

# Building Effective Safety Oversight of AIS and AIM



Federal Aviation  
Administration

Day 3: QMS as the Safety Risk  
Control



# Objectives

## Recap Day 2

- SMS concepts
- ICAO annex 15
- AIS data chain
- Variation in aeronautical products
- Surveillance program
- Surveillance techniques
- Audit process

## Introduce today's topics

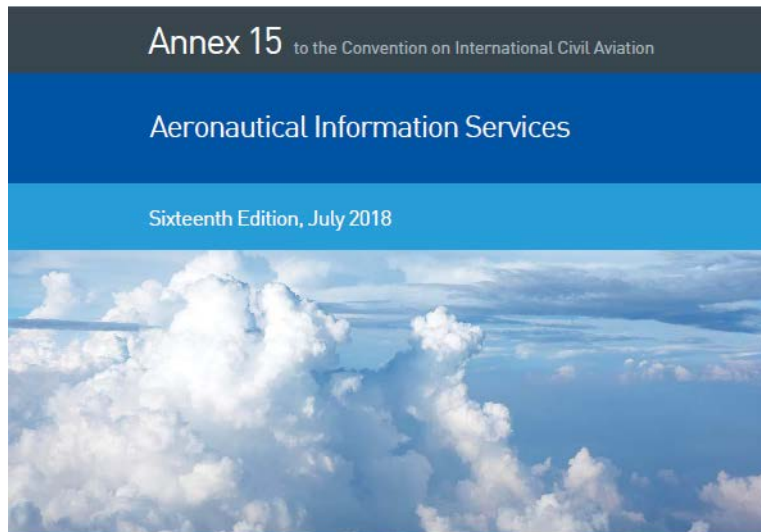
# SRM Concepts Review



# ICAO Annex 15 Review



International Standards  
and Recommended Practices



This edition supersedes, on 8 November 2018, all previous editions of Annex 15.

For information regarding the applicability of the Standards and Recommended Practices, see Foreword.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

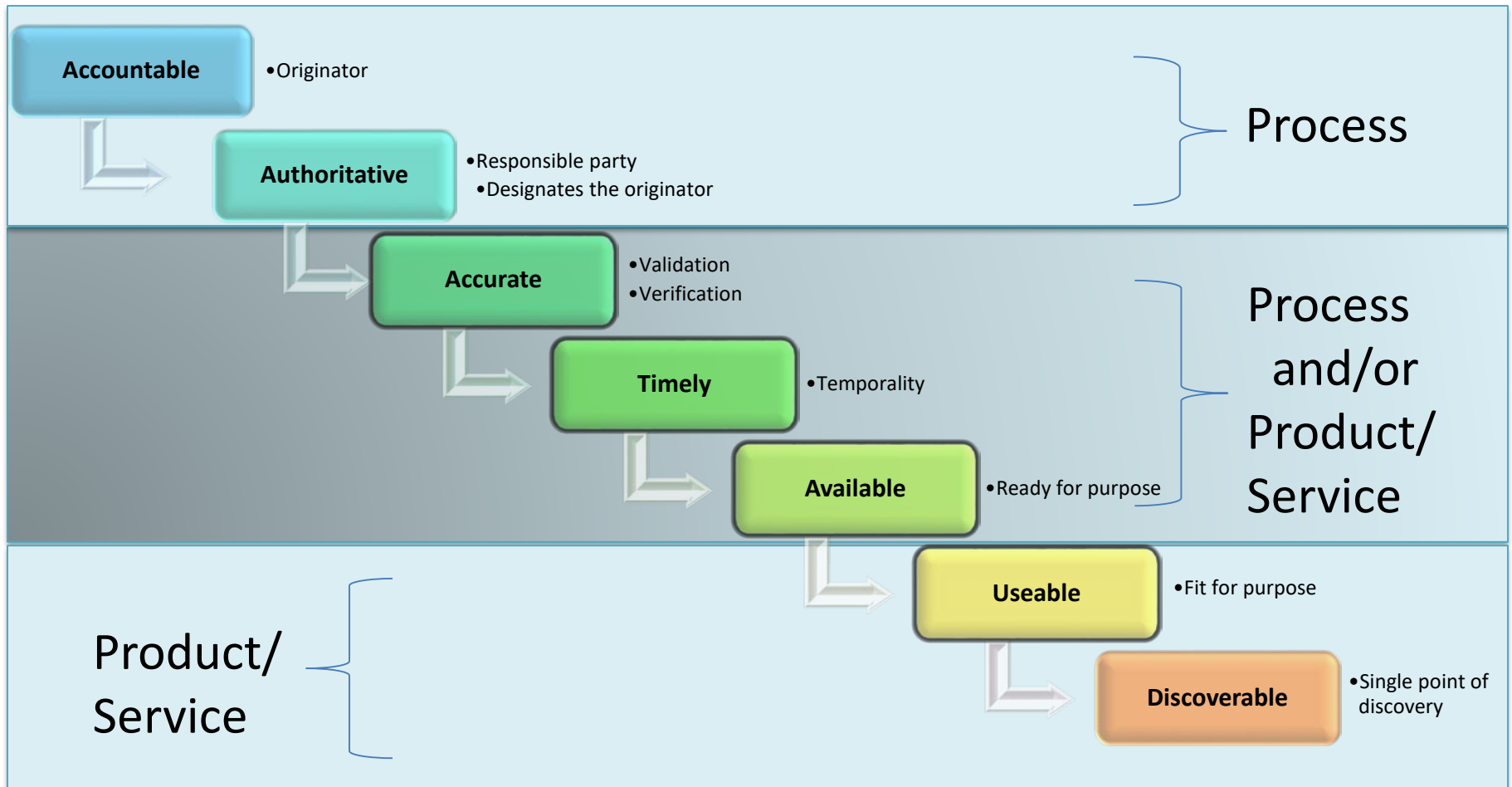
- What is AIS/AIM?
- State responsibilities
- AIS functions
- AIS oversight:
  - Requirements
  - Products
  - Services
  - Data/information



# Variation in Aeronautical Products Review

- Variation in products/services:
  - AIP
    - AIRAC
    - Amendments
    - Supplements
    - Aeronautical charts in accordance with ICAO Annex 4
  - NOTAM
  - Aeronautical information circular
  - Pre and post flight information service
- Variation in competency:
  - Timely
  - Synchronized
  - Usable
  - Accurate
  - Complete

# AIS Data Chain Review



# Surveillance Program Review

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

# Surveillance Techniques Review

Common safety oversight surveillance techniques include:

- Investigations
- Inspections
- Audits
- Assessments
- Continuous monitoring

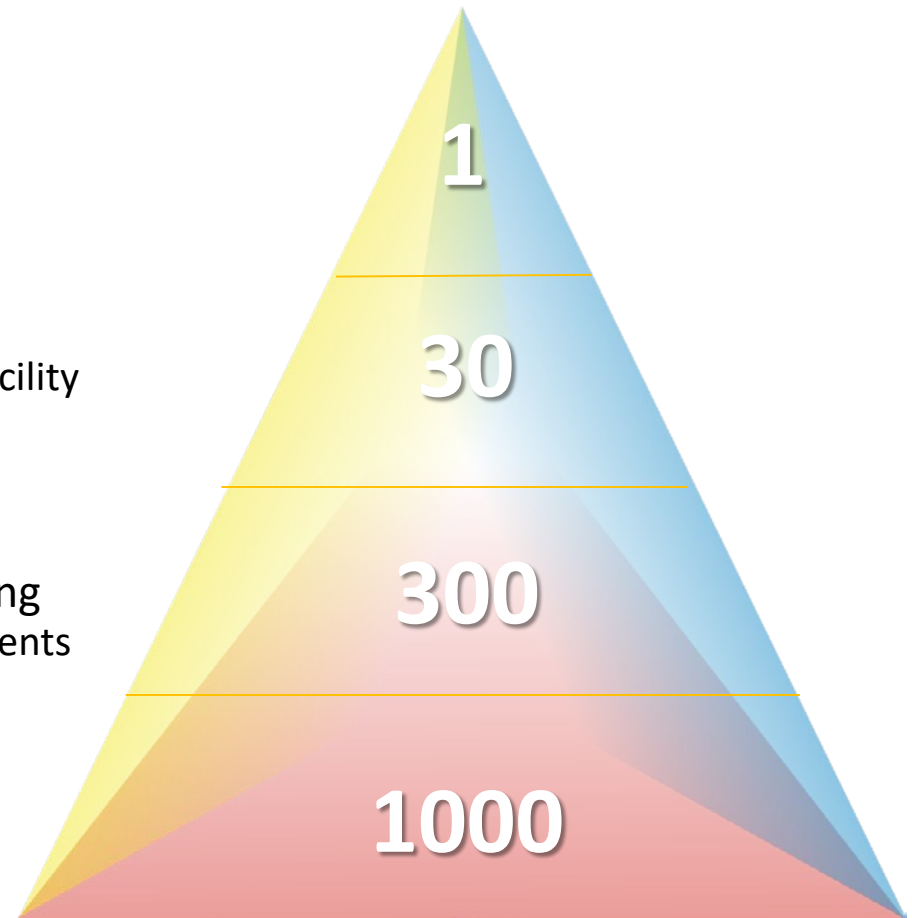


# Surveillance Techniques Review (continued)

Investigate  
Cause(s) of a single safety occurrence

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

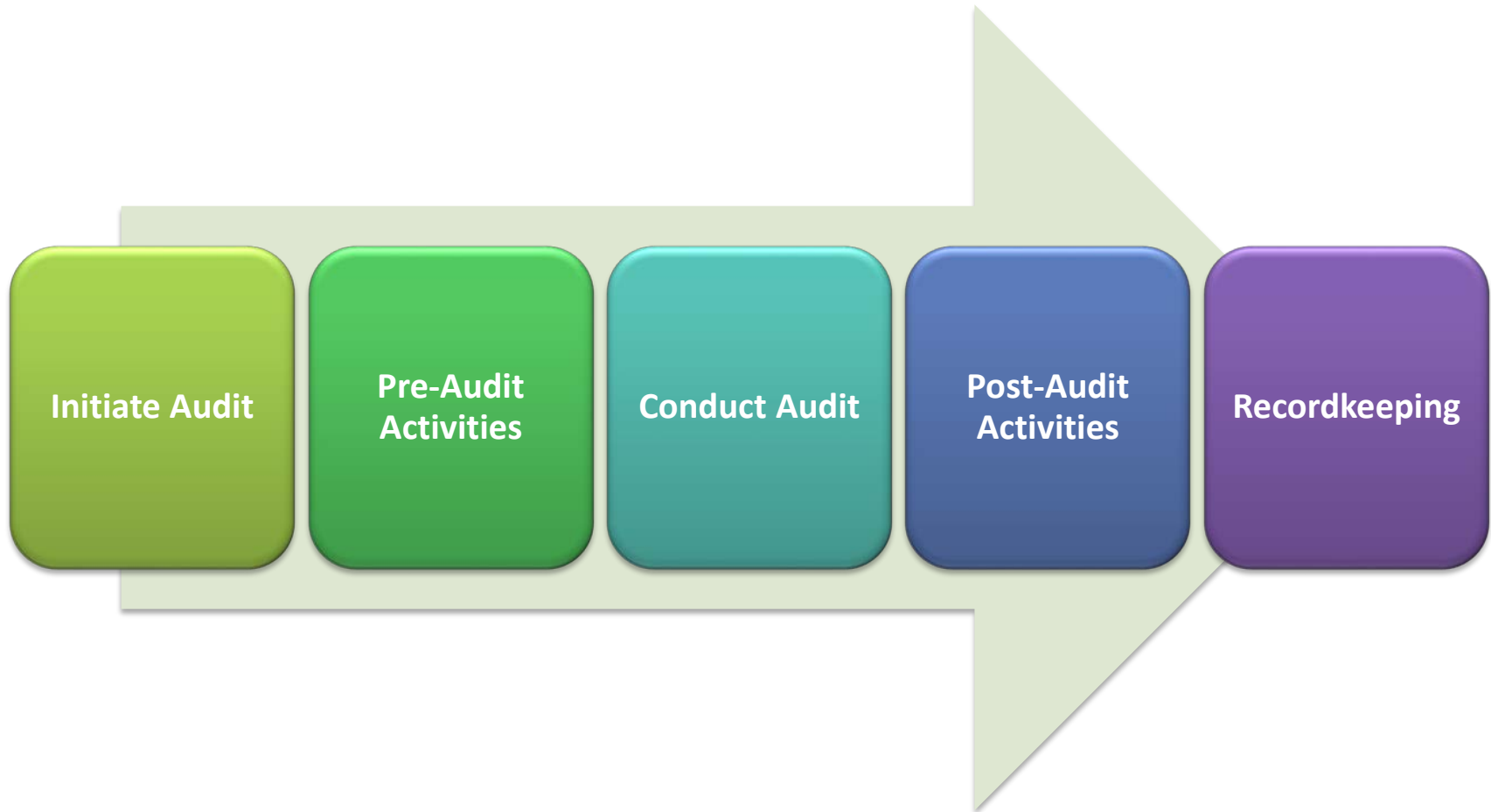
Audit/Assessment/Continuous Monitoring  
Systemic evaluation of compliance to requirements



Source: Heinrich's Triangle



# The Audit Process Review



# Today's Topics

- Data and information management
- Quality management system
- Production control and configuration management
- Understanding metadata in safety oversight exercise
- Build an audit checklists exercise

# References

- ICAO Annex 15
- ICAO Annex 4
- ICAO Safety Oversight Manual, Doc 9734-A
- Heinrich's Triangle
  - The Accident Pyramid, July 22, 2008 By: James Roughton Category: Culture, Leadership, Management, Motivation

# Data and Information Management



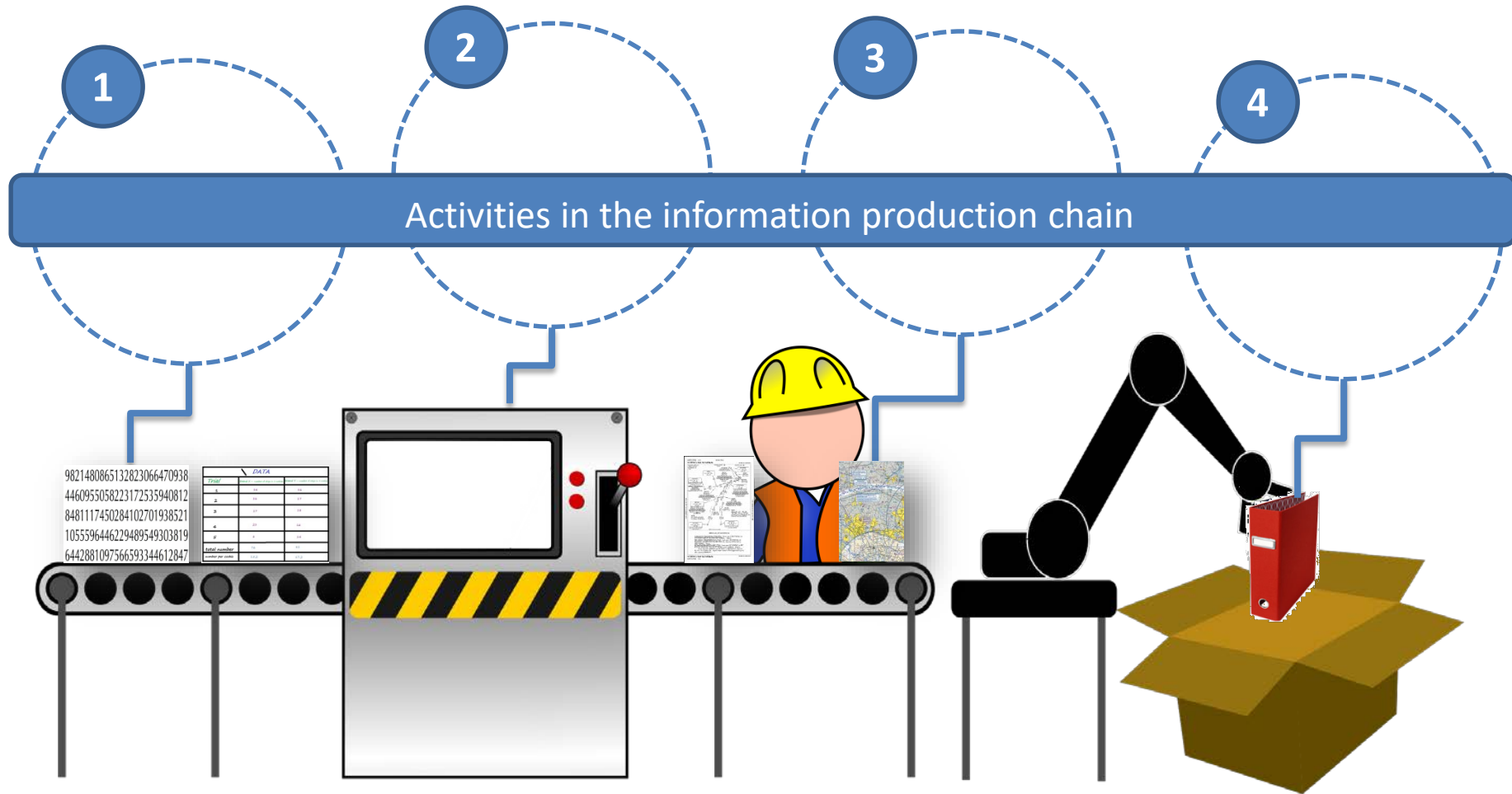
Federal Aviation  
Administration



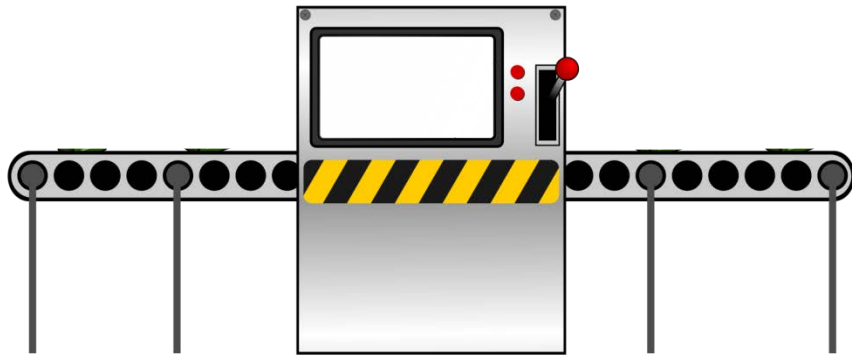
# Module Objectives

- Understand data, information, and knowledge concepts and how they support Annex 15 requirements
- Understand the difference between data and information management
- Understand how to recognize data vs. information
- Understand the business value of data, information, and knowledge

# The Information Factory



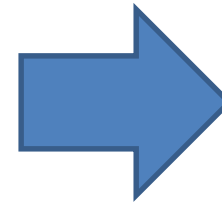
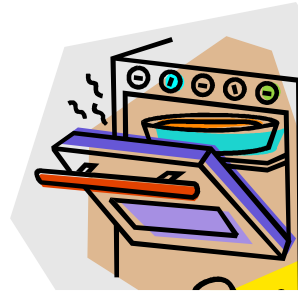
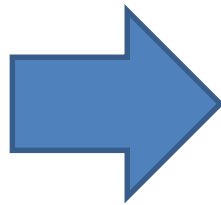
# Let's Build a Factory



- What are we making?
- What are the performance requirements (specifications) for the product?
- Where do the raw materials come from?
- What is the tolerance for the raw materials?
  - How much variation is acceptable?
- What is the process to make the product?
- What resources are needed?
- How do we apply the process to multiple products?
- How do we meet performance requirements?

# Building Products and Services

Creating Business/Consumer Value

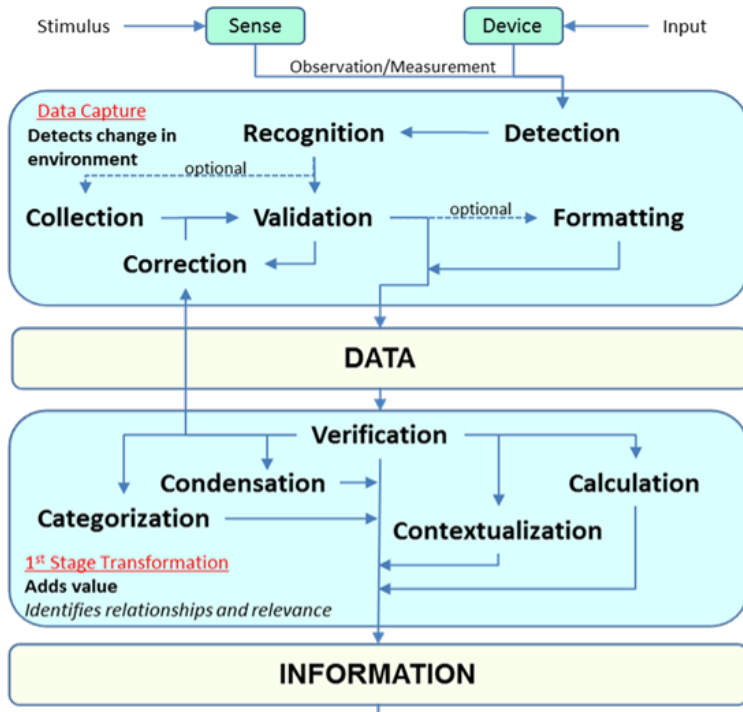


Raw Materials

People, Tools, Process

Product/Service

# Data and Information Management



**Data Management** is about managing data throughout its lifecycle



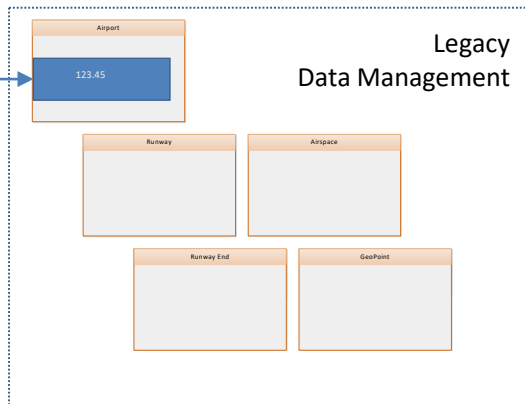
**Information Management** is about providing business context to the data to create value



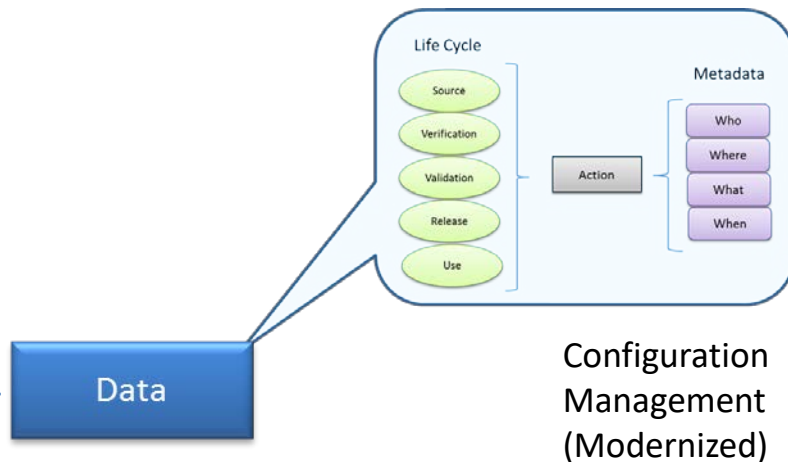
The information product/service provides context; delivering business/consumer value

# Data Management Shift

## From Record Keeping to Configuration Management

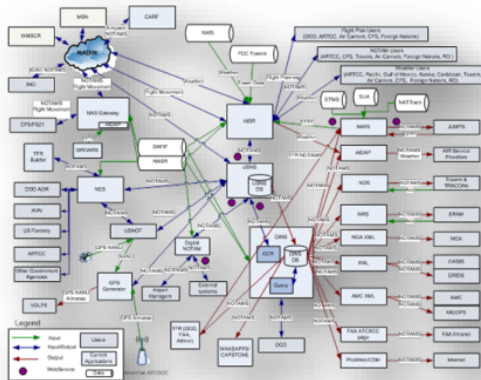


Record Keeping (Legacy)



- Annex 15 focuses on the management of individual pieces of data throughout their lifecycle (data chain)
- Annex 15 requires metadata throughout the data chain
  - “Who, When, What” of actions performed on the data
- This changes the paradigm of the support systems
  - Changing from a record-keeping system where the latest version of the data is recorded, to a configuration management system where the life-cycle actions for each piece of data is recorded

# The Information Management Shift

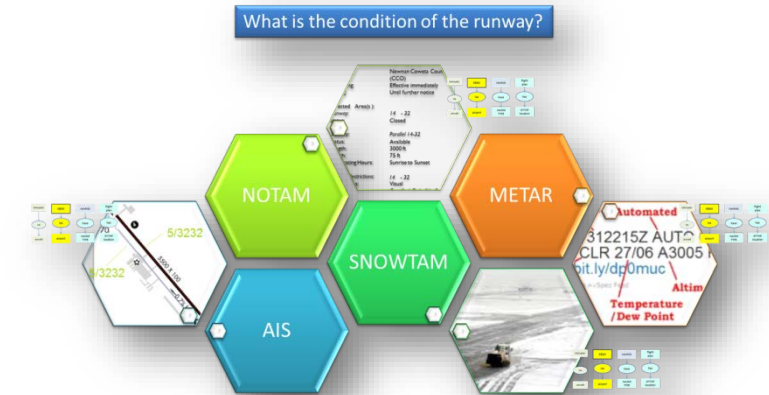


Data Systems  
Focus

What helps systems process  
(Instances)



Information  
Focus



What helps humans understand  
(Relationships)

# Managing Data and Information

## Data Management

Activities that support the management of data (i.e., data assurance)

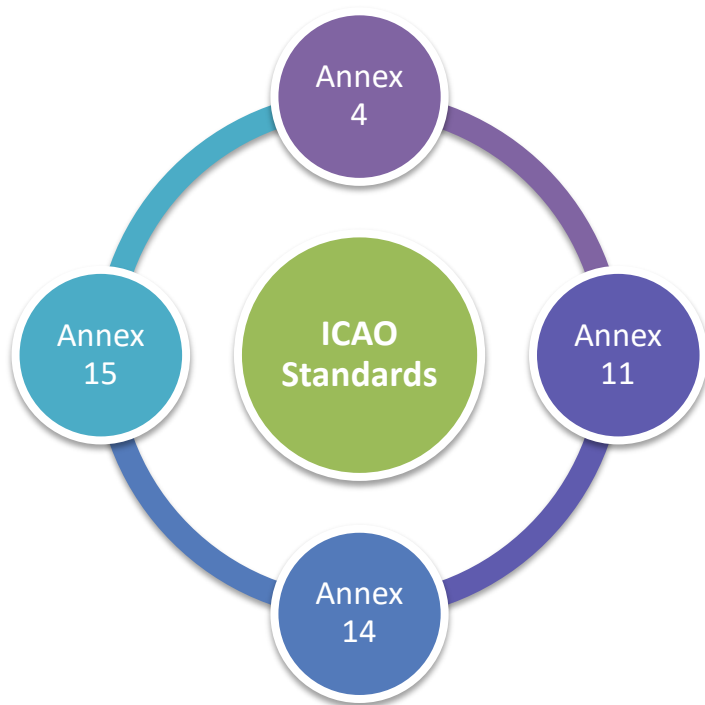
- Data are raw values
- Structure of data
- Ensure the tolerance (accuracy) requirement

## Information Management

Activities that support the management of information (i.e., the business value)

- Information adds context to data (raw values)
- Format of information
- Ensure the performance requirement of the information

