methodology used during audit
- Review audit results
- Provide estimated final report date
- Close out any security or logistics items



Phases of audit process

POST-AUDIT ACTIVITIES DETAILS

Final Data/Information Review

- Compile, review and analyze all data/information collected during the audit
- Is there enough information to ensure that we can fill in the data sheets and answer checklists questions?
- Do we need to obtain additional information?

Audit Observations and Validation

Key questions to consider:

- Does the data/information reveal system-wide issues or concerns?
- Will you recommend observations of non-compliance? Observations of potential safety impact? Comments? Why or why not?
- What will you recommend being included in the audit report?

Audit Observations and Validation (continued)

Validation Briefing

- Typically targeted at 5 business days after the audit closing date. May be adjusted based on circumstances (i.e. additional data, executive availability, etc.)
- Present audit observations, findings and comments to safety oversight management
- Based on the validation briefing approval, what have you determined to be included in the final report?

Prepare Audit Report and Transmittal Letter to ANSP

- Clearly communicate audit results
  - Include all validated audit observations and safety compliance issues
- Provides a record of safety oversight activities
- Adhere to audit timeline
  - Typically scheduled for 25 business days after the Validation Briefing date

Prepare Audit Report and Transmittal Letter to ANSP (continued)

Components of an audit report:

- Executive Summary
- Overview
  - Background
  - Objective and Scope
    - Describe the focus areas
  - Dates and facility locations
  - Requirements
  - Methodology
    - Describe how you determined compliance/non-compliance

Prepare Audit Report and Transmittal Letter to ANSP (continued)

Components of an audit report (continued):

- Audit Results
  - Auditors' Observations as they relate to each focus area
    - Observations of noncompliance
    - Observations of potential adverse safety impact
    - Comments (variation, best practices, positive feedback, observations outside of the scope of the audit, etc.)
- Appendix
  - List of auditors
  - Requirements checklist

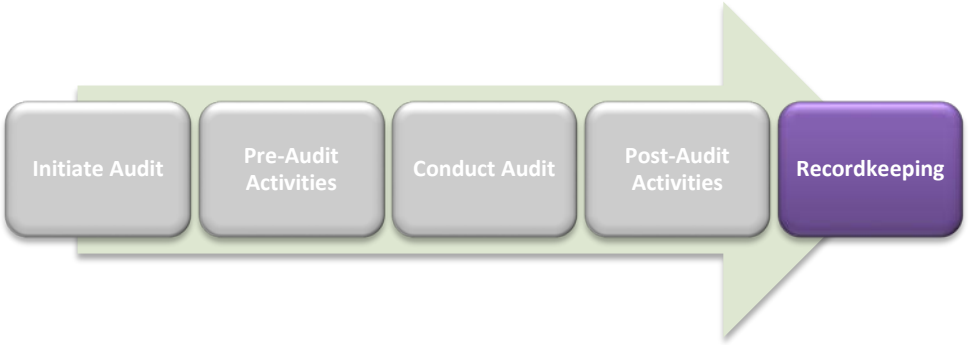
Prepare Audit Report and Transmittal Letter to ANSP (continued)

Strategies for report writing:

- Write the report from a risk-based perspective to focus on activities or changes that pose the greatest risk to safety
- Ensure the audit topic and results relate to aviation safety
- Present audit observations effectively
  - Convey important information up front
  - Include details in the body of the report
  - Use objective evidence to support conclusions and observations
  - Be clear, accurate and consistent

Final Audit Activities

- Monitor and track:
  - Observations
  - Findings
  - Corrective actions
- Encourage feedback with ANSP on the contents of the audit report
- Finalize audit records
- Discuss lessons learned with audit team and management



Phases of audit process

RECORD KEEPING DETAILS

Audit Portfolio

- Audit records are established and maintained in an audit portfolio throughout the audit
- List of pertinent records:
  - Audit Proposal
  - Audit Plan/Checklists
  - Audit Notification
  - Audit Report
  - Corrective Action Plan
- Team documents to be retained in a team folder, as applicable, but not as part of the retained portfolio

Records Management

- Final records are archived according to a retention schedule contained within the records management requirements
- Maintain permanent copies of:
  - Audit Plan
  - Audit Notification
  - Checklists
  - Audit Report
- Record document status

Which of the following best describes the order of the phases of an audit process?

