International Civil Aviation Organization

The Seventh Meeting of the Asia/Pacific Aeronautical Information Services – Aeronautical Information Management Implementation Task Force (AAITF/7)

Ha Noi, Viet Nam, 13 – 16 March 2012

Agenda Item 4: AIS-AIM Updates

AIS to AIM in Japan

(Presented by Japan)

SUMMARY

This paper presents the progress and issues which Japan has made or is now facing in transitioning from AIS to AIM.

This paper relates to –

Strategic Objectives:
    A: **Safety** – *Enhance global civil aviation safety*

Global Plan Initiatives:
GPI-18 Aeronautical information

1.   INTRODUCTION

1.1   This information paper and the attached presentation address the progress made by Japan and also the issues it is facing while transitioning from AIS to AIM.

1.2   Japan has been considering to transition to AIM supporting CARATS.

2.   AIM transition in CARATS

2.1   Japan Civil Aviation Bureau (JCAB) has developed a long term vision for the future air traffic systems named "Collaborative Actions for Renovation of Air Traffic Systems (CARATS)" in coordination with parties concerned. In establishing the future air traffic systems, JCAB is focusing on the following directions of change, considering the needs of operators and aviation users, social and economic trends, etc.
- Realizing Trajectory-based Operation
- Improving Predictability in ATM operation
- Promoting Performance-based Operation
- Realizing Satellite-based Navigation for all flight phases
- Enhancing Situational Awareness on the Ground and in the Air
- Making Maximum Use of the Capability of Humans and Machines
- Adequate Information-sharing and Collaborative Decision Making
- Realizing High-density Operation in Congested Airports and Airspaces

2.2   The year 2025 is the target year of this vision.

2.3   Information Management W/G under CARATS planning and implementation team works for considering an enabler of CARATS to establish an information infrastructure including GIS database, SWIM, digital NOTAM, etc. in the future. GIS database will be used to introduce eTOD.
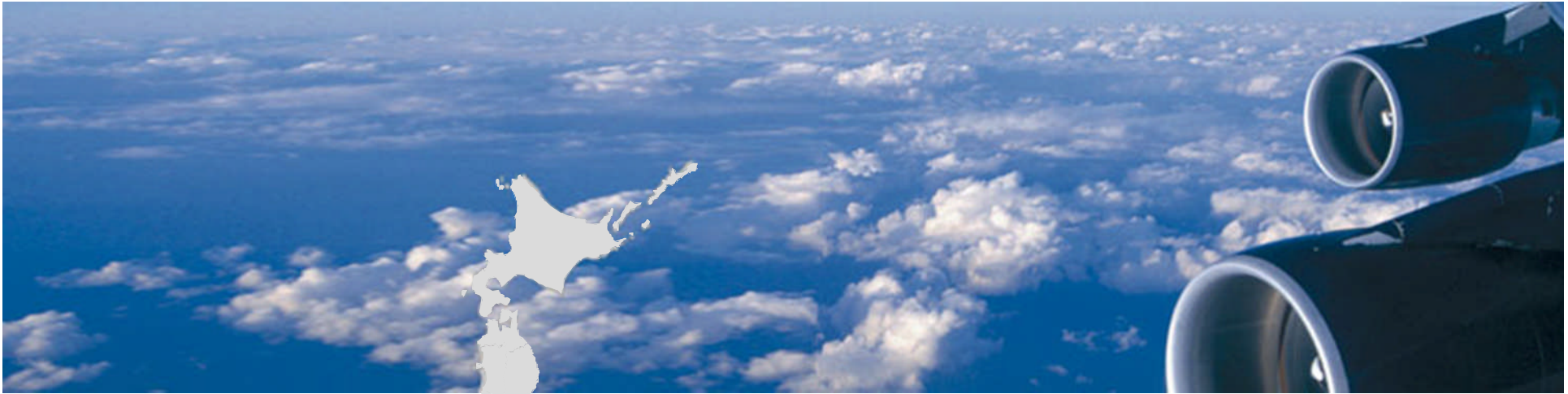
2.4   Japan still faces and is addressing some issues such as legislation issues and cost recovery issues to implement eTOD, eCHART, CHAIN, digital NOTAM, etc.

3.   ACTION BY THE MEETING

3.1   The meeting is invited to:

   a)   note the information contained in this paper and the attached presentation; and

   b)   discuss any relevant matters as appropriate.

— END —

Ministry of Land, Infrastructure, Transport and Tourism
CIVIL AVIATION BUREAU 0F JAPAN

