



Global Services

A faint, light gray world map is visible in the background of the slide. A thick blue horizontal bar is positioned above the main title.

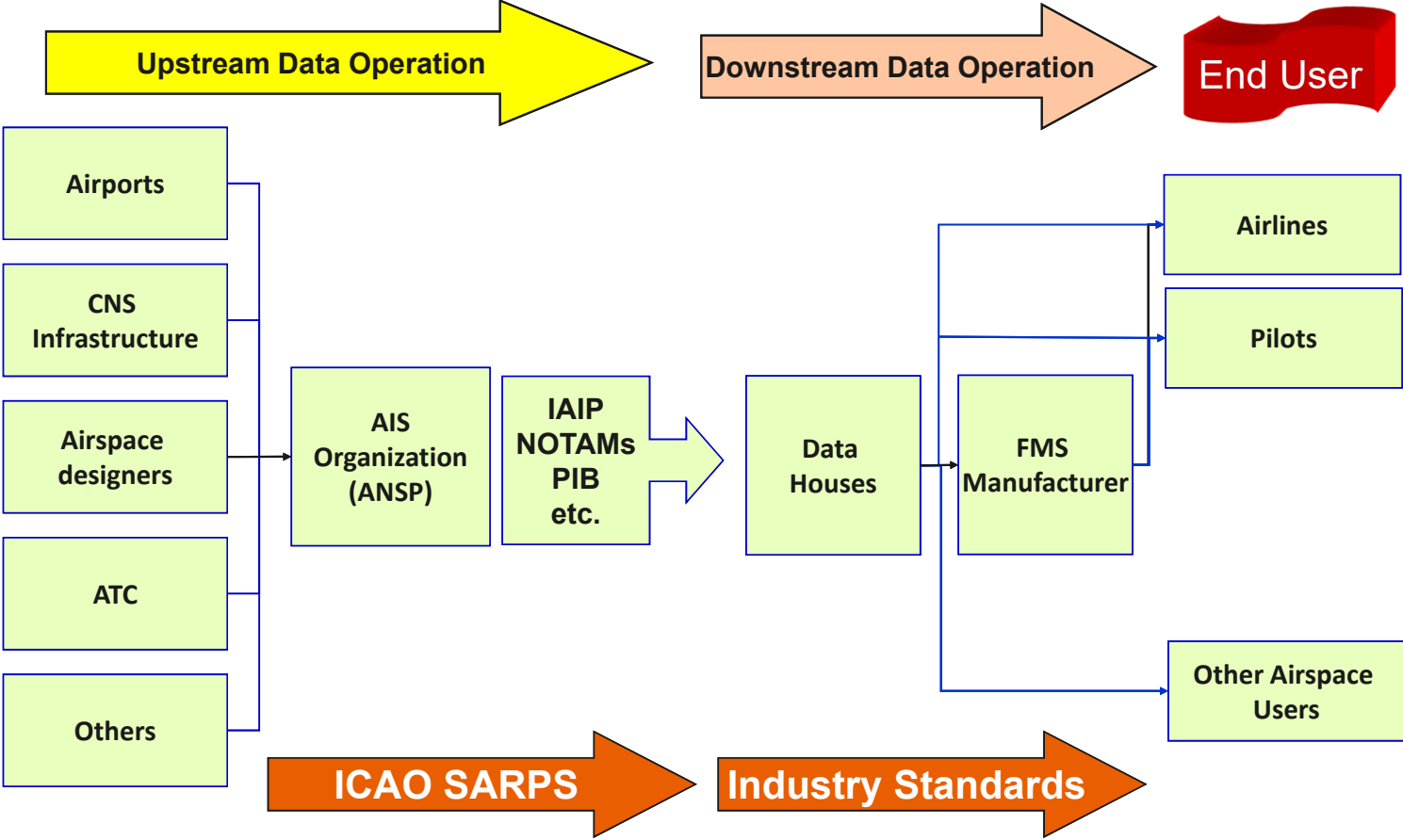
AIS Data Process after its Origination – a Data-House View

ICAO MID AIM/QMS Webinar

Volker Meyer – Manager International Relations

29 April 2021

Upstream and Downstream Actors in the Aeronautical Data Supply Chain



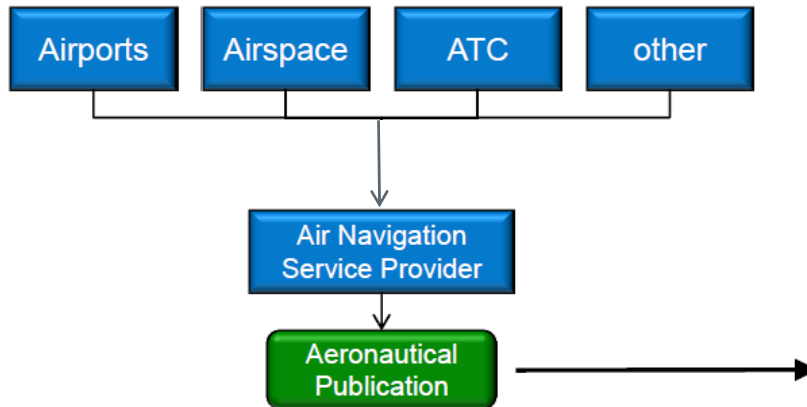
Standardizing Aeronautical Information

Global Services

Boeing Commercial Airplanes / Flight Services | Jeppesen GmbH



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A BOEING COMPANY



New ICAO Annex 15

2.1 State responsibilities

2.1.1 Each Contracting State shall:
provide an aeronautical information
service (AIS) ...

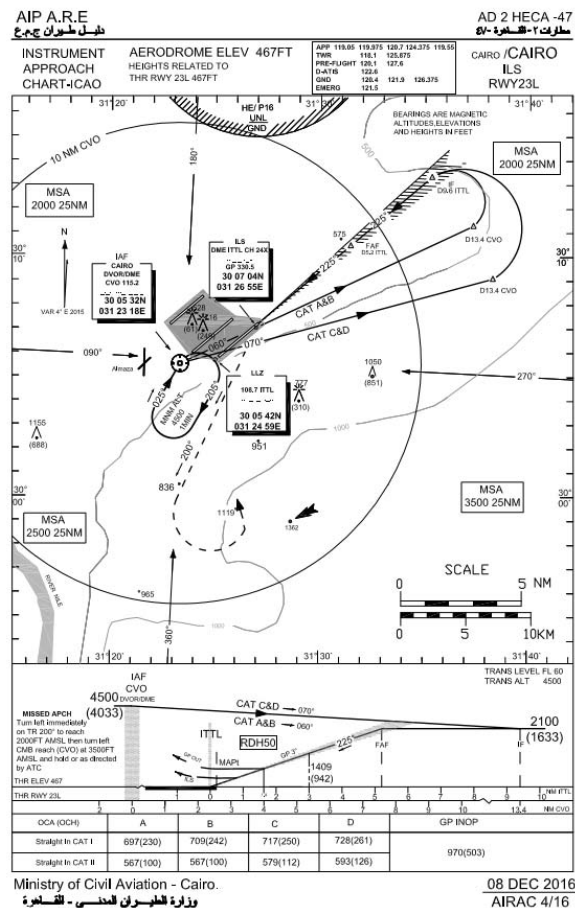
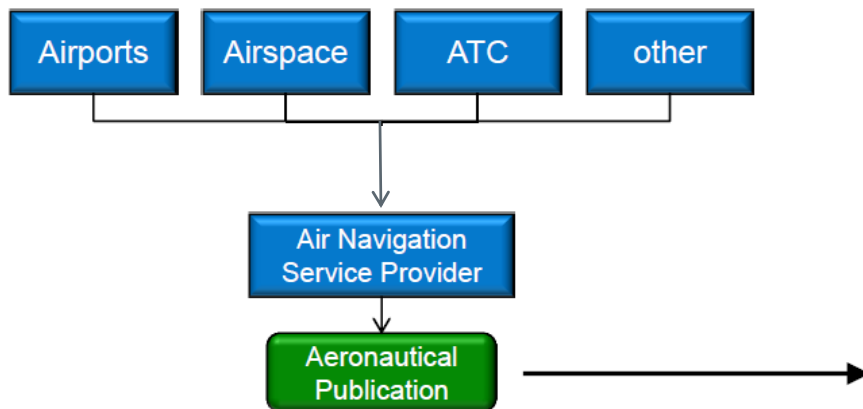
2.1.2 Each Contracting State shall
ensure that the provision of aeronautical data
and aeronautical information covers its own
territory and those areas over the high seas for
which it is responsible for the provision of air
traffic services ...