# Where are the Data Requirements?



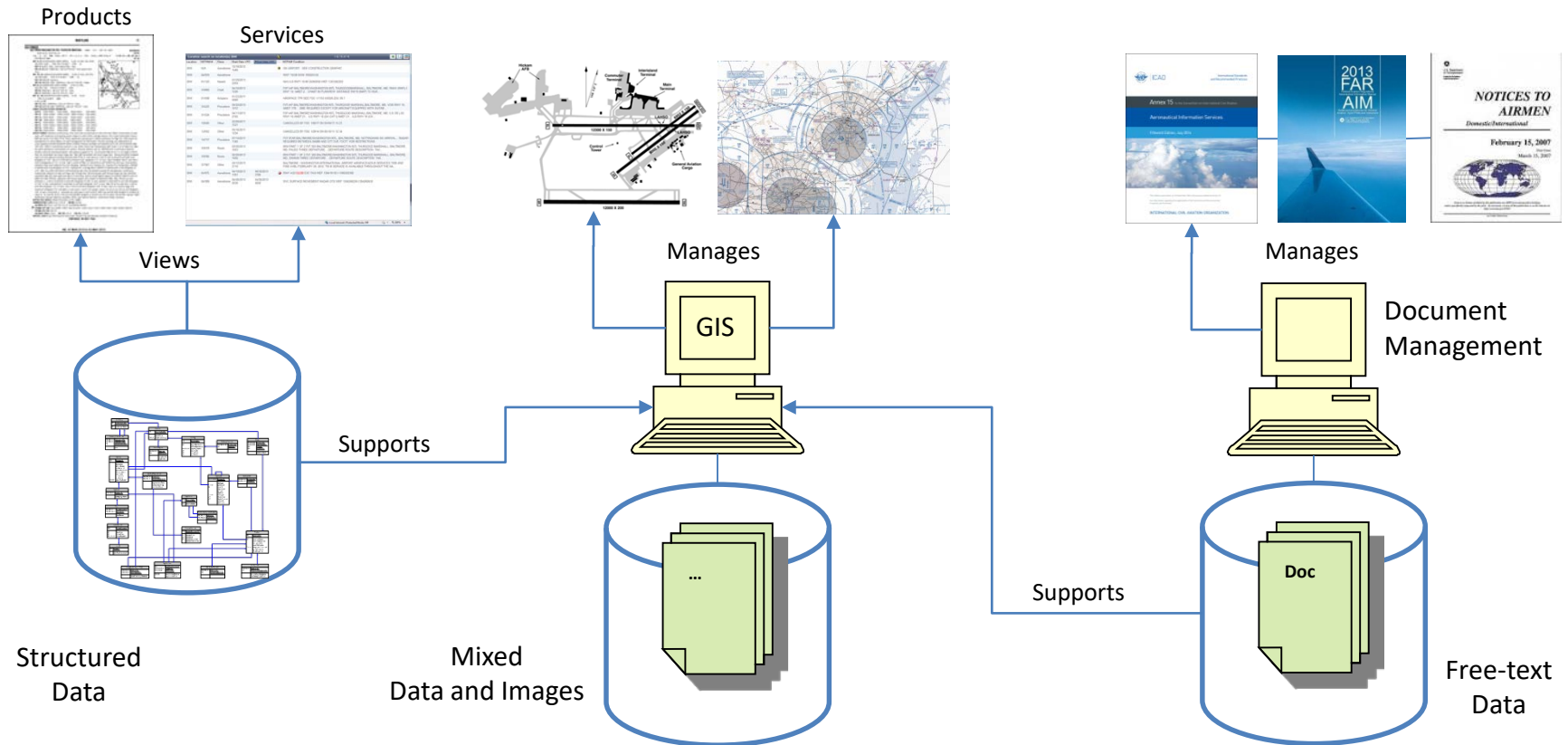
= PANS-AIM/Data Catalog  
(Doc 10066)

# General Types of Data

- Sensor/Measure
- User Input
- Interactions (data about an activity)
- Calculated
- Metadata (data about data)
- Information (data in context, has meaning to humans)

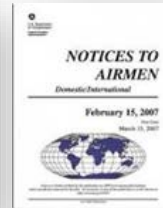
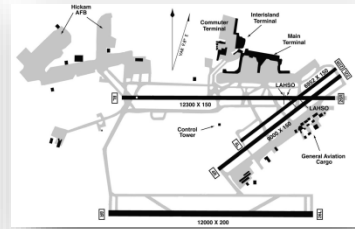
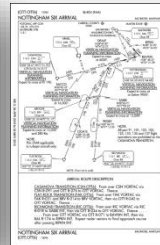
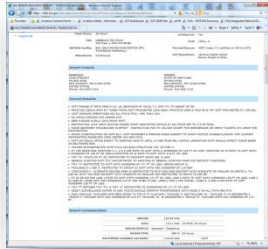
# Diversity of Information Products/Services

Structured Views



# Information Products/Services

(Delivering Value)





# Data or Information?

Time	Type	Text
00:00	Metadata	1234.6
00:01	Metadata	11:00
00:02	Metadata	1234.6
00:03	Metadata	11:00
00:04	Metadata	1234.6
00:05	Metadata	11:00
00:06	Metadata	1234.6
00:07	Metadata	11:00
00:08	Metadata	1234.6
00:09	Metadata	11:00
00:10	Metadata	1234.6
00:11	Metadata	11:00
00:12	Metadata	1234.6
00:13	Metadata	11:00
00:14	Metadata	1234.6
00:15	Metadata	11:00
00:16	Metadata	1234.6
00:17	Metadata	11:00
00:18	Metadata	1234.6
00:19	Metadata	11:00
00:20	Metadata	1234.6
00:21	Metadata	11:00
00:22	Metadata	1234.6
00:23	Metadata	11:00
00:24	Metadata	1234.6
00:25	Metadata	11:00
00:26	Metadata	1234.6
00:27	Metadata	11:00
00:28	Metadata	1234.6
00:29	Metadata	11:00
00:30	Metadata	1234.6

Metadata

1234.6 kilos

11:00

Runway Length = 12000 feet

Blue light special

1234.6



Red Light

MPM

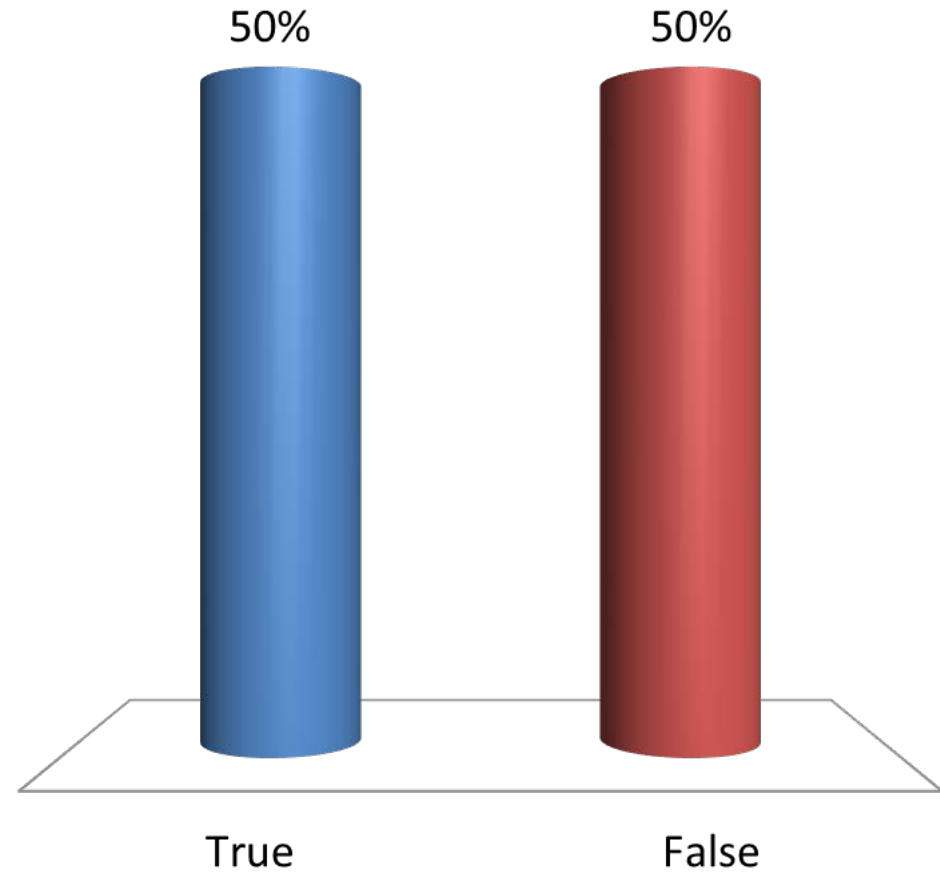
Red

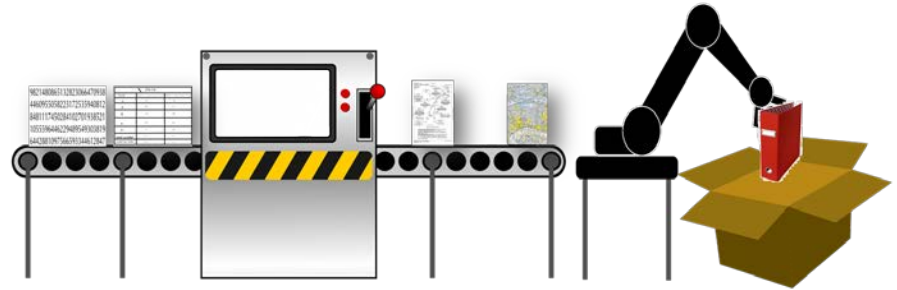
12000 feet

# True or False

Information is data in context?

- A. True
- B. False

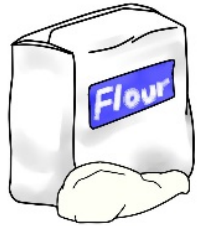




What Happens in the Information Factory?

# METADATA, RECORD KEEPING AND ARTIFACTS

# Metadata 101



Metadata  
(Batch #)



Metadata  
(Lot #)



Metadata  
(Serial #)

- Food production, drug manufacturing, and aircraft parts production all have management systems that manage the source, production, and distribution of their products
- They capture metadata about the source; the who, what, when, and where of components within their production and use life cycles
- Metadata also provides the identification and makeup of the product or part that is being provided

Is aeronautical data different?

# Record Keeping

Table

KBWI	
xxx	BWI
Baltimore Washington International	
MD	yyy
KIAD	
xxx1	IAx
Washington Dulles International	
VA	yyy2
KDCA	
xxx2	DCA
Washington National	
DC	yyy3

Record

KIAD	
xxx1	IAx
Washington Dulles International	
VA	yyy1

Element

IAx
-----

ICAO ID	IATA ID	Name	State	Field y
KBWI	BWI	Baltimore..	MD	yyy
KIAD	IAD	Washington D...	VA	yyy1
KDCA	DCA	Washington N...	DC	yyy2

# Record Updates

Record (original)

KIAD	
	IAX
Washington Dulles International	

Record (updated)

KIAD	
	IAD
Washington Dulles International	



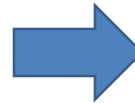
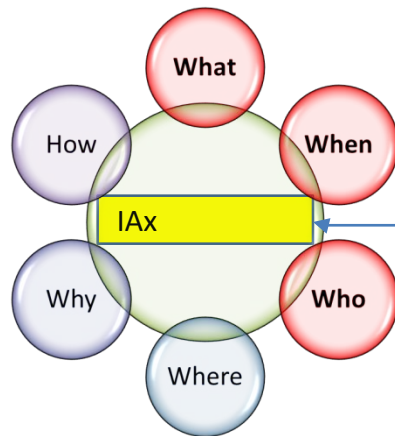
Audit Trail

Modern information systems usually generate an audit trail when the record is updated. This may or may not go to the element level.

# Metadata

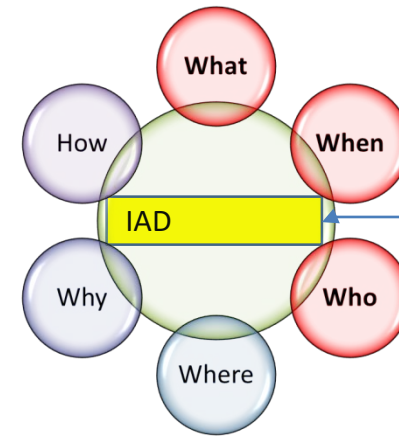
Record (original)

KIAD	
	IAX
Washington Dulles International	



Record (updated)

KIAD	
	IAD
Washington Dulles International	



# Metadata in the Credit Card Processing Chain Example

## 1. TRANSACTION BEGINS

The cardholder purchases goods or services from the merchant.

## 2. AUTHENTICATION

The merchant, in effect, sells the transaction to the "acquirer" and is reimbursed the amount of the sales ticket less a "discount fee," the majority of which is driven by the cost of interchange and which is usually expressed as a percentage + a transaction fee.

## 3. TRANSACTION SUBMITTED

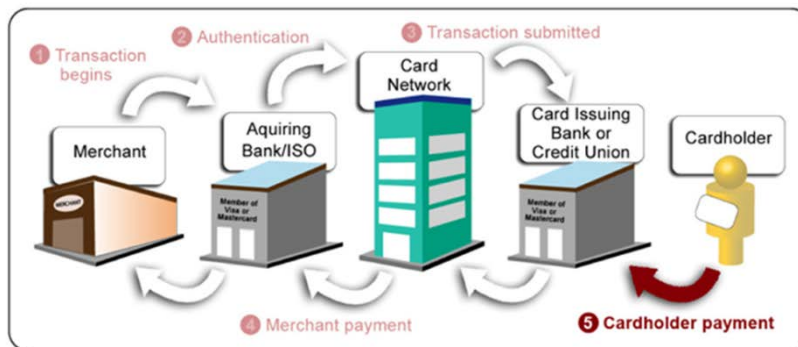
The acquirer then submits the transaction to the issuing bank for payment via the appropriate card network.

## 4. MERCHANT PAYMENT

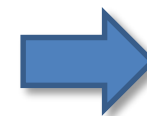
The issuing bank pays the merchant acquirer, less the interchange fee, who then pays the merchant less the "merchant fees."

## 5. CARDHOLDER PAYMENT

Finally, the cardholder repays the issuer for the goods or services originally purchased from the merchant.



Is aviation different?



Source: <http://www.retailersprocessingnetwork.com/process-of-a-credit-card-transaction.htm>

# Artifacts vs. Metadata

## Artifacts

Documents that support the processing of data

- Origination documents
- Checklists
- Approvals
- QA reviews
- Receipts

## Metadata

Data that describes the actions supporting the processing of data

- Who
- What
- When
- Why
- Where
- How

Documents are information containers; providing data describing actions performed (i.e., checklists)

# Artifacts are Everywhere

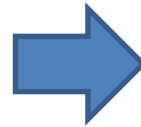
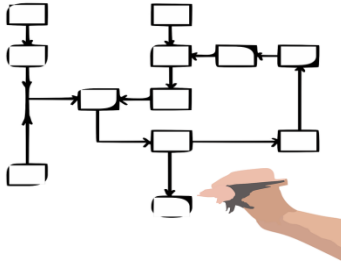
## Artifacts

Origination



Work Documents

SOP

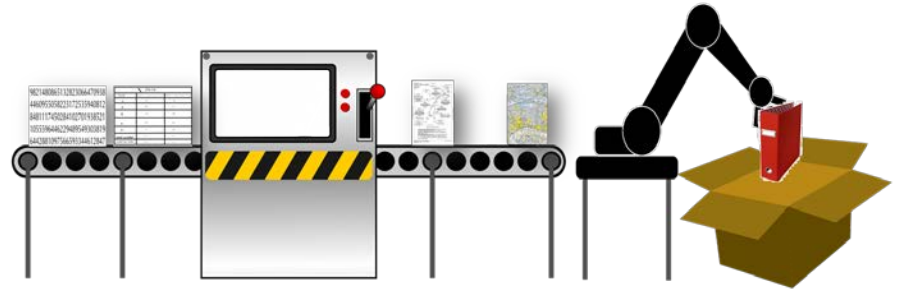


## Products/Services (also an artifact)



Checklists





Powering the Data Engine

# KNOWLEDGE AS BUSINESS RULES

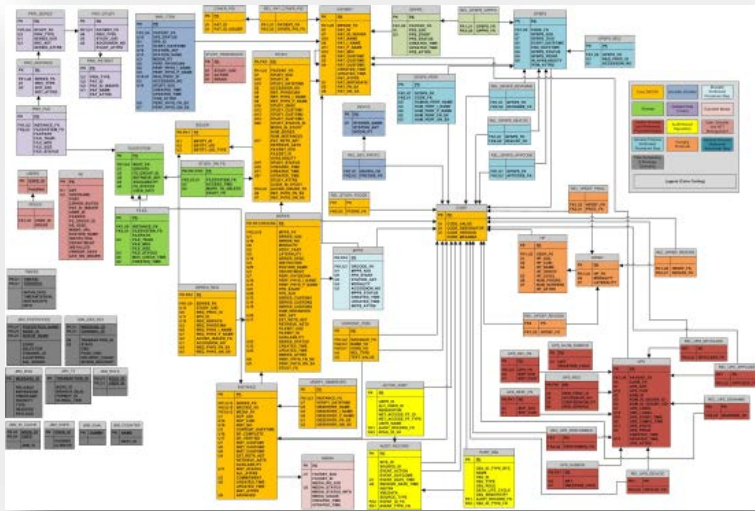
# What Does Knowledge Look Like?

Knowledge comes in many forms:

- Specifications
- Standard operating procedures
- Workflow
- Business rules
- Scenarios
- Formulae (Example:  $\text{DegF} = \text{DegC} * 9/5 + 32$ )
- Data descriptions and catalogs
- Metadata (knowledge about an activity)
- Experience

# How to get ...

...from here (data)...



People  
Tools  
Process



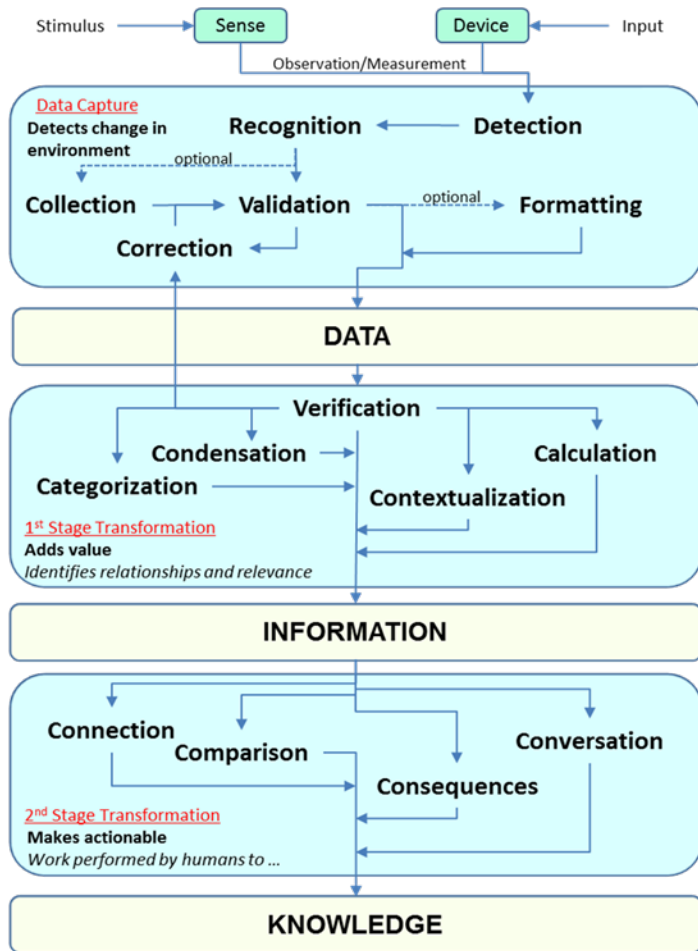
Artifacts  
Metadata

...to here (product/service)?



Information Product/Service

# Data, Information and Knowledge



Data Management is about managing data throughout its lifecycle



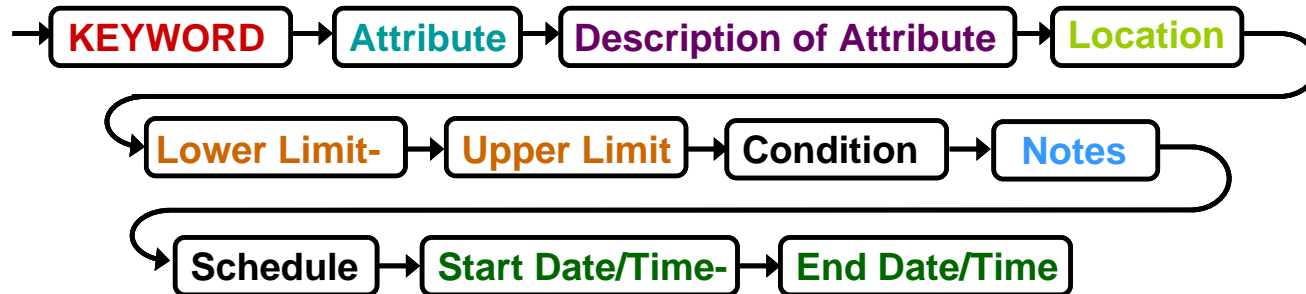
Information Management is about providing business context to the data to create value



Knowledge Management is about leveraging data and information as intellectual capital

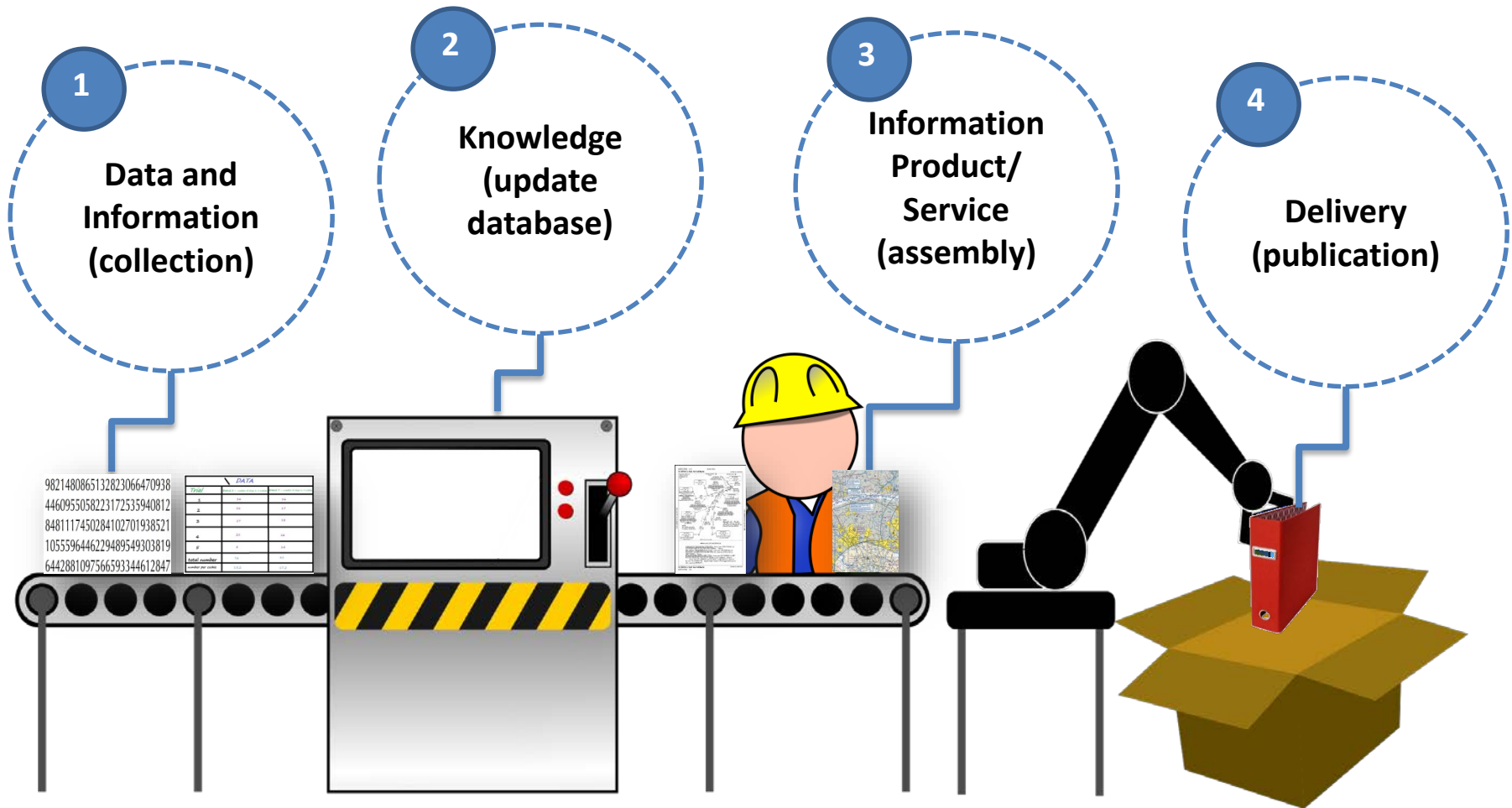
# Scenarios as Knowledge

- What is an event scenario?
  - A scenario describes the condition or event that is being processed
  - The purpose is to capture the rules that are specific to each category of aeronautical information events



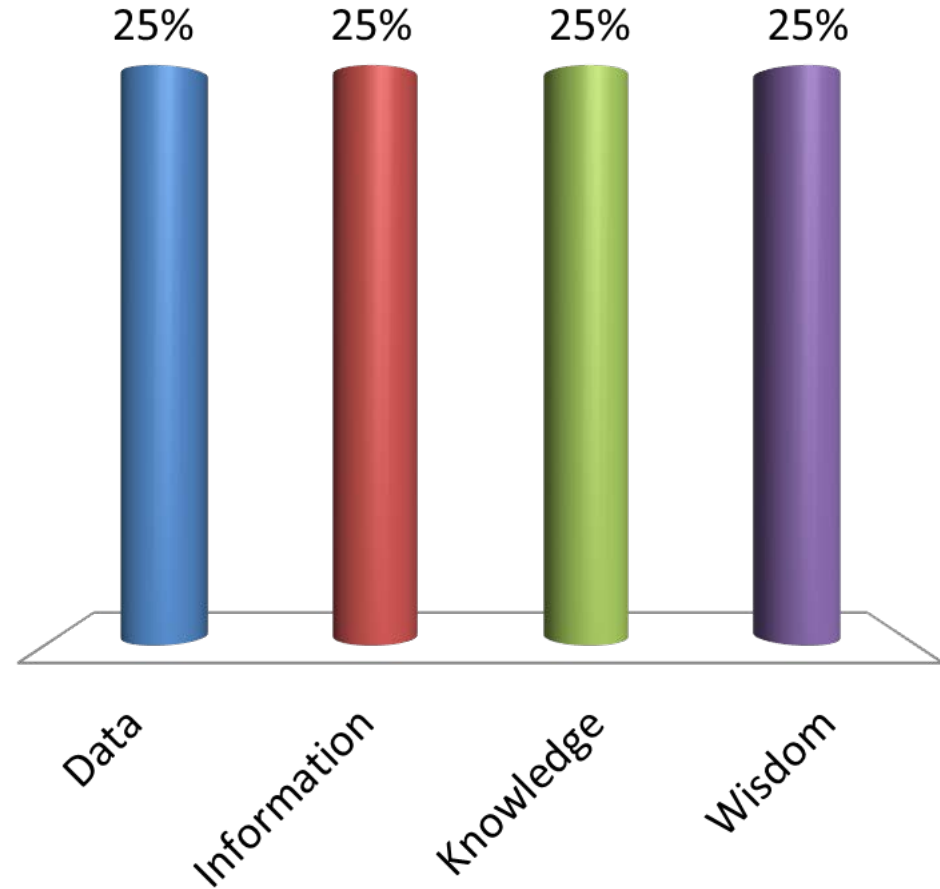
- Each scenario documents the following:
  - Minimum required data
  - AIXM mapping of NOTAM elements
  - Translations between the digital encoding to FAA legacy, ICAO, and plain language
  - Business rules
  - Sample digital NOTAM messages

# AIS: The Information Factory

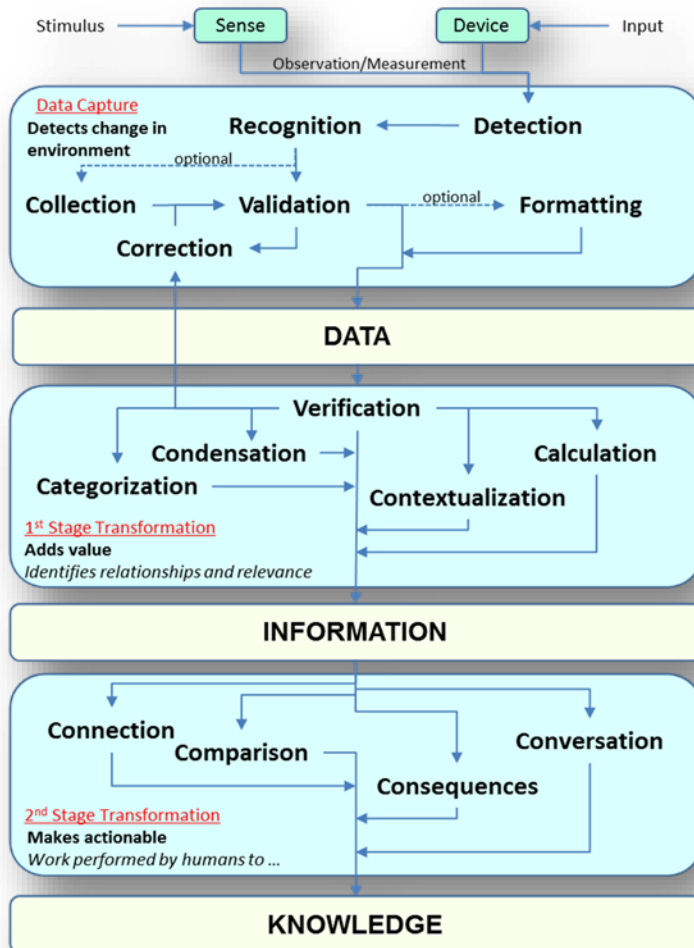


Are ingredients in a cooking recipe considered data, information, knowledge or wisdom?

