

# QUALITY ASSURANCE FOR INSTRUMENT FLIGHT PROCEDURE IMPLEMENTATION

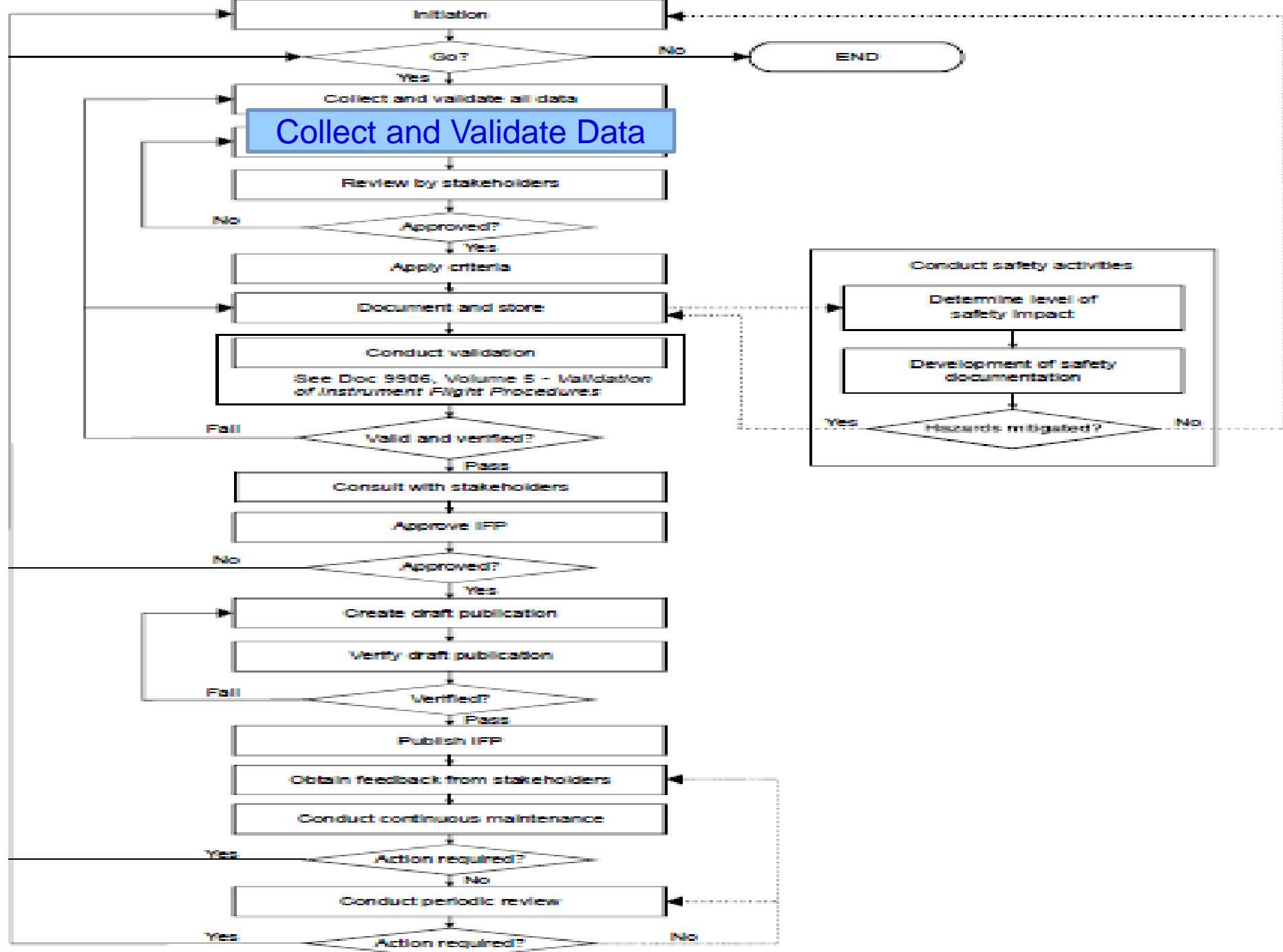
## Aeronautical Data Quality

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# Aeronautical Data Quality

## *Presentation Outline*

- 1. Understanding Data Quality**
- 2. Data Quality Evaluation**
- 3. Kenya IFPD Data Management with focus on Data quality**



# Aeronautical Data Quality

To establish a good understanding of data quality, it is necessary to first understand the term quality.

