Sharing UAE experience in

AIM implementation

NCLB AIM WORKSHOP

Cairo, Egypt, 11-13 September 2017

MID Region NCLB Strategy

- "No Country Left Behind" campaign help ensure all States of effective implementation (EI) and globally harmonized ICAO SARPS, Policies and Programs;
- MID Region is faced with a wide geopolitical diversity, socio-economic prosperity, airspace characteristics, operational challenges and aviation capacity issues;
- Key words for NCLB success: Support, collaboration and direct assistance from States to States;
- MID NCLB strategy aims the following targets:
  - Regional average EI above 70% by 2020 and,
  - Eleven (11) States to have EI at least 60% by 2020.

UAE AIM – Strategic overview

1st Strategic Objective: The finalization of national plan for transition AIS to AIM (2011)

2nd Strategic Objective: Development of AIM system and capabilities (2014 – 2016)

- AIM Static database;
- eAIP tool;
- Electronic charting tool;
- Interoperability export/import trials w/ national stakeholder;

Note: *Scope is closely following the AIM transition roadmap!*

3rd Strategic Objective: Enhance AIM system capabilities (5-year plan, 2017–2021)

- SWIM interfaces & web services exposing UAE data;
- Graphical and Geodesic validation capabilities in support of AIM DQR;
- Management of ETOD;
- Management of AMDB w/ significant performance improvement;
- Migration to EAD (phase 1 of MIDAD) w/ alignment to a common standard;
- Extended data exchange w/ national and inter-regional stakeholders
- D-NOTAM integration

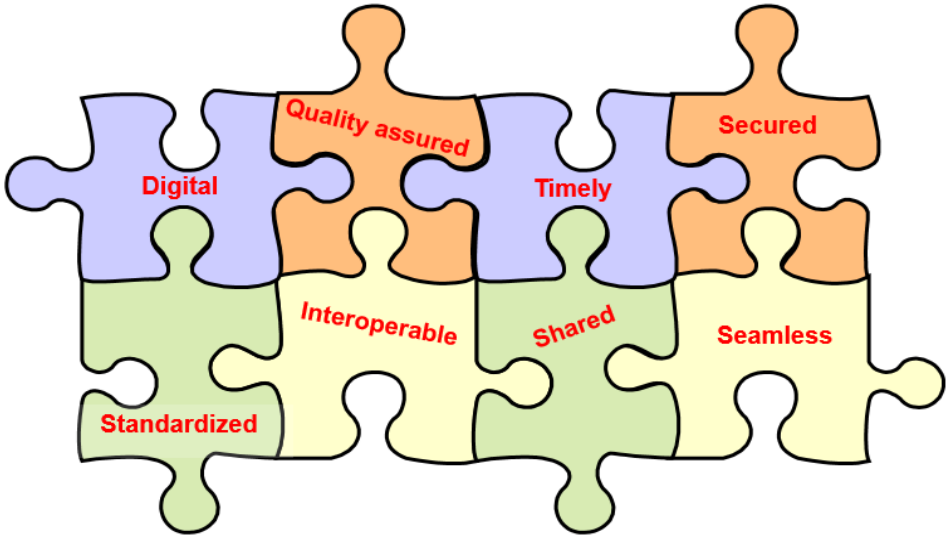
Note: *Scope covering national roadmap + alignment to GANP + new Annex 15/PANS-AIM datasets*

UAE National AIM Implementation Matrix

PHASE	STEP	START DATE	END DATE
PHASE 1	STEP-01 — Data quality monitoring STEP-02 — Data integrity monitoring STEP-03 — AIRAC adherence monitoring STEP-04 — Monitoring of differences to Annex 4 and Annex 15 STEP-05 — WGS-84 implementation STEP-08 — Aeronautical information conceptual model (Database - ICAO) STEP-13 — Electronic terrain – Area 1 and 4 STEP-14 — Electronic obstacles – Area 1 and 4	2008	2011
PHASE 2	STEP-06 — Integrated aeronautical information database STEP-07 — Unique identifiers (Database - ICAO) STEP-11 — Electronic AIP STEP-12 — Aeronautical information briefing STEP-13 — Electronic terrain – Area 2 and 3 STEP-14 — Electronic obstacles – Area 2 and 3 STEP-16 — Personnel training STEP-17 — Quality Management STEP-18 — Agreements with data originators STEP-20 — Electronic aeronautical charts	2012	2015
PHASE 3	STEP-09 — Aeronautical data exchange - Global STEP-10 — Communication networks - enhanced STEP-15 — Aerodrome mapping STEP-19 — Interoperability with meteorological products STEP-21 — Digital NOTAM	2016	2021