2.1.4 Each Contracting State shall
ensure that the aeronautical data and
aeronautical information provided are
complete, timely and of required quality ...

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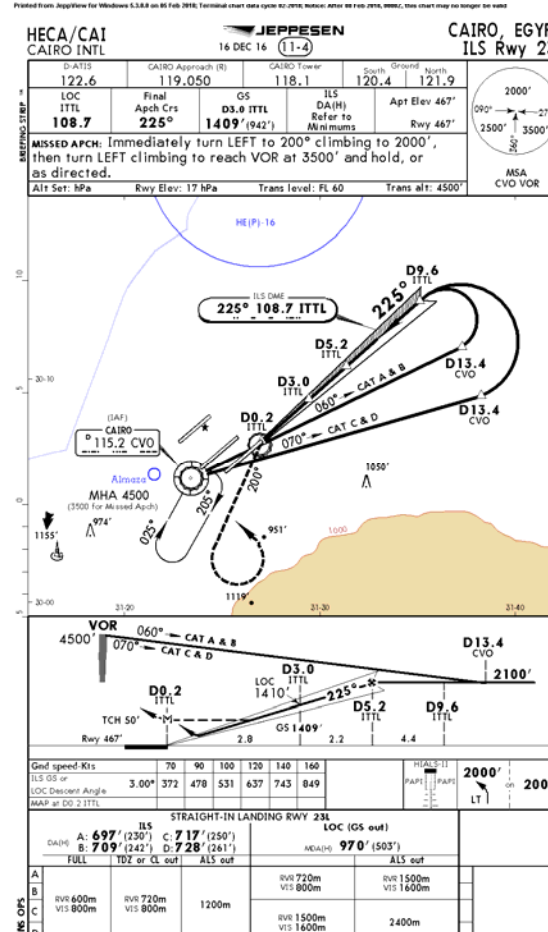
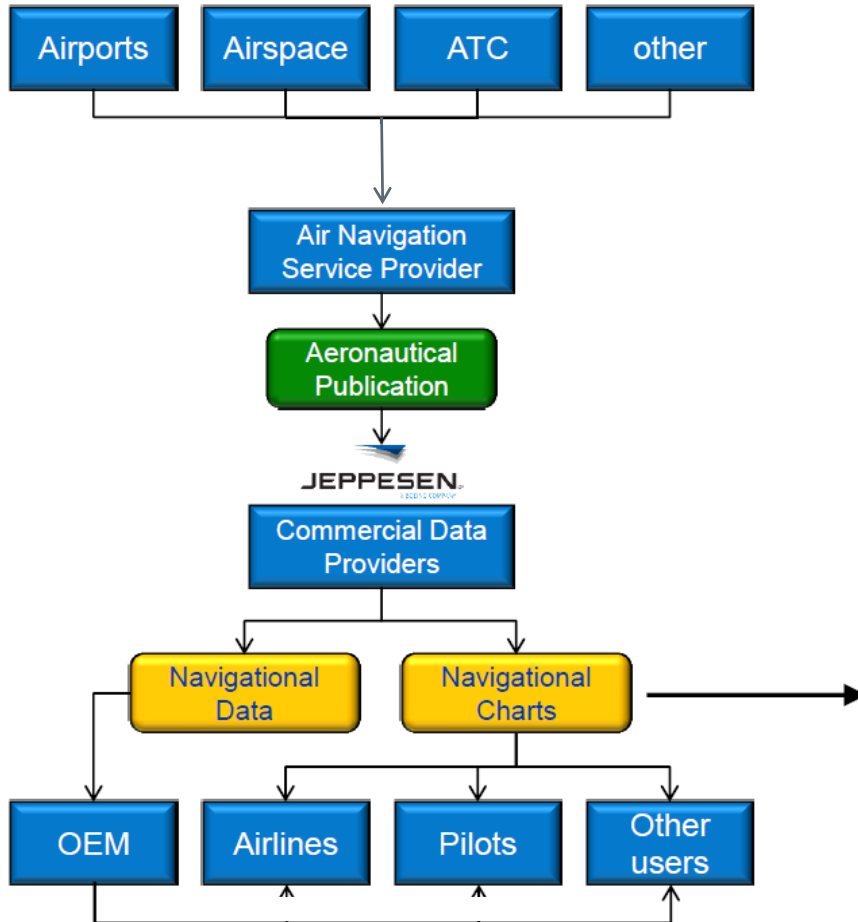
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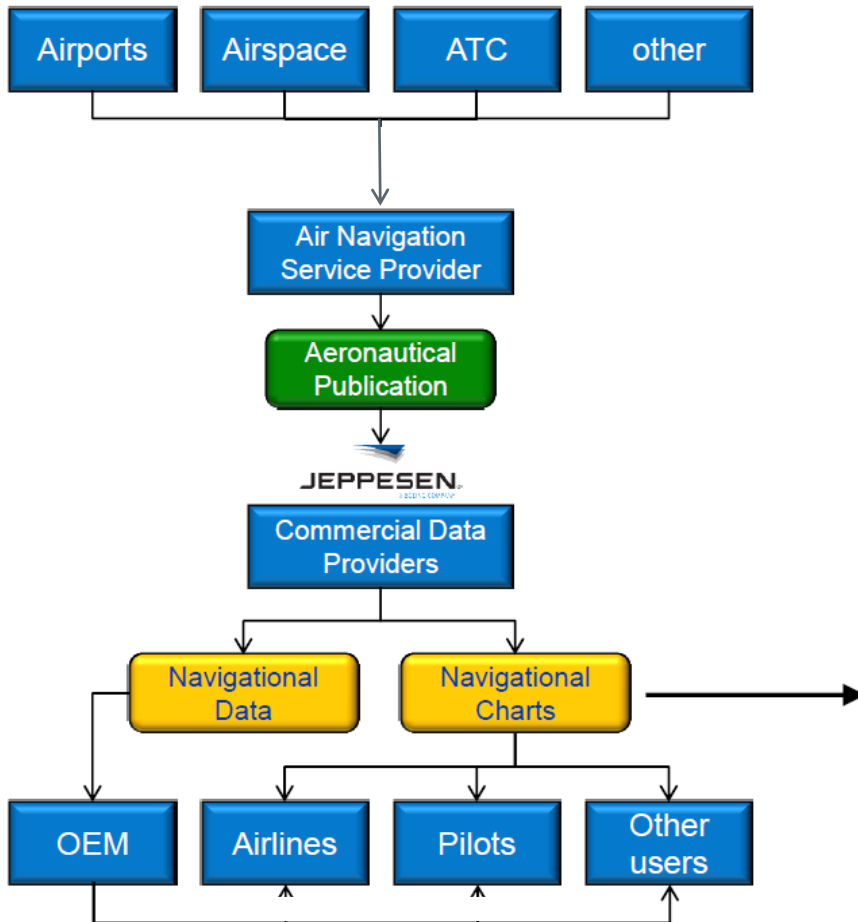
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Jeppesen NavData

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Terminal Procedure: @HECA: I23L APL APILD
 Transition: Final