## Quality

Degree to which a set of inherent characteristics fulfils requirements (ISO 9000).

*Inherent characteristics* -Existing as an essential constituent.

*Requirement* -need or expectation

# Aeronautical Data Quality

The term Aeronautical data quality is more comprehensive. It includes quality elements such as:

- Accuracy,
- Resolution,
- Integrity,
- traceability,
- timeliness,
- completeness,
- logical consistency.

*Note: Some Quality elements are part of metadata.*

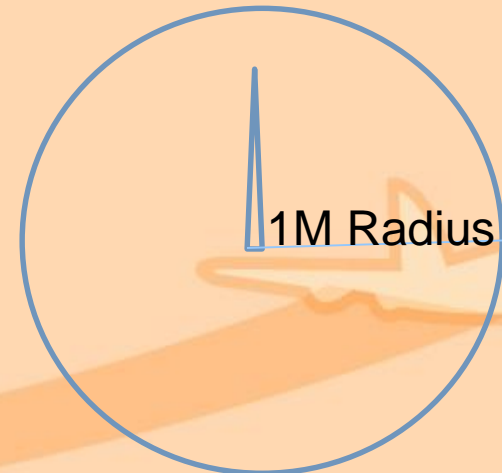
# Aeronautical Data Quality

## 1. Accuracy

Degree of conformance between the estimated or measured value and the true value (*How close to reality*).

Examples with positional Accuracy(x,y,z)

Horizontal Accuracy  
(x,y) of 1m



# Aeronautical Data Quality

## 1. Accuracy cont...

Examples:

Vertical Accuracy(z) of 20m

The true height of Pylon falls anywhere between + or - 20M



# Aeronautical Data Quality

## 2. Resolution

- A number of units or digits to which a measured or calculated value is expressed and used. (*How many units or digits after the comma*).

Examples:

- The length of a line published at a resolution of 1/10.

45.9m, 55.2m, 100.5

- The length of a line published at a resolution of 1/100.

45.90m, 55.20m, 100.65

- The Width of a rectangle published at a resolution of 1m

20m, 45m



# Aeronautical Data Quality

## ***3.Integrity (aeronautical data)***

- A degree of assurance that aeronautical data and its value has not been lost or altered since the data origination or authorized amendment-ICAO Annex 15 (*How good is the data*).
- It refers to the aspect of wholeness or completeness of data during such operations such as **transfer, storage and retrieval.**

# Aeronautical Data Quality

## 3.Integrity (aeronautical data)

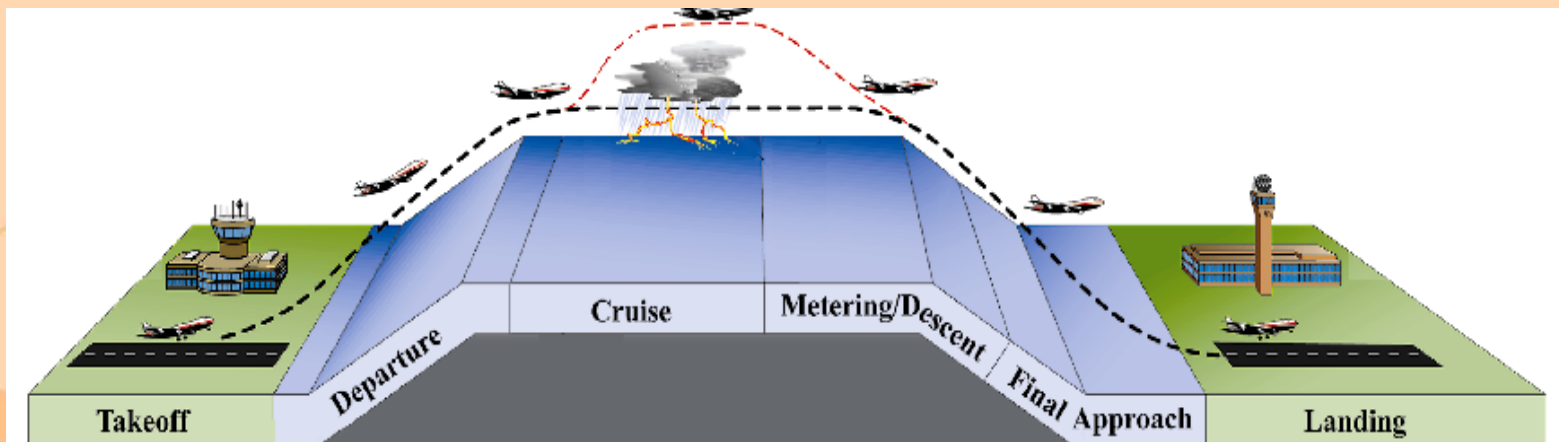
- **Integrity** requirements are based upon the potential risk resulting from the corruption of data and upon the use to which the data item is put.