- Present and future navigation & ATM systems are all data-dependent;
- The biggest change in the transition to AIM is the increased use of computer technology in IM;
- UAE national plan and its subsequent AIM projects are centered around high data quality in digital format;

The problem: Solving AIM Puzzle



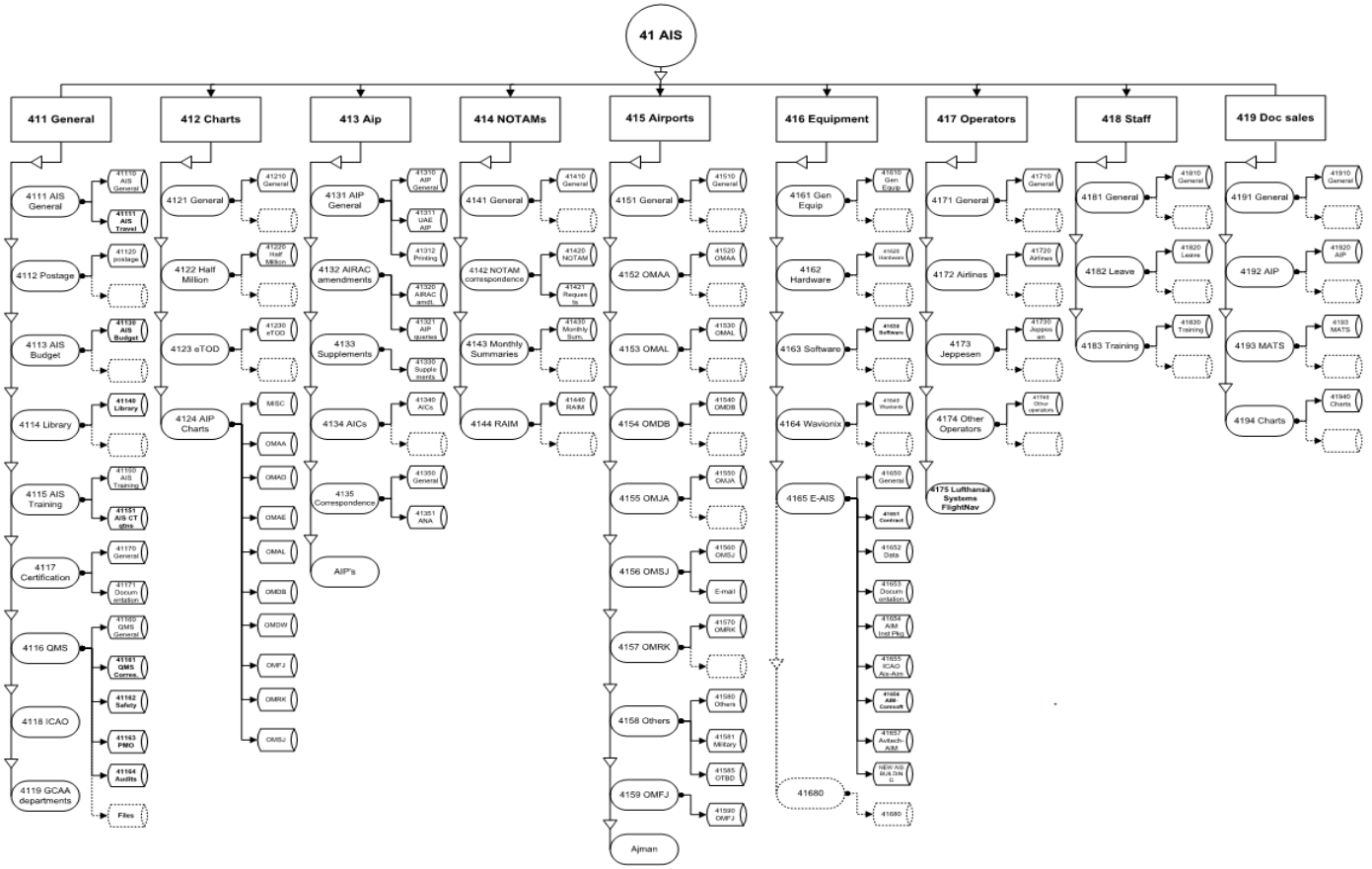
ICAO Safety Indicators report (NCLB MID region plan) is best positioning UAE as follows:

- No Significant Safety Concerns (SSC);
- Almost 100% EI;
- 100% Aerodrome certification;
- 100% PBN airspace implementation;
- High level of activities/movements;

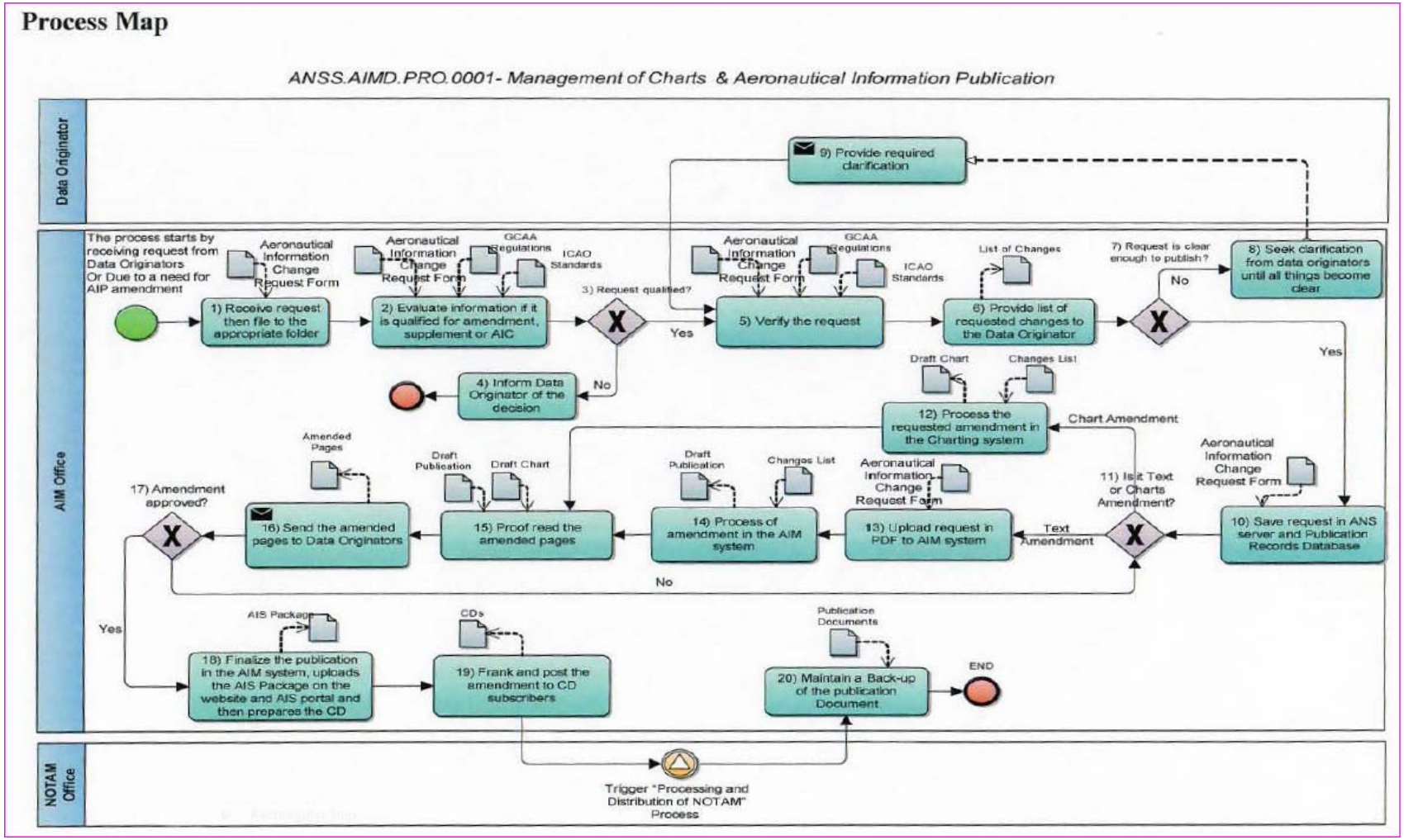
Sharing UAE AIM best practices: “41 AIS” shared folder

Local AIM Instructions (LAIMI), Guidance Procedures, Tasks manuals:

- eAIP amendments & NOTAM requests and correspondence (regulatory & military activities approval, when necessary) ;
- Staff & operational administration (duties & responsibilities, leave, training log, time-keeping, etc.);
- Quality & Certification (publication queries and error log, AIM Certification, quality targets and performance);
- Library: Other States AIPs and ICAO documents;
- Sales (general accounting procedures, reciprocal exchange, customer complaints);



Sharing UAE AIM best practices:
Process Flow for management of eAIP & Charts



Sharing UAE AIM best practices: Processing eAIP Package

General:

- Published in accordance w/ Annex 15 & Doc. 8126;
- Observing pre-notified AIRAC dates (one of the dates is first AIRAC Nov. date to coincide w/ any ICAO SARPS changes);
- Each AIRAC date associated to deadline dates for requests, receive submissions and publication – communicated thru AIC

THE SIGNIFICANT AIRAC DATES FOR 2018 ARE AS FOLLOWS:

AIRAC Number	Receive 5LNC Request	Receive Submissions	Publication Date	Effective Date	Status
				04 JAN 18	
02/2018	09 NOV 17	16 NOV 17	07 DEC 17	01 FEB 18	Planned
				01 MAR 18	
04/2018	04 JAN 18	11 JAN 18	01 FEB 18	29 MAR 18	Planned
				26 APR 18	
06/2018	01 MAR 18	08 MAR 18	29 MAR 18	24 MAY 18	Planned
				21 JUN 18	
08/2018	26 APR 18	03 MAY 18	24 MAY 18	19 JUL 18	Planned
				16 AUG 18	
10/2018	21 JUN 18	28 JUN 18	19 JUL 18	13 SEP 18	Planned
				11 OCT 18	
12/2018	16 AUG 18	23 AUG 18	13 SEP 18	08 NOV 18	Planned
13/2018	13 SEP 18	20 SEP 18	11 OCT 18	06 DEC 18	Planned

Deadlines for receiving submissions by the GCAA-AIM office for AIP Supplements and AIC's are as follows:

- Text and graphics: 3 weeks prior to intended publication date.
- Text only: 1 week prior to intended publication date.

Sharing UAE AIM best practices: Processing eAIP Package

eAIP Amendment "Change Request" steps:

- Material submitted for the eAIP can essentially be defined for processing in three formats:

1. *AIP narrative* – normally published as received;
2. *Charts* – refer separate process;
3. *Data;*

- Request shall be in writing (paper or electronic);
- Inspection is carried out to ensure incoming materials are in accordance with ICAO SARPS;
- Changes to Airspace or Flight Procedures shall preliminary require Regulatory approval;
- Requests are saved/scanned at 41 AIS specific location i.e. Request Received of the data Originator folder;
- When AIRAC cycle is decided, the request and publication records are moved to originator folder of 41 AIS share location;

Sharing UAE AIM best practices: Processing eAIP Package

eAIP Amendment Processing steps:

- Softcopy of the current AIP for editing is stored on the AIM system;
- A new version with the name of the upcoming AIRAC is created;
- Changes shall be made in accordance with the Data Originator request;
- Once the changes are completed, a hard copy of the amended pages are printed for quality check (QC) by at least two members of the AIM staff;
- The QC should include an assessment for:
  - Content validity, accuracy, conformity with existing material, formatting, style, punctuation and spelling;
  - All checked pages are to be scanned and filed as one document under the relevant AIRAC folder in 41 AIS server;
  - DO written approval is obtained for any editorial changes made by AIM
- Validation and verification – *refer to next slide* - of amended data is carried out to ensure the quality (resolution, integrity and traceability) requirements of the aeronautical data;
- The amended pages are sent to the originator for final acceptance and approval;
- A link to the completed eAIP package is distributed to AIM staff for review;

Sharing UAE AIM best practices: Processing eAIP Package

Validation and Verification: AIM data Cascading effect:

- UAE AIM implemented a data quality and integrity monitoring check based on D*ata Cascading Effect* concept.
- Considered complete data category & element list as published in Annex 15, Appendix 7, Table A7-1 to 5.
- Data grouping based on three integrity classes (color coded) i.e. Critical (C1,..), Essential (E1,..) and Routine (R1,..)