AIS to AIM in Japan

- What we are addressing -

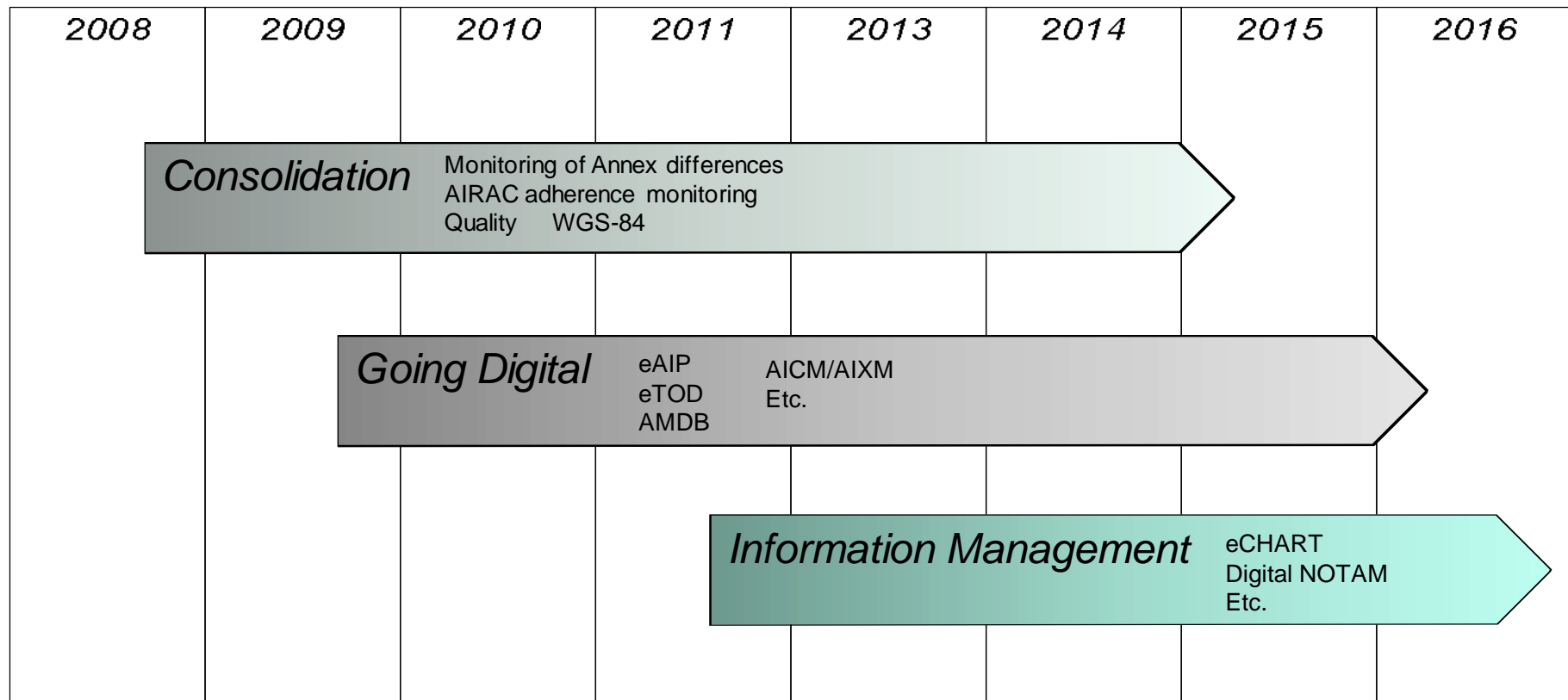13 to 16 March 2012 in Hanoi, Viet Nam
ICAO AAITF/7 Meeting

Contents

✈ ICAO Roadmap for the Transition from AIS to AIM

✈ Phase 1－Establishment of CHAIN (QMS from raw
　　　　　　data providers to end-users)

✈ Phase 2－(1)　eAIP

✈ Phase 2－(2)　eTOD

✈ Phase 3－(1)　Common Aeronautical Information
　　　　　　　　　Exchange Model (AIXM)

✈ Phase 3－(2)　digital NOTAM

✈ Phase 3－(3)　eChart

ICAO Roadmap for the Transition from AIS to AIM

✈ Provides guidance for the development of Aeronautical Information consistent with the vision of the Global ATM Operational Concept and the objectives of the Global Air Navigation Plan

✈ Provides guiding principles for transition

✈ Transition is envisioned in 3 Phases:
  - Phase 1 Consolidation (commencing 2008)
  - Phase 2 Going Digital (commencing Nov 2009)
  - Phase 3 Information Management (commencing 2013)

ICAO Roadmap Phases

2008	2009	2010	2011	2013	2014	2015	2016

Consolidation
Monitoring of Annex differences
AIRAC adherence monitoring
Quality   WGS-84

Going Digital
eAIP   AICM/AIXM
eTOD   Etc.
AMDB

Information Management   eCHART
Digital NOTAM
Etc.

Phase 1－Establishment of CHAIN (QMS from raw data providers to end-users)

- ❖ AISC introduced QMS on basis of ISO9000 series
- ❖ Remaining Issue is to introduce CHAIN (QMS from raw data providers to end-users like airlines)
- ❖ Monitoring new programs globally, including some FAA Advisory Circulars to airport operators

Phase 2－(1) eAIP

- Introduced eAIP using AIXM Ver4.5
- Also introduced graphic NOTAM utilizing SVG providing at website (https://aisjapan.mlit.go.jp)