For this purpose Aeronautical data integrity levels are classified into three major classifications:

- Critical data integrity level,
- Essential data integrity level and
- Routine data integrity level.(ICAO Annex 14)

# Aeronautical Data Quality

- **Critical data, integrity level-** There is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;
- Research shows that 83% of the accidents occur during approach, landing and take-off phases collectively referred to as critical phases of a flight.



# Aeronautical Data Quality

**Essential data integrity level** - there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

Example : Coordinates of en-route Ground Based Navigation Aid.

# Aeronautical Data Quality

- **Routine data integrity level**-there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

- Example : FIR points, ACFT Stands etc

The integrity levels or assurance levels are basically achieved through data management processes defined to ensure integrity of data is maintained from the point of origin through various steps to the end use.

# Aeronautical Data Quality

## 4 *Traceability report(History)*

- Ability to trace the history, application or location of that which is under consideration. Ability to determine the origin of the data and subsequent changes made to it from creation to the current status.
- End result being a traceability report
- Traceability records can be both electronic and paper records

# Aeronautical Data Quality

## **5. Timeliness**(Temporal accuracy)

- The degree of confidence that the data is applicable to the period of its intended use.

## **6. Completeness**

- Commission: excess data present in dataset
- Omission: data absent from a dataset.

*Note: Completeness also addresses metadata requirements*

## **7. Logical consistency.**

Example of Logical Consistency is date format, coordinate format etc.

# Data Quality Evaluation

- A process of determining how well the data /products meet the quality requirements.
- Guided by the need to determine to what extent the data is relevant .
- Conducted to determine the extent to which errors can be associated with certain stages along the data chain.
- findings used to improve the quality of data capture methods and processes among others



# Data Quality Evaluation

## Evaluation process

- Factors to be considered include:
  - Data uses. e.g . Which phase of flight
  - Users(Different users have different needs)
  - Risk of errors(What is the probability?)
  - Impact of errors (What is the severity)
  - Quality variation over time,
  - Cost of the evaluation(CBA)
  - Improving quality(Is the process geared at improving quality?)

# Data Quality Evaluation

## Evaluation process

- Process part of data management tasks i.e part of data collection, capture, data processing etc.
- It should be geared at increasing efficiency and productivity.
- Should come with ease of interpretation.
- Data quality evaluation results should be valid and timely.

# Methods of evaluating data quality:

- There are two broad methods of evaluating data quality:

***i) Verification***

***ii) Validation***

- **Verification**-confirmation through the provision of objective evidence that specified requirements have
- *Confirmation can comprise activities such as:*
  - performing alternative calculations;*
  - Making comparisons with similar products.*
  - undertaking tests*
  - Demonstrations e.t.c*

# Methods of evaluating data quality:

- **Validation**-confirmation through the provision of objective evidence that the requirements for a specific intended use or application have been fulfilled.
- Data Validation can therefore be described as the process that extends the evaluation of data beyond verification to determine the analytical quality of a specific data set.
- Validation focuses on particular data needs for a specific use mainly specified for Quality Assurance(QA) measure.