1. List of AIP page/table & Charts where the specific data entity is residing i.e. data direct impacts:

No.	Data Category	Data Element	Publication Resolution	Integrity Classification	AIP Sections - SARPs Provisions
C1	Latitude and Longitude	Runway threshold	1/100 sec	Critical	AD 2.12 5) - Annex 15, Appendix 1 AD 2.12 2, 3, 6, 7, 8, 9, 10 & 11) - Annex 15, Appendix 1 AOC Type A - Annex 4, 3.5.1 AOC Type B - Annex 4, 4.9.1 b) PATC - Annex 4, 6.5.1 SID Chart - Annex 4, Chapter 9, 9.9.1.1 & 9.9.1.2; STAR Chart - Annex 4, Chapter 10, 10.9.1.1 & 10.9.1.2; IAC - Annex 4, 11.10.1.2 VAC - Annex 4, 12.10.1.1 AD/Heliport Chart - Annex 4, 13.6.1 f)

2. List of data dependencies i.e. cascading effect + AIP/Charts & other application (AMDB, ETOD, etc.) impacted by the data in 1). Cascading effect may be multi-level i.e. one data type triggers other data change, which generates deeper 2nd, 3rd level of changes.

Dependent Data	Dependent Data References
Ellipsoid height of the landing threshold point (LTP) for SBAS/GBAS	AD 2.19 6) for SBAS; Doc. 8168, Vol. II for GBAS
Elevation of runway threshold	AD 2.12 6)
Geoid undulation at the RWY THR position	AD 2.12 5)
RWY length	AD 2.12 3)
Runway true bearing	AD 2.12 2) - Annex 15, Appendix 1, Annex 4, Chapter 11, 11.9.1
RWY portrayal (pattern)	SID/STAR Charts, IAC, AD/Heliport Chart, AD Terrain and Obstacle Chart, AOC Type A, AOC Type B, PATC, Visual Approach Chart,
Take-off Run Available (TORA)	AD 2.13 2) - Annex 14, Vol. I, Attachment A, 3
Take-off Distance Available (TODA)	AD 2.13 3) - Annex 14, Vol. I, Attachment A, 3
Accelerate-Stop Distance Available (ASDA)	AD 2.13 4) - Annex 14, Vol. I, Attachment A, 3
Landing Distance Available (LDA)	AD 2.13 5) - Annex 14, Vol. I, Attachment A, 3
Slope of runway & associated SWY (if any)	AD 2.12 7) - Annex 15, Appendix 1
Dimension of associated SWY (if any)	AD 2.12 8) - Annex 15, Appendix 1
Dimension of associated CWY (if any)	AD 2.12 9) - Annex 15, Appendix 1
Dimension of strip	AD 2.12 10) - Annex 15, Appendix 1
Dimensions of RESA;	AD 2.12 11) - Annex 15, Appendix 1
Runway Threshold Lights, colour and wing bars	AD 2.14 3) - Annex 15, Appendix 1
GP/VNAV angle for PA & APV respectively	Annex 4, Chapter 11, 11.10.8.6, 11.10.9 and Doc. 8168, Vol. II, Part I, Section 4, 5.5.1 & 2;
Final descent gradient (descent angle) for NPA with FAF	Annex 4, Chapter 11, 11.10.8.5, 11.10.9 and Doc. 8168, Vol. II, Part I, Section 4, 5.5.1 & 2
Reference Datum Height/Threshold Crossing Height (RDH/TCH) for PA & APV respectively	Annex 4, Chapter 11, 11.10.8.6; Doc. 8168, Part I, Section 4, 5.5.1 and Part II Chapter 1
Visual Approach Slope Indicator Sytem: MEHT and Slope	Annex 4, Chapter 12, 12.10.5.3