- A. Data
- B. Information
- C. Knowledge
- D. Wisdom



# Final Thoughts...



- We collect data
- We develop information
- We publish information products/services
- We use knowledge to assure quality
  - QMS
  - Configuration management
  - Production control
- Risk can occur at any level
- We use metadata and artifacts to provide traceability and mitigate risk

# References

- ICAO Annex 4
- ICAO Annex 11
- ICAO Annex 14
- ICAO Annex 15
- PANS-AIM/Data Catalogue, Doc 10066



# Questions and Discussion



# Quality Management System



Federal Aviation Administration



# Module Objectives

- Describe the 5 required parts of a Quality Management System (QMS) as described by ICAO Annex 15 and discuss how they work together
- Describe potential means of compliance to meet the QMS requirements
- Discuss how a QMS may function as a safety risk control in the management of aeronautical information, data, and products
- Introduce industry QMS standards

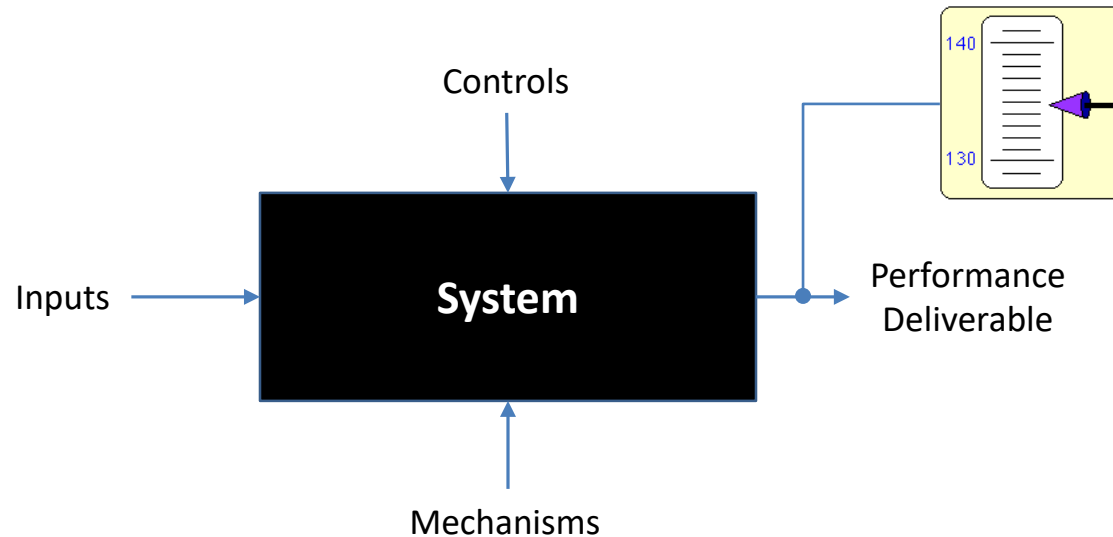
# Topics

- Quality Management System
- Industry Quality Standards
  - RTCA DO-200B/EUROCAE ED-76A

- Configuration Management
- Production Control

Part 2

# A System/Service

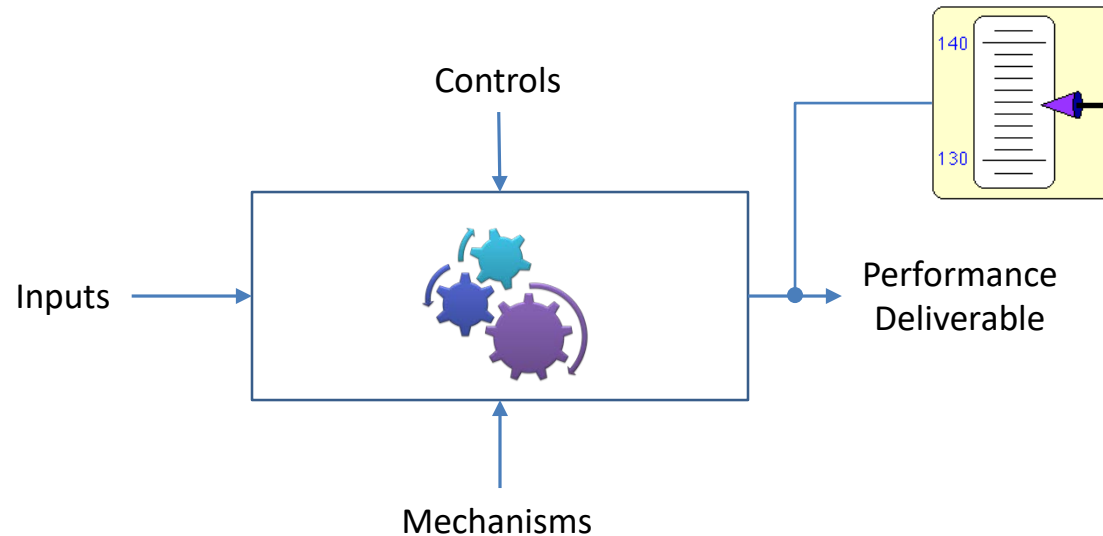


“You can't measure it, you can't manage it” <sup>1</sup>

“You can't control what you can't measure” <sup>2</sup>

Sources: <sup>1</sup>Peter Drucker, <sup>2</sup>Tom DeMarco

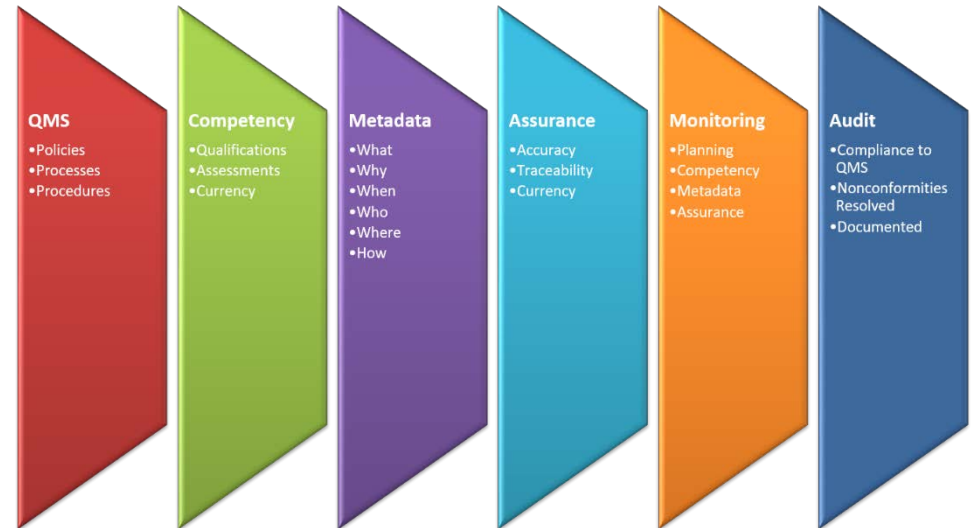
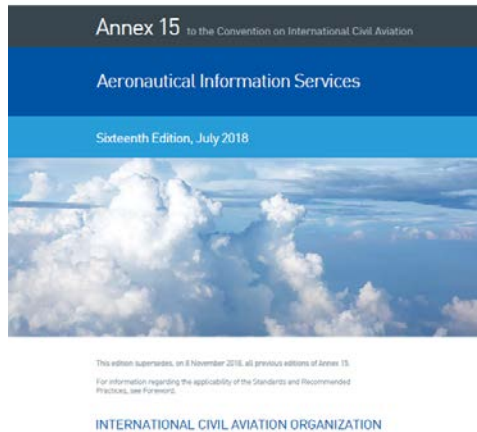
# A System/Service



Is it easier to manage if the system/service is transparent?

# Quality Management System

The Quality Management System (QMS) is how Annex 15 brings transparency into managing Aeronautical Information Services



ICAO Standards

# QUALITY MANAGEMENT SYSTEM

# ICAO Standard

## 3.6 Quality management system

3.6.1 Quality management systems shall be implemented and maintained encompassing all functions of an aeronautical information service, as outlined in 2.2. The execution of such quality management systems shall be made demonstrable for each function stage

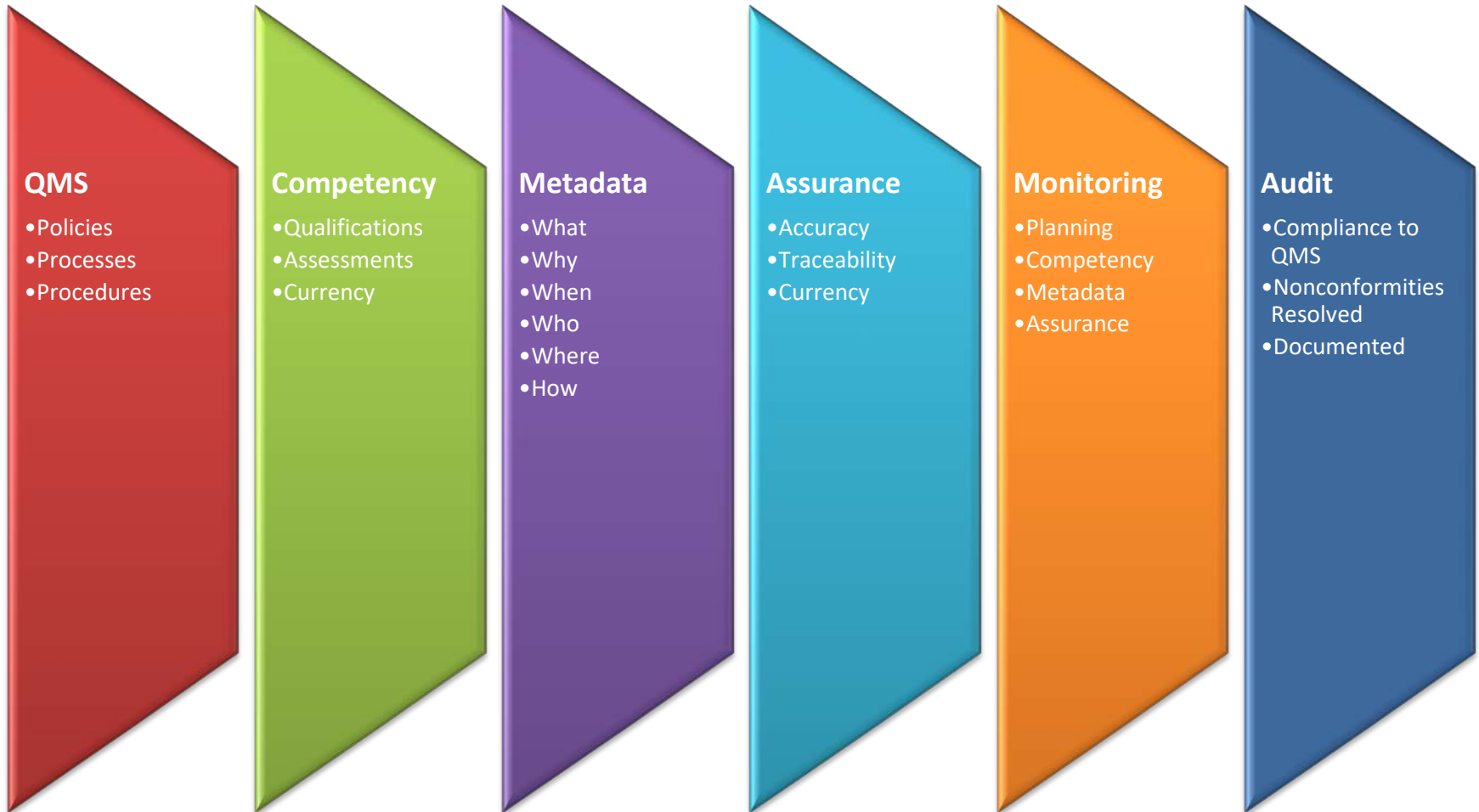
## 2.2 AIS responsibilities and functions

2.2.1 An AIS shall ensure that aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation are made available in a form suitable for the operational requirements of the air traffic management (ATM) community

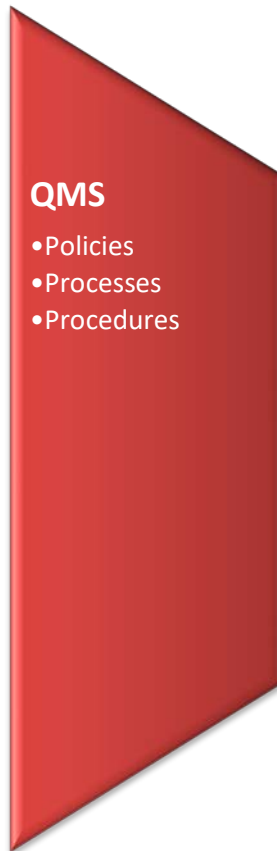
Resource: Annex 15, July 2018, Amendment 40

# General QMS Requirements

## ICAO Annex 15



# QMS



3.6.1 Quality management systems shall be implemented and maintained encompassing all functions of an AIS, as outlined in 2.2.

The execution of such quality management systems shall be made demonstrable for each function stage.

Resource: Annex 15, July 2018, Amendment 40

# Competency



3.6.4 Within the context of the established quality management system, the competencies and the associated knowledge, skills and abilities required for each function shall be identified, and personnel assigned to perform those functions shall be appropriately trained.

- Processes shall be in place to ensure that personnel possess the competencies required to perform specific assigned functions.
- Appropriate records shall be maintained so that the qualifications of personnel can be confirmed.
- Initial and periodic assessments shall be established that require personnel to demonstrate the required competencies.
- Periodic assessments of personnel shall be used as a means to detect and correct shortfalls.

Resource: Annex 15, July 2018, Amendment 40

# Metadata



3.6.5 Each quality management system shall include the necessary policies, processes and procedures, including those for the use of metadata, to ensure and verify that aeronautical data is traceable throughout the aeronautical information data chain so as to allow any **data anomalies or errors detected** in use to be identified by root cause, corrected and communicated to affected users.

4.2.1 Metadata shall be collected for aeronautical data processes and exchange points.

4.2.2 Metadata collection shall be applied throughout the aeronautical information data chain, from origination to distribution to the next intended user.

Resource: Annex 15, July 2018, Amendment 40

# Assurance

## Assurance

- Accuracy
- Traceability
- Currency

3.6.6 The established quality management system shall provide users with the necessary assurance and confidence that distributed aeronautical data and aeronautical information satisfy the aeronautical data quality requirements.

Resource: Annex 15, July 2018, Amendment 40

# Monitor

## Monitoring

- Planning
- Competency
- Metadata
- Assurance

3.6.7 All necessary measures shall be taken to monitor compliance with the quality management system in place.

Resource: Annex 15, July 2018, Amendment 40

# Audit



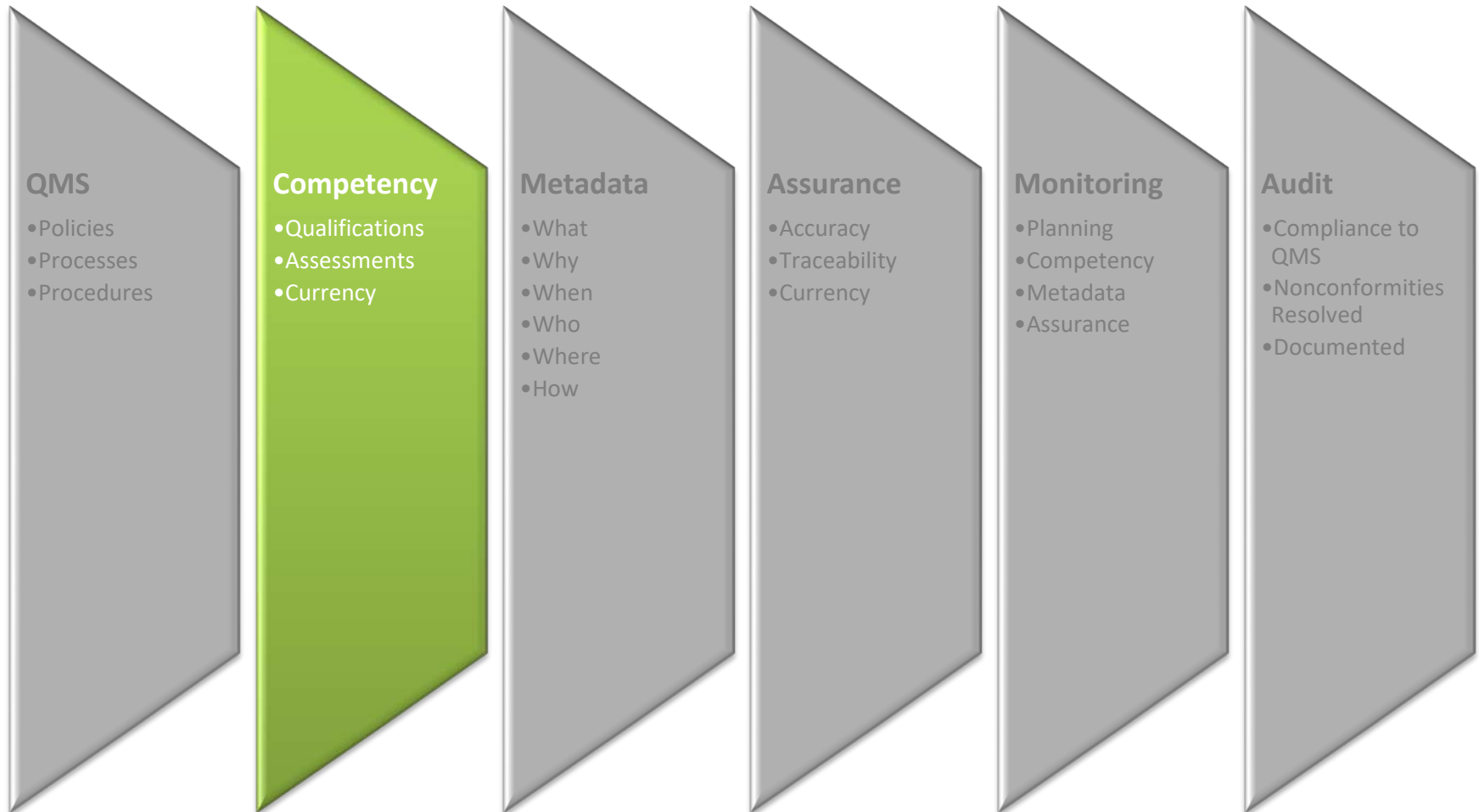
3.6.8 Demonstration of compliance of the quality management system applied shall be by audit.

If nonconformity is identified, initiating action to correct its cause shall be determined and taken without undue delay.

All audit observations and remedial actions shall be evidenced and properly documented.

Resource: Annex 15, July 2018, Amendment 40

# Competency Management



# Management Controls

What controls could be established to ensure staff competency?

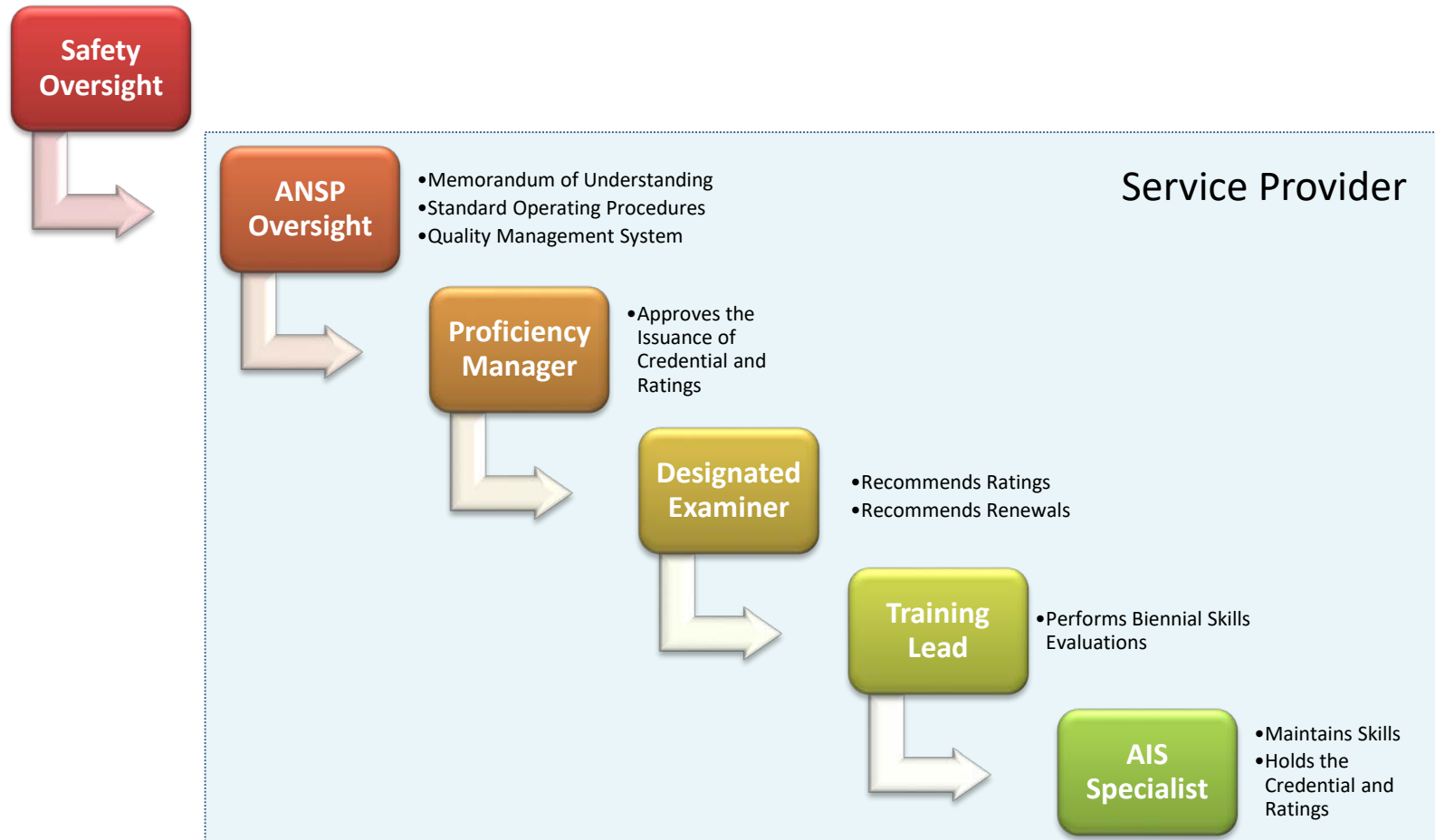
- Credentialing as an example means of compliance to ensure authoritative data management

# What is Credentialing?

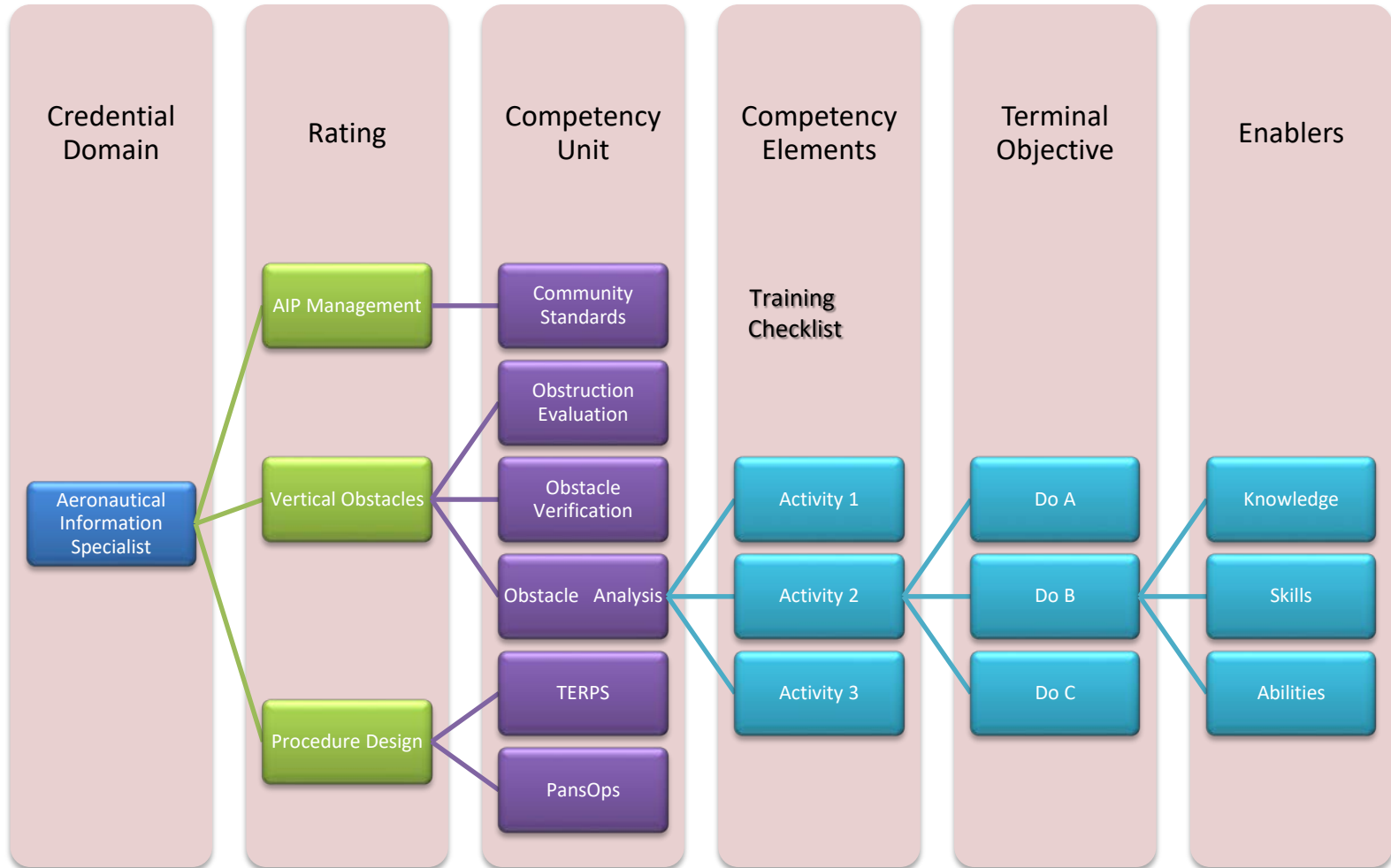
- The FAA Credentialing Program was developed to provide independent oversight of how personnel are trained and certified to perform direct safety-related air traffic control services or certification on certifiable systems, sub-systems, and equipment in support of the National Airspace System
- Credentialing is the program used by the FAA Air Traffic Safety Oversight Service to ensure that operational personnel have the required knowledge, skills and abilities to perform their assigned functions
  - The Credentialing Program identifies how to issue, amend, withdraw, and remove credentials
- While technically not a license, a credential acts like a license in that the holder is authorized to perform the duties as defined on the credential document

Resource: FAA Order 8000.90B, Air Traffic Safety Oversight Credentialing and Control Tower Operator Certification Programs

# Credentialing Program Governance Example



# AIS Ratings Example



# Competency Management

3.6.4 Within the context of the established quality management system, the competencies and the associated knowledge, skills and abilities required for

- 1 each function shall be identified, and personnel assigned to perform those functions shall be appropriately trained. 3
- 2 Processes shall be in place to ensure that personnel possess the competencies required to perform specific assigned functions.
- 4 Appropriate records shall be maintained so that the qualifications of personnel can be confirmed.
- 5 Initial and periodic assessments shall be established that require personnel to demonstrate the required competencies.
- 6 Periodic assessments of personnel shall be used as a means to detect and correct shortfalls.