Phase 2 －(2) eTOD

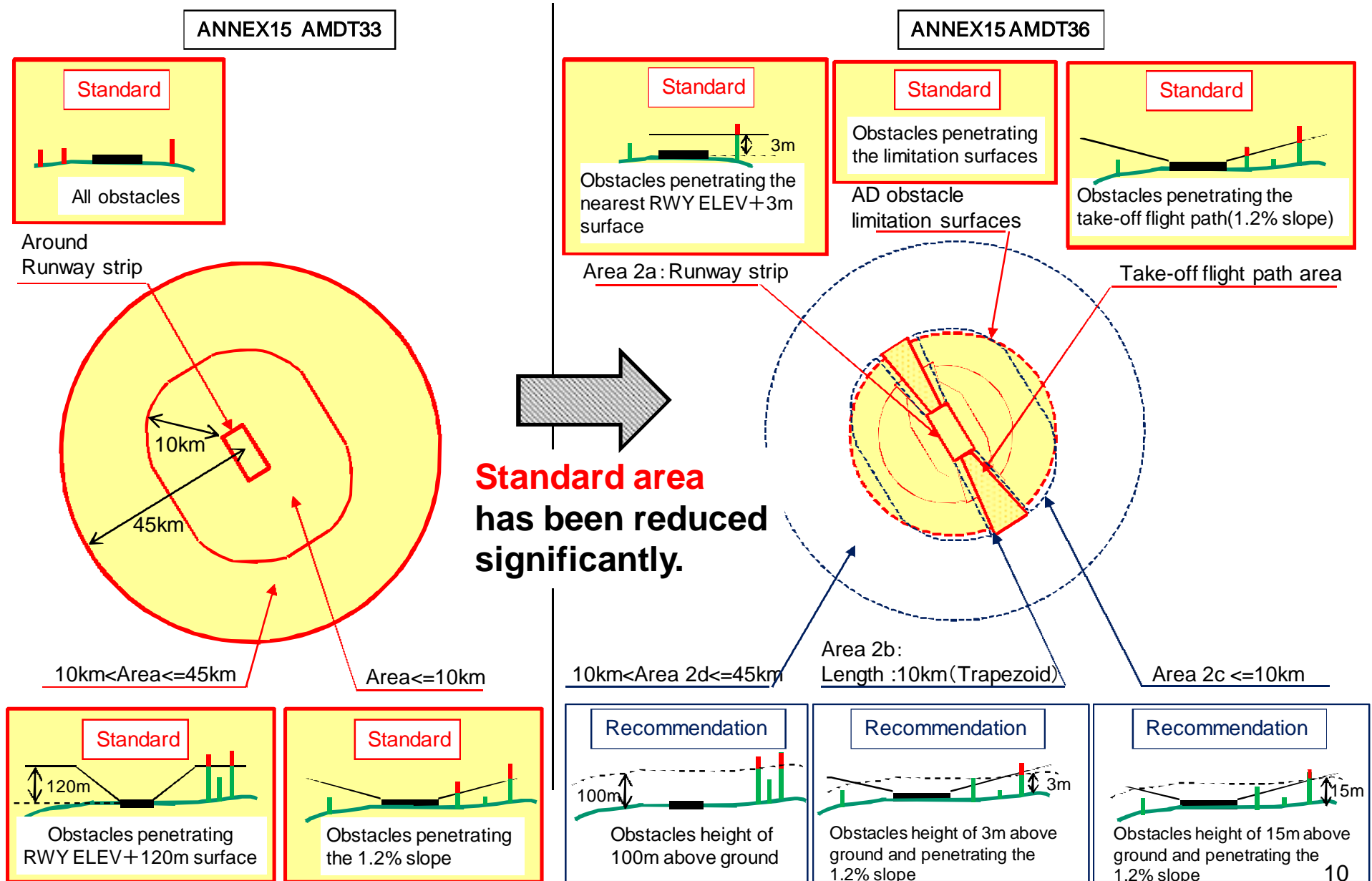# Comparison between AMDT33 and AMDT 36

Summary of ICAO SARPs for eTOD (electronic terrain and obstacle data)

Area	2004.11.25 AMDT 33			2010.11.18 AMDT 36			Point of AMDT 36	EFF DATE	Japanese Response for AMDT 33
	Terrain	OBST	SARPs	Terrain	OBST	SARPs			
Area 1 (Entire territory of a State)	O	O	S	O	O	S	No change	2008	Difference※
Area 2 (Terminal control area)	O	O	S				Divided into 4 and Postpone EFF DATE	~~2010~~	
Area 2a (Runway strip)				O	O	S	Divided into 4 and become new Standard		
Take-off flight path				O	O	S	New Standard	2015	
Aerodrome obstacle limitation surface				O	O	S	New Standard		
Area2b (10km from Runway strip to departure direction)				△	△	R			
Area2c (within 10km around Airport)				△	△	R			
Area2d (within 45km around Airport)				△	△	R			
Area 3 （Aerodrome area）	O	O	S	△	△	R	Downgrade to Recommendation	~~2010~~	
Area 4 （Category 2 and 3 operations area）	O		S	O	O	S	Obstacle become new Standard	2008	Difference※

Postpone EFF DATE for the successful implementation

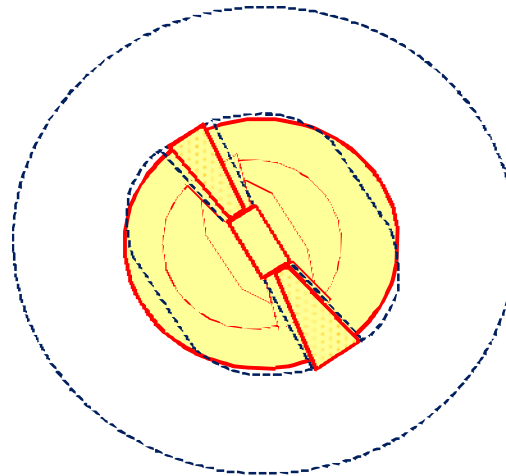**Standard areas are reduced to the minimum coverage. It allows each State to implement eTOD.**

※Data will be available gradually.

Obstacle Data around Airport
(Area2a,2b,2c,2d,Take-off flight path area and AD obstacle limitation surface）

Standard

All obstacles

Around
Runway strip

Standard

Obstacles penetrating the
nearest RWY ELEV＋3m
surface

3m

Area 2a：Runway strip

Standard

Obstacles penetrating
the limitation surfaces

AD obstacle
limitation surfaces

Standard

Obstacles penetrating the
take-off flight path(1.2% slope)