TRAN SEG A/CAT RSTR GRND MSA MAI

Show: All FMS Depiction

U	Seq	Leg	Fix Desc
B	0010	IF	CI23L/T/HE
B	0020	CF	FI23L/T/HE
B	0030	CF	23L - Asphalt at Cairo Intl /H
F	0040	CA	
B	0045	CA	
B	0050	DF	CVQ/VOR/E/HE
B	0060	HM	CVQ/VOR/E/HE

CI23L/T/HE

FIX CRS ALT

Fix Description: Jeppesen Usage:

Leg Type: Brg Type:

Fix Code:

Overfly-Last Seq. Trans/Rte:

Reporting Code at Fix:

Fix Approach Code: Fix Approach Code QAI:

First Leg of Missed Approach

Recommended Navaid

Description:

Dist From (nm): Dist QAI Code:

Brg: Brg QAI Code:

Derived Data

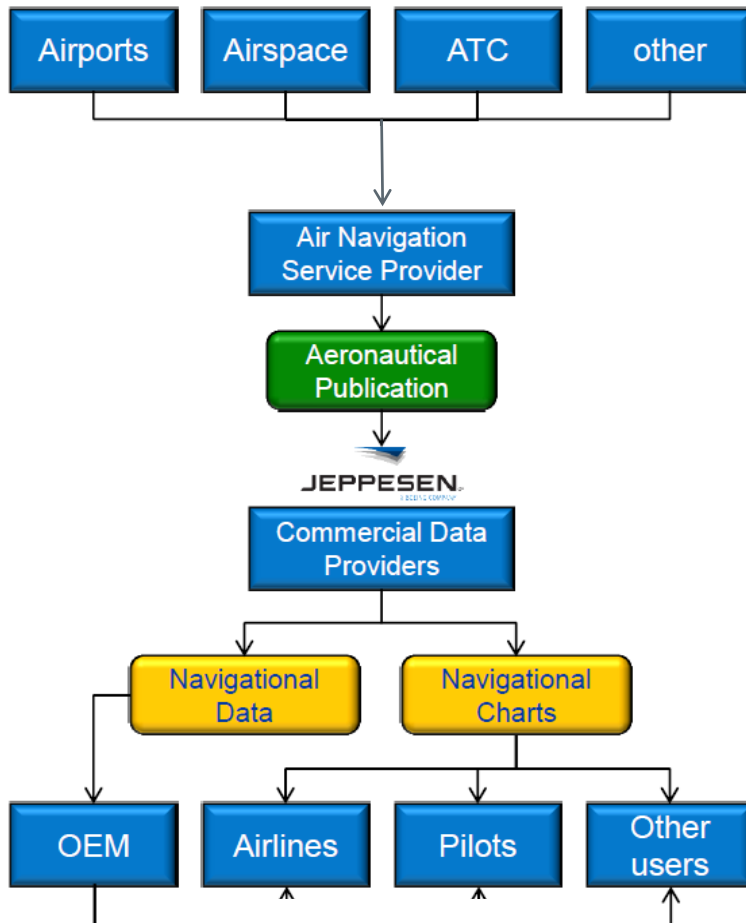
Bearing: (M) (T) Distance From (nm):

Speed Limit: Speed Limit Description:

Standardizing Aeronautical Information

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▲ UPTAR 213042N 0774055E	109/289 62.2 NM	FL 250 FL 75 Class D 5400 FT <small>(M095)</small>	20 NM	↓	↑
△ ATMUV 211059N 0784408E					

AMDT 01/2019

Airports Authority of India

AIP
India

ENR 3.1 G472-3
11 OCT 2018

Route Designator (RNP Type) Name of Significant Points Coordinates	Track- Magnetic/Geo VOR Radial Distance COP	Upper Limit Lower Limit MFA Airspace Classification	Lateral Limits	Direction of Cruising Levels		Remarks Controlling Unit Frequency
				Odd	Even	
G472 cont'd				↓	↑	
	109/289 19.0 NM	FL 250 FL 75 Class D 5400 FT <small>(M095)</small>	20 NM	↓	↑	
▲ NAGPUR VOR DVOR/DME (NNP) 210453N 0790322E	098/278 90.2 NM	FL 250 FL 75 Class D 5300 FT	20 NM	↓	↑	
△ RUXAL 205314N 0803857E	098/278 40.9 NM	FL 250 FL 75 Class D 5300 FT	20 NM	↓	↑	

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Navigational Data

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Airway: G472

[Airway](#) | [Segments](#) | [Restrictions](#) | [Communications](#) | [Airspace Relations](#)

SEQ	AREA	FIX
3005	MES	BEGON/VA
3010	MES	BODAR/VA
3015	MES	MONPI/VA
3020	MES	LIPDU/VA
3025	MES	DULAR/VA
3030	MES	UPTAR/VA
3035	MES	ATMUV/VA
3040	MES	NNP/VOR/VA
3045	MES	RUXAL/VA
3050	MES	SADEV/VE
3055	MES	IKOSI/VE
3060	MES	OPASA/VE
3065	MES	BBBS/VOR/VE
3070	MES	BOLUS/VE
3075	MES	BIXON/VE
3080	MES	BUBKO/VE
3095	MES	RUMUN/VE
3110	MES	SAGOD/VE
3110	PAC	SAGOD/VE
3120	PAC	5IPTN/VY
3130	PAC	PTN/VOR/VY

ATMUV/Enroute/VA/India : 109.00 (M)
NNP/VOR/Nagpur/Enroute/VA/India 3040
 RUXAL/Enroute/VA/India

FXA GNR AIR MOA MET SPA MSC

Route Type: Route Ident Suffix:

ARINC Area: One-Way Code:

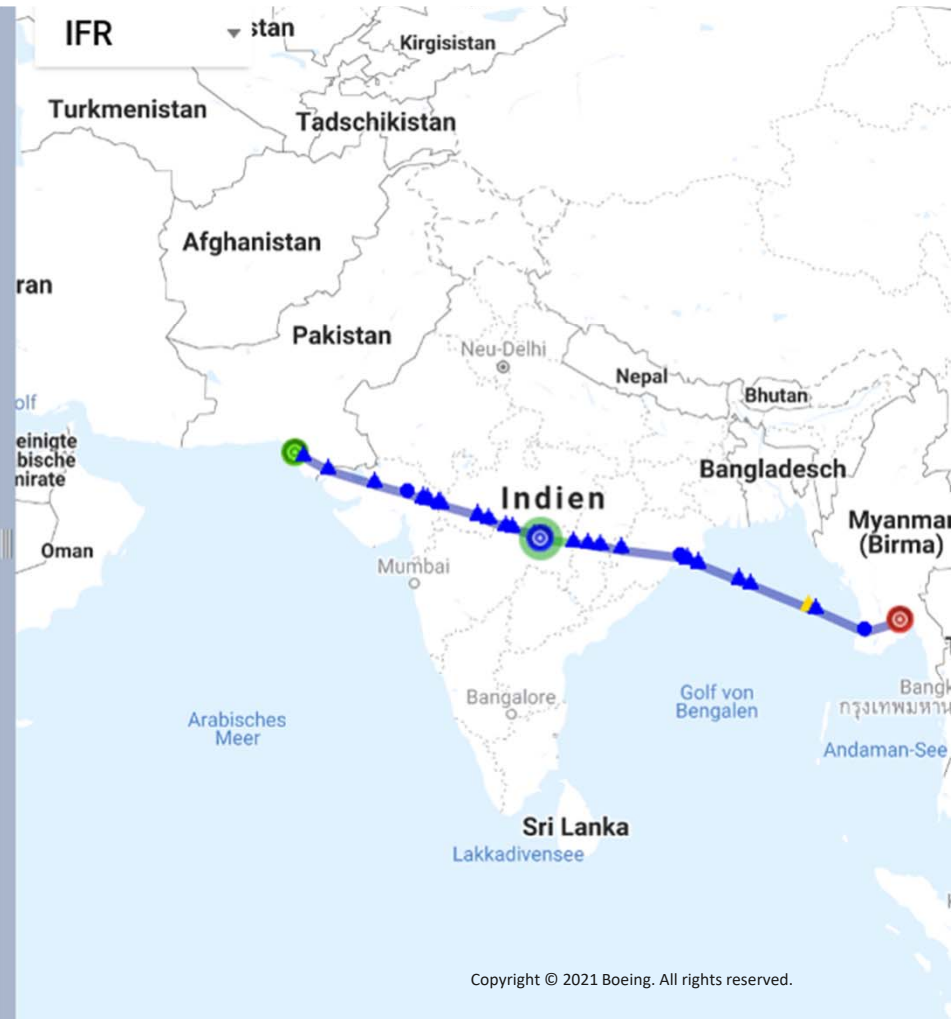
Segment Airway Level
 None High Low Both RNAV Indicator