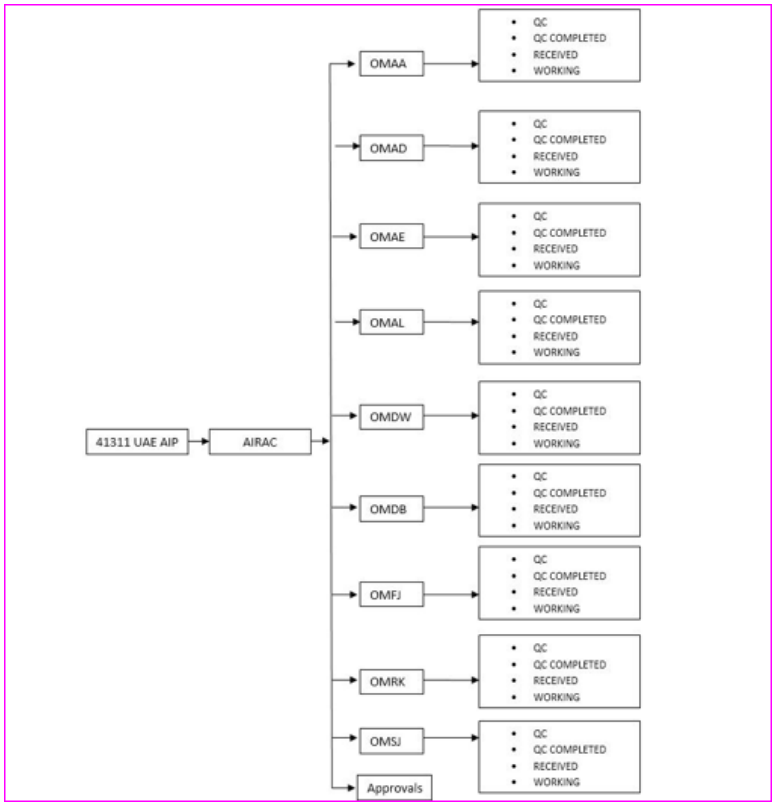
3. Remarks – covering (if needed, explanatory and/or clarification material

Remarks
Especially, the obstacles horizontal surfaces for 2a, b and c have to be revisited for possible re-survey.
The SID starts at the RWY end i.e. DER (Annex 4, 9.3.1 Note)

Sharing UAE AIM best practices: Processing eAIP Package

Charting steps:

- Data Submission from Originator: AIM receives the Chart or Change Request for charts from DO by FTP link/Email attachment or CD/DVD delivery;
- Data Sorting: Evaluate the data in the "Request Received" folder. The following folder structure (41 AIS) shall be followed by Charting team while moving the data for charts amendment:



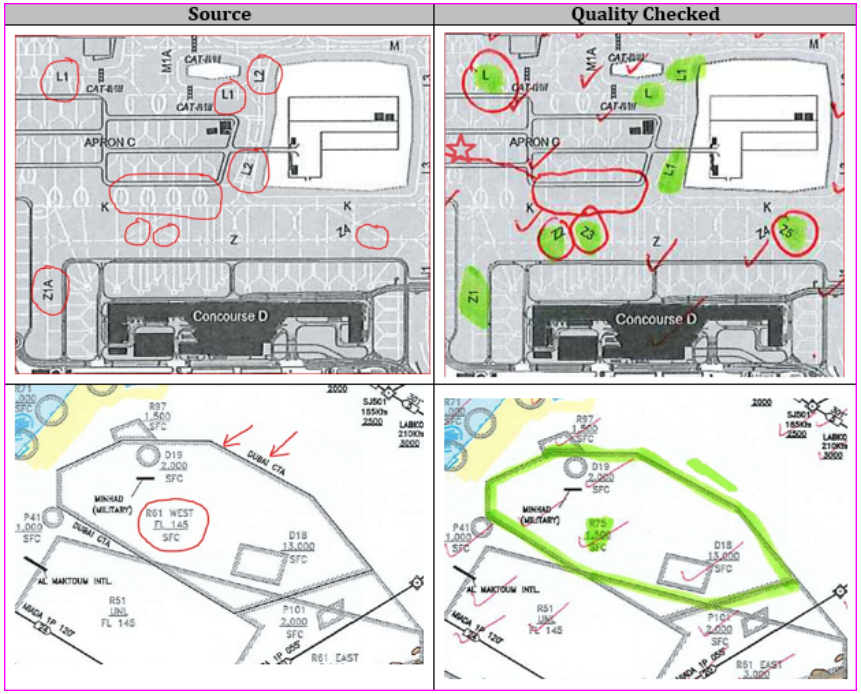
Sharing UAE AIM best practices: Processing eAIP Package

Charting steps:

Source Data Validation:

- Check all received AutoCAD files are geo-referenced.