# Examples of Verification Checks

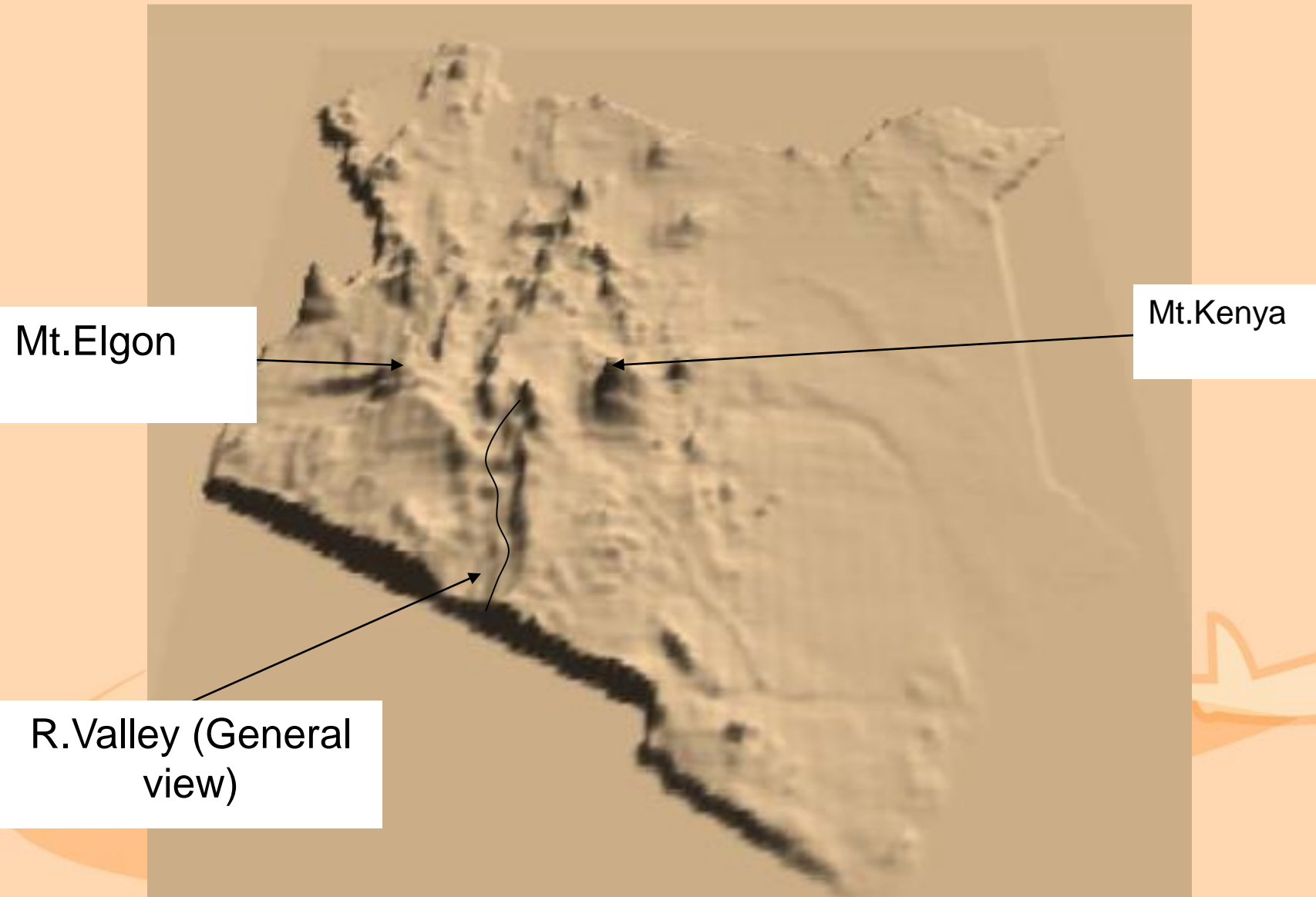
- Comparison by Geo-referencing and overlay.