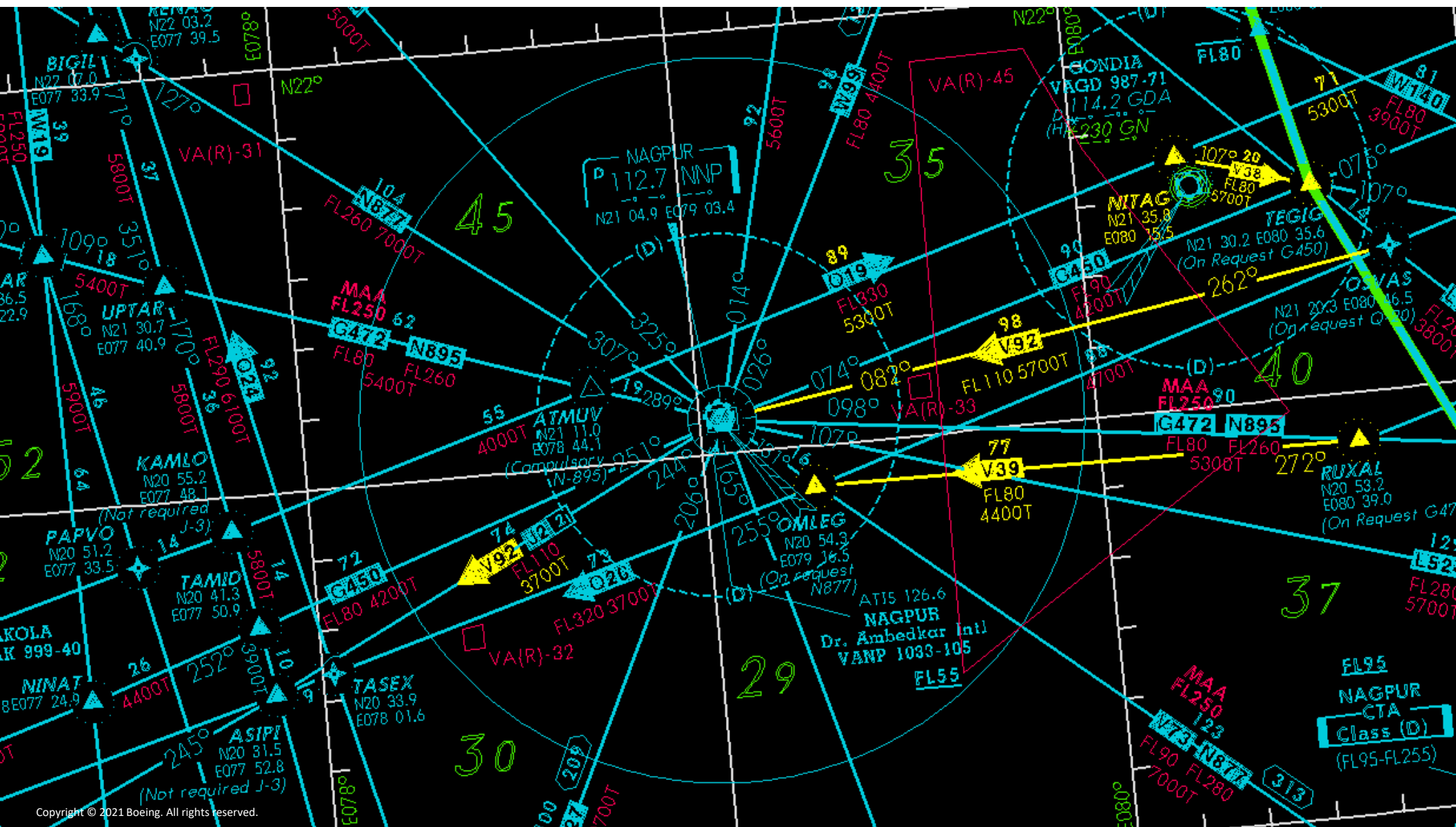
Bearing Distance

Fwd Bearing:	Mag/True:	Bearing QAI Code:
<input type="text" value="098.00"/>	<input type="text" value="Mag Bearing"/>	<input type="text" value="Source supplied"/>
Bkwd Bearing:	Mag/True:	Bearing QAI Code:
<input type="text" value="278.00"/>	<input type="text" value="Mag Bearing"/>	<input type="text" value="Source supplied"/>
Segment Dist.(nm):	Distance QAI Code:	
<input type="text" value="0090.2"/>	<input type="text" value="Source supplied"/>	

Derived Data

Forward Bearing:	Backward Bearing:
<input type="text" value="097.11"/> (M) <input type="text" value="097.11"/> (T)	<input type="text" value="277.75"/> (M) <input type="text" value="277.68"/> (T)