Source: Annex 15, July 2018, Amendment 40

# Sample Competency Audit Survey

Group		1 Identify competencies	2 Document process to manage, conduct, record	3 Employees appropriately trained	4 Records maintained	5 Initial Assessment of competencies	5 Periodic Assessment of competencies	6 Means to detect & correct shortfalls	Access only by authorized personnel
1	Airport Survey								
2	AIS- Airports								
3	AIS- Airspace								
4	AIS - Procedures								
5	Obstacle Evaluation								
6	Obstacle Verification		✓						
7	Airport Mapping		✓						
8	Instrument Flight Procedures		✓						
9	IFP Charting		✓						
10	Visual Charting		✓						
11	En Route Charting								
12	RADAR Video Maps								
13	NOTAMS – Policy								
14	NOTAM Originators								
15	State NOTAM Office								

# Example Competency Rubric

## VERTICAL OBSTRUCTIONS SYLLABUS

### Course Overview

This training syllabus, used in conjunction with the OJT Rubric – Vertical Obstructions (VO), is designed to provide a structured training approach for Aeronautical Safety of Navigation VO analysts. The trainer will instruct in knowledge, skills, and abilities (KSA) required to maintain a Vertical Obstruction rating under the FAA Credentialing structure. Introduction/Overview – ISO and Security procedures

- Phase 1 - Basic
  - AOE Functions – Actions, Layers, Search, History
    - Production – Shapefile and feature creation and manipulation
    - Attributions – Accuracies, DEM, and codes
    - Maintenance
  - RemoteView Functions – Imagery Research, Search, Ordering
    - Production – Open Imagery, Saving, Graphics, Auto Review, MSP, Shapefiles
    - Attribution – Shapemaster, Codes, Accuracies, DEM
    - Maintenance
- Phase 2 – Proficient
  - Source Supplement

- Phase 3 – Advanced
  - Database Functions – Java Basics, Search, Map, Query, Diagnostics
  - Production – Access Files, managing Layers, Find matches, Accept/Update/Commit
  - Attributions – Accuracies, DEM, and codes
  - Maintenance
- Metrics

### Learning Objectives

- Student should be able to understand, analyze, edit, manipulate, and commit Vertical Obstructions.
- Student should be able to understand, analyze, manipulate, and collect Vertical Obstructions from RemoteView.
- Student should be able to manage Vertical Obstruction datasets.

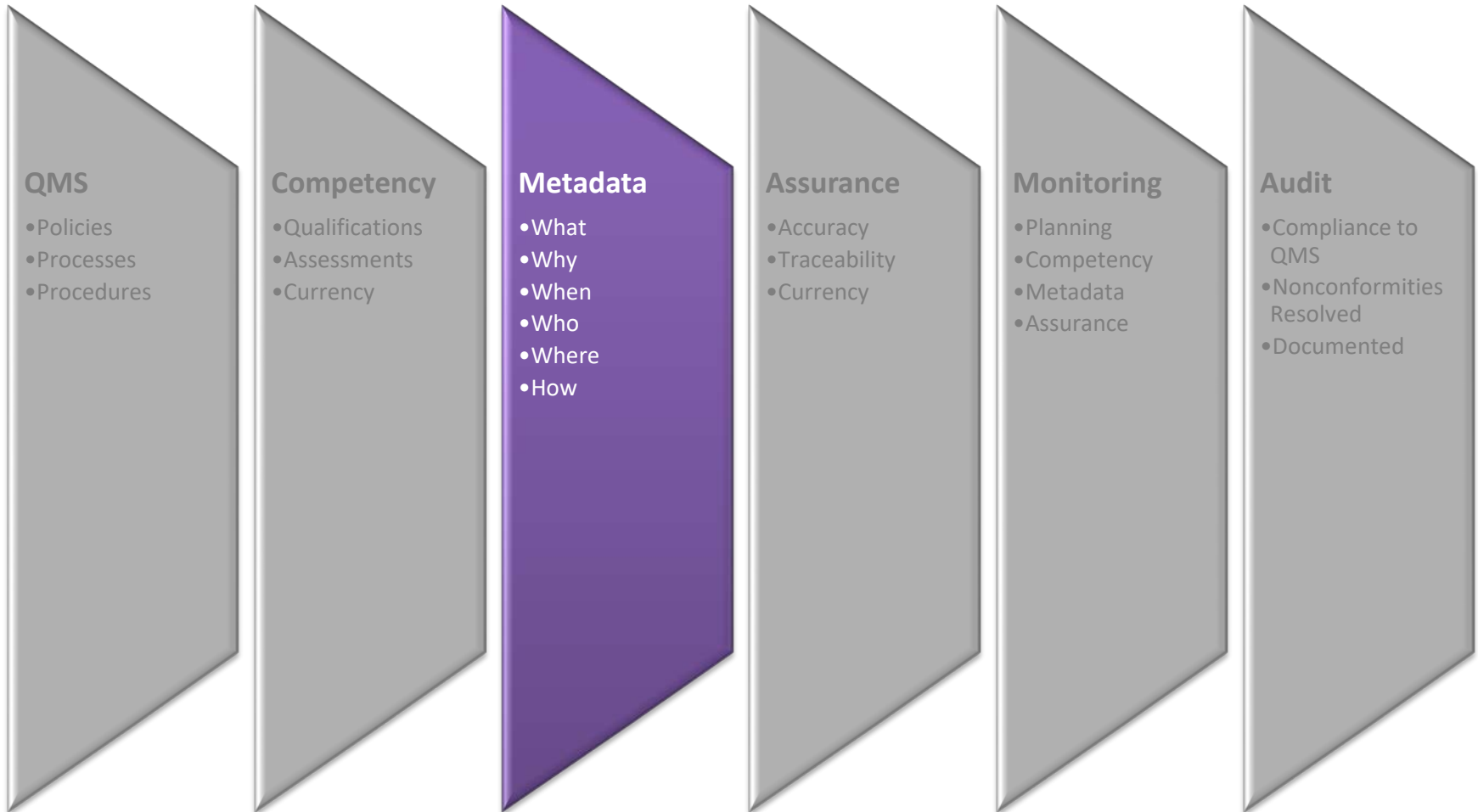
### Target Audience

This course is required for analysts who collect Vertical Obstructions.

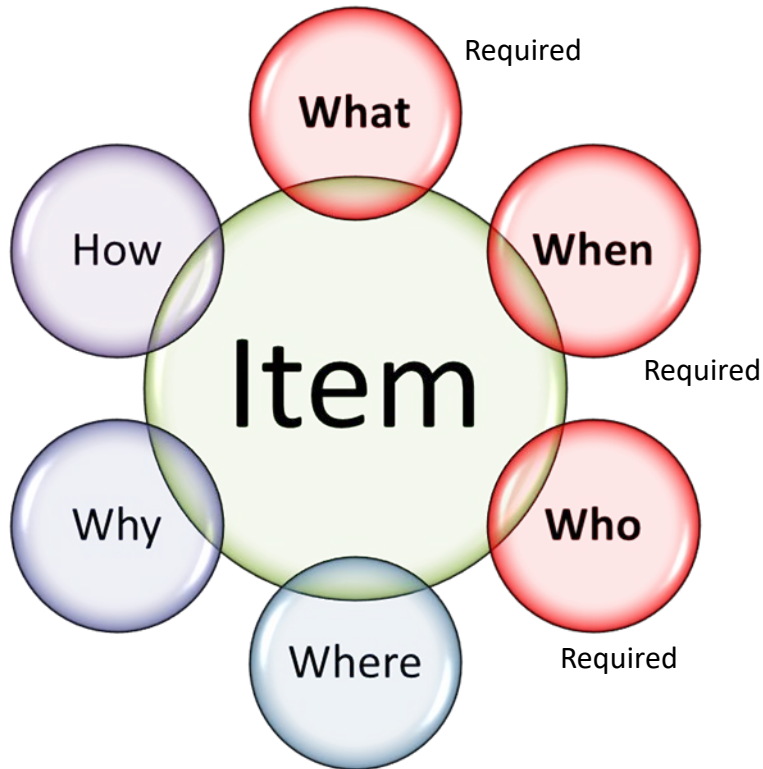
### Course Procedure

#### Training Overview

# Metadata



# Key Metadata Requirements



- To ensure and verify that aeronautical data are traceable throughout the aeronautical information data chain
- Entities performing any action of originating, transmitting or manipulating the data

# Key Metadata Requirements (Continued)

## 4.2 Metadata

4.2.1 Metadata shall be collected for aeronautical data processes and exchange points.

4.2.2 Metadata collection shall be applied throughout the aeronautical information data chain, from origination to distribution to the next intended user.

## 4.2 PANS-AIM

The metadata to be collected shall include, as a minimum:

- a) the names of the organizations or entities performing any action of originating, transmitting or manipulating the data;
- b) the action performed; and
- c) the date and time the action was performed.

Resource: Annex 15, July 2018, Amendment 40, PANS-AIM, July 2019, Edition 1.

# Key Metadata Requirements (Continued)

5.3.1.2 Each data set shall be provided to the next intended user together with at least the minimum set of metadata that ensures traceability.

## 5.3.2 Metadata

Each data set shall include the following minimum set of metadata:

- a) the names of the organization or entities providing the data set;
- b) the date and time when the data set was provided;
- c) period of validity of the data set; and
- d) any limitations with regard to the use of the data set.

*Note.* — *ISO Standard 19115 specifies requirements for geographic information metadata.*

# Common Metadata

	<b>What</b>	<ul style="list-style-type: none"><li>• is the data content?</li><li>• source data was used?</li></ul>	Required
	<b>Why</b>	<ul style="list-style-type: none"><li>• was the data created?</li><li>• are there missing values?</li></ul>	
Accurate	<b>How</b>	<ul style="list-style-type: none"><li>• was the data created?</li><li>• is the data distributed?</li></ul>	
Authoritative	<b>Who</b>	<ul style="list-style-type: none"><li>• created the data?</li><li>• manages the data?</li></ul>	Required
Timely	<b>When</b>	<ul style="list-style-type: none"><li>• is the time period of the content?</li><li>• was the data created?</li></ul>	Required
Discoverable	<b>Where</b>	<ul style="list-style-type: none"><li>• is the study area?</li><li>• can I access the data?</li></ul>	

# Artifacts vs. Metadata

## Artifacts

Documents that support the processing of the feature

- Origination documents
- Checklists
- Approvals
- QA reviews

## Metadata

Data that describes the actions supporting the processing of the feature

- Who
- What
- When
- Why
- Where
- How

# Revision History from Metadata Example

The screenshot shows the TopSky database interface. At the top, the search date is 2015/07/23 and the organization is 'no value'. The interface includes a navigation menu on the left and a main data table. The table contains columns for various identifiers and dates. Below the table, there is a detailed view of a feature related to 'MEXICO + MMCS + 03/21 + 03 + THR'. The 'History' tab is selected, showing a timeline of version changes from 2004 to 2021. The 'THALES' logo is prominently displayed in the center of the history view.

MMCO	MMCS	MMCS	THR
MMCO	09/27	09	THR
MMCO	03/21	21	THR
MMCO	17/05	35	THR
MMCO	17/05	17	THR
MMES	11/29	11	THR
MMES	11/29	29	THR
MMCS	02/20	02	THR
MMCS	02/20	20	THR
MMCV	15/03	33	THR
MMCV	15/03	15	THR

Feature Related THR / DTHR Centreline Point: **MEXICO + MMCS + 03/21 + 03 + THR**

Version effective from: 2015/07/23      Version effective until: 9999/12/31      Owner Authority: NATIONAL

History

This tab allows you to visualize the different versions of a feature, the timeline display. You can click on a line to display the detailed differences between the two versions.

Timeline: 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021

2015/07/23 - Indeterminate

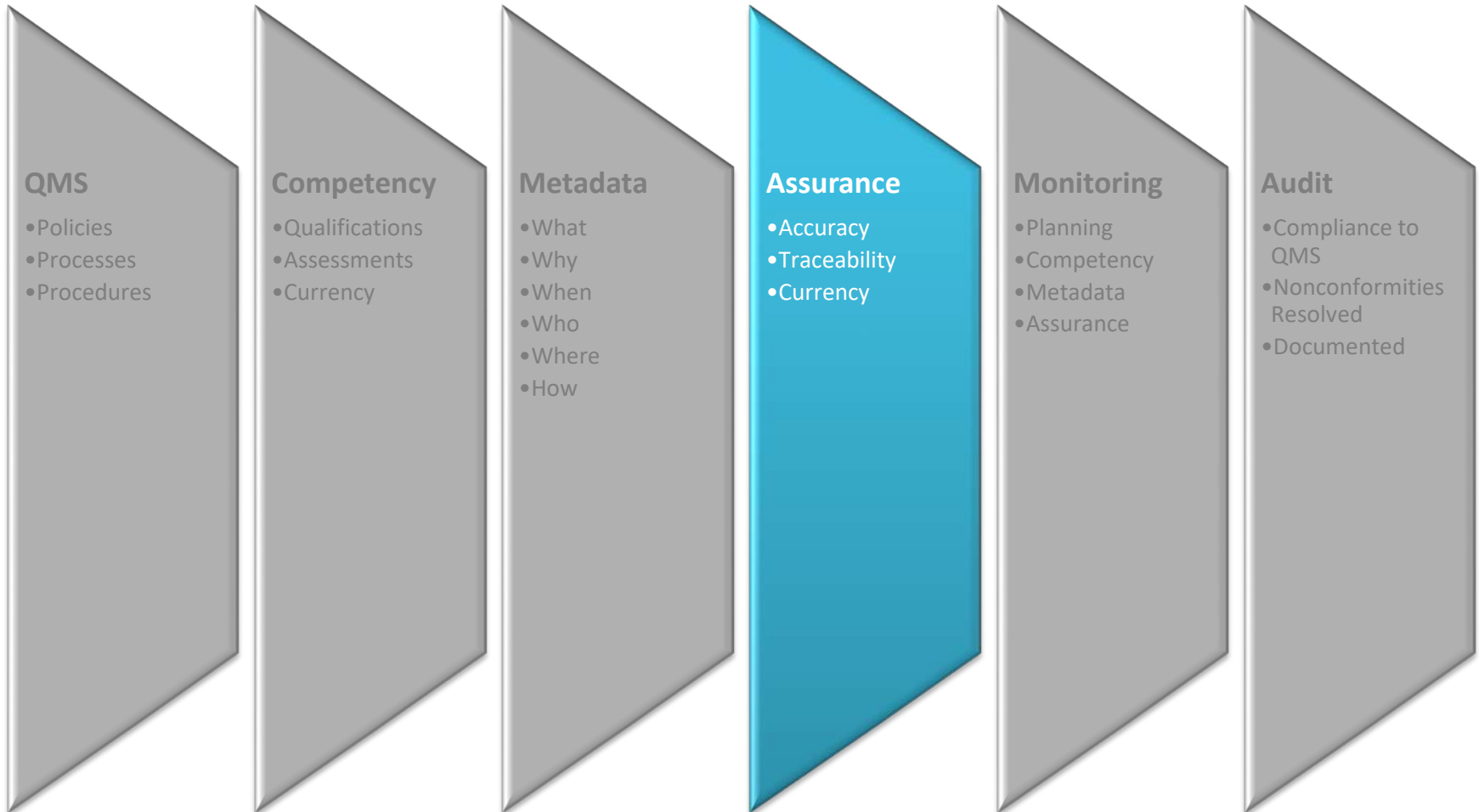
2013/07/12 - 2015/07/23

2008/05/20 - 2013/07/12

2004/07/08 - 2008/05/20

Not an advertisement or endorsement – EXAMPLE ONLY

# Assurance

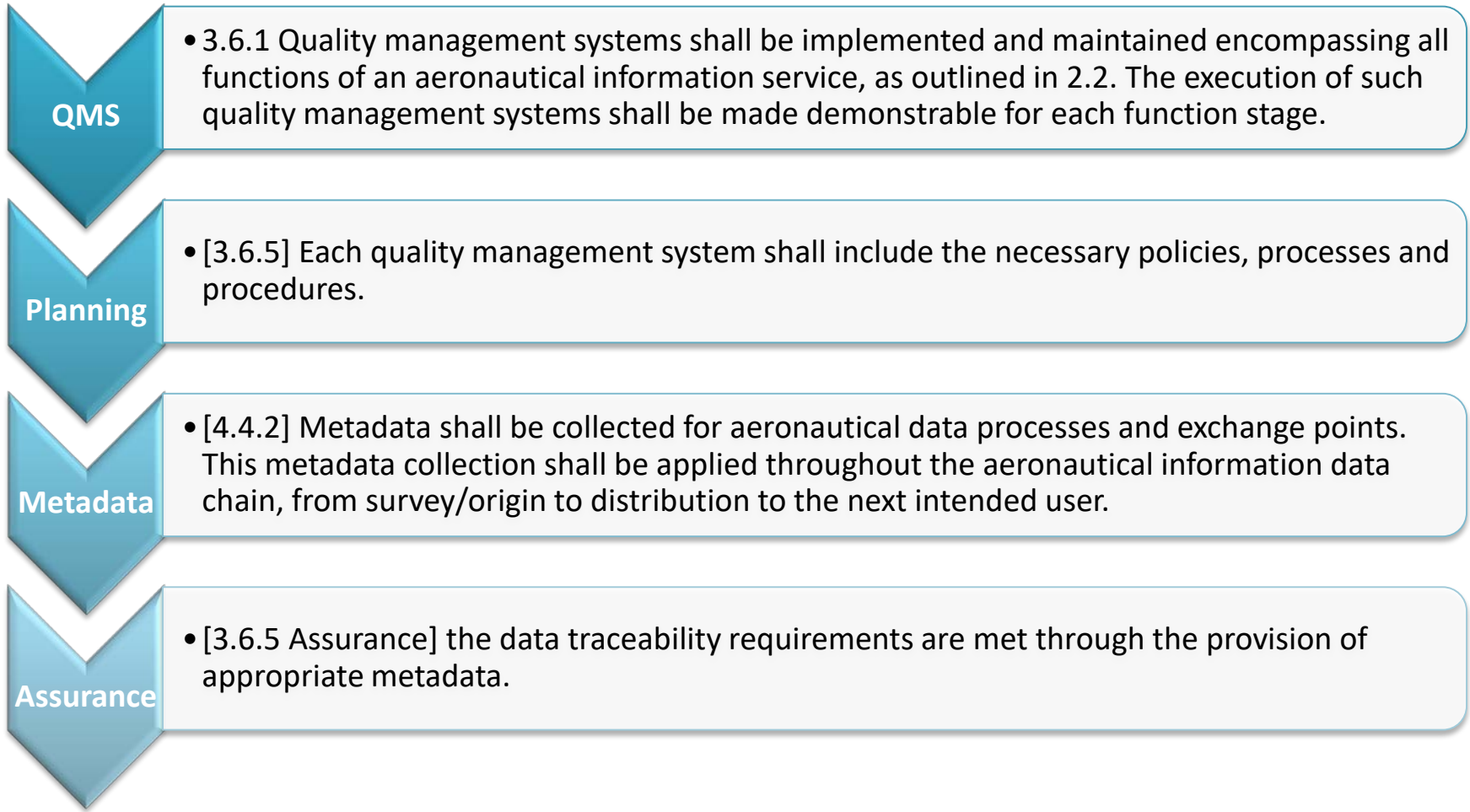


# Data Assurance

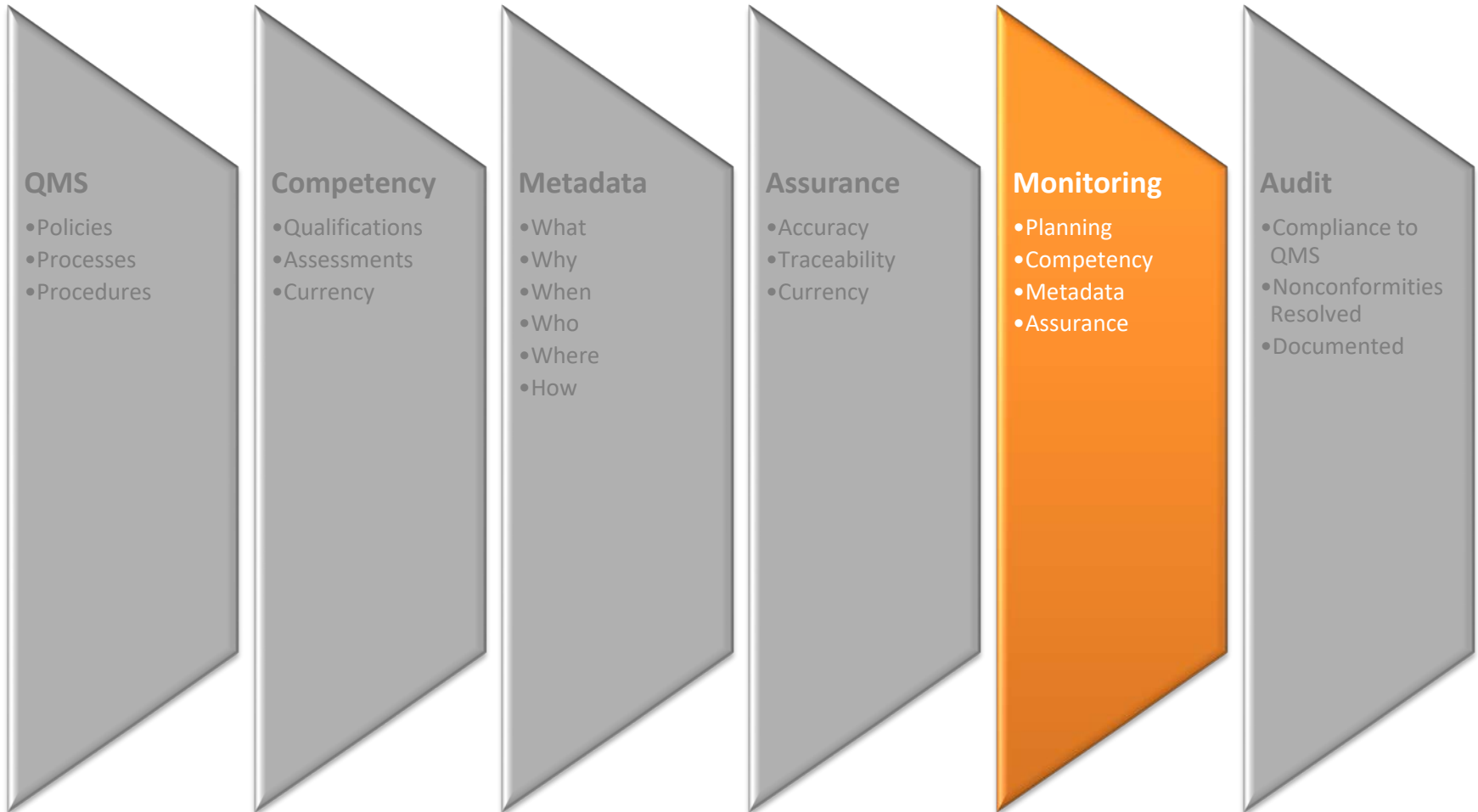
Requirement	Description
Accuracy	The order of accuracy for aeronautical data shall be in accordance with its intended use
Resolution	The order of resolution of aeronautical data shall be commensurate with the actual data accuracy
Integrity	The integrity of aeronautical data shall be maintained throughout the data process from origination to distribution to the next intended user
Traceability	Traceability of aeronautical data shall be ensured and retained as long as the data is in use
Timeliness	Timeliness shall be ensured by including limits on the effective period of the data elements
Completeness	Completeness of the aeronautical data shall be ensured in order to support the intended use

Resource: Annex 15, July 2018, Amendment 40, paragraph 3.2 Data quality specifications