Take-off flight path area

10km

45km

**Standard area
has been reduced
significantly.**

10km<Area<=45km

Area<=10km

10km<Area 2d<=45km

Area 2b：
Length :10km（Trapezoid）

Area 2c <=10km

Standard

120m

Obstacles penetrating
RWY ELEV＋120m surface

Standard

Obstacles penetrating
the 1.2% slope

Recommendation

100m

Obstacles height of
100m above ground

Recommendation

3m

Obstacles height of 3m above
ground and penetrating the
1.2% slope

Recommendation

15m

Obstacles height of 15m above
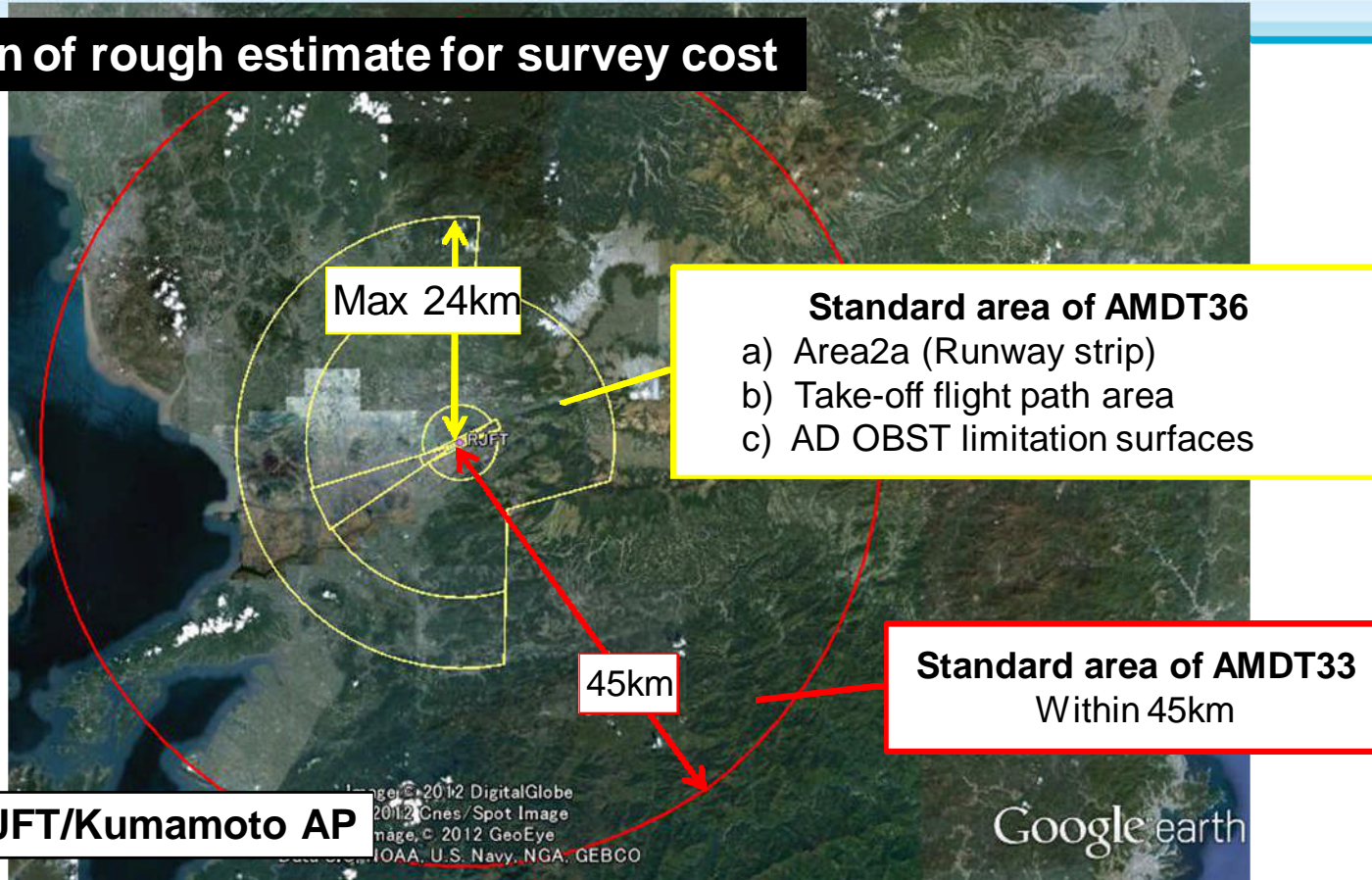ground and penetrating the
1.2% slope

10

(Area2a,2b,2c,2d,Take-off flight path area and AD obstacle limitation surface）

Numerical requirements for obstacle data around airport is
stricter than Area1(entire territory of a State).

	Area 1	Area 2	
Post spacing	3 arc seconds (approx. 90m)	1 arc (approx. 30m)	
Vertical accuracy	30m	3m	It is **10-fold** stricter than Area1.
Vertical resolution	1m	0.1m	
Horizontal accuracy	50m	5m	
Confidence level	90%	90%	It is **100-fold** stricter than Area1.
Data classification Integrity level	routine 1×10^{-3}	essential 1×10^{-5}	

Comparison of rough estimate for survey cost

Max 24km

Standard area of AMDT36
a) Area2a (Runway strip)
b) Take-off flight path area
c) AD OBST limitation surfaces

45km

Standard area of AMDT33
Within 45km

Image © 2012 DigitalGlobe
© 2012 Cnes/Spot Image
Image © 2012 GeoEye
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google earth

Example: RJFT/Kumamoto AP

ANNEX 15	Area requirement Area2	Public data available (Laser profiler) 625 US$/km^2	Survey (Laser profiler) 1,875 US$/km^2	Survey (aerial photogrammetry) 500 US$/km^2
AMDT 33	3300km^2	2,062,500 US$	6,187,500 US$	1,650,000 US$
AMDT 36	1300km^2	812,500 US$	2,437,500 US$	650,000 US$
	600km^2	375,000 US$	1,125,000 US$	300,000 US$

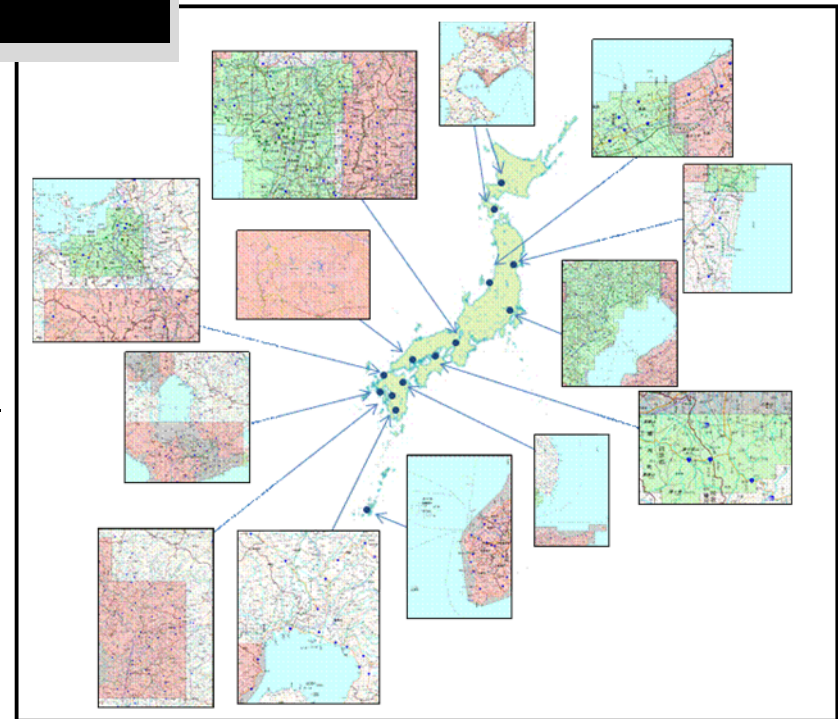Reduction by considering the characteristics of Kumamoto AP