# Examples of Verification

## Demonstrating a reasonableness check



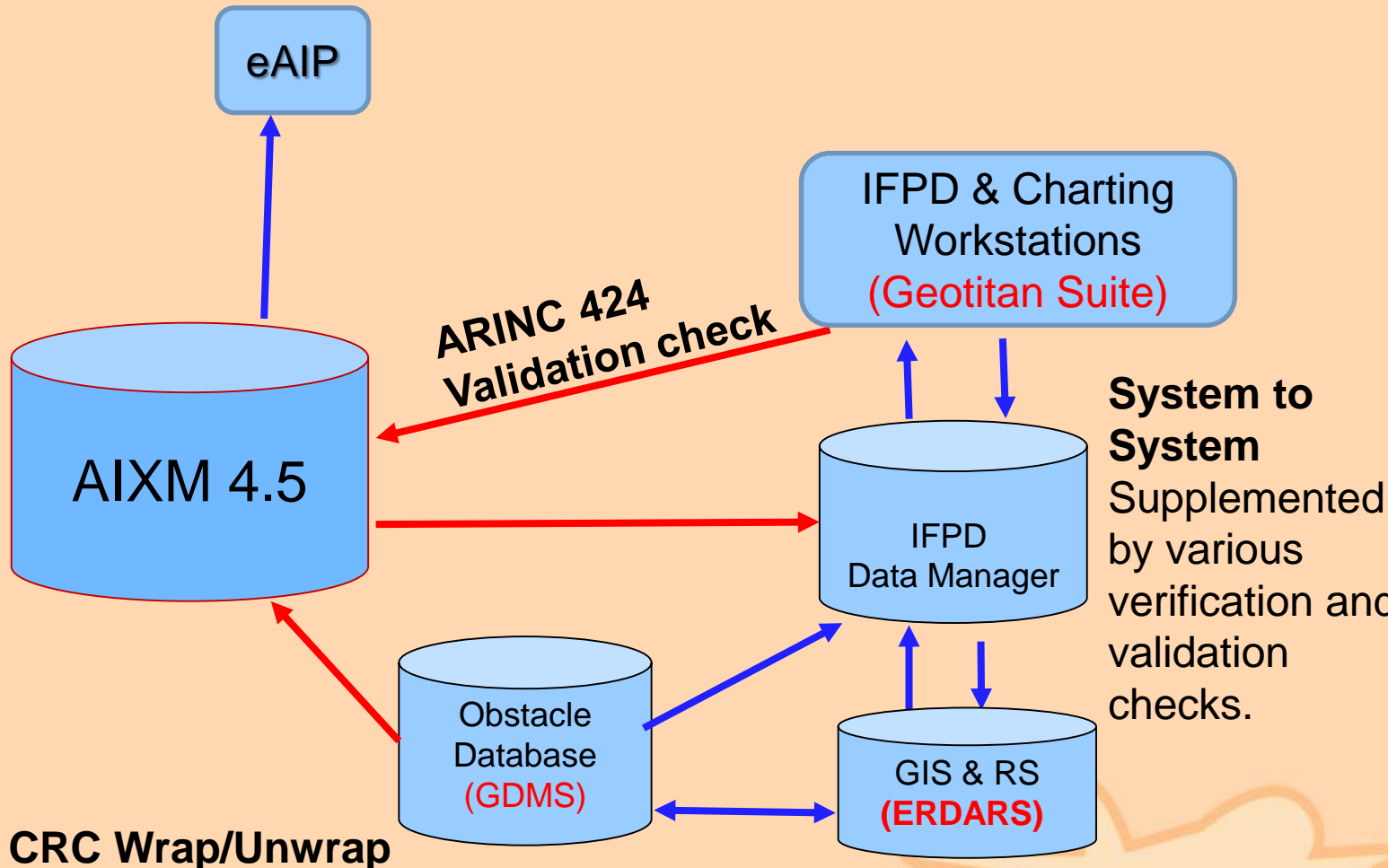
# Examples of Verification

- Reconnaissance Survey
- A preliminary *survey* before a detailed evaluation.
- Undertaken by the procedure Designer during site visit for ground data verification.
- It is recommended as a comparison of the collected data with what is actually on ground.

# KENYA IFPD DATA MANAGEMENT FOCUSING ON DATA QUALITY

## Validation Criteria

In built in the system and supplemented by three level user rights.



## CRC Wrap/Unwrap

CRC adds the crc code to any comma separated data (csv) and also verifies the code on pre-wrapped data.

## System to System

Supplemented by various verification and validation checks.



# In progress for Kenyan System