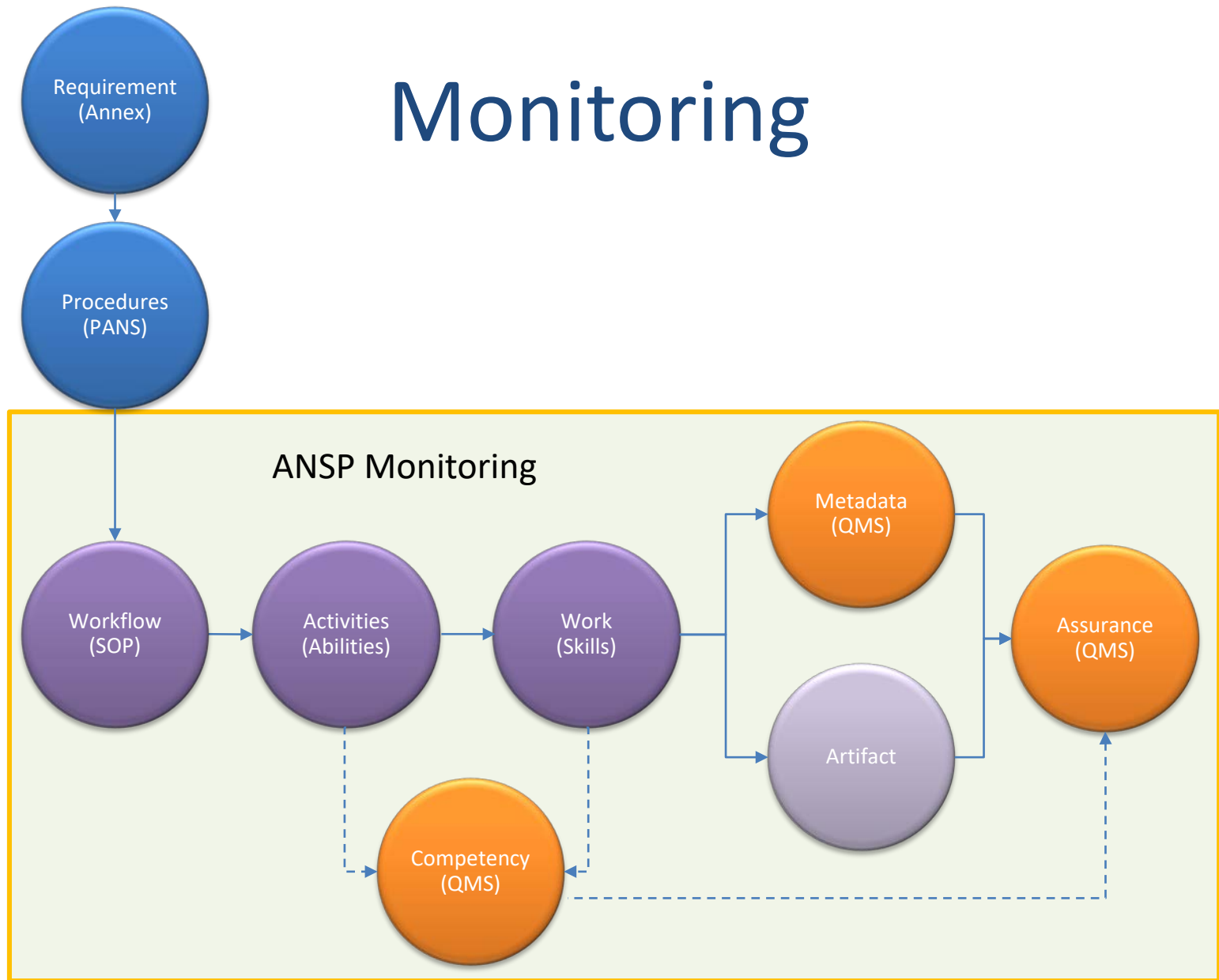
# Line of Sight



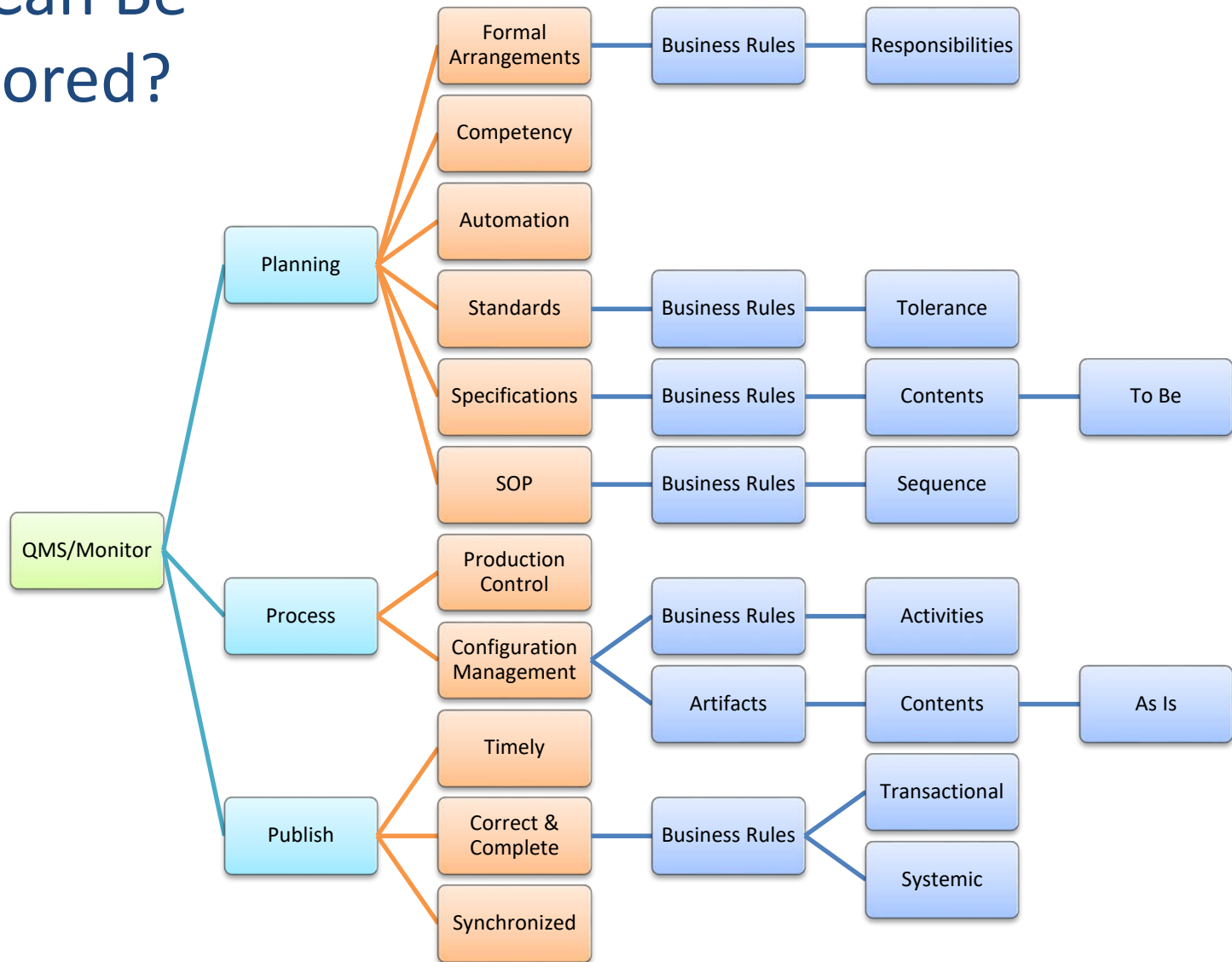
# Monitoring



# Monitoring



# What Can Be Monitored?



# Audit

## QMS

- Policies
- Processes
- Procedures

## Competency

- Qualifications
- Assessments
- Currency

## Metadata

- What
- Why
- When
- Who
- Where
- How

## Assurance

- Accuracy
- Traceability
- Currency

## Monitoring

- Planning
- Competency
- Metadata
- Assurance

## Audit

- Compliance to QMS
- Nonconformities Resolved
- Documented

# QMS Audit

- Compliance to QMS
- Nonconformities resolved
- Documented



# QMS Review

## QMS

- Policies
- Processes
- Procedures

## Competency

- Qualifications
- Assessments
- Currency

## Metadata

- What
- Why
- When
- Who
- Where
- How

## Assurance

- Accuracy
- Traceability
- Currency

## Monitoring

- Planning
- Competency
- Metadata
- Assurance

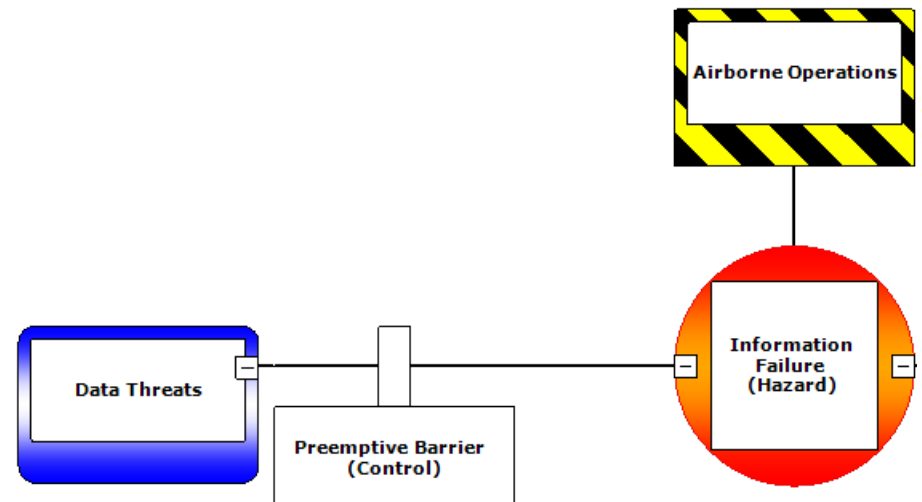
## Audit

- Compliance to QMS
- Nonconformities Resolved
- Documented

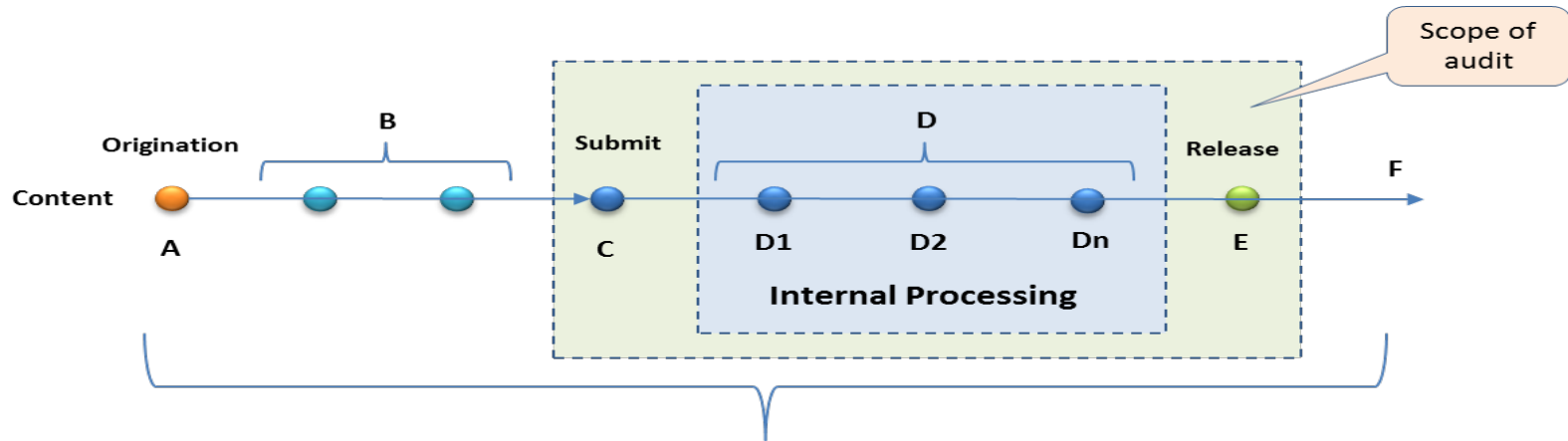


# Discussion

- What does QMS mean to safety oversight?
- What does the State ensure?
  - How do we ensure...
- What tools do we have?



# QMS Applied to AIS

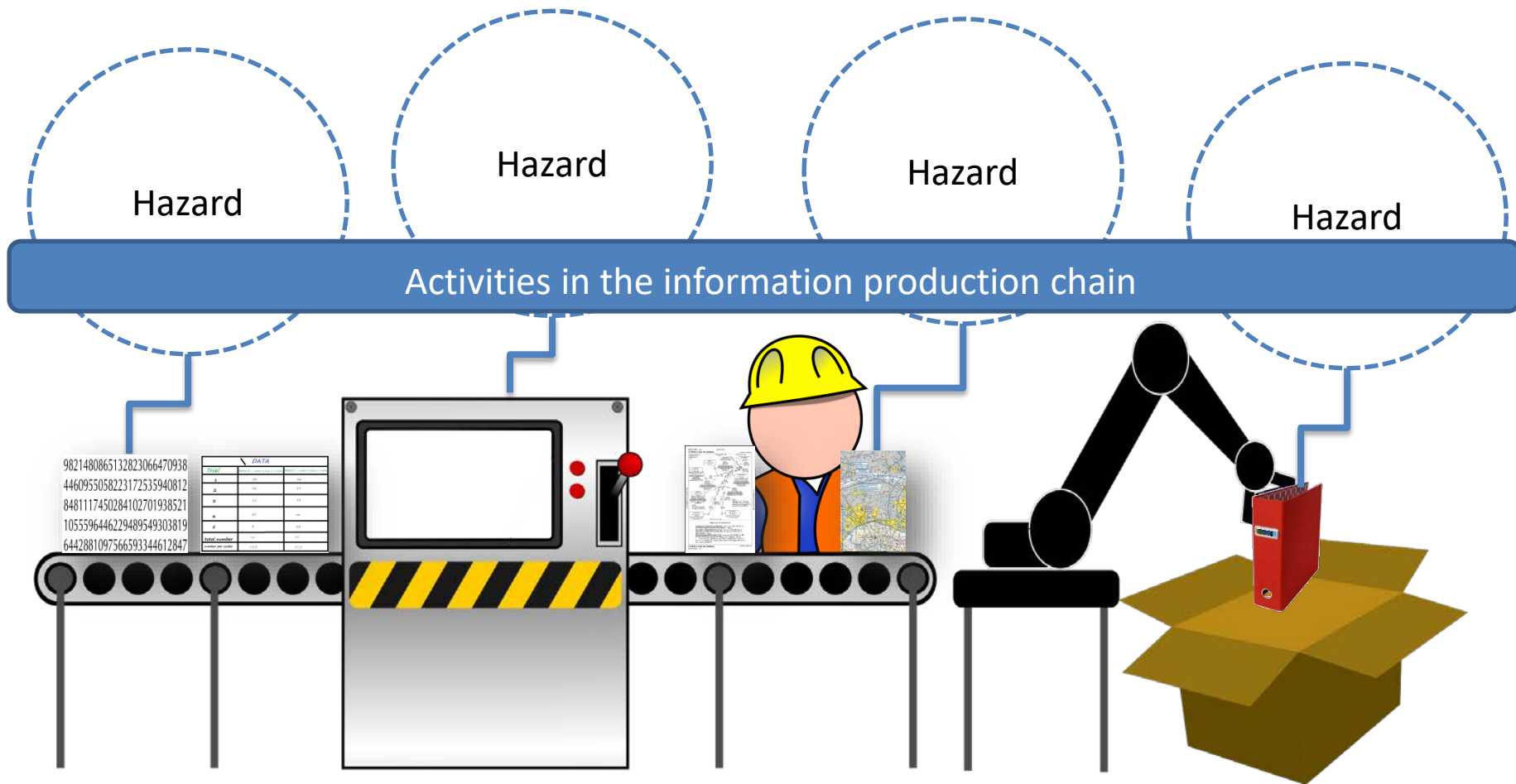


**Aeronautical Data Chain**

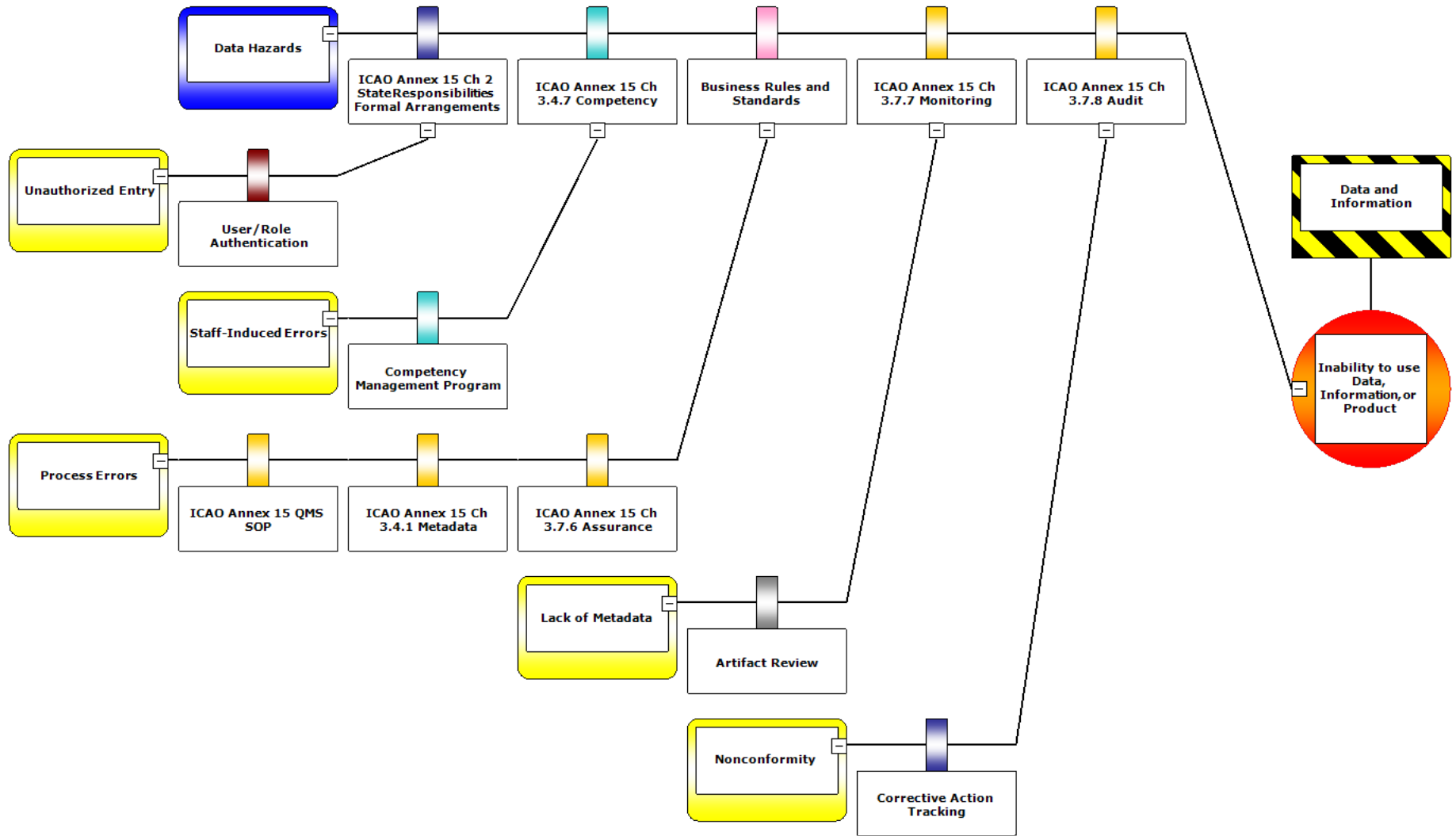
Activity	Description
A	Origination
B	Pre-AIS processing
C	Submission to AIS
D	AIS Internal Processing
E	Release by AIS
F	Downstream Processing

Resource: FAA Air Traffic Safety Oversight Service, Audit Report, Aeronautical Data Metadata, ADT-FY15-010; dated May 14, 2015

# AIS: What are the Safety Risk Controls?



# Annex 15 QMS as the Safety Risk Control



# Final Thoughts...

- ICAO Annex 15 requires AIS providers to implement a QMS
- A QMS includes the following components:
  - Competency
  - Metadata
  - Assurance
  - Monitoring
  - Audit
- A QMS helps AIS providers:
  - Meet aeronautical information performance requirements
  - Control products, services and process outcomes

QMS = safety management control

# RTCA

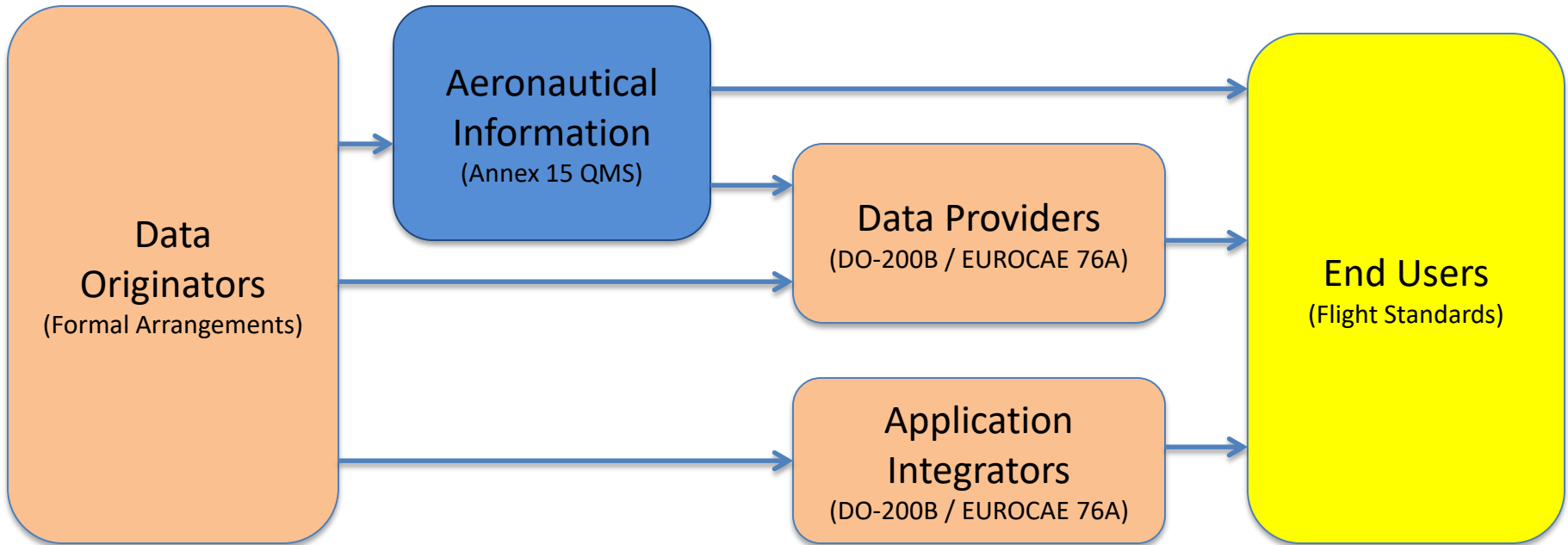


Industry Standards for Processing Aeronautical Data

## RTCA DO-200B

## EUROCAE ED-76A

# Data Chain Overview



Resource: RTCA DO-200B Figure 1-2, Aeronautical Data Chain Participants and Flow of Aeronautical Data

# Data Quality Requirements

## 2.3.2 Data Quality Characteristics

The data quality requirements shall characterize the data by:

1. The accuracy of the data;
2. The resolution of the data;
3. The confidence that the data has not been corrupted while stored, processed or transmitted (assurance level);
4. The ability to determine the origin of the data (traceability);
5. The level of confidence that the data is applicable to the period of intended use (timeliness);
6. The data needed to support intended use (completeness); and
7. The format of the data.

Resource: RTCA DO-200B

# Aeronautical Data Processing Requirements

- 2.4.1 Data Processing Procedure Requirements
- 2.4.2 Data Alteration Communication Requirement
- 2.4.3 Data Configuration Management
- 2.4.4 Competency Management
- 2.4.5 Aeronautical Data Tool Qualification
- 2.4.6 Defining Data Security Requirements

Resource: RTCA DO-200B, Ch. 2.4 Defining Aeronautical Data Processing Requirements

# Data Configuration Management

2.4.3.2 The following requirements apply to data placed under configuration management:

- Each distinct version of data element or data set shall be assigned an unique identification
- Configuration management procedures shall ensure that a data element cannot be changed without changing the data element identification

Resource: RTCA DO-200B, Ch. 2.4 Defining Aeronautical Data Processing Requirements

# Data Configuration Management (continued)

These records shall be sufficient to allow the following to be established:

1. That data element has not been separated from its correct label
2. The start and end dates of the period of validity of the data element
3. The date of production of the data element
4. The supplier of each data value contained within the data element or data set
5. The procedures used to produce the data elements
6. Verification and Validation checks, including feedback comparison output as relevant

Resource: RTCA DO-200B, Ch. 2.4 Defining Aeronautical Data Processing Requirements

# Data Configuration Management (continued)

A copy of each data element shall be retained for a period determined by the Configuration Management Plan.

The method of storage and the numbers of copies maintained shall be such that:

1. The integrity of each data element can be assured for the entire period that it is retained
2. Data storage media is protected against physical damage and degradation

Resource: RTCA DO-200B, Ch. 2.4 Defining Aeronautical Data Processing Requirements

# Quality Management Requirements

2.5.1 Quality Management Procedure Requirements

2.5.2 Quality Management Control

2.5.3 Review

2.5.4 Document Control Requirements

2.5.5 Quality Records

2.5.6 Management Reviews

Resource: RTCA DO-200B, Ch. 2.5 Defining Quality Management Requirements

# Compliance

## 3.1 Demonstration of Compliance

- Shall demonstrate such compliance to the applicable sections
- Compliance, normally, demonstrated by audit

## 3.2 Audit Objectives

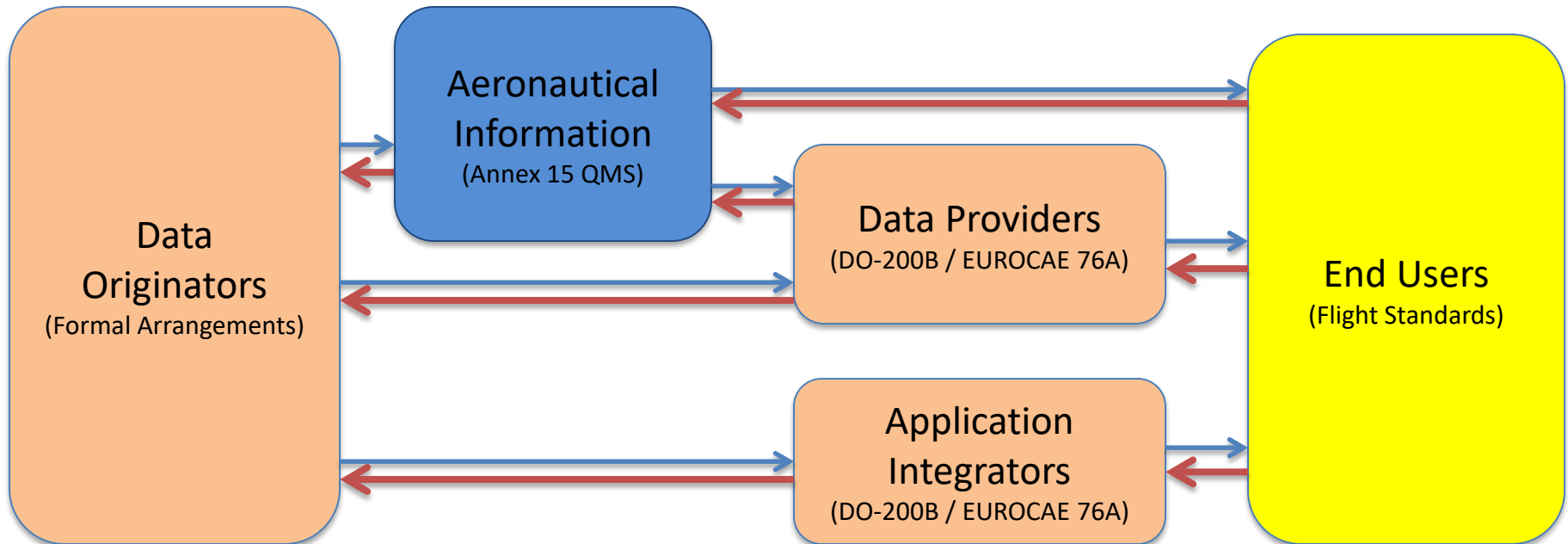
- The audit shall confirm that the QMS meets all requirements and that any compliance deviations have been coordinated, documented, and tracked

## 3.3 Audit Procedures

## 3.4 Audit Report

Resource: RTCA DO-200B, Ch. 3 Compliance

# Data Chain with Feedback



# References

- ICAO Annex 15
- PANS-AIM/Data Catalogue, Doc 10066
- FAA Order 8000.90B, Air Traffic Safety Oversight Credentialing and Control Tower Operator Certification Programs
- FAA Air Traffic Safety Oversight Service, Audit Report, Aeronautical Data Metadata, ADT-FY15-010; dated May 14, 2015
- NGA Sample Competency Rubric:
  - Aeronautical Analyst, Vertical Obstructions
- Lessons from Peter Drucker, Peter Drucker
- Famous principle from Tom DeMarco
- RTCA DO-200B
- EUROCAE ED-76A



# Questions and Discussion



# Production Control and Configuration Management



Federal Aviation  
Administration



# Topics

- Quality Management System
- Industry standards
  - RTCA DO-200B/EUROCAE ED-76A

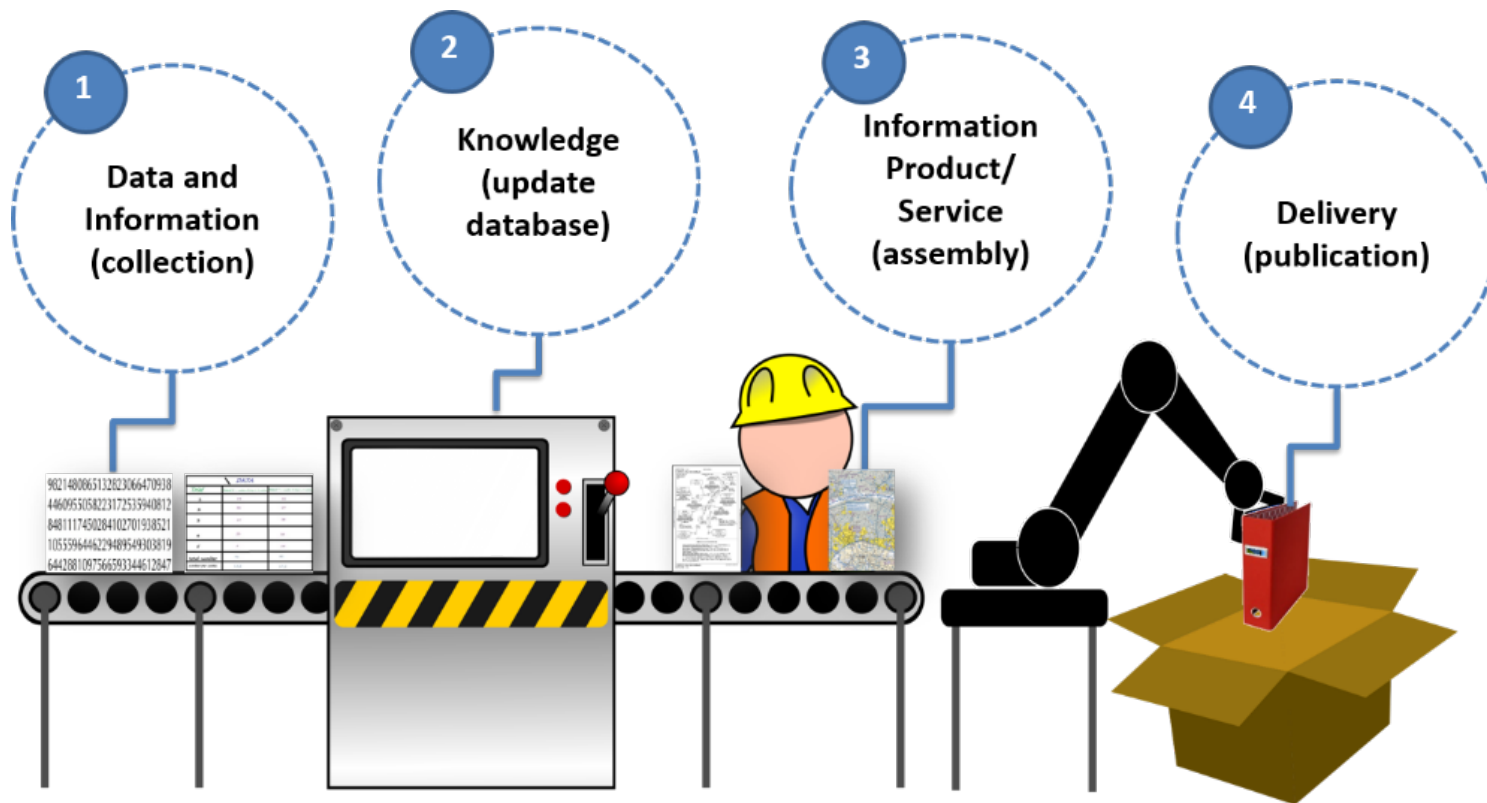
Part 1

- **Production Control**
- **Configuration Management**

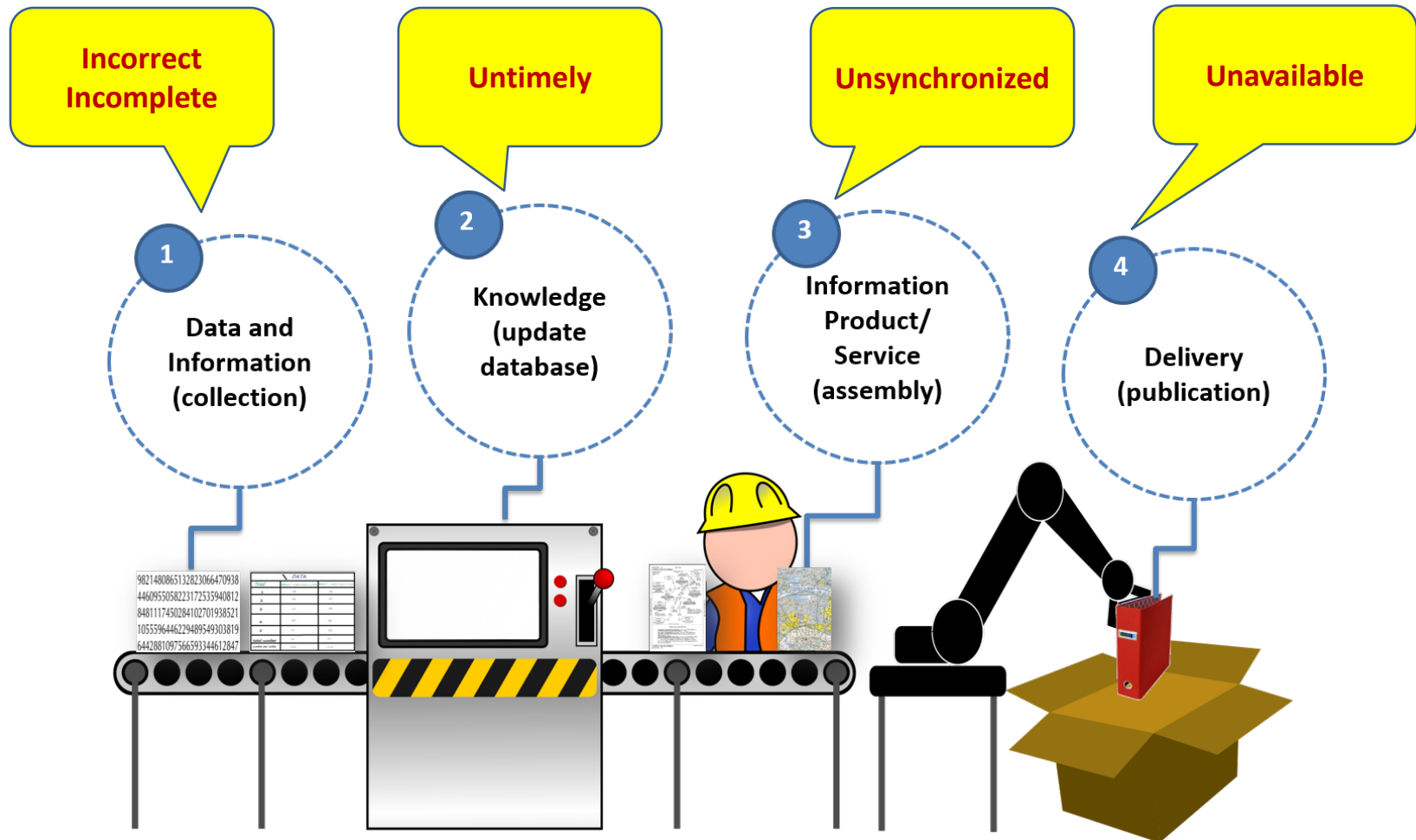
# Module Objectives

- Introduce production control and configuration management concepts that support the ICAO QMS requirements
- Discuss production control and configuration management relationship to information hazards