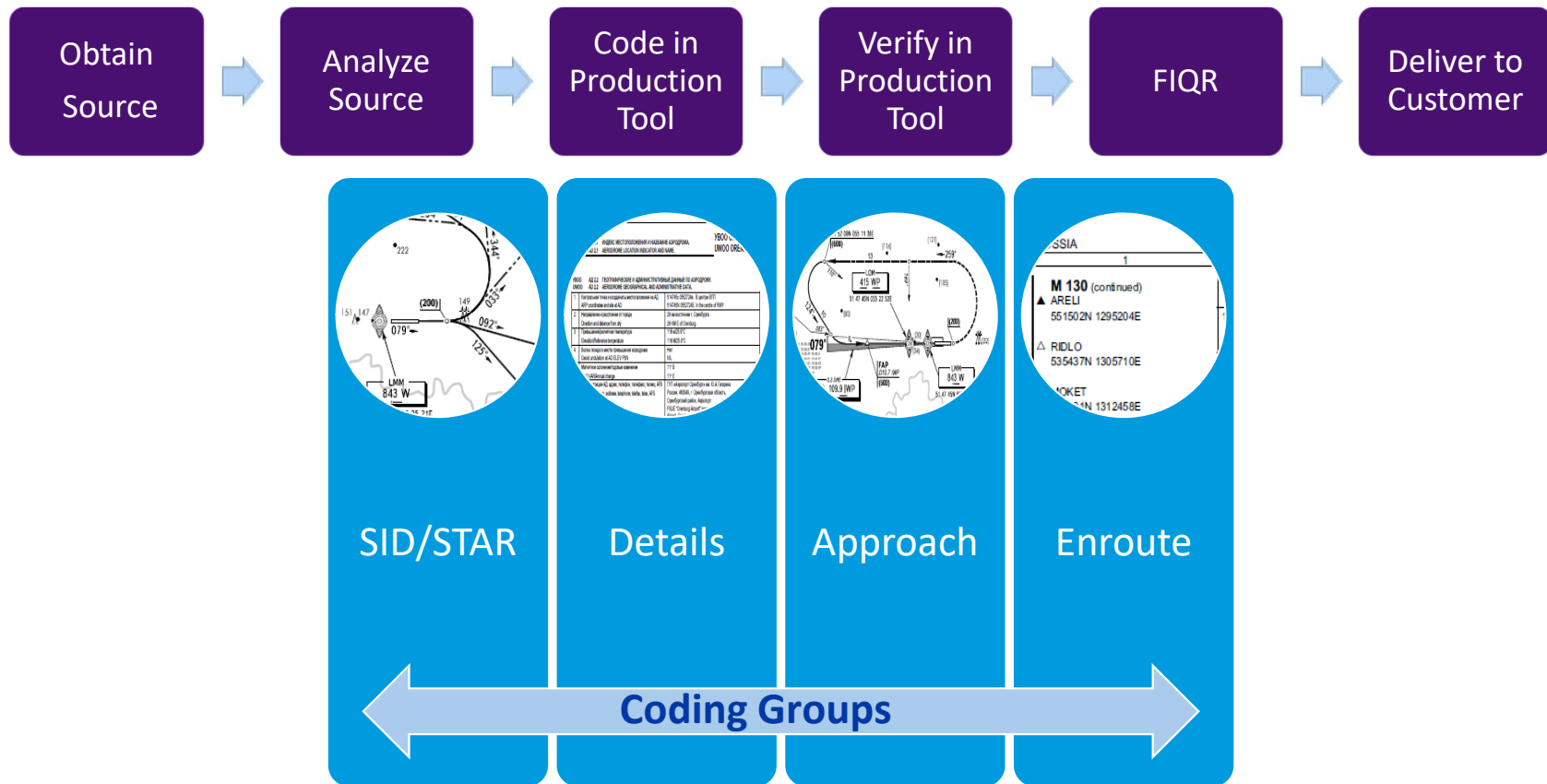




Aviation Data Management

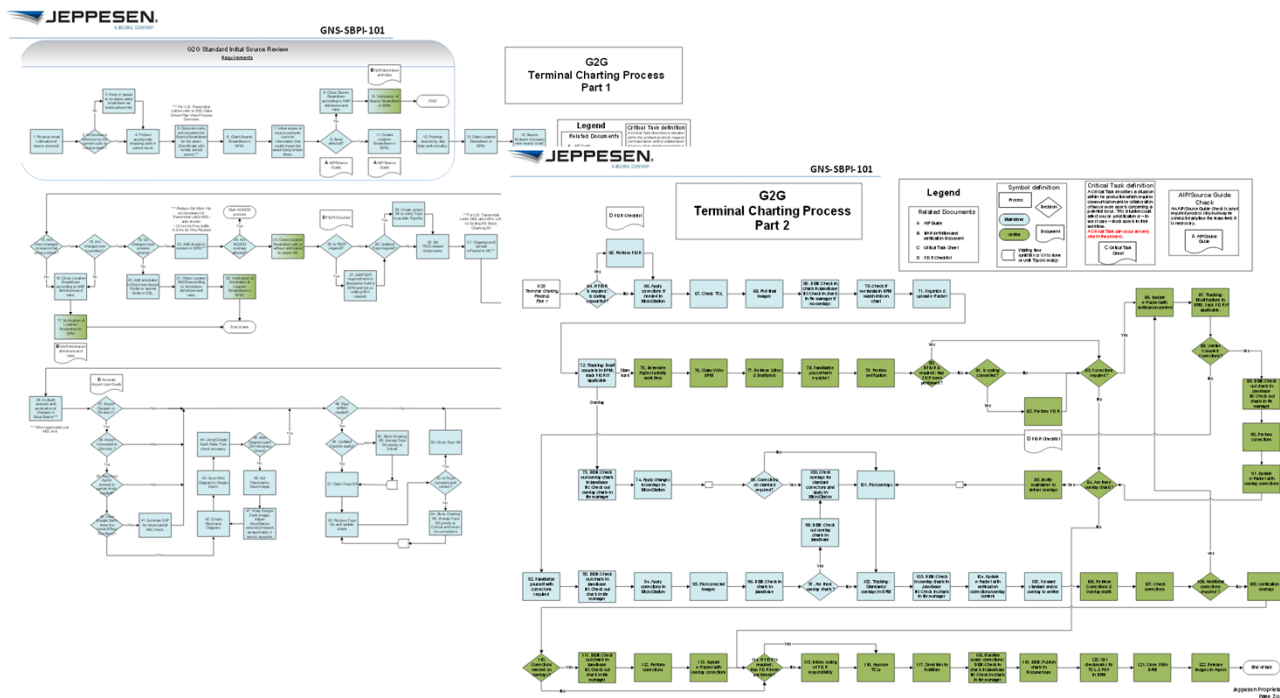
Main steps of the production process

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Maintenance:

... following proven and documented processes, product specifications....



Standard & Regulation Compliance

External Audit Evidence & Certificates

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Maintain compliance with standards:

- ISO 9001:2015
- DO-200A/B ED-76/A

Maintain compliance with regulations:

- FAA AC 20-153A
- EASA LOA Conditions*
- CASA Part 175

Global ISO compliance – certified with a third party registrar, SGS

- First certification in 1997
- Annual audit in DEN, NI, GDN & UK

Type 1 Letter of Acceptance (LOA) for NavData 424 Data

- FAA & EASA 2005

Type 2 Letter of Acceptance (LOA) for Airport Moving Map Data

- FAA 2009

*Transition from LoA to Certificate based upon EU 2017/373 Regulation (LoA Condition Replacement)



Maintenance: ... and requirements like ARINC 424.

ARINC
NAVIGATION SYSTEM DATA BASE
ARINC SPECIFICATION 424

Procedure Report for 14L
Roissy, France

Path	Term	Ident	Type	Desc	ICAO	TD	TV	Rec'd Navaid	Type	Ident	Theta	RHO	Outbound Course	TM	Route	Leg	Desc	ATC Ind	Alt One	Alt Two
API	Transition Ident:	Final	Transition ICAO:					GPS: 0		MSA Ident:	TOU		MSA Type:	V	MSA ICAO:	LF	MSA Same Designator			
	10	CF	CH4L	P E I	LF	N	L	TG			324.4	011.0				000.0	I	3000	3000	
	20	CF	FI4L	P E F	LF	N	L	TG			324.0	005.6	144.0	M	005.4	005.4	G	1750	3000	
	30	CF	14L	G G M	LF	N	L	TG			323.9	001.8	144.0	M	003.8	003.8	0	540		
	40	CF	14L	G G M	LF	N	L	TG			142.4	003.3	144.0	M	008.0	008.0	+	899		
	50	CF				L	V	TOU					010.0	M						
	60	CF	D02BJ	P E	LF	N	V	TOU			028.0	010.5	333.0	M	012.0	012.0	0	4000		
	70	CF	NETRO	E EE	LF	N	V	TOU			028.1	025.0	028.0	M	014.5	014.5				

Route Type: APA Transition Ident: NETRO Transition ICAO: LF GPS: 0 MSA Ident: MSA Type: MSA ICAO: MSA Same Designator