RMK : Rough costs calculated based on Unit price(2004). 1 US$ = 80 JPY.

Reducing costs can be expected by using existing data.

12

Expansion of area meeting the Area2 requirements (Geospatial Information Authority of Japan).
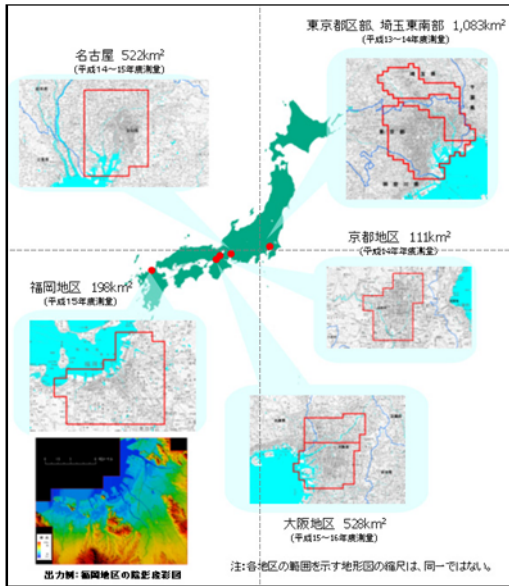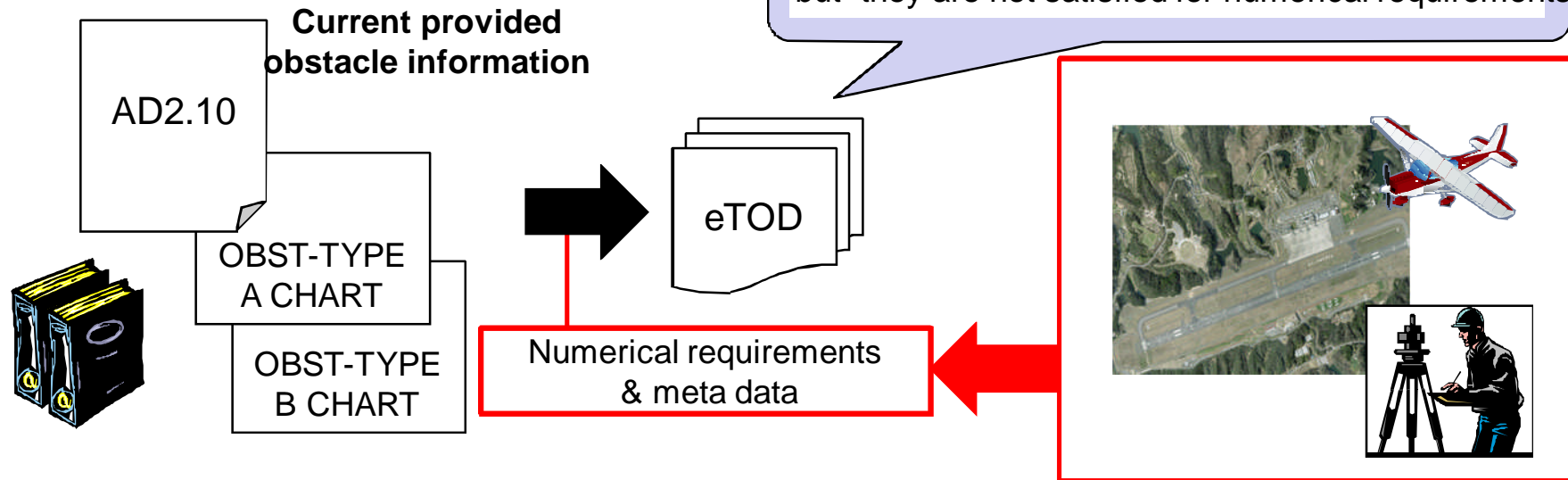

2005 ➡ **2011**

ANNEX	AREA 1	AREA 2	Attributes
AMDT 33	○ 「Digital Map 50m Grid (ELEV)」	× 「Digital Map 5m Grid (ELEV)」 ＊Only 4.6% of whole Area2 is available.	× Existing data dose not have 「Surface type(Mandatory)」
AMDT 36	○ 「Digital Map 50m Grid (ELEV)」 「Digital Map 10m Grid（ELEV）」	△ 「Digital Map 5m Grid（ELEV）」 ＊Significant large area has been surveyed.	○ All enough 「Surface type(Optional)」

Survey for the rest of the area is not planned yet.

Requirements for Obstacle data

Current provided obstacle information

AD2.10

OBST-TYPE A CHART

OBST-TYPE B CHART

eTOD

Numerical requirements & meta data

We have obstacle information, but they are not satisfied for numerical requirements.

ANNEX	AREA 1	AREA 2	Area 3	Area 4
AMDT 33	△ Height of 100m above ground	× Area>= 10km Penetrating the 1.2% slope △ 10km<Area<=45km Penetrating RWY ELEV + 120m surface	× Penetrating the nearest AD movement area + 0.5m surface	–
AMDT 36	△ Height of 100m above ground	△ a) Runway strip b) AD obstacle limitation surface c) Take-off flight path	**Not provided** Downgrade for Recommendation	△ All obstacles

Should we provide existing data at first or satisfy the accuracy requirements? 14

How to exchange eTOD globally?