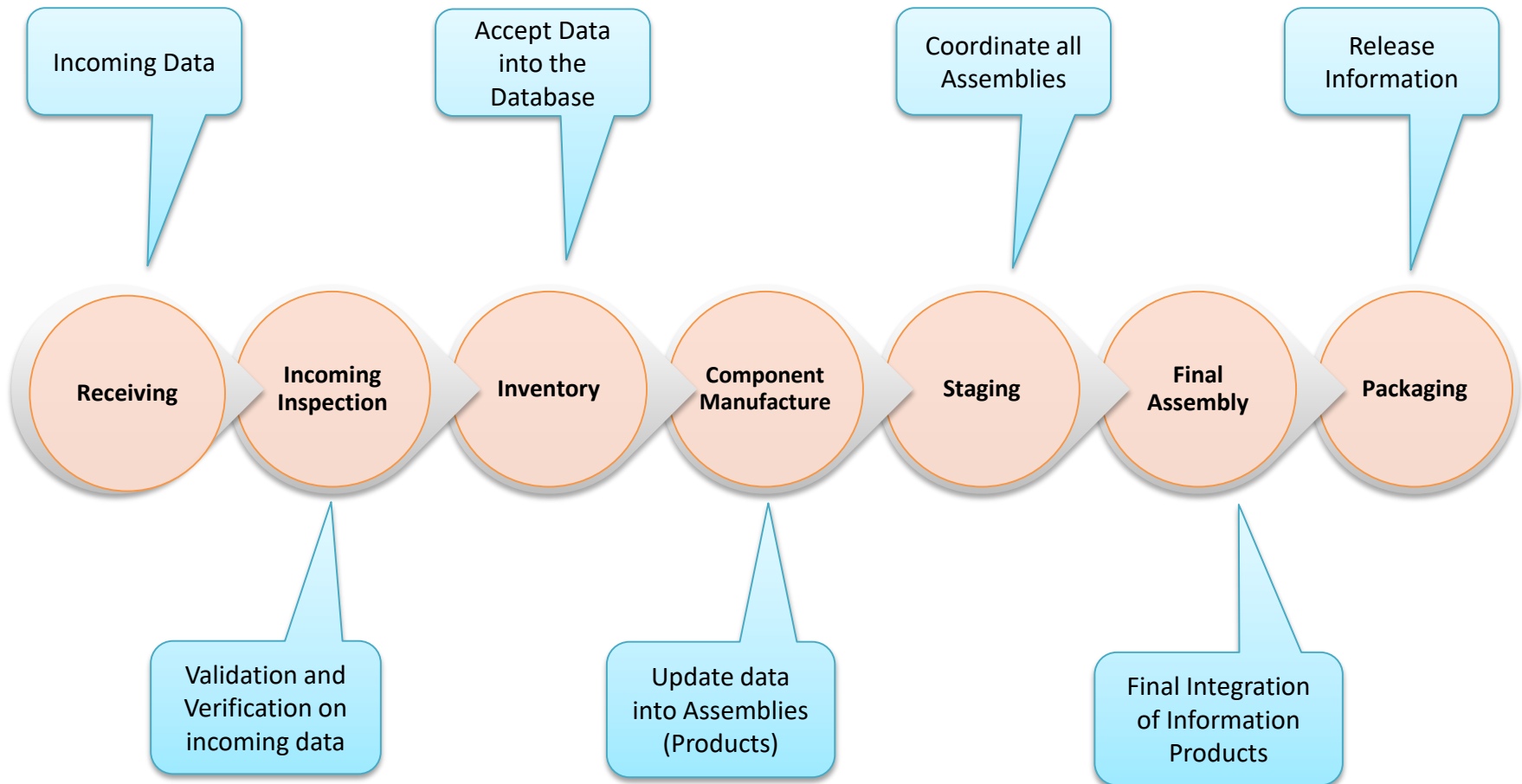
# The Information Factory



# What Could Go Wrong?



# Fundamental Processes



# The Safety Oversight View of AIS

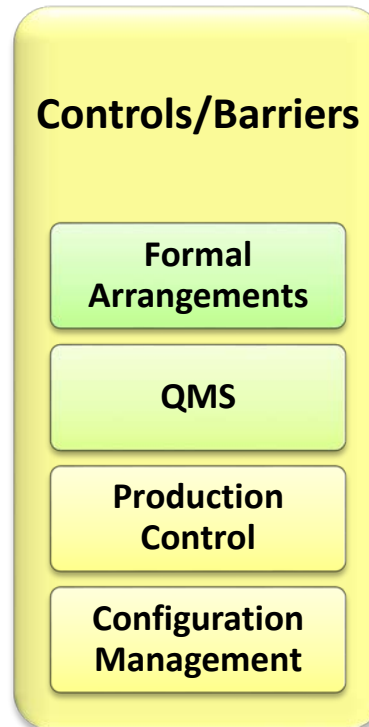
What could go wrong?



What does risk look like?



What prevents things from going wrong?



How will I know if controls are working?



# The Safety Oversight View of AIS (continued)

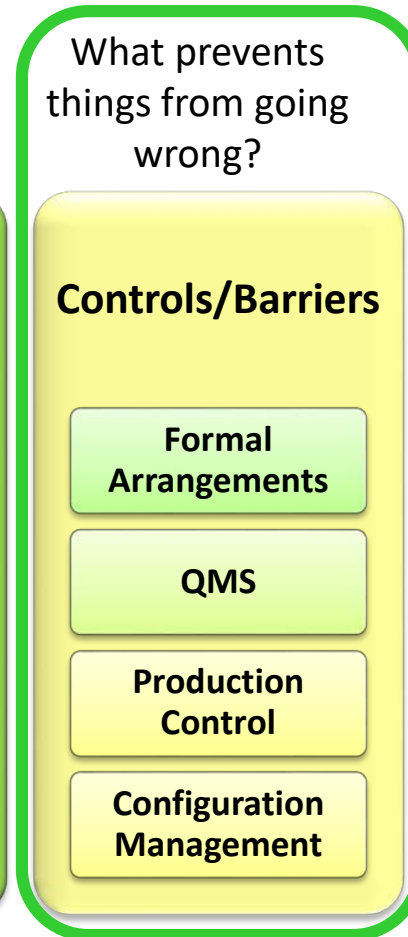
What could go wrong?



What does risk look like?



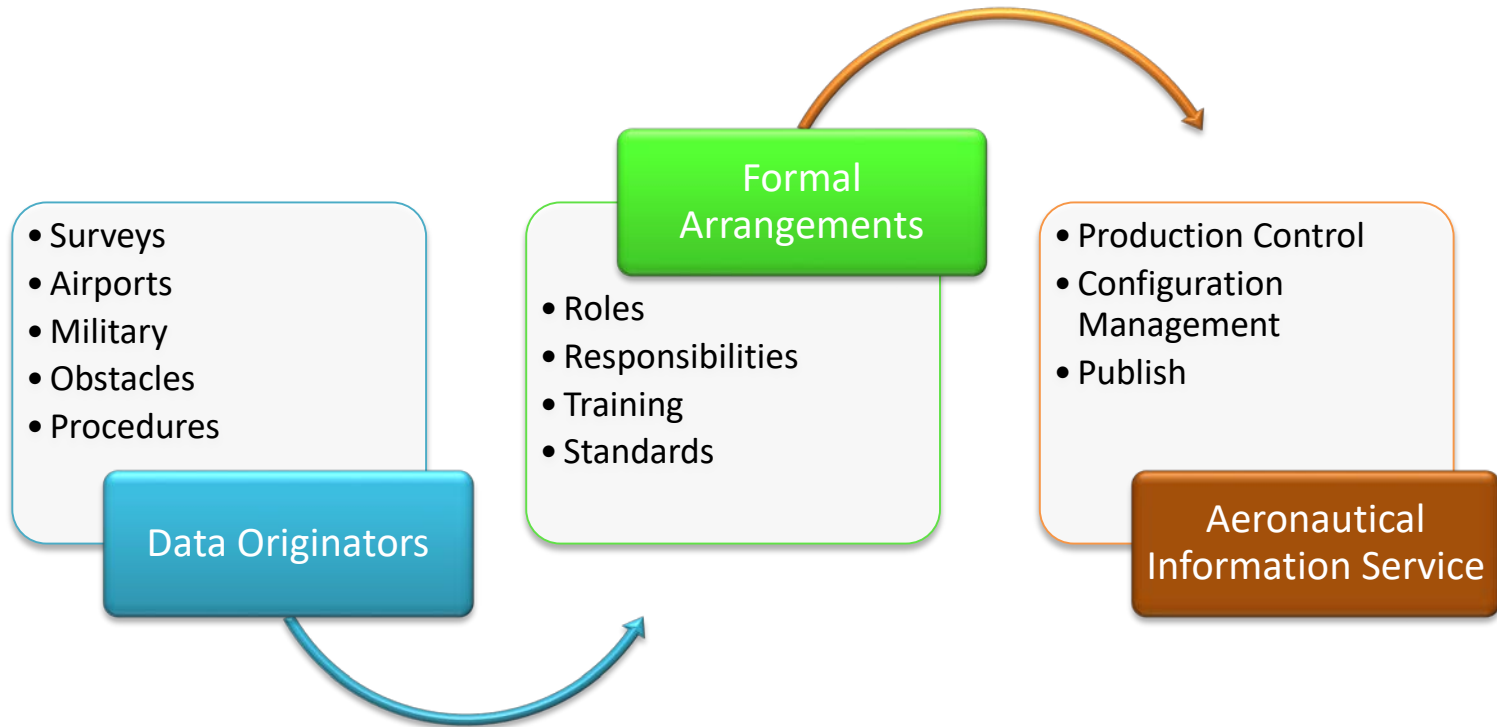
What prevents things from going wrong?



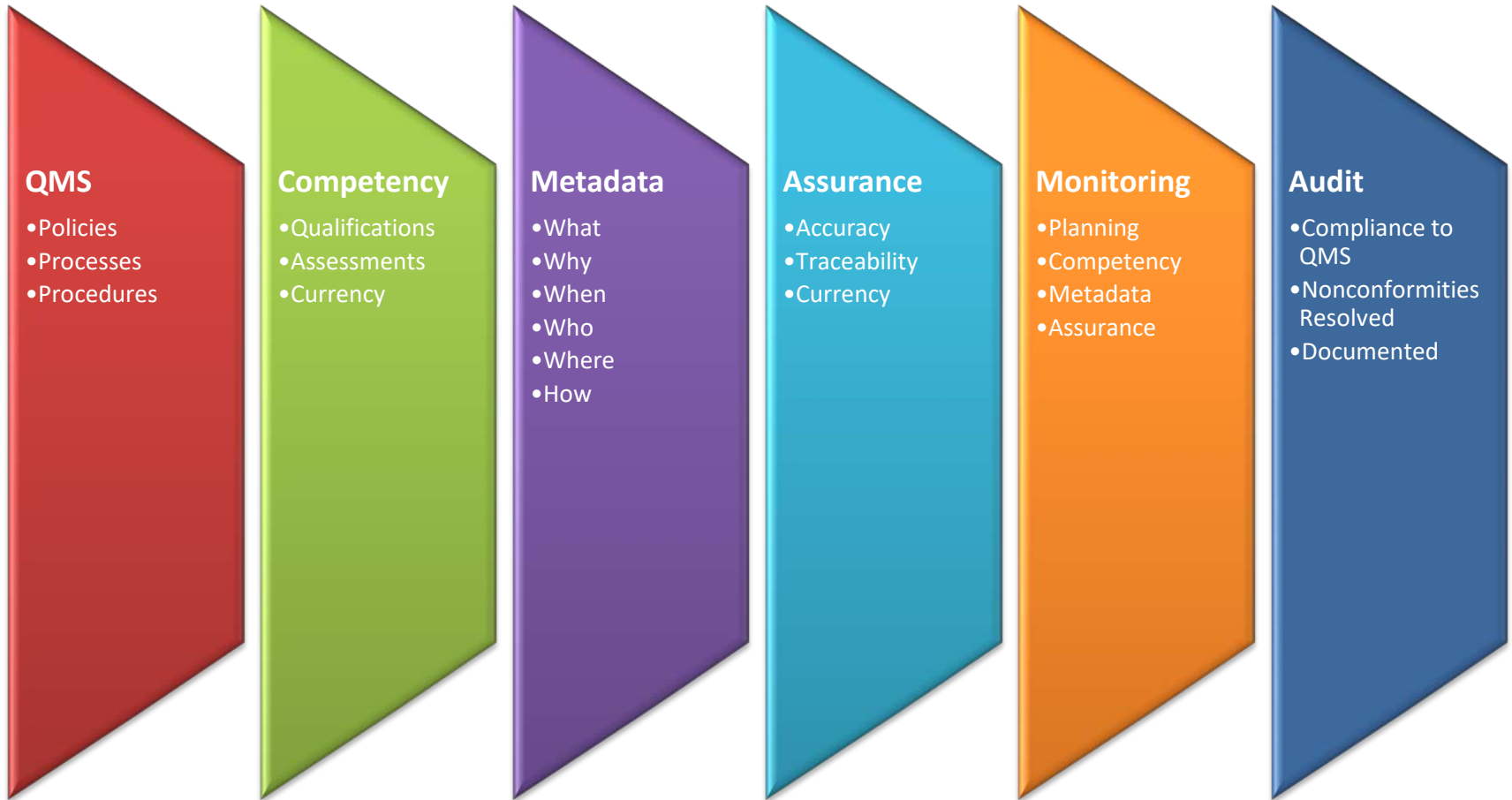
How will I know if controls are working?

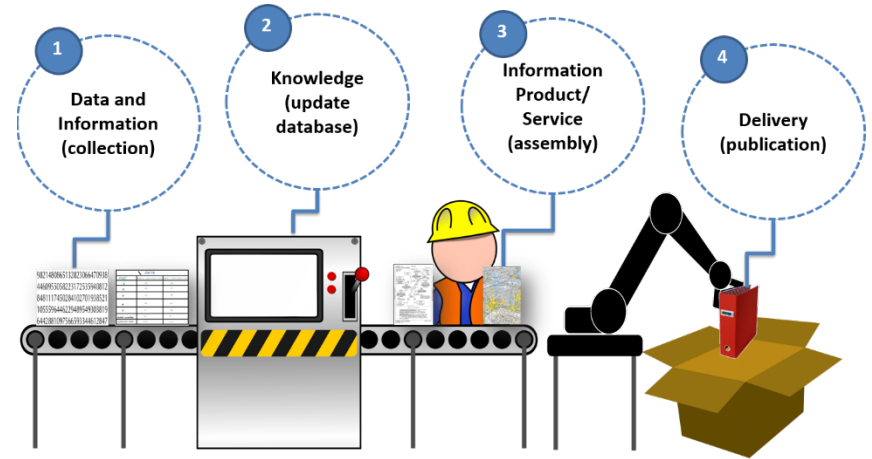


# Formal Arrangements



# Quality Management System





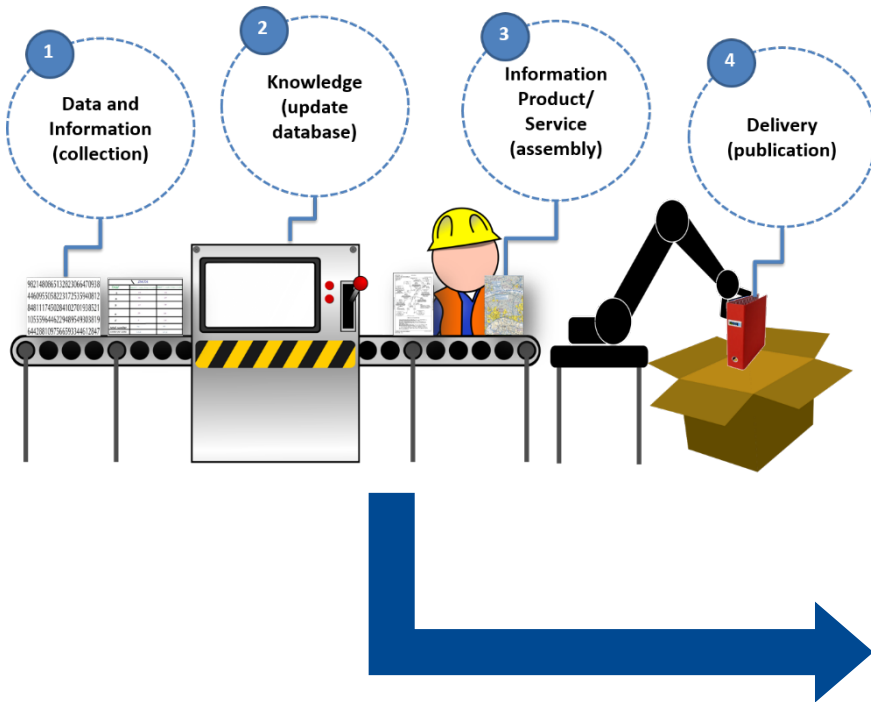
Production Control of Workflow

Configuration Management of Products and Services

# PRODUCTION MANAGEMENT

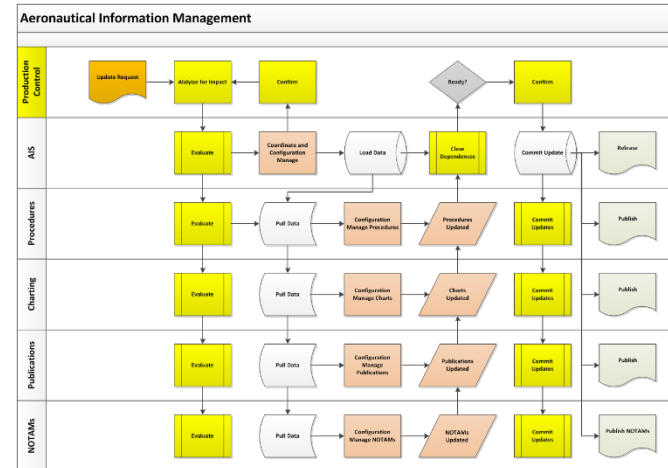
# Production Management

## Managing the Factory



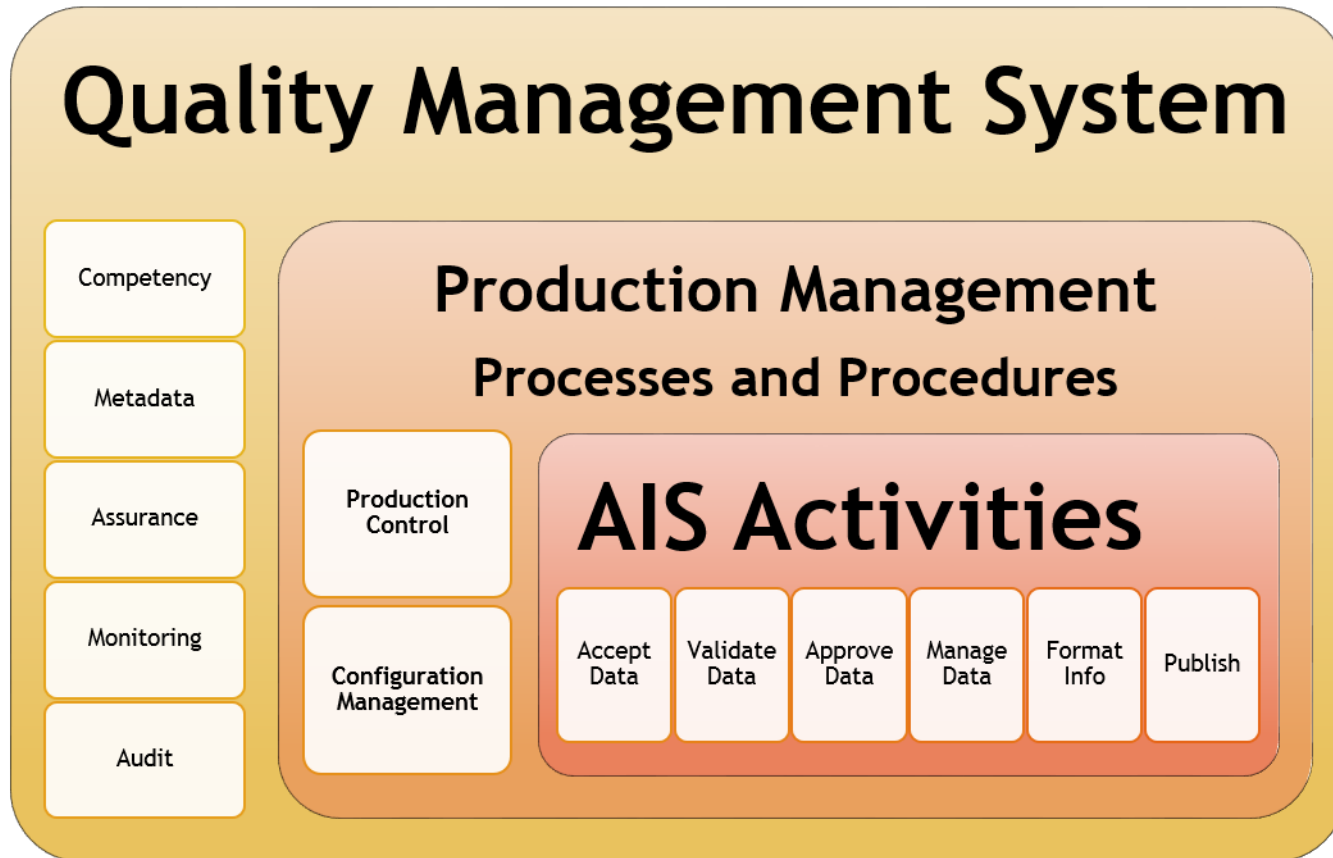
## AIS Activities

Accept Data    Validate Data    Approve Data    Manage Data    Format Information    Publish



Workflow

# Connecting Multiple Processes



# Production Control



- ▶ What products contain information about data element/feature X?
- ▶ Is there any data in product Y that is expired?
- ▶ What changes did person A make to which elements in product Y?

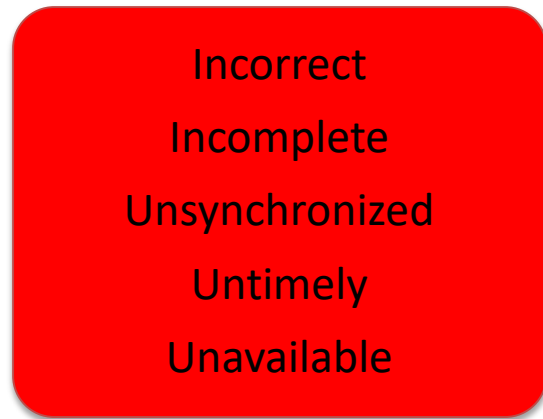


Would you expect the manufacturer of food products to be able to answer these questions?