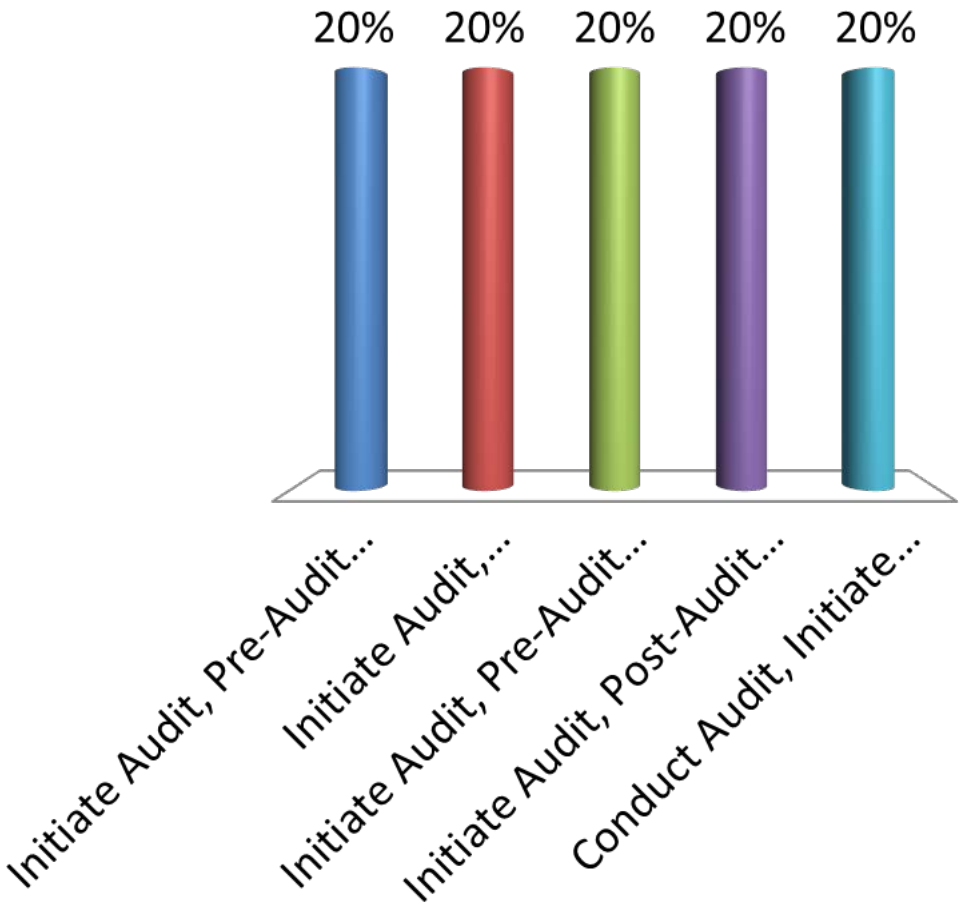
A. Initiate Audit, Pre-Audit Activities, Post-Audit Activities, Conduct Audit, Recordkeeping

B. Initiate Audit, Recordkeeping, Pre-Audit Activities, Conduct Audit, Post-Audit Activities

C. Initiate Audit, Pre-Audit Activities, Conduct Audit, Post-Audit Activities, Recordkeeping

D. Initiate Audit, Post-Audit Activities, Pre-Audit Activities, Conduct Audit, Recordkeeping

E. Conduct Audit, Initiate Audit, Pre-Audit Activities, Recordkeeping, Post-Audit Activities



Final Thoughts…

- Ask questions
- Think critically
  - Analyze data/information and objective evidence with an approach that seeks the most appropriate solution
- Communicate effectively
- Build cohesive teams
  - Regular team meetings
  - Standardize team materials
- Be professional
- Adhere to the audit timeline
- Keep management apprised

References

- ICAO Annex 15
- FAA AOV Audit and Assessment Work Instruction, AOV-002-001-W1 (May 1, 2019)
- *The Regulatory Craft*, by Malcolm Sparrow

Questions and Discussion

Document Definitions

- Audit Proposal
  - A form to submit a proposed audit topic for management review and to record decisions about a proposed audit topic after it is submitted
- Audit Plan/Checklists
  - Describes what will be audited and which facilities will be visited
- Audit Notification
  - Memo or letter advising ANSP of the audit dates and facility location(s)
- Audit Report
  - Shared with ANSP and audited facilities
- Corrective Action Plan
  - To be completed by ANSP in response to compliance issues identified during the audit