Obstacle (excerpt from EUROCONTROL TOD Manual)
No new model has been developed by EUROCONTROL for the sole purpose of meeting the requirements of obstacle data. Rather, and in order to maintain a more homogenous approach, the obstacle element of the existing **Aeronautical Information Exchange Model (AIXM)** has been enhanced to provide full coverage of the attributes needed.

AIXM will be referred to in Annex15/AIS manual to enable data exchange

Terrain (excerpt from EUROCONTROL TOD Manual)
The TOD WG was not able to identify an existing, suitable exchange model to fully meet the requirements of ICAO Annex 15 [Reference 4]. The provision of the required metadata was noted as a particular issue with existing models. As a result, EUROCONTROL has developed a new model, the **Terrain Information Exchange Model (TIXM)**, to support the exchange of terrain data.

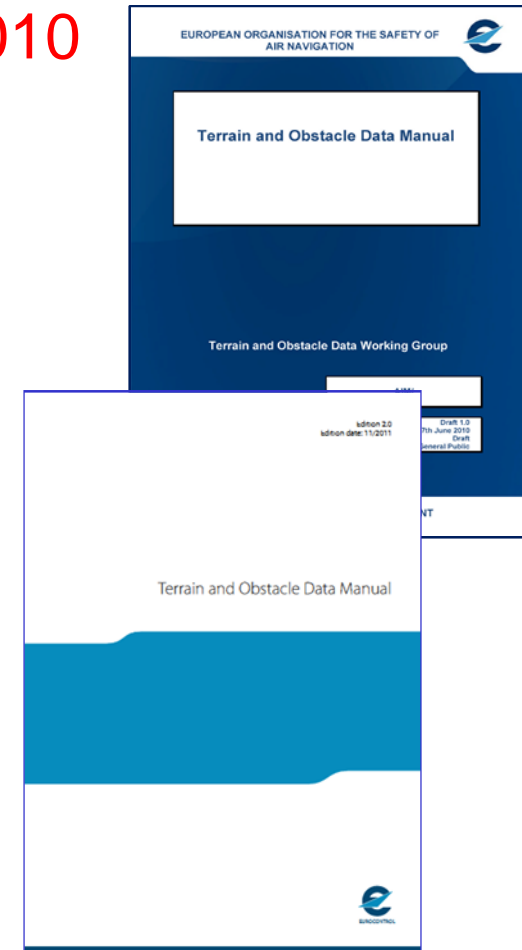Some reference to TIXM would be needed in Annex15/AIS manual to enable terrain data exchange

EUROCONTROL
Terrain and Obstacle Data Manual
EDITION :2.0
EDITION DATE :October 2011

Look at EUROCONTROL Activities

→ EURCONTROL discussed in TOD WG to support ECAC states to implement eTOD in each state and issued a draft Terrain and Obstacle Manual in 2010

→ Carry out a trial for one year

- After the trial some modifications are to be considered to revise the TOD Manual.

- Terrain and Obstacle Manual Ver2.0 issued in October 2011

- EUROCONTROL TOD Manual is to be used and exploited as guidance material for developing ICAO's eTOD manual.

EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION

Terrain and Obstacle Data Manual

Terrain and Obstacle Data Working Group

edition 2.0
edition date: 11/2011

Draft 1.0
7th June 2010
Draft
eneral Public

Terrain and Obstacle Data Manual

Requests from some Japanese airlines

- Wants to use eTOD with overlaying obstacle data on the terrain data as is used in eGPWS to facilitate takeoff performance analysis
- Wants to be provided soon with digital data of AIP and numerical data of terrain information, which are very beneficial for performance analysis
- Wants to be provided with OBST Charts for all the airports in Japan and also the locations of obstacles in digital data
- Aerodrome OBST Chart and OBST data covering a large area (aprx 20nm around AP) is very useful for decision in the case of emergency like one-engine inoperative

Implementation plan (draft)

Firstly, get down to the standards of Annex15

Area		SARPs	Entities	means
Area 1		Standard	State	Utilize numerical map produced by GS
Area 2	a	Standard	(Airport operators)	Review of existing data and survey
	b／c／d	Recom-mendation		
	Takeoff flight path	Standard	(Airport operators)	Review of existing data and survey
	Limitation surfaces	Standard	(Airport operators)	Review of existing data and survey
Area 3		Recom-mendation		
Area 4		Standard	(Airport operators)	Review of existing data and survey

Issues

→ Clarification of responsible bodies to implement "Terrain Data" and "Obstacle Data" for each area

→ Currently survey and management of OBST Data does not necessarily meet the accuracy required by ICAO

→ ICAO Standards apply to international airports. However, Japanese airlines basically request all data for all the airports they serve
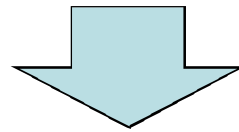
- To clarify bodies responsible to implement eTOD for each area
  - Discussion at Eurocontrol AIT/34 and ICAO EANPG/53
- To get data ready which meet the ICAO accuracy requirements
- To clarify target airports

AERONAUTICAL INFORMATION TEAM (AIT)
34th meeting, 15-16 March 2011, Brussels, Belgium
MEETING MINUTES (Issue 1.0)

3.4.5 AENA/ES confirmed that the problem with TOD implementation was mainly linked to the question of who was to pay for it. One of the reasons for this was that the TOD requirements were currently listed only in ICAO Annex 15, and that the TOD originators, which did not consider this Annex to belong to them, were not willing to accept the responsibility for providing these data. It was therefore important for the TOD data provision requirements to be included in ICAO Annex 14 and the requirements for aerodrome certification. ICAO fully supported this remark, and proposed that EUROCONTROL raise this matter in its report to the EANPG. In support, CAA/BE suggested that similar cross-references also be made in ICAO Annex 4.