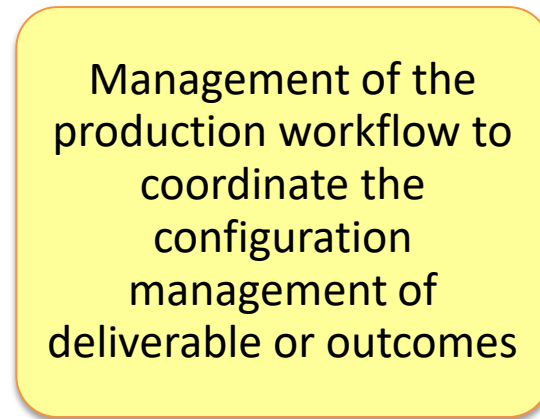
# Production Control

Production control is the management of the production workflow to ensure quality of deliverables or outcomes

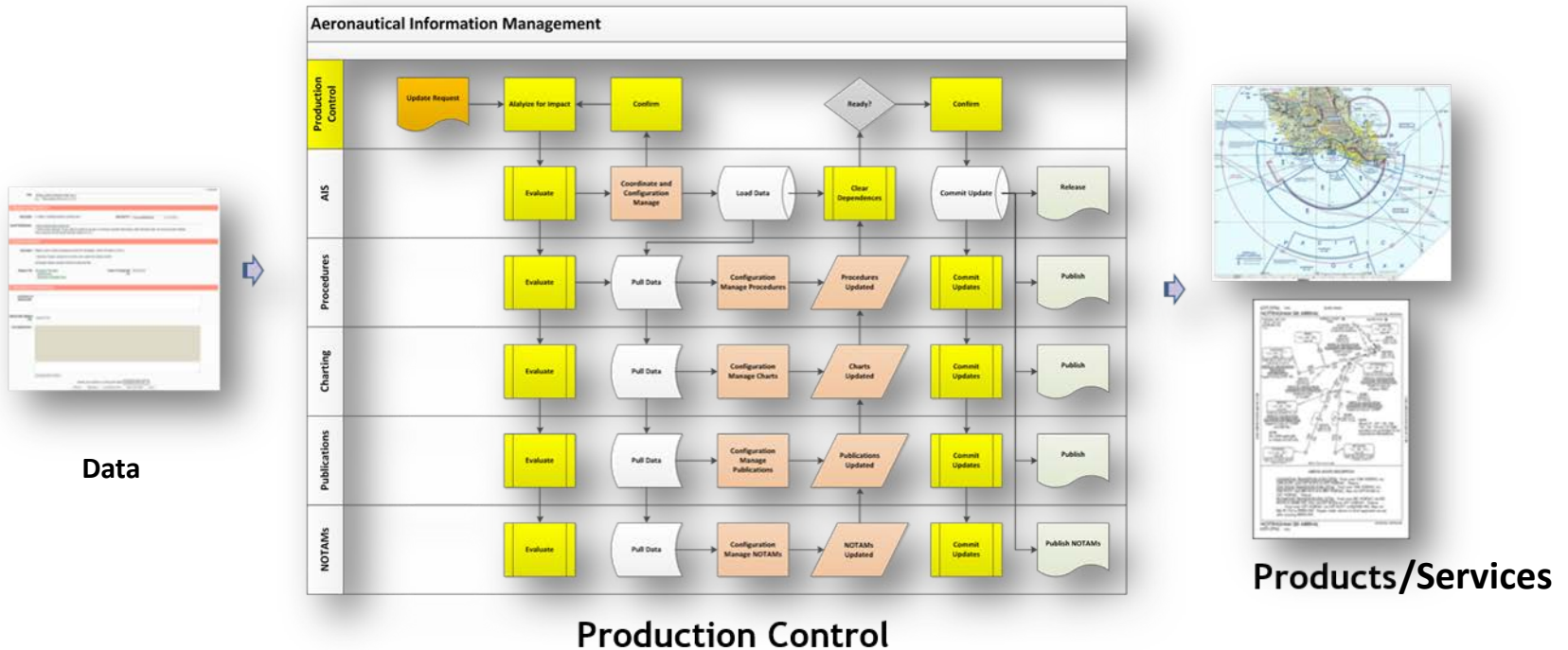
Data/Information Hazards



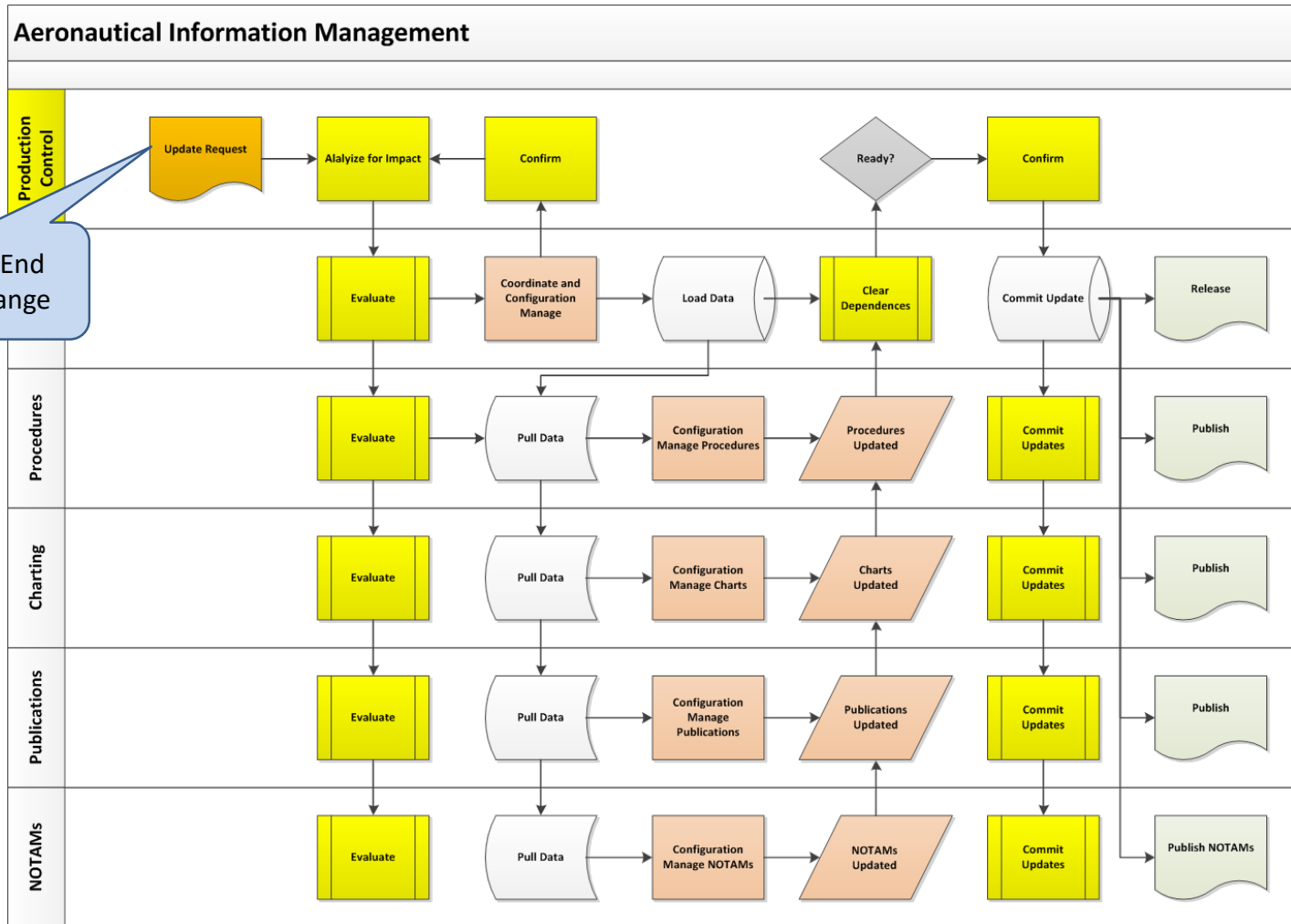
Production Control



# How to Synchronize Data Across Multiple Products/Services?



# Production Control Example

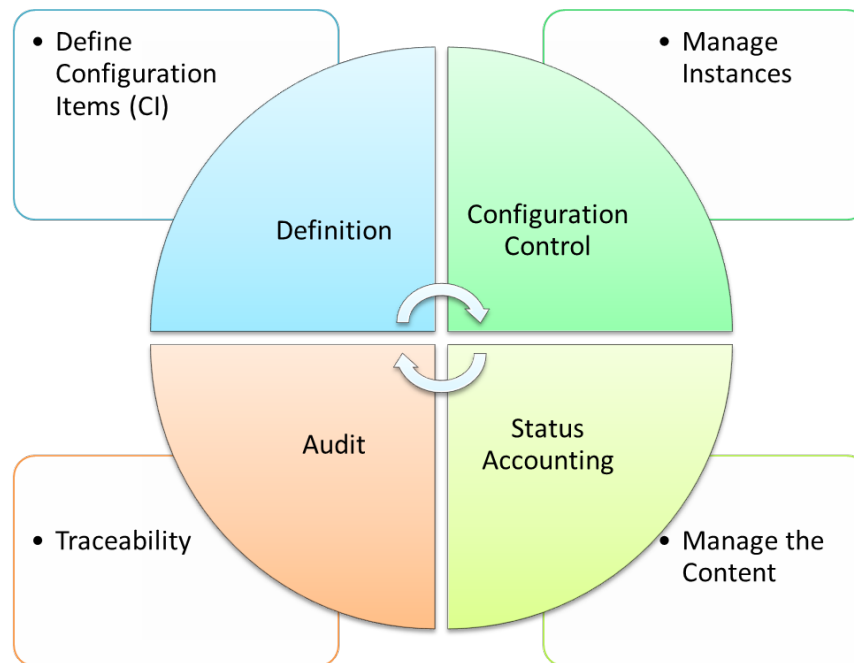


Runway End Point Change

# Production Control Summary

- Production control is the management of the data chain from origination, through processing, to publication in downstream products and services
- All databases and products share a common production but have their own configuration management criteria and activities for synchronization
- There is a significant dependency on metadata for traceability
  - Remember our discussion on QMS and metadata
- A single change can affect the content management of multiple products and services

# Configuration Management



- Managing Configuration Items
- Change Management

# Configuration Management (continued)

Management of changes to a system (data, products/services) to ensure the performance requirements of the system are maintained

Data/Information Hazards

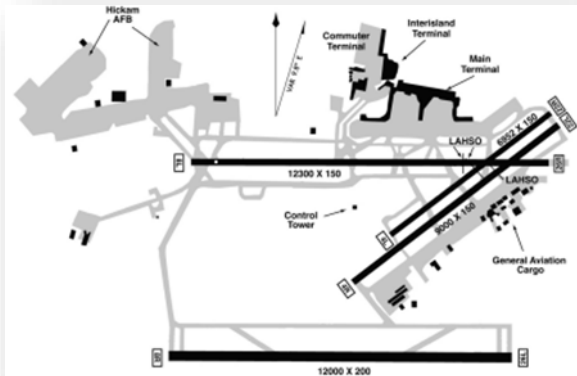
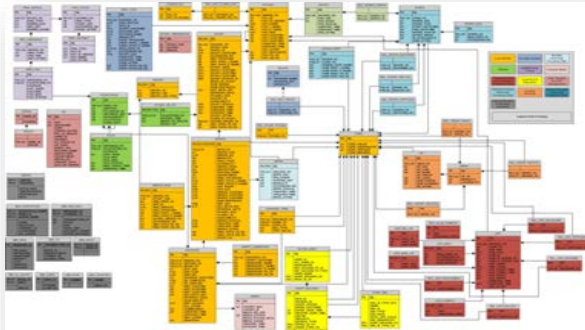
Incorrect  
Incomplete  
Unsynchronized  
Untimely  
Unavailable



Production Control

Management of the production workflow to coordinate the configuration management of deliverable or outcomes

# What is Managed?



## Configuration Item (CI)

Exchange model

Data element

Feature

Document

Chart

Process

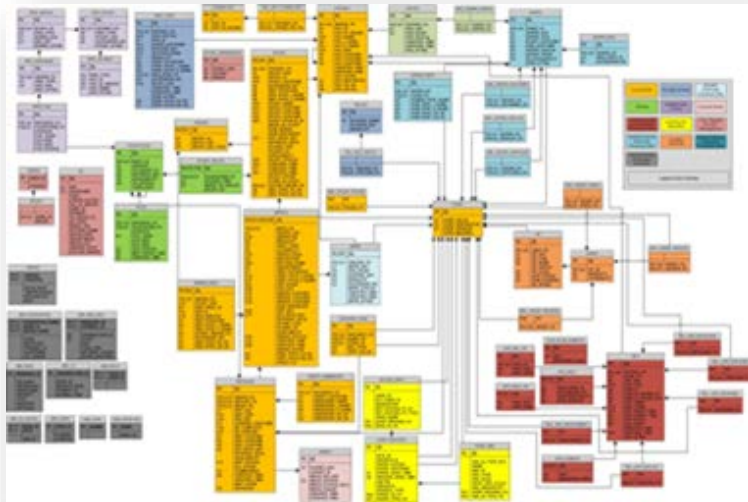
Rulebase/rules

Database

Publication

# Exchange Model, Database and Data Feature

What are we required to manage?



Exchange Model (Structure)  
AIXM

Database (Container)  
Data feature

Data Feature (Content)

- Runway
- Obstacle

# Features and Charts

What are we required to manage?



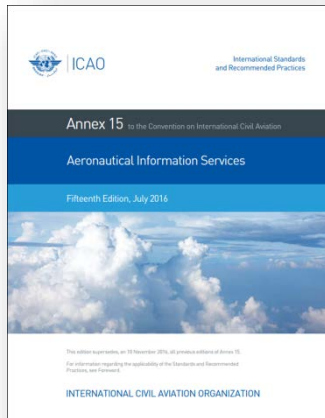
## Chart (Container)

- Content depicted as features
- Feature = visual representation of data element(s)
- Visualization standard(s)

## Feature (Content)

- Airspace
- Airport
- Navaid
- Obstacle
- Route

# Documents and Publications



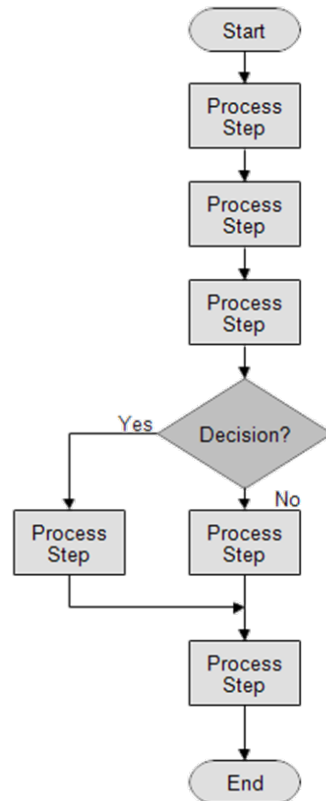
A document or publication is a container.

How do we manage revisions?

What information do we keep about the different revisions?



# Processes



- Standard operating procedures are normally written down and stored
- Is it be important to know information (who, what, why) about changes to a process?
- If so, what information do we keep?

# Processing/Business Rules Example

CONDITIONS				ACTIONS
CompanyInfo.type	CompanyInfo.initialListingStandard	CompanyInfo.approval	CompanyInfo.totalRevenue	CompanyInfo.violationCode = {value}
"company"	"PriceStandard"	true	"	"APS"
		false	"	"DPS"
	"ValuationStandard"	true	< 10000	"ALVS"
			>= 10000	"AHVS"
		false	< 10000000	"DD"
			>= 10000000	"TBR"
	"Equity"	true	< 20000	"E1"
			< 200000	"E1B"
			between 20000 and 2000000	"E2"
			> 2000000	"E3"
			false	"
	"PureValuation"	true	< 30000	"OP"
between 30000 and 3000000			"LOP"	
> 3000000			"HOP"	
false		< 50000000	"DOP"	
"Fund"	"Fund"	true	"	"ATF"
		false	"	"DTF"

A rule base is the container of rules

# Configuration Management Summary

- Management of changes to a system (data, products/services) to ensure the performance requirements of the system are maintained
  - Managed through Configuration Items (CI)
    - CI could be the structure (AIXM)
    - CI could be a container (Database, chart, document)
    - CI could be unique content (element or feature)
    - CI could be a visualization standard(s)
- Provides traceability within a product or database
- Managed using metadata, rules and production control

# The Safety View of AIS

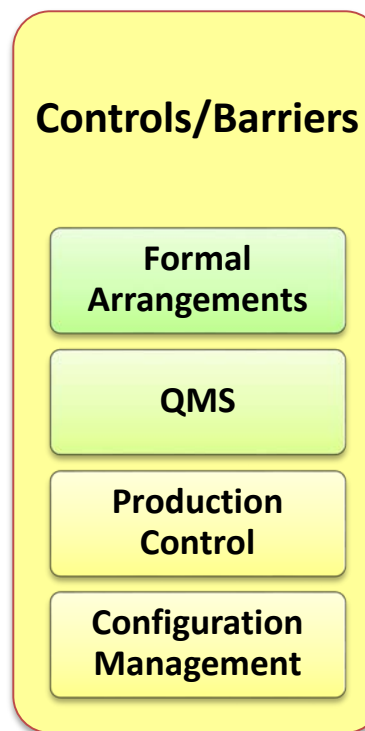
What could go wrong?



What does risk look like?



What prevents things from going wrong?



How will I know if controls are working?





# Questions?



# Workshop Exercise

## Understanding Metadata in Safety Oversight



Federal Aviation  
Administration



# Metadata

- ICAO metadata requirements review
- Metadata types
  - Container metadata
    - Digital Data set metadata
  - Activity metadata (the focus of this discussion)
- Applying metadata to safety oversight
- Metadata exercise

# ICAO Annex 15 Standards Review

3.6.5 Each quality management system shall include the necessary policies, processes and procedures, including those for the use of metadata, to ensure and verify that aeronautical data are traceable throughout the aeronautical information data chain so as to allow any data anomalies or errors detected in use to be identified by root cause, corrected and communicated to affected users.

Resource: Annex 15, July 2018, Amendment 40

# ICAO Annex 15 Standards Review

## Data Element Metadata

### 4.2 Metadata

4.2.1 Metadata shall be collected for aeronautical data processes and exchange points.

4.2.2 Metadata collection shall be applied throughout the aeronautical information data chain, from origination to distribution to the next intended user.

### 4.2 PANS-AIM

The metadata to be collected shall include, as a minimum:

- a) the names of the organizations or entities performing any action of originating, transmitting or manipulating the data;
- b) the action performed; and
- c) the date and time the action was performed.

Resource: Annex 15, July 2018, Amendment 40, PANS-AIM, July 2019, Edition 1.

# ICAO Annex 15 Standards Review

## Dataset Metadata

5.3.1.2 Each data set shall be provided to the next intended user together with at least the minimum set of metadata that ensures traceability.

PANS-AIM

### 5.3.2 Metadata

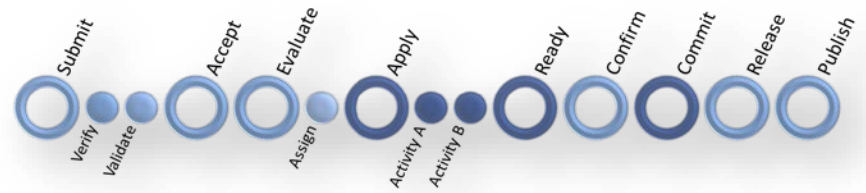
Each data set shall include the following minimum set of metadata:

- a) the names of the organization or entities providing the data set;
- b) the date and time when the data set was provided;
- c) period of validity of the data set; and
- d) any limitations with regard to the use of the data set.

Resource: Annex 15, July 2018, Amendment 40, PANS-AIM, July 2019, Edition 1.

# Key Metadata Requirements

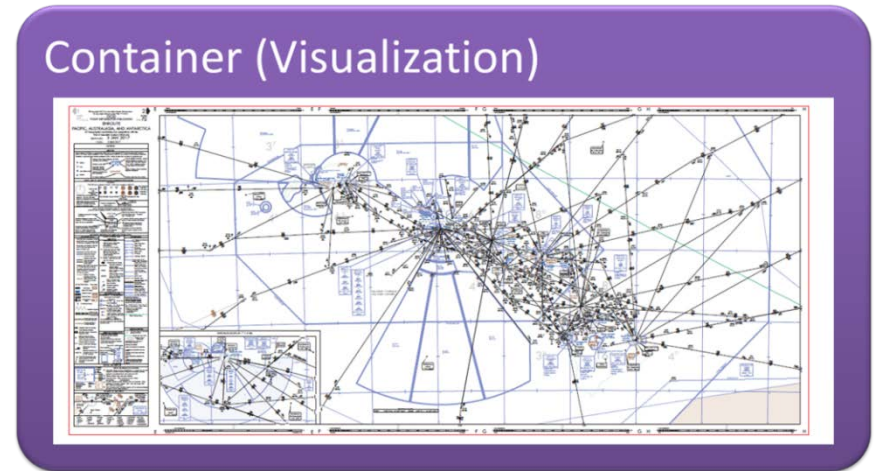
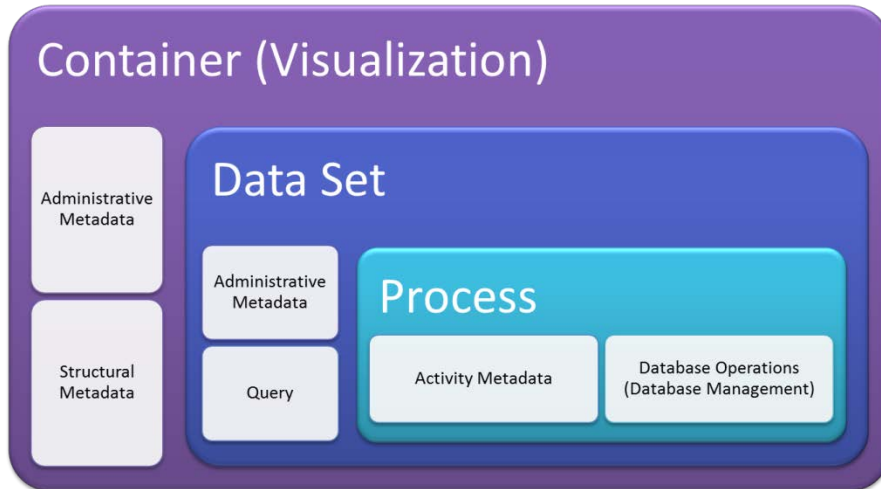
- To ensure and verify that aeronautical data are traceable throughout the aeronautical information data chain for entities performing any action of originating, transmitting or manipulating the data
- To ensure datasets reflect information about the information provider and use of the data



A deeper exploration into types of metadata

# METADATA TYPES

# Container Metadata



Administrative Metadata: information to help manage a resource, such as when and how it was created, file type and other technical information, and who can access it

Structural Metadata: indicates how compound objects are put together; for example, how pages are ordered to form chapters

Resource: <http://marciazeng.slis.kent.edu/metadatabasics/types.htm>

# Digital Data Set Metadata

Date	Queue	Action	Facility	What	Who	Remark
23 Aug 2019 1330	AIS	Submission	ABC	Element X	ABC Airport Authority (Jane Doe)	Submission by airport
23 Aug 2019 1400	AIS	Accept	ABC	Element X	ANSP AIS (Sara Tomo)	Received by AIS, enters workflow
23 Aug 2019 1445	AIS	Evaluate	ABC	Element X	ANSP AIS (Tommy Ojo)	Evaluated, No errors detected
23 Aug 2019 1445	AIS	Update DB	ABC	Element X	ANSP AIS (Tommy Ojo)	
23 Aug 2019 1445	AIS	Product Analysis	ABC	Element X	AIS Analysis Scenario	2 Products affected (A and B)
23 Aug 2019 1445	Chart B	Geo Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	AIS	Authority Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	Pub A	Temporality Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	AIP	AIP Inclusion Rule	ABC	Element X	Rule Engine	
23 Aug 2019 1445	Pub A	Submission	ABC	Element X	AIS Submission Scenario	Submit for evaluation
23 Aug 2019 1445	Chart B	Submission	ABC	Element X	AIS Submission Scenario	Submit for evaluation
23 Aug 2019 1445	AIP	Submission	ABC	Element X	AIS Submission Scenario	
23 Aug 2019 1445	Pub A	Evaluate	ABC	Element X	Product Mgr (Sam Oto)	Required by product
23 Aug 2019 1445	Pub A	Accept	ABC	Element X	Product Mgr (Sam Oto)	
23 Aug 2019 1448	Pub A	Apply Transaction	ABC	Element X	Product Mgr (Sam Oto)	
23 Aug 2019 1525	Chart B	Evaluate	ABC	Element X	Product Mgr (Jane Wi)	Not required by product
23 Aug 2019 1525	Chart B	Tolerance Rule Check	ABC	Element X	Rule Engine	No change from current view

Administrative Metadata: information to help manage a resource, such as when and how it was created, file type and other technical information, and who can access it

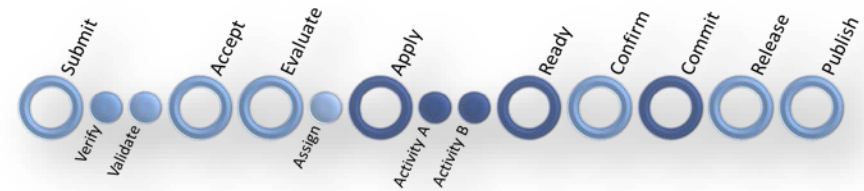
Structural Metadata: information on how the data was created (queried)

Resource: <http://marciazeng.slis.kent.edu/metadatabasics/types.htm>

# Activity Metadata



- AIS Activity Metadata
  - The activities performed throughout the process
  - Annex 15 requirements
    - Who did what, when?
- Database Transaction Log (CRUD)
  - Create
  - Read
  - Update
  - Delete



Workshop Exercise

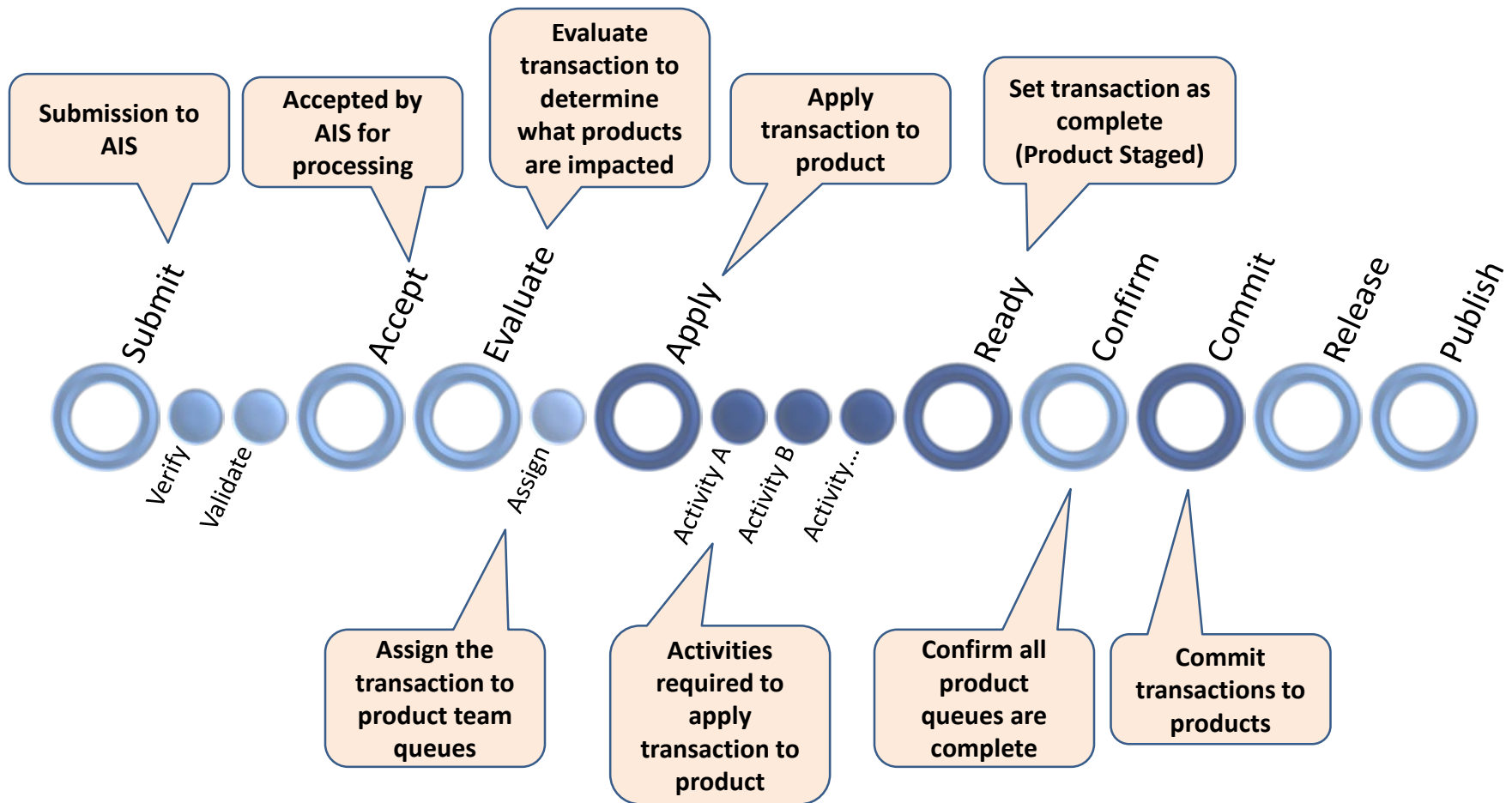
# UNDERSTANDING ACTIVITY METADATA

# Filter the Metadata Instructions

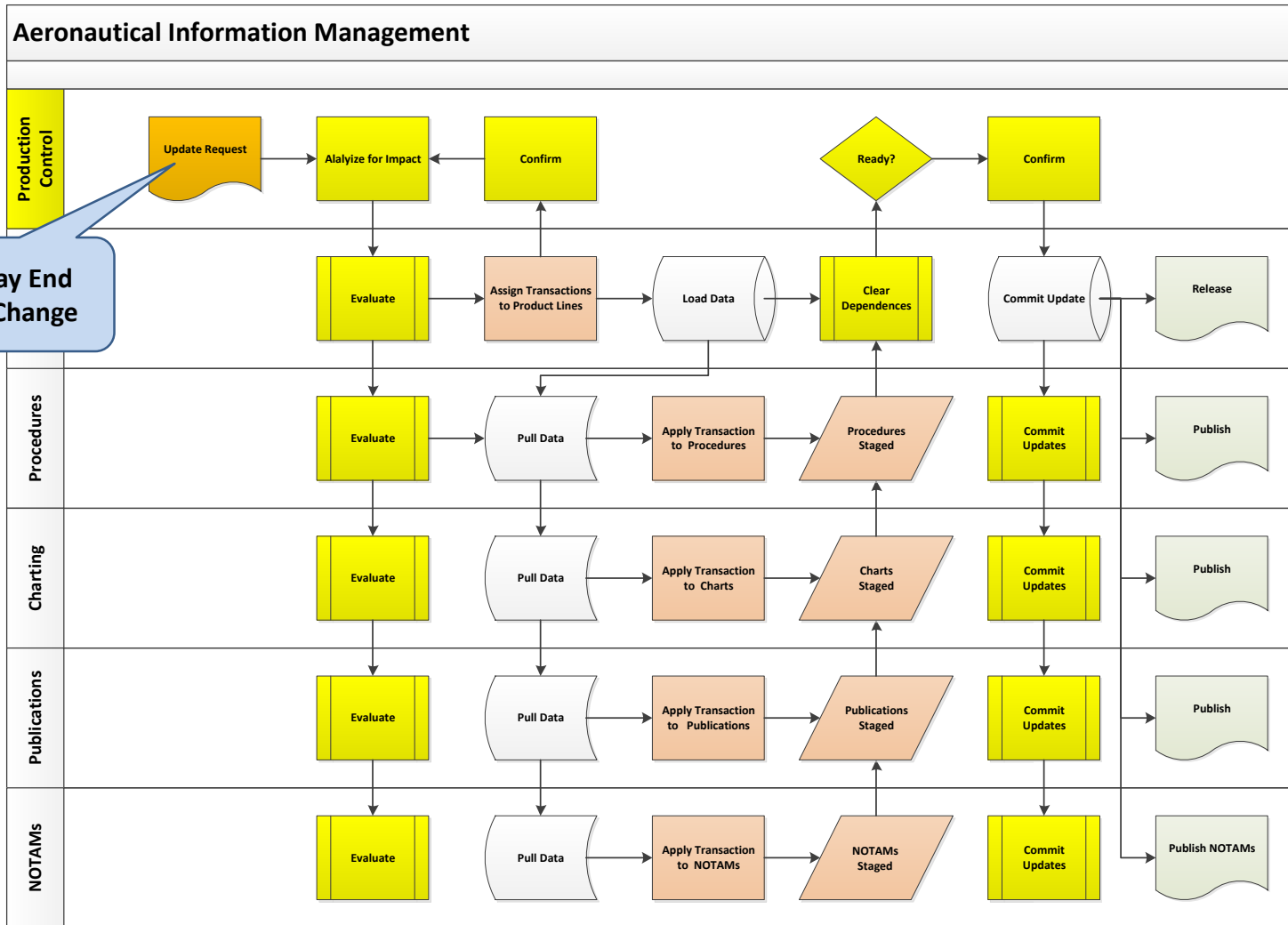
Date	Queue	Action
23 Aug 2019 1330	AIS	Submission
23 Aug 2019 1400	AIS	Accept
23 Aug 2019 1445	AIS	Evaluate
23 Aug 2019 1445	AIS	Update DB
23 Aug 2019 1445	AIS	Product Analysis
23 Aug 2019 1445	Chart B	Geo Rule Check
23 Aug 2019 1445	AIS	Authority Rule Check
23 Aug 2019 1445	Pub A	Temporality Rule Check
23 Aug 2019 1445	AIP	AIP Inclusion Rule
23 Aug 2019 1445	Pub A	Submission
23 Aug 2019 1445	Chart B	Submission
23 Aug 2019 1445	AIP	Submission
23 Aug 2019 1445	Pub A	Evaluate
23 Aug 2019 1445	Pub A	Accept
23 Aug 2019 1448	Pub A	Apply Transaction
23 Aug 2019 1525	Chart B	Evaluate