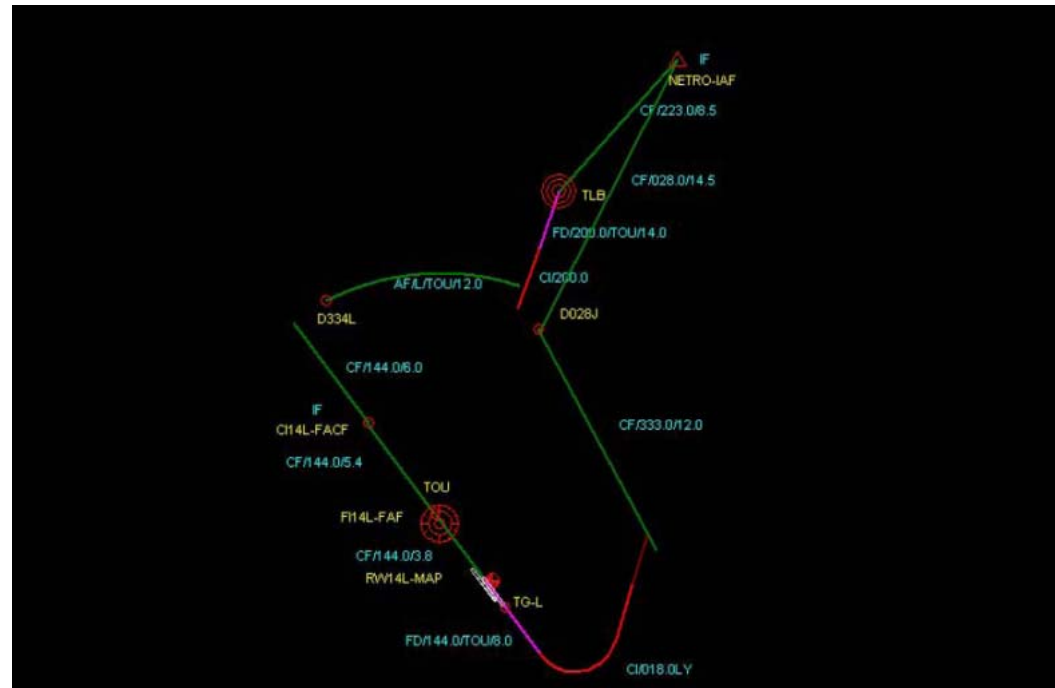
10 F NETRO E E CA LF N N 020.7 016.9 223.0 M 008.5 008.5
 20 CF TLB N E LF N Y TOU 020.7 016.9 200.0 M 014.0 003.0 0
 40 CI N N 200.0 M 002.0
 50 AF D034L P E LF L N Y TOU 324.0 012.0 020.0 M 009.0
 60 CF CH4L P EE LF N L TO 324.4 011.0 144.0 M 006.0 006.0 +

Verification:

JAD Verification considers critical, essential and routine elements

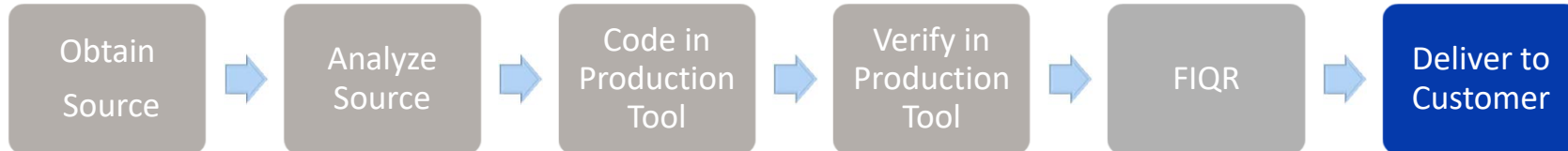
- **Re-Key**
 - Non-Critical data
- **Blind Re-Key**
 - Flight Critical data

Supported by Graphical Editing Tool



Aviation Data Management

Global Services



ARINC 424 file maintenance and creation

- ARINC 424 parameters maintained in Production Tool
- Extracts ARINC 424 data from Production Tool based on requested

SEEUP	URSSURFJ02	AKOGU2	010KOGULUREAOE	CC	IF			B FL200FL11005000	0	LS	134281905
SEEUP	URSSURFJ02	AKOGU2	020SS024URPCOE		TF				0	LS	134291905
SEEUP	URSSURFJ02	AKOGU2	030SS023URPCOE		TF				0	LS	134301905
SEEUP	URSSURFJ02	AKOGU2	040SS022URPCOEE	B	TF	G02AUR		PT + 02020	0	LS	134311905
SEEUP	URSSURFJ02	AKOGU3	010KOGULUREAOE	CC	IF			B FL200FL11005000	0	LS	134321905
SEEUP	URSSURFJ02	AKOGU3	020SS026URPCOE		TF			+ FL110	0	LS	134331905
SEEUP	URSSURFJ02	AKOGU3	030GOKINURPCOE		TF			B FL100FL060	0	LS	134341905
SEEUP	URSSURFJ02	AKOGU3	040SS024URPCOE		TF				0	LS	134351905
SEEUP	URSSURFJ02	AKOGU3	050SS023URPCOE		TF				0	LS	134361905
SEEUP	URSSURFJ02	AKOGU3	060SS022URPCOEE	B	TF	G02AUR		PT + 02020	0	LS	134371905
SEEUP	URSSURFJ02	APITOP	010PITOPURPCOE	CC	IF			B FL080FL06005000	0	LS	134381905
SEEUP	URSSURFJ02	APITOP	020SS022URPCOEE	B	TF	G02AUR		PT + 02020	0	LS	134391905
SEEUP	URSSURFJ02	J	010SS022URPCOE	I	IF	G02AUR		PT J 020200202005000	0	LS	134401905
SEEUP	URSSURFJ02	J	020SS028URPCOE	F	TF	G02AUR	02200050PT	G 0202002020	-280ADL	URD	0 LS 134411905
SEEUP	URSSURFJ02	J	030MJ02 URPCOEY	M	TF	G02AUR	02200035PT	00960	-280		0 LS 134421905
SEEUP	URSSURFJ02	J	040SS029URPCOE	M R	DF				210		0-LS 134431905
SEEUP	URSSURFJ02	J	050PITOPURPCOEE	H	TF			+ FL060			0 LS 134441905

How it began:

- NavData department established 1970
- First Commercial Flight 1973
- ARINC Specification 424 1975
- First Direct Update Service 1983 for the B737-300 FMS

How is NavData being used:

- Flight Planning Engines
- Flight Management Systems (FMS)
- Simulation
- Paper / Electronic Charting
- Airport Analysis
- Terrain Awareness Warning Systems (TAWS)
- Synthetic Vision Systems

AIRAC Adherence in New Annex 15

6.2 Aeronautical Information Regulation and Control (AIRAC)

~~6.2.3~~ ~~6.2.1~~ Information provided under the AIRAC system ~~in paper copy form~~ shall be ~~distributed~~ made available by the AIS unit at least 42 days in advance of the effective date with the objective of reaching so as to reach recipients at least 28 days in advance of the AIRAC effective date.

Note. — AIRAC information is distributed by the AIS at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

~~6.2.7~~ ~~6.2.2~~ Recommendation. — *Whenever major changes are planned and where advance notice is desirable and practicable, information ~~provided in paper copy form~~ should be ~~distributed~~ made available by the AIS ~~unit~~ so as to reach recipients at least 56 days in advance of the effective date. This should be applied to the establishment of, and premeditated major changes in, the circumstances listed in ~~Appendix 4, Part 3,~~ below, and other major changes if deemed necessary.*

New Annex 15 – AIRAC Changes

6.2 Aeronautical Information Regulation and Control (AIRAC)

6.2.1 Information concerning the following circumstances shall be distributed under the regulated system (AIRAC) ...:

a) Limits (horizontal and vertical), regulations and procedures applicable to:

1) FIRs; 2) CTAs; 3) CTRs; 4) ADZs; 5) ATS Routes; 6) restrictive airspace ...

c) Holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATS procedures.

d) Transition levels, transition altitudes and minimum sector altitudes.

6.2.3 Information provided under the AIRAC system shall be made available by the AIS so as to **reach recipients at least 28 days in advance** of the AIRAC effective date.

Note. — AIRAC information is distributed by the AIS at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

New Annex 15 – Major AIRAC Changes

6.2.7 **Recommendation.**— Whenever **major changes** are planned and where advance notice is desirable and practicable, information should be made available by the AIS so as to **reach recipients at least 56 days in advance** of the effective date. This should be applied to the establishment of, and premeditated major changes in, the circumstances listed below, and other major changes if deemed necessary.