REPORT OF
THE FIFTY-THIRD MEETING OF
THE EUROPEAN AIR NAVIGATION PLANNING GROUP
(Paris, 28 November to 1 December 2011)

EANPG Conclusion 53/10 - Inclusion of appropriate provisions related to eTOD in Annex 14

That, in order to expedite the Electronic Terrain and Obstacle Data (eTOD) implementation, the ICAO Regional Director, Europe and North Atlantic undertake necessary action, in coordination with ICAO Headquarters, to consider the inclusion of appropriate provisions related to eTOD in Annex 14, including in the minimum requirements for aerodrome certification.

Phase 3－(1)
Common Aeronautical Information eXchange Model (AIXM)

- ➢ Introduced eAIP utilizing SD in AIXM 4.5 format
- ➢ Providing SD to RAIM predicting system
- ➢ Future ATM systems to exploit SD
- ➢ Dialogue with airlines
  - Present status – most airlines have already implemented their flight planning, flight watch and AIS systems which are developed by vendors. They are not much interested in SD. They, however, say SD will be useful for producing their briefing materials.
  - Providing SD – we are working for preparation to provide SD to airlines and public entities soon.
- ➢ Possibility to cooperation with Jeppesen
- ➢ What are merits to introduce AIXM 5.1?
- ➢ Why to transition to AIXM 5.1?

Why to transition to AIXM 5.1?

- ➷ Already implemented AIXM 4.5
- ➷ Already introduced eAIP
- ➷ However, AIXM Static Data not exchanged with a foreign NOF or provided to outside of JCAB yet
- ➷ Of course AIXM 5.1 good for OBST of eTOD
- ➷ Of course AIXM 5.1 a MUST for digital NOTAM
- ➷ Cost is an extremely hard issue under this tight budget
- ➷ Merits not enough to explain for budget
- ➷ 'It is a MUST just now' needs to be clearly justified.

Phase 3－(2) digital NOTAM

→ Concern to present situation

→ Discussion on NOTAM at ICAO IVATF

→ Improve NOTAM to meet the requirement from discussion at IVATF (see slides after)

Specifically

→ Clarification of specification

→ Clarification of global transition plan

→ Timing to upgrade to AIXM 5.1

→ Enforcement of relationship with avionics vendors

→ Early realizing uplink to aircraft of digital NOTAM

→ Legacy NOTAM via AFTN / digital NOTAM via what means?

International Volcanic Ash Task Force(IVATF)

- ➔ In response to the unprecedented interruption to United Kingdom and European air traffic by the Icelandic volcanic event in April and May 2010, ICAO has formed a special Task Force to expedite a review and recommendations for enhancing ICAO volcanic ash related Standards and Recommended Practices (SARPs)

  The First meeting of the IVATF was held in July 2010 and the second meeting was held in July 2011 at ICAO HQ.

Issues recognized and Future Work Plan of IVATF/1

Items to be discussed at IVATF :

1-1 Review of Operational response to Volcanic Ash aircraft encounters

1-2 Review of existing Notification and Warning Procedures of Volcanic Ash

2   Development of Volcanic Ash Concentration Thresholds

3   Improvement of Ash Detection/Avoidance Systems

4   Improvement and harmonization of Dispersion Models and their visual presentation

To review these issues, 4 SG (ATM, AIR, SCI, IAVW Coordination-Group) was established.

1-2 Review of existing Notification and Warning Procedures of Volcanic Ash

Issues recognized

● Reporting on Volcanic Ash

Special air-reports on volcanic ash were seldom issued by aircraft in flight.

● Notification and Warnings for Volcanic Ash

Overlap and low-frequency of notification and warnings;
e.g. ・ Volcanic Ash (VA) Advisory and SIGMET for volcanic ash
・NOTAM for volcanic ash and ASHTAM

Future Work Plan

・Review ways and means to improve and enhance the issuance of special air-reports by aircraft
・Review ways and means to eliminate information redundancies and overlapping
・Review ways and means to improve and enhance the transmission/reception of information
↓
Development of Procedures and Guidance material , as necessary

ATM Sub-Group

26

An excerpt from IVATF2 report(1)

✈ Agenda Item 4: Report of the ATM SG

4.2 Flight planning information dissemination

4.2.4 The IVATF noted that NOTAM,ASHTAM, volcanic ash dvisories(VAA) and SIGMET for volcanic ash were closely related, and that the existence of additional products and graphical variants of VAA and SIGMET for volcanic ash were either already available or under development.

In addition, the progress report indicated that a digital NOTAM format was being discussed within the AIS/AIM community, and that many advanced information products were dependent on the availability of technological solutions both on the ground and in the aircraft.

An excerpt from IVATF2 report(2)

✈ Agenda Item 4: Report of the ATM SG

　4.2 Flight planning information dissemination

　　4.2.8　In view of the foregoing, the IVATF formulated the following recommendations:

　　Recommendation 2/21 – That appropriate ICAO groups, such as the AIS-ATM SG, OPLINKP or OPSP, working on advanced technologies for dissemination of information, be provided with operational requirements from an IVATF perspective to help them develop appropriate systems; and that ICAO develops a migration plan to these advance technologies.

An excerpt from IVATF2 report(3)

✈ Agenda Item 4: Report of the ATM SG

    4.2 Flight planning information dissemination

        4.2.8   In view of the foregoing, the IVATF formulated the following recommendations:

        Recommendation 2/22 – The IVAWOPSG and other ICAO groups (where necessary) be invited to review the detailed results of the investigation into flight planning information dissemination, as presented at **Appendix 4B** to this report.

An excerpt from IVATF2 report(4)

✈ **APPENDIX 4B**

DETAILED RESULTS OF AN INVESTIGATION INTO FLIGHT PLANNING INFORMATION DESSEMINATION

1. EXISTING ICAO PROVISIONS

    1.1 Annexes and Docs

    1.1.5.2   Due to technical limitations, SIGMETs and NOTAMs are transmitted in a format that is not considered, by some, to be user-friendly(CAPTIAL LETTERS, MISSING STRUCTURE, etc). When the transmitted information includes long list of coordinates defining the affected area it becomes a nightmare for aircrews to gain situational awareness on the position of the hazard.