Workshop Exercise

Develop an Audit Proposal

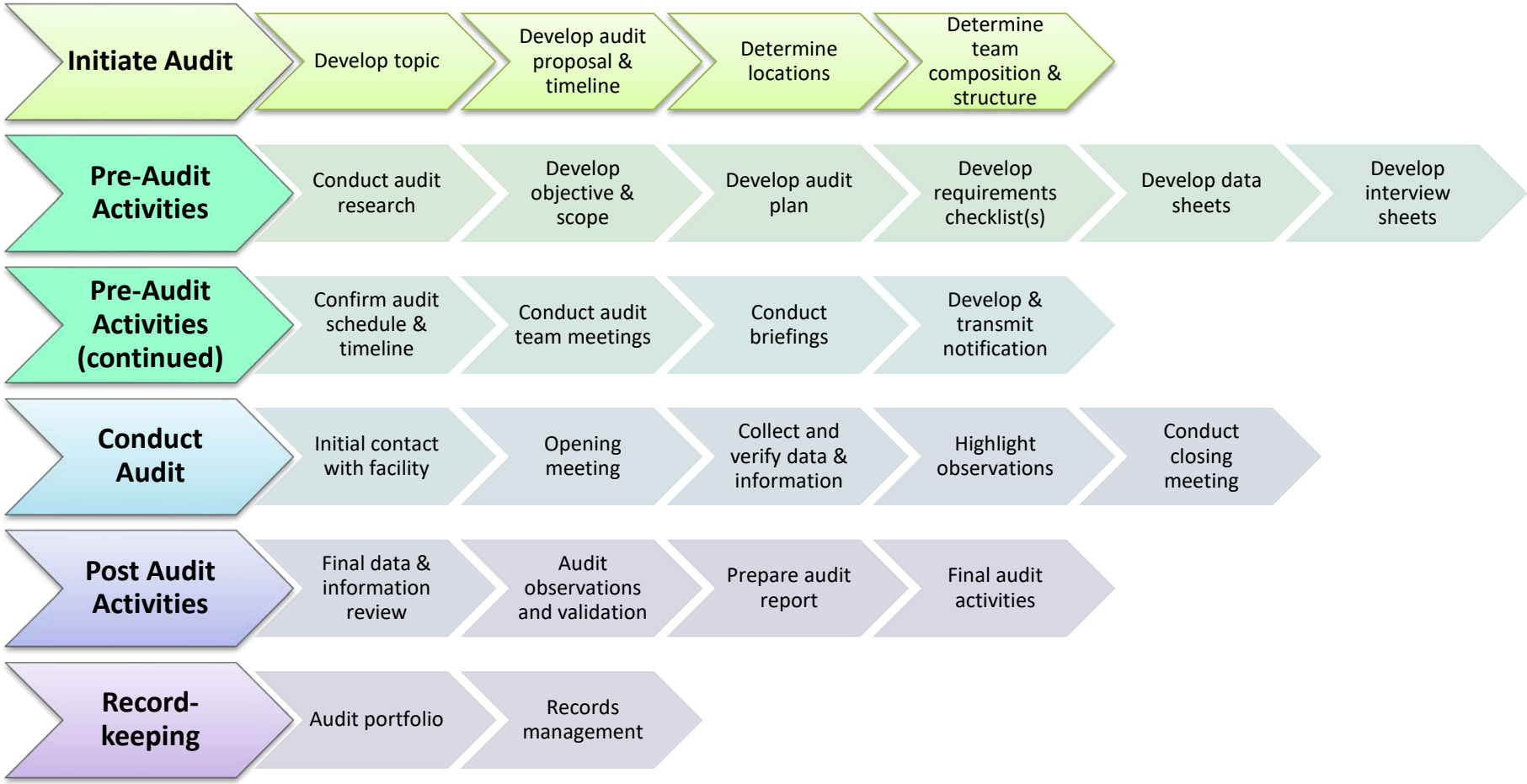
Federal Aviation Administration

AIP Audit

- Review
  - Develop an AIS/AIM audit
  - What can be audited?
  - Potential audit triggers, an AIS Example
  - Audit proposal outline