- Overview all charts (AutoCAD) for chart completeness and required elements as per Annex 4 & Doc. 8697 as follows:
  - Chart Projection
  - Orientation (North)
  - Chart Scale
  - Chart Coverage (Extent)
  - Chart Features – Aeronautical, Cultural, topographical.
  - Units of Measurement (Bearings, Distances, Elevation)
  - Operationally significant changes in change bar
  - AIRAC Number and Effective Date
  - References to Adjacent Charts or Text Pages



- Check the Charts Layout have the following elements:

  - Chart Number
  - Chart Designation/Title
  - Units for expressing Elevations
  - AIRAC Number and Effective Date
  - Publishing Authority

- Check the Charts have charting symbols as per Annex 4, Appendix 2:

  - Check that the symbols are also listed in UAE AIP GEN 2.3.
  - If symbols are **not** listed in UAE AIP GEN 2.3, then add a **Legend** in the chart
  - Reference to Doc 8400, make sure all the **ICAO and Non-ICAO abbreviations** indicated on the chart are listed in UAP AIP GEN 2.2

- Check the Charts have Cultural and Topographic feature colors as per Annex 4, Appendix 3 and 4.

- Compare each type of Chart against publication resolution per Annex 4, Appendix 6

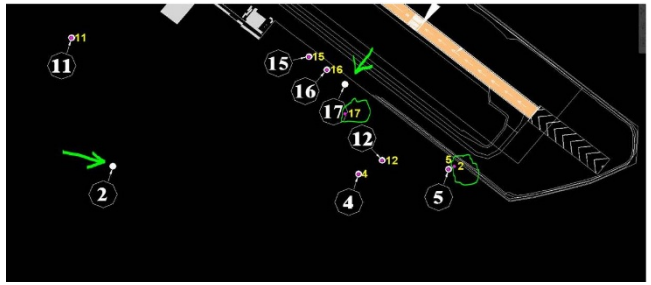
Sharing UAE AIM best practices: Processing eAIP Package

Charting steps:

Data Quality Assurance (DQA) Principles:

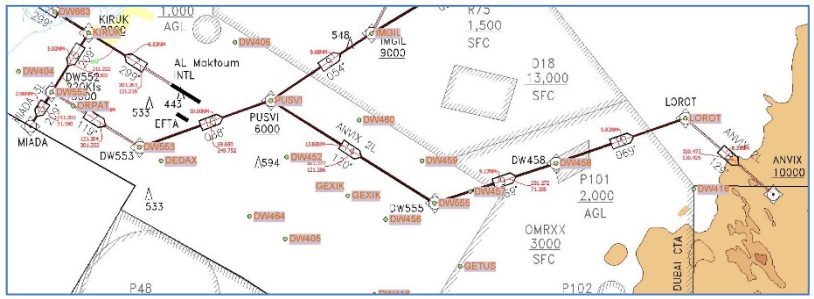
- Go through the complete text of the "Change Request" submitted by the Originator to identify cascading effect on charts and coding table.

- Print received charts and coding table and compare with the published chart and associated table to identify the intended changes as per Originator's "Change Request". Any other changes other the intended ones shall be communicated with the Originator prior to publication.



- If modified or new procedure is submitted check the followings:
  - Plot all the tracks to validate and verify the TRUE course.
  - Calculate MAG bearing indicated on chart for validation and verification.
  - If new waypoints are provided in Excel, Word or PDF format, convert them into ESRI Shape file.
  - Plot them in the chart for verification and validation.
  - Use the **published chart as Xref** to identify editorial or changes that are not listed in the "Change Request".

- Following coordinates in the "Change Request" are converted to Shape file and validated/verified:
  - **AD 2.10:** Aerodrome obstacles coordinates verified against the AD Chart.
  - **AD 2.12:** Runway threshold coordinates verified against the AD Chart.
  - **AD 2.17:** ATS AIRSPACE coordinates verified against the relevant Chart.
  - **AD 2.19:** NAVAID coordinates verified against the AD Chart & relevant Chart.
  - **ENR 2.1:** CTA coordinates verified against the relevant Chart.
  - **ENR 2.2:** Regulated airspace border coordinates verified against the relevant Chart.
  - **ENR 5.1:** D, P, R coordinates verified against the relevant Chart.
  - **VFR Charts:** Plot all the VFR points for validation and verify the routes description with the chart.
  - **Minimum Radar Vector Altitude Chart:** Verify the description and sector coordinates against the chart.
  - **Parking and Docking Chart:** Validate and verify stand coordinates against the chart.
  - **Type "A" Chart:** Validate the Obstacle(s) against the chart.



Important: Human Factors (Doc. 9683) is considered while cartographically enhancing the chart to avoid ambiguity and improve clarity with proper annotation and distinction of Aeronautical & Topographic Features with colors & linetype.