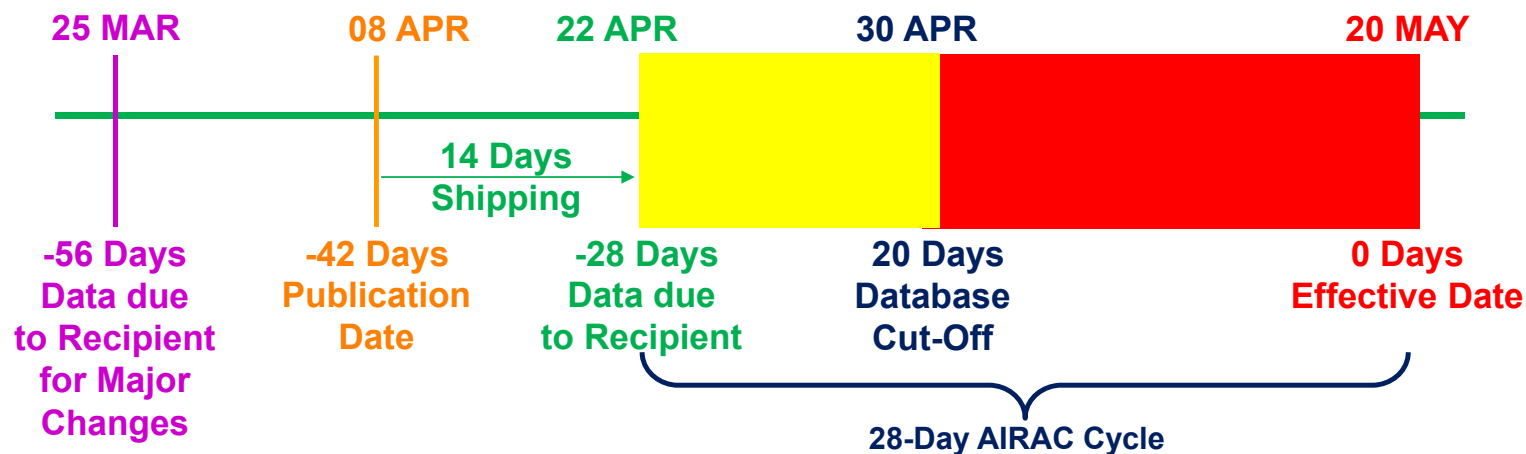
- a) **New aerodromes** for international IFR operations.
- b) **New runways** for IFR operations at international aerodromes.
- c) Design and structure of the **air traffic services route network**.
- d) Design and structure of a **set of terminal procedures** (including change of procedure bearings due to magnetic variation change).
- e) Circumstances listed in 6.2.1 if the **entire State** or any significant portion thereof is affected or if **cross-border coordination** is required.

Note. — Guidance material on what constitutes a major change is included in Doc 8126.

Jeppesen Production Process in sync with ICAO Publication Dates according to Annex 15

Jeppesen Navigation Database

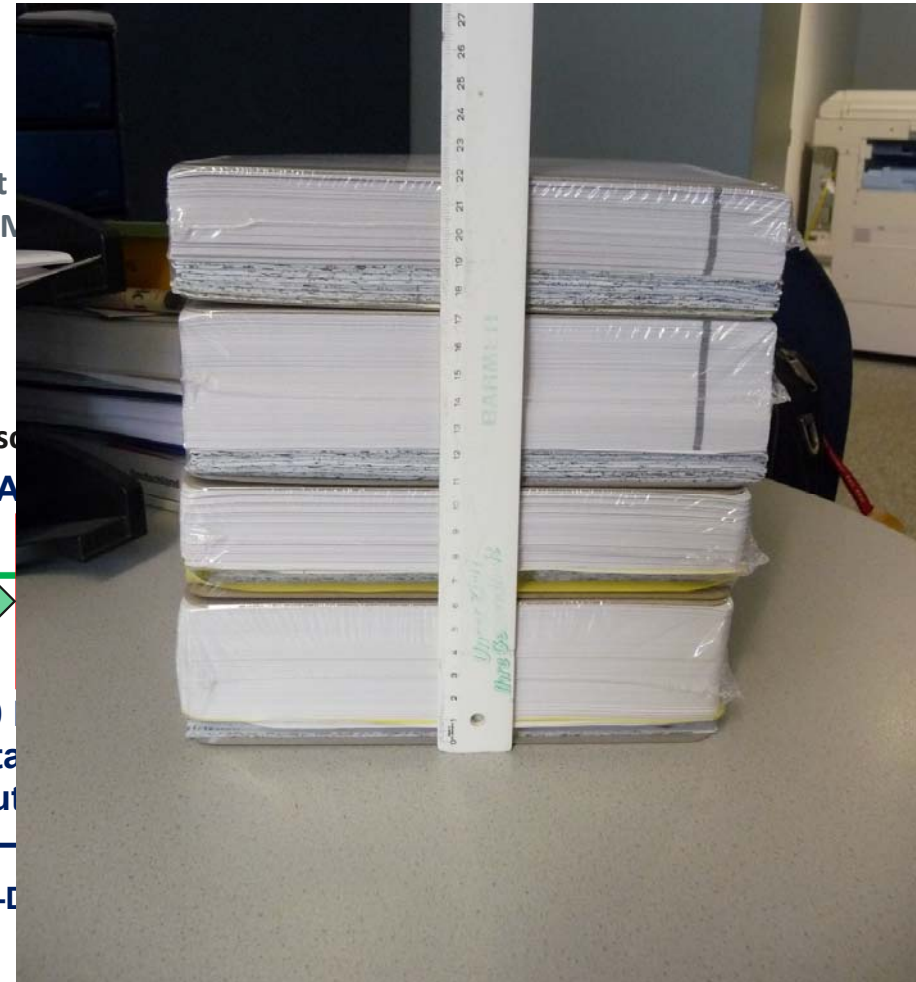
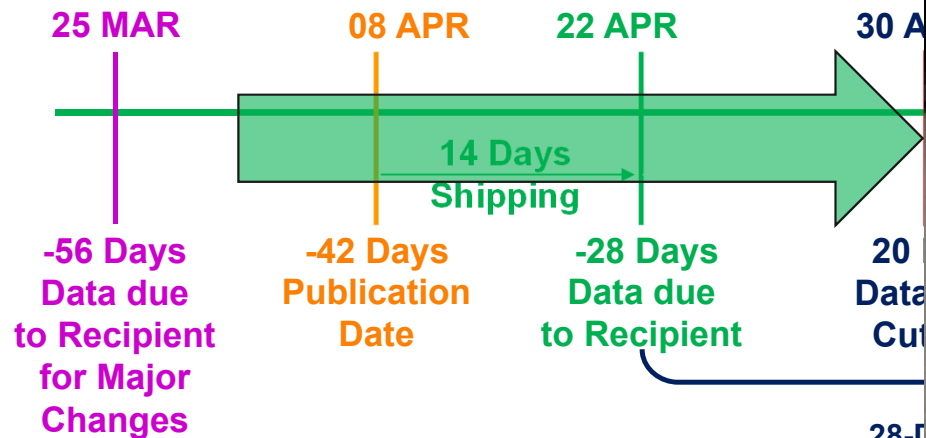
- Updated every 28 days (AIRAC system)
- No updates outside AIRAC system
- A change may not be in the database at the effective date if
 - the effective date is outside the AIRAC system
 - source was received late
 - the ANSP is not responding to clarifications
- Cancellation of changes has to follow the AIRAC system as well
- Adherence to the AIRAC system should ensure that the change is in the database



Jeppesen Production Process in sync with ICAO Publication Dates according to Annex 15