- Checklist exercise

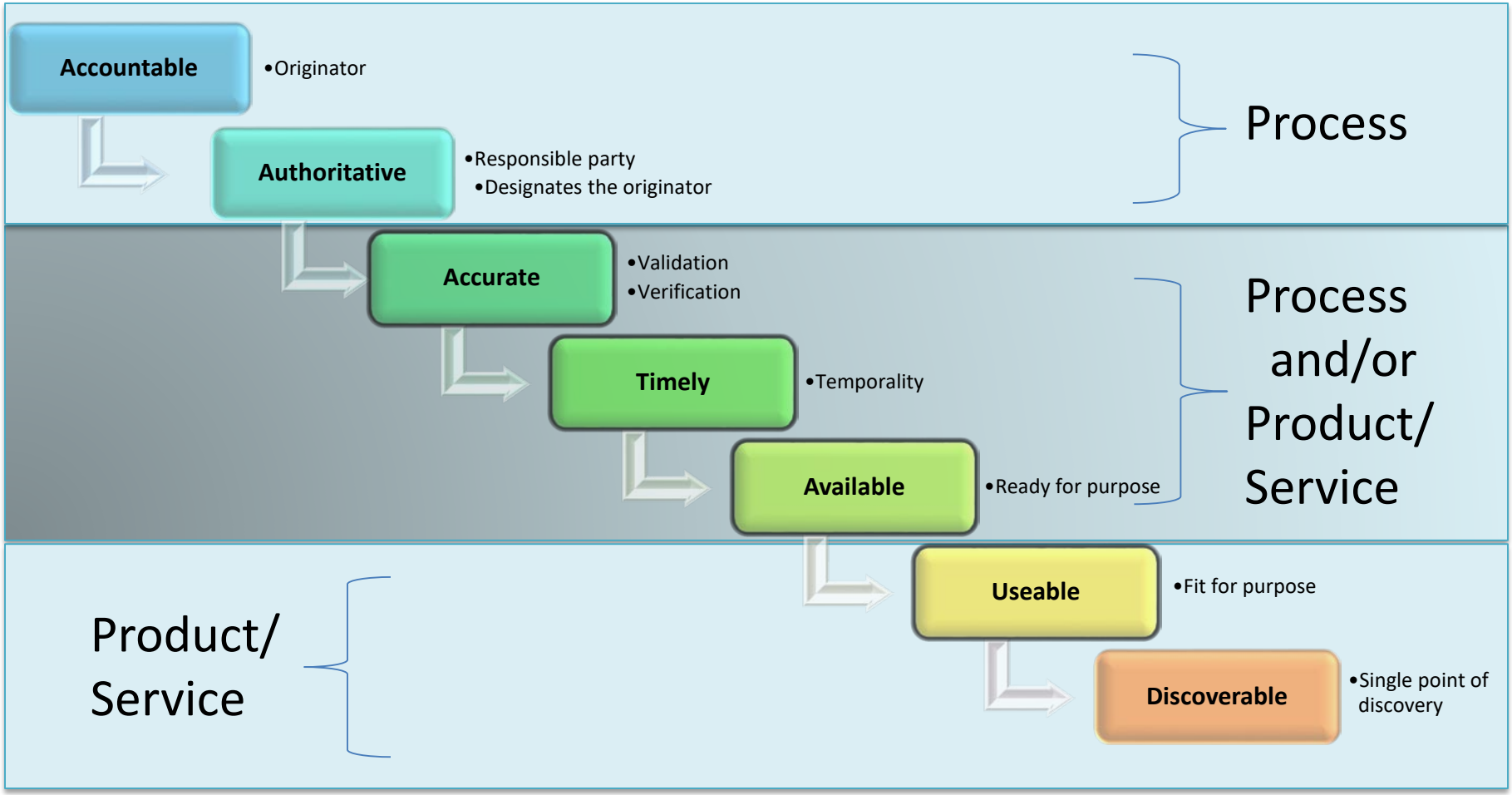
Develop an AIS/AIM Audit



What Can Be Audited?