- Access the **Sample Activity Metadata** file in the Activities folder on your flash drive
- Be ready to follow-along with presenter instructions

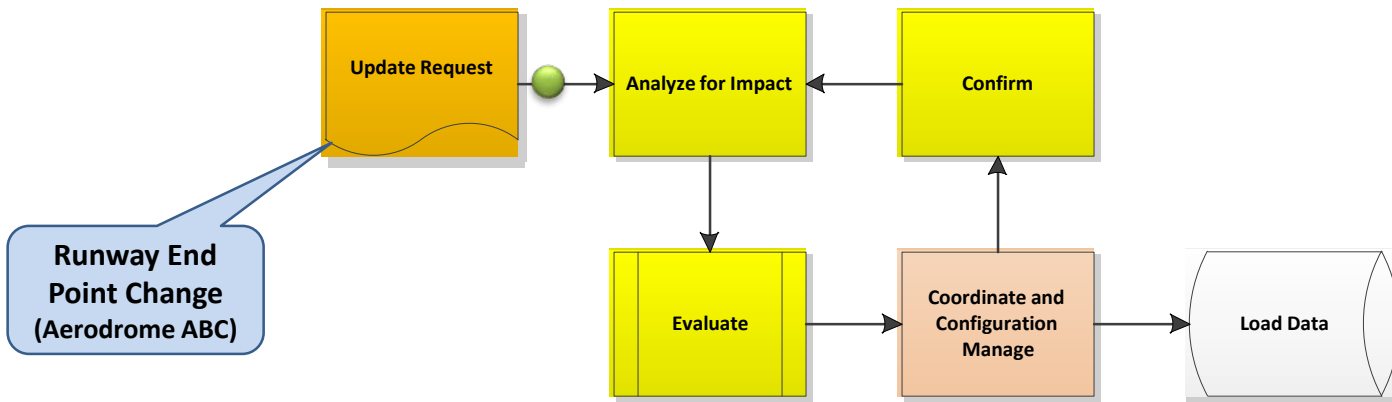
# AIS Activity Workflow (Hypothetical)



# Production Control Example

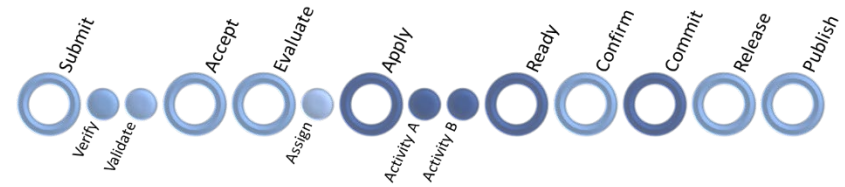


# Initial Metadata Generation



Timestamp	Queue	Action	What	Who	Remark
23 Aug 2019 1330	AIS	Submission	Element X	ABC Airport Authority (Jane Doe)	Submission by airport
23 Aug 2019 1400	AIS	Accept	Element X	ANSP AIS (Sara Tomo)	Received by AIS, enters workflow
23 Aug 2019 1445	AIS	Evaluate	Element X	ANSP AIS (Tommy Ojo)	Evaluated, No errors detected
23 Aug 2019 1445	AIS	Product Analysis	Element X	AIS Analysis Scenario	2 Products affected (A and B)
23 Aug 2019 1445	Pub A	Submission	Element X	AIS Submission Scenario	
23 Aug 2019 1445	Chart B	Submission	Element X	AIS Submission Scenario	

# What's Next?



Timestamp	Queue	Action	What	Who	Remark
23 Aug 2019 1330	AIS	Submission	Element X	ABC Airport Authority (Jane Doe)	Submission by airport
23 Aug 2019 1400	AIS	Accept	Element X	ANSP AIS (Sara Tomo)	Received by AIS, enters workflow
23 Aug 2019 1445	AIS	Evaluate	Element X	ANSP AIS (Tommy Ojo)	Evaluated, No errors detected
23 Aug 2019 1445	AIS	Product Analysis	Element X	AIS Analysis Scenario	2 Products affected (A and B)
23 Aug 2019 1445	Pub A	Submission	Element X	AIS Submission Scenario	Submit for evaluation
23 Aug 2019 1445	Chart B	Submission	Element X	AIS Submission Scenario	Submit for evaluation
23 Aug 2019 1445	Pub A	Evaluate	Element X	Product Mgr (Sam Oto)	Required by product
23 Aug 2019 1445	Pub A	Accept	Element X	Product Mgr (Sam Oto)	
23 Aug 2019 1448	Pub A	Apply	Element X	Product Mgr (Sam Oto)	
23 Aug 2019 1525	Chart B	Evaluate	Element X	Product Mgr (Jane Wi)	Not required by product
23 Aug 2019 1525	Chart B	Dismiss	Element X	Product Mgr (Jane Wi )	

# Learning Question

How could you identify all of the data features contained in Pub A?

Timestamp	Queue	Action	What	Who	Remark
23 Aug 2019 1330	AIS	Submission	Element X	ABC Airport Authority (Jane Doe)	Submission by airport
23 Aug 2019 1400	AIS	Accept	Element X	ANSP AIS (Sara Tomo)	Received by AIS, enters workflow
23 Aug 2019 1445	AIS	Evaluate	Element X	ANSP AIS (Tommy Ojo)	Evaluated, No errors detected
23 Aug 2019 1445	AIS	Product Analysis	Element X	AIS Software	2 Products affected (A and B)
23 Aug 2019 1445	Pub A	Submission	Element X	AIS Software	Submit for evaluation
23 Aug 2019 1445	Chart B	Submission	Element X	AIS Software	Submit for evaluation
23 Aug 2019 1445	Pub A	Evaluate	Element X	Product Mgr (Sam Oto)	Required by product
23 Aug 2019 1445	Pub A	Accept	Element X	Product Mgr (Sam Oto)	Accept as Update or Insert
23 Aug 2019 1448	Pub A	Apply	Element X	Product Mgr (Sam Oto)	
23 Aug 2019 1525	Chart B	Evaluate	Element X	Product Mgr (Jane Wi)	Not required by product
23 Aug 2019 1525	Chart B	Dismiss	Element X	Product Mgr (Jane Wi)	

# Follow Along Activity

## Data Filters

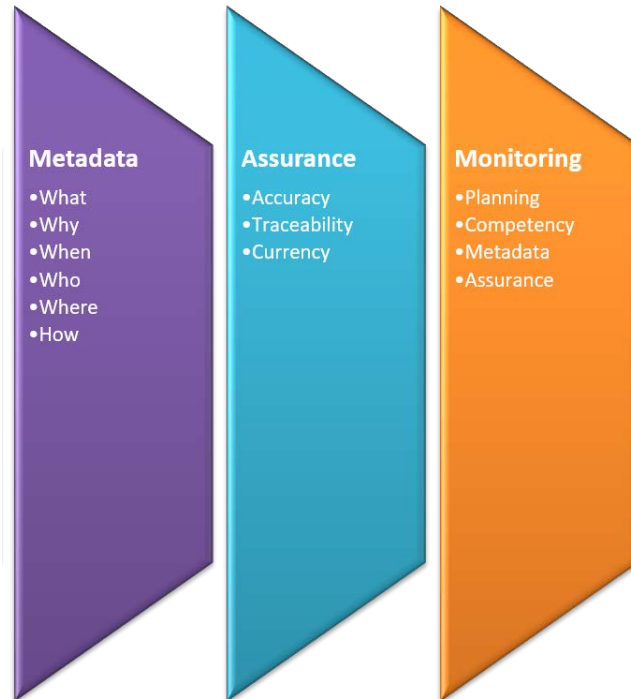
- What updates were submitted in 2017?
- How many facilities had update requests?
- Were there any updates to facility ABD?
- How many updates affected each product line?

Date	Queue	Action	Facility	What	Who	Remark
23 Aug 2019 1330	AIS	Submission	ABC	Element X	ABC Airport Authority (Jane Doe)	Submission by airport
23 Aug 2019 1400	AIS	Accept	ABC	Element X	ANSP AIS (Sara Tomo)	Received by AIS, enters workflow
23 Aug 2019 1445	AIS	Evaluate	ABC	Element X	ANSP AIS (Tommy Ojo)	Evaluated, No errors detected
23 Aug 2019 1445	AIS	Update DB	ABC	Element X	ANSP AIS (Tommy Ojo)	
23 Aug 2019 1445	AIS	Product Analysis	ABC	Element X	AIS Analysis Scenario	2 Products affected (A and B)
23 Aug 2019 1445	Chart B	Geo Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	AIS	Authority Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	Pub A	Temporality Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	AIP	AIP Inclusion Rule	ABC	Element X	Rule Engine	
23 Aug 2019 1445	Pub A	Submission	ABC	Element X	AIS Submission Scenario	Submit for evaluation
23 Aug 2019 1445	Chart B	Submission	ABC	Element X	AIS Submission Scenario	Submit for evaluation

# Tracking Scenarios and Rules

Date	Queue	Action	Facility	What	Who	Remark
23 Aug 2019 1330	AIS	Submission	ABC	Element X	ABC Airport Authority (Jane Doe)	Submission by airport
23 Aug 2019 1400	AIS	Accept	ABC	Element X	ANSP AIS (Sara Tomo)	Received by AIS, enters workflow
23 Aug 2019 1445	AIS	Evaluate	ABC	Element X	ANSP AIS (Tommy Ojo)	Evaluated, No errors detected
23 Aug 2019 1445	AIS	Update DB	ABC	Element X	ANSP AIS (Tommy Ojo)	
23 Aug 2019 1445	AIS	Product Analysis	ABC	Element X	AIS Analysis Scenario	2 Products affected (A and B)
23 Aug 2019 1445	Chart B	Geo Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	AIS	Authority Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	Pub A	Temporality Rule Check	ABC	Element X	Rule Engine	
23 Aug 2019 1445	AIP	AIP Inclusion Rule	ABC	Element X	Rule Engine	
23 Aug 2019 1445	Pub A	Submission	ABC	Element X	AIS Submission Scenario	Submit for evaluation
23 Aug 2019 1445	Chart B	Submission	ABC	Element X	AIS Submission Scenario	Submit for evaluation
23 Aug 2019 1445	AIP	Submission	ABC	Element X	AIS Submission Scenario	
23 Aug 2019 1445	Pub A	Evaluate	ABC	Element X	Product Mgr (Sam Oto)	Required by product
23 Aug 2019 1445	Pub A	Accept	ABC	Element X	Product Mgr (Sam Oto)	
23 Aug 2019 1448	Pub A	Apply Transaction	ABC	Element X	Product Mgr (Sam Oto)	
23 Aug 2019 1525	Chart B	Evaluate	ABC	Element X	Product Mgr (Jane Wi)	Not required by product
23 Aug 2019 1525	Chart B	Tolerance Rule Check	ABC	Element X	Rule Engine	No change from current view
23 Aug 2019 1525	Chart B	Dismiss	ABC	Element X	Product Mgr (Jane Wi)	
21 Aug 2019 1330	AIS	Submission	ABD	Element R	ABD Airport Authority	Submission by airport
21 Aug 2019 1400	AIS	Accept	ABD	Element R	ANSP AIS (Sara Tomo)	Received by AIS, enters workflow
21 Aug 2019 1445	AIS	Evaluate	ABD	Element R	ANSP AIS (Tommy Ojo)	Evaluated, No errors detected
21 Aug 2019 1445	AIS	Update DB	ABD	Element R	ANSP AIS (Tommy Ojo)	
21 Aug 2019 1445	AIS	Product Analysis	ABD	Element R	AIS Analysis Scenario	2 Products affected (A and B)
23 Aug 2019 1445	AIP	AIP Inclusion Rule	ABD	Element R	Rule Engine	
21 Aug 2019 1445	Pub A	Submission	ABD	Element R	AIS Submission Scenario	Submit for evaluation
21 Aug 2019 1445	Chart B	Submission	ABD	Element R	AIS Submission Scenario	Submit for evaluation
23 Aug 2019 1445	Chart B	Evaluate	ABD	Element R	Product Mgr (Sam Oto)	Required by product
23 Aug 2019 1445	Chart B	Accept	ABD	Element R	Product Mgr (Sam Oto)	
23 Aug 2019 1445	Chart B	Activity 1	ABD	Element R	Carto (Mike H)	Updated Location
23 Aug 2019 1445	Chart B	Activity 2	ABD	Element R	Carto QA (Mike K)	Verified Location
23 Aug 2019 1448	Chart B	Apply Transaction	ABD	Element R	Product Mgr (Sam Oto)	Product is ready
23 Aug 2019 1448	Chart B	Commit	ABD	Element R	Automation	
23 Aug 2019 1525	Pub A	Evaluate	ABD	Element R	Product Mgr (Jane Wi)	Not required by product

# Metadata and Safety Oversight



- What kind of metadata standards or requirements could be established for an ANSP/AIS?
- How could you conduct surveillance?
  - What kind of questions can be asked or answered?
    - Production Control
    - Configuration Management
- How does this relate to
  - QMS Assurance
  - QMS Monitoring

# Final Thoughts...

- Annex 15 requires an AIS provider to collect and maintain metadata throughout the production workflow and on the digital data set
- Types of metadata include:
  - Activity metadata
  - Container metadata
    - Administrative
    - Structural
- Metadata assures traceability of aeronautical data/information and products

# References

- ICAO Annex 15
- <http://marciazeng.slis.kent.edu/metadatabasics/types.htm>
- PANS-AIM/Data Catalog, Doc 10066



# Questions and Discussion



# Workshop Exercise

## Build an Audit Checklist



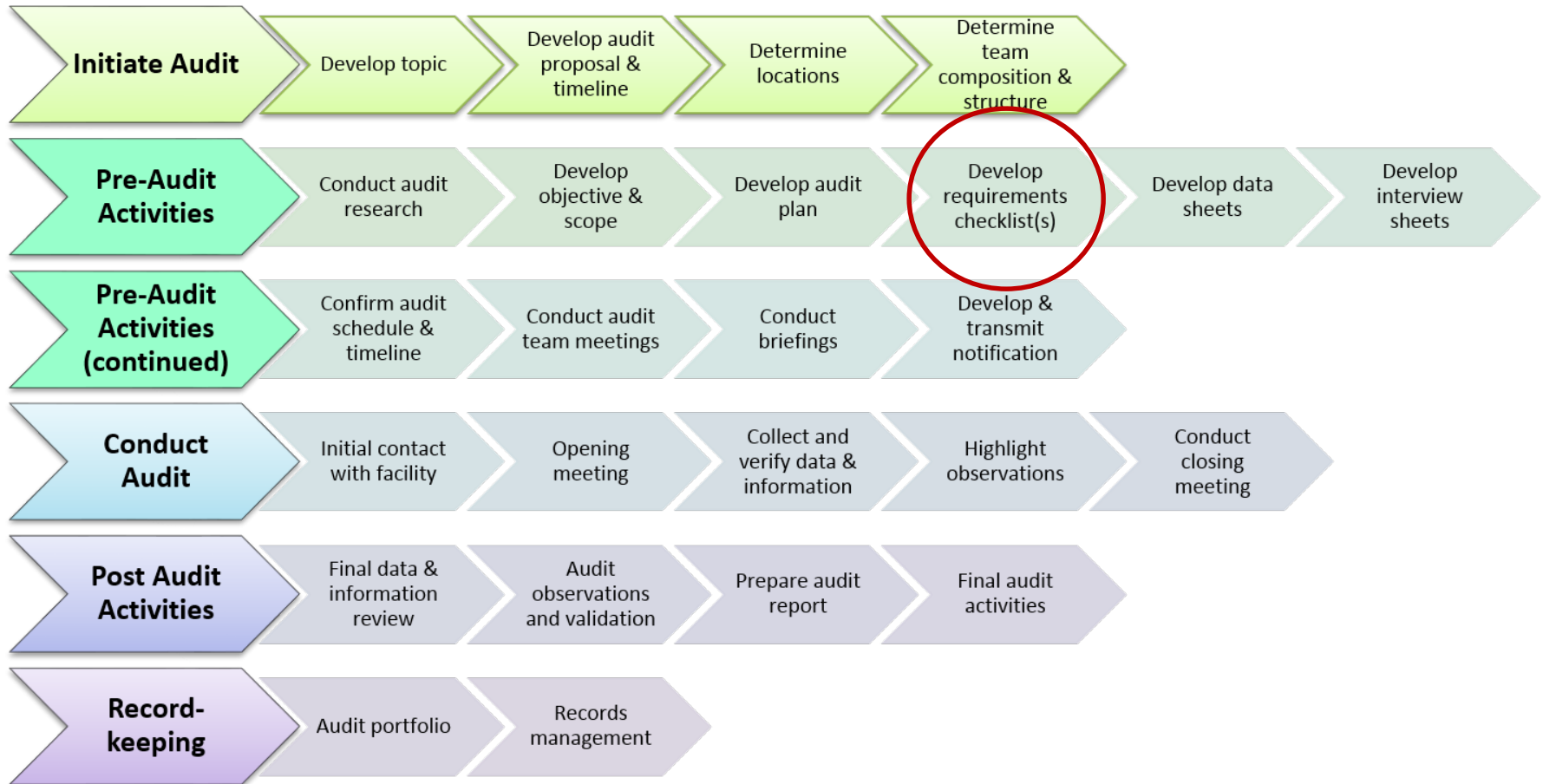
Federal Aviation  
Administration



# Audit Checklist

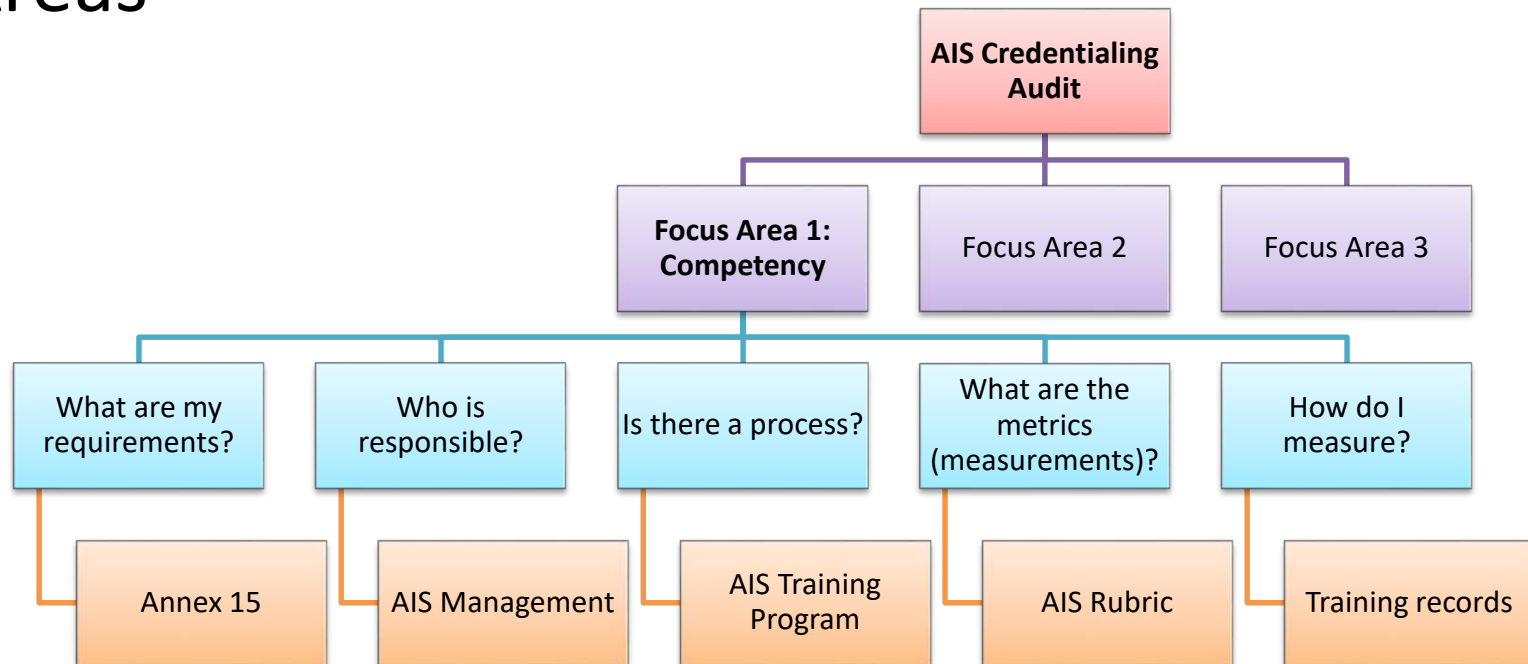
- Review
  - Develop an audit
  - Develop an audit checklist
    - Checklist questions
      - Sample requirement
      - Sample checklist
- Checklist exercise

# Develop an Audit



# Develop an Audit Checklist

Checklists relate to Objective, Scope, and Focus Areas



# Develop an Audit Checklist (continued)

- Review/update audit proposal
- Create a checklist
  - Determine the requirement(s)
    - ICAO SARP, 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

# Checklist Questions

**Chapter 2. General Information**  
**Section 2-11. Obstacle Data**  
**Paragraph 2-11-2. Obstacle Data Sources**

a. The Aeronautical Information Management Office (AIM), Geographic Services Group maintains a Digital Obstacle File (DOF) that includes a record of all as-built manmade obstructions reported under 14 CFR Part 77. It also includes records of manmade obstructions reported through various other sources; e.g., AIS, Flight Inspection, the Federal Communications Commission (FCC), Airports Geographic Information System (GIS), Third Party Survey System (TPSS), and the OE/AAA program. The Geographic Services Group will provide obstacle data as necessary for procedure development under current AIM internal standard operating procedures. The Geographic Services Group will provide obstacle data to other FAA offices on a time available basis. Requests for obstacle data should identify the DOF Obstacle Repository System (ORS) code and obstacle number; e.g., 01-00103, the area desired by geographical coordinates or a specified radius from an ARP or navigation facility and should be accompanied by any source and/or survey documentation available.

Questions	Compliance verified? (yes or no)	Evidence / Observations
1. Is there objective evidence the ATO ensures the AIG/Obstacles Team receives supplemental notice from OEG? JO7400.2K 7-1-4.4.		
2. Is there objective evidence that ATO collects, validates, and disseminates as-built obstacles information? FAA Order 8260.19F 1-2-5a.(2)(b),(2-11-2a.)		
3. Is there objective evidence that the ATO: a. Ensures the source data is verified for as-built obstacles FAA Order 8260.19F 1-2-5a.(2)(c) b. Ensures the accuracy codes are assigned to reflect the reliability of the reported obstacle's vertical height and horizontal position? FAA Order 8260.19F 1-2-5a.(2)(c)		
4. Is there objective evidence that the DOF contains a record of all as-built man-made obstructions that effect domestic aeronautical charting products? FAA Order 8260.19F 1-2-5.a(2)(b)1.		
<b>Audit Sampling Methods</b> (where to look and how many to look at, find, discuss or interview)		
<b>Additional Comments</b> (use additional pages as needed)		

Requirement text

What is the question that answers the requirement?

Reference text

Comment area

# Sample Requirement

- All steak must be broiled and basted to an internal temperature of 65°C in a convection oven
- Requirements
  - Broiled
  - Basted
  - Internal temperature of 65°C
  - Convection oven

# Sample Checklist

<p><b>Requirement:</b> All steak must be broiled and basted to an internal temperature of 65° in a convection oven.</p>		
Checklist Questions	Compliance verified? (yes or no)	Evidence and/or Observations
1. Is there objective evidence that all steaks were broiled?		
2. Is there objective evidence that all steaks were basted?		
3. Can you think of additional questions?		
4.		
5.		
<p><b>Audit Sampling Methods</b> (where to look and how many to look at, find, discuss or interview)</p>		
<p><b>Additional Comments</b> (use additional pages as needed)</p>		



Build the Audit Checklist(s)

# EXERCISE

# Create an Audit Checklist Instruction

Version Control: V05-04-2018

pg. 1

PROPOSAL FOR OVERSIGHT ACTIVITY			
Title	Monitoring AOV discovered noncompliance items		
Activity Type Definitions in Work Instructions	Audit <input type="checkbox"/>	Assessment <input type="checkbox"/>	Combo <input type="checkbox"/> Part audit/part assessment
	Initial _____	Replication _____ Modified Replication _____	Follow-up: _____ Addresses a compliance issue or condition noted in an observation.
	On-site _____	Desk _____	
			SEI _____ Special emphasis item SERFI _____ Special emphasis request for information Facility-specific: _____
Category	<input type="checkbox"/> ATC <input type="checkbox"/> Tech Ops <input type="checkbox"/> AIS <input type="checkbox"/> QA <input type="checkbox"/> QC <input type="checkbox"/> 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 8000.508 for Credentialing and Control		
Requirement			
Problem Hypothesis	Insert specific requirement (e.g., FAA Order 7110.65, Air Traffic Control, paragraph X-X)		
Purpose Statement (Focus of the Act)			
Background	<b>Checklist Questions</b>	<b>Compliance verified? (yes or no)</b>	<b>Evidence and/or Observations</b>
	1.		
	2.		
	3.		
	4.		
	5.		
<b>Audit Sampling Methods</b> (where to look and how many to look at, find, discuss or interview)			
<b>Additional Comments</b> (use additional pages as needed)			

In your teams:

- Review Atlantis Audit Proposal and update as necessary
- Access the **Audit Checklist** folder in the Activities > AIP Audit folder on your flash drive
- Develop audit questions based on the controls identified in the Audit Proposal
  - Questions should be answerable in YES/NO format
  - Evidence: how will you determine compliance?



# Questions and Discussion