Issues

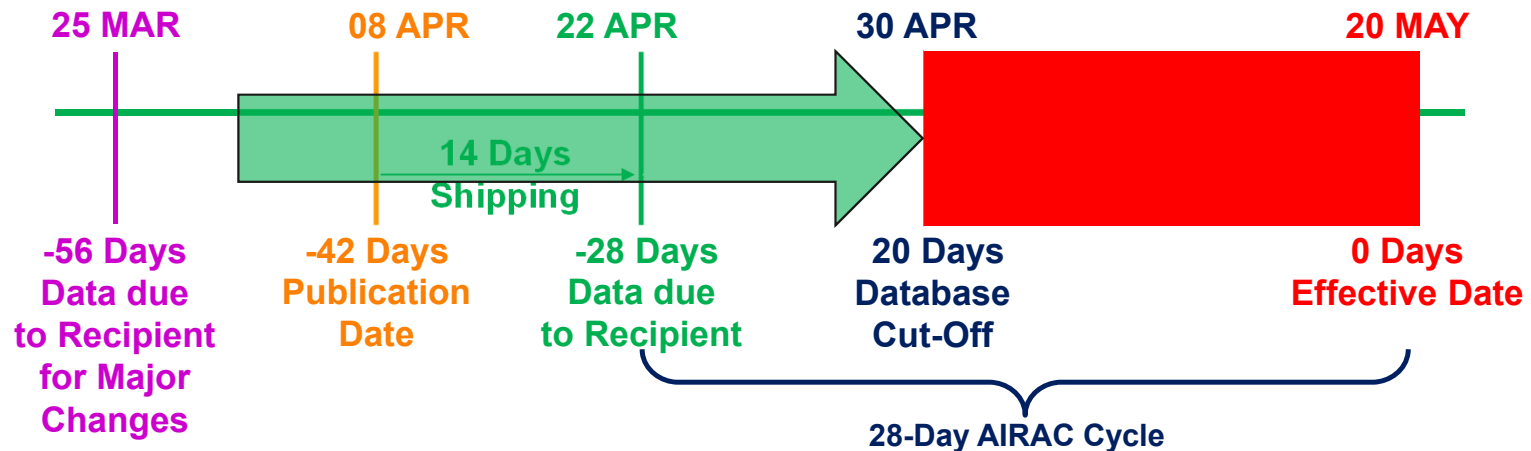
- Late source, no source
- **Incomplete and erroneous source**
- AIRAC changes published in a non-AIRAC Amendment
- Permanent AIRAC changes published by SUP or NOTAM
- Late postponement
- Effective date outside AIRAC system
- Missing harmonisation between states
- No response
- Restrictive disclaimers on Websites, Manipulation of source



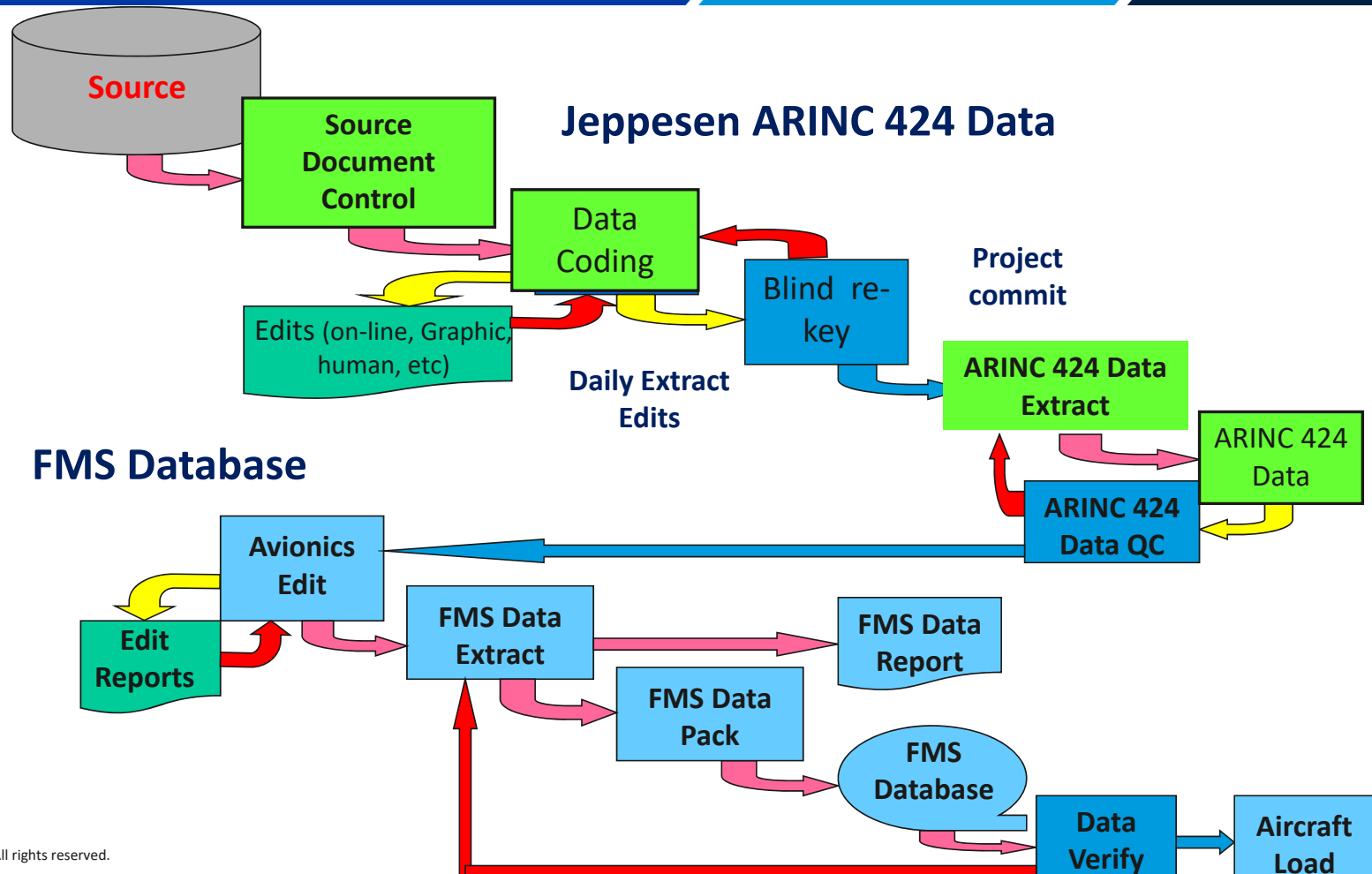
Jeppesen Production Process in sync with ICAO Publication Dates according to Annex 15

Issues

- Late source, no source
- **Incomplete and erroneous source**
- AIRAC changes published in a non-AIRAC Amendment
- Permanent AIRAC changes published by SUP or NOTAM
- Late postponement
- Effective date outside AIRAC system
- Missing harmonisation between states
- No response
- Restrictive disclaimers on Websites, Manipulation of source on Websites



Downstream Data Process



Two types of DAT providers are identified:

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Authoritative Source -> Type 1 DAT Provider -> Type 2 DAT Provider -> End User

Process/Data Obstacles

Late source

No source

Incomplete source

Erroneous source

No communication

Manipulating source

Process/Data Obstacles

OEM restrictions

Database size restrictions

FMS capabilities

Process/Data Obstacles between AIS and OEMs/Users

Memory Size and other Restrictions by OEMs (DQRs)

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- We deliver ARINC-424 from -8 to -20
- Older FMSs cannot handle all procedure types
- Older FMSs may have a very small memory size (database overflow – customers have to select)
- Max. memory size in modern aircraft is 30 MB
- OEM (database manufacturer) excludes certain data elements to save memory
- OEM (database manufacturer) cannot handle certain procedure types
- OEM (aircraft manufacturer) does not allow certain procedure types
- Data may lose attributes and differentiators in FMS

Waypoint: NOR

Waypoint
Waypoint Detail
Boundary Relation

Waypoint Location

Latitude: Longitude:

N 50 50 26.000 E 006 41 39.000

Class	Designation	SD	Ident	Name
ARINC Area			EUR	Europe
ICAO Code			ED	Germany
Information Region	FIR Area		EDGG	Langen
Information Region	UIR Area		EDVV	Hannover

Navaid: NOR (DME) - Station Nord

Navaid
Position
Frequency
MagVar/Declination
Signal
DME Details
Boundary Relation

Navaid Location

Latitude: Longitude:

N 81 35 53.80 W 016 39 55.20

Class	Designation	SD	Ident	Name
ARINC Area			EUR	Europe
ICAO Code			BG	Greenland
Information Region	FIR Area		BGGL	Nuuk



Questions?

Global Services