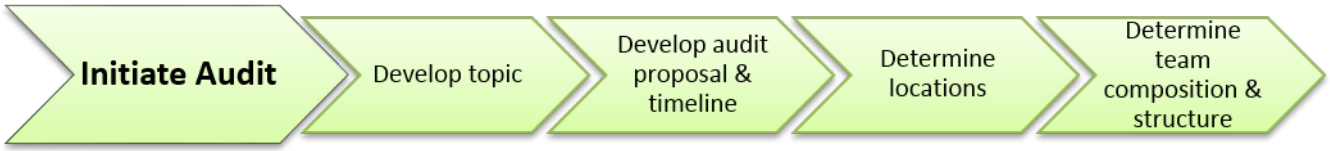
- Product/Service
  - Format
  - Content
- Process
  - Risk controls
    - How are products prepared and maintained?
    - By whom?
    - Who accepts the risk?

Potential Audit Triggers
AIS Example



Audit Proposal Outline

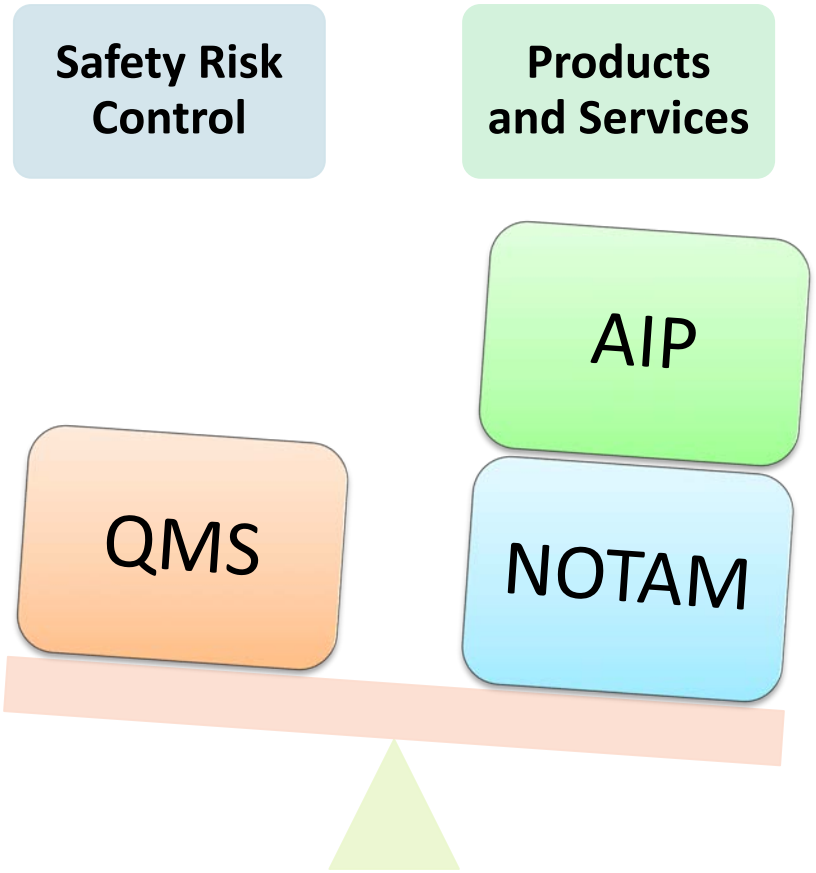
Title	• What is the topic of your audit?
Activity Type	• Is this a new audit, or a follow-up? • Will it be onsite, or a desk audit?
Category	• What functional area? Air traffic control? Aeronautical Information Services? Technical Operations?
Thesis	• What is the expected system state, assuming controls are effective?
Hypothesis	• What is the potential risk, if controls are not effective (or not followed)?
Purpose	• What is the focus of the activity?
Background	• Why do you think this audit should be conducted? • Have related audits been conducted in the past?
Methodology	• How will you conduct the audit? Include limitations, recommendations, facilities and resource allocation
Controls	• Which requirements will you audit?



Develop the Audit Proposal

EXERCISE

Build an Audit Proposal Instructions



In your teams:

- Access the Audit Proposal folder in the Activities > AIP Audit folder on your flash drive
- Review the Atlantis AIP in the Activities > AIP Audit folder on your flash drive
- Develop an AIP Audit Proposal
  - Consider requirements (Annex 15)
  - What problems exist in the AIP?
  - What will you audit to identify the root cause(s) of the problems?
- Present proposals for discussion

Briefing Audit Topic Instructions

Key Points:

- What is the topic?
- Why is it important?
- How will the audit be conducted?