- Basic Principles of QC for Charting team:
  - For each chart type, compare the chart with the "Chart Checklist" located on 41 AIS server
  - Tick every element that has been checked against the source.
  - Only highlight with an appropriate marker if the element differs when compared with source.
  - Only highlight with an appropriate marker if the element is missing at a place when compared w/ source.
  - Only highlight with an appropriate marker if the element is new at a place when compared w/ source.

Success story: UAE AIM Database

UAE AIM database (core of the system) is used and is continuing to be further enhanced for following objectives:

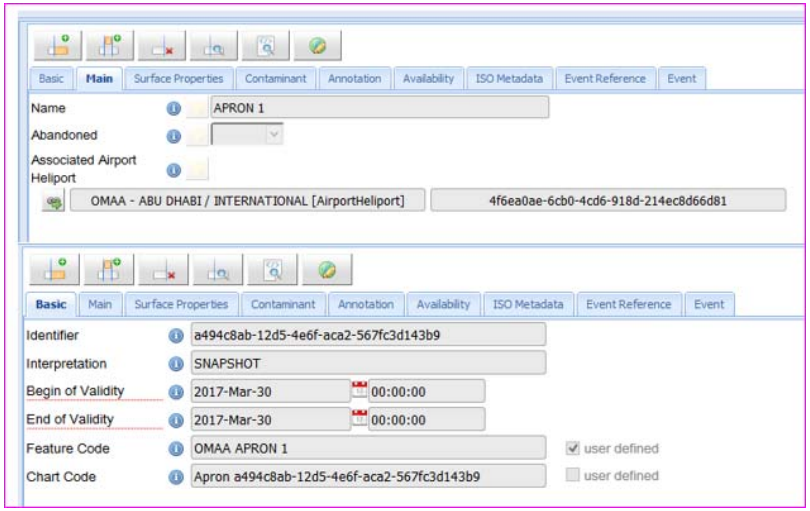
- Usage of the static data by the AIM system components i.e. eAIP Tool and electronic charting tool;
- Graphical viewer verification and geodesic validation tools in support of UAE data quality checks;
- Exchange of aeronautical data with internal (presently) and external (future) stakeholders;
- Development of SWIM compliant interfaces (national transition roadmap) and web services exposing UAE data;
- Management (import, integration and handling) of eTOD Area 1;

Static data in the AIM central repository is linked to EAIP template. Once data is updated, it is automatically detected all eAIP table or text instances and how many charts are going to be affected by each single data change.

Examples of data coding procedures

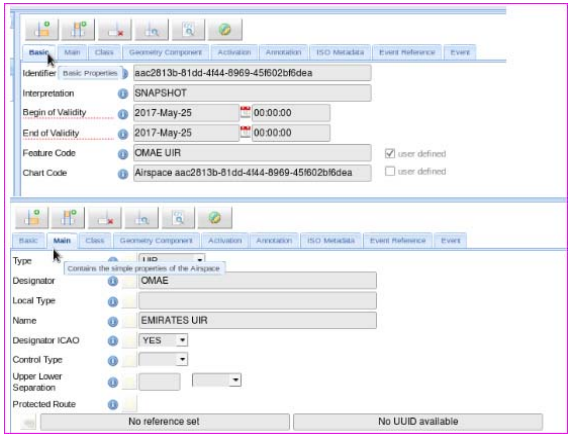
Feature APRON (Source: UAE E-AIP or Publication Request)

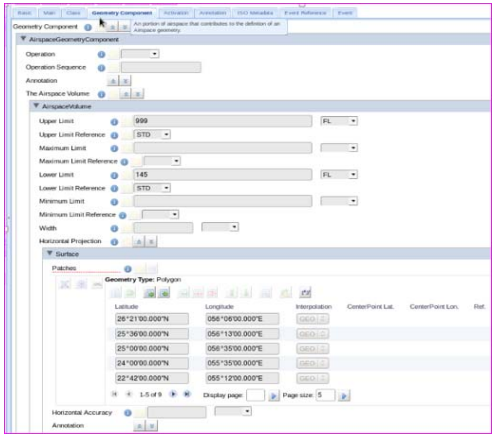
Sample Data Entry Screen:



Feature AIRSPACE (Source: UAE E-AIP ENR 2.1, ENR 2.2, ENR 5.1 and ENR 5.2)

Sample Data Entry Screen:






ICAO • OACI • ИКАО
国际民航组织 • ايكاو


الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY
United Arab Emirates

Thank you