An excerpt from IVATF2 report(5)

✈ **APPENDIX 4B**

   DETAILED RESULTS OF AN INVESTIGATION INTO FLIGHT PLANNING INFORMATION DESSEMINATION

   5. TECHNOLOGY

   5.1 SIGMETs, NOTAMs and ASHTAMs are traditionally transmitted via alpha-numeric communication means which do not allow user-friendly presentation. The Task Team recognized that these systems will have to be maintained for years to allow information flow to the low-end users, including aircraft in flight that do not have reception capability for graphical information.

   5.3 Advanced airspace users(e.g. large airlines) require the information in data formats that can be used in automated systems.

Conclusion

1. Look at the Digital NOTAM project by FAA and EUROCONTROL as means of solving the issue raised by IVATF !

2. There is need for haste in consideration of the Digital NOTAM and international deployment in ICAO AIS/AIM SG.

Phase 3－(3) eChart

✈ Only paper version chart for now while looking at the global discussion on AIXM etc.

✈ Considering introduction of some application for creating charts following the discussion on AIXM and amendments to ICAO SARPs and guidance materials.
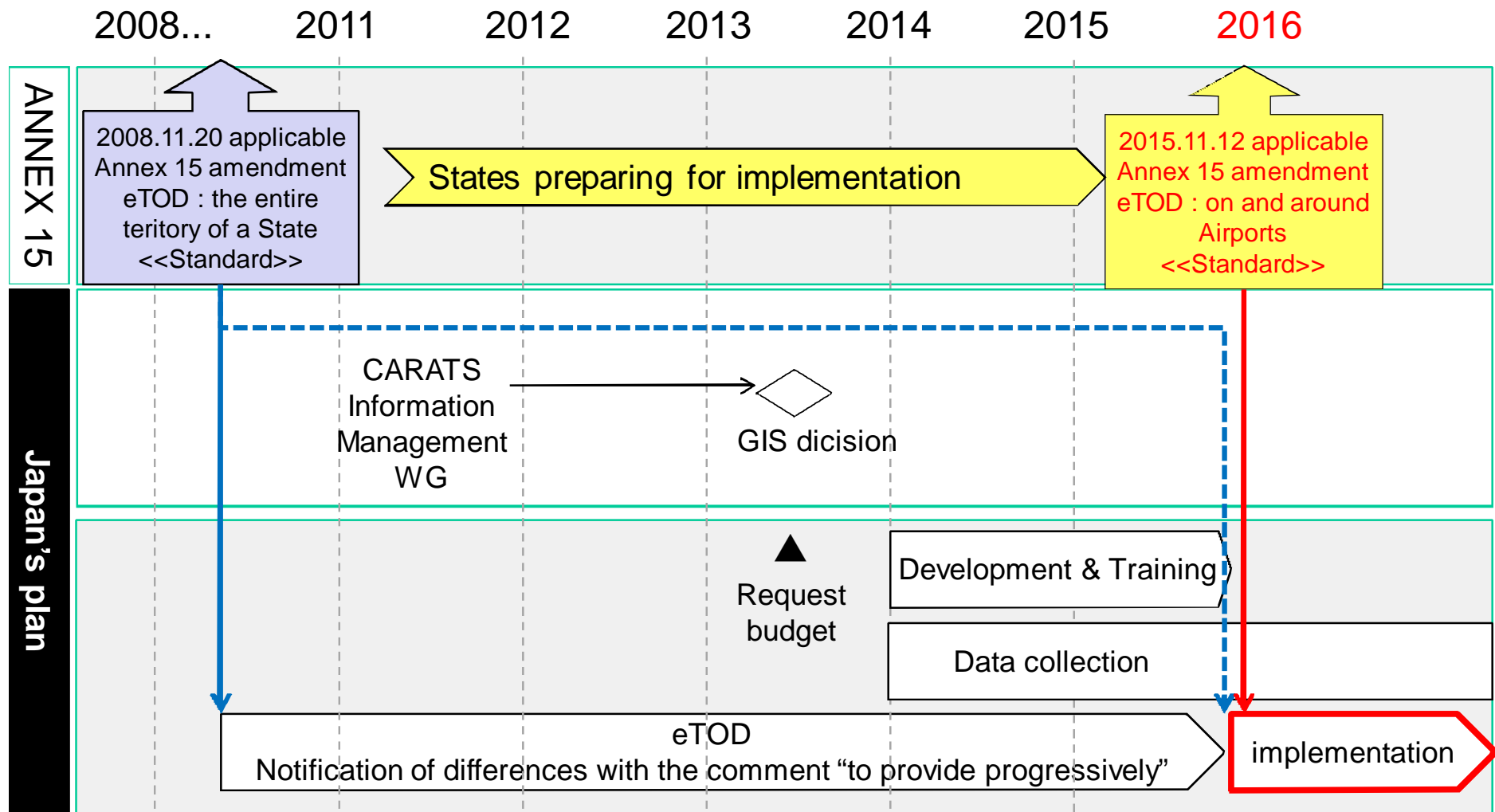
ICAO AIS-AIM SG

	2011	2012	2013	2014	2015	2016	2017
ICAO event	★ GANIS	★ ANConf/12		★ MET/AIM Divisional Meeting			
AIS/AIM SG	④ ⑤	⑥	⑦				
Global AIM Operational Concept	Draft	Review ● Draft (Final)	Issue				
AIM Roadmap		● Draft ● Review Draft (Final)	Issue				
ANNEX15		Draft ● Review (Final)		AMDT37 (incl: global common exchange)			AMDT38
			Review				
PANS-AIM							publish
AIS Manual (Doc8126)		Draft AMDT3 (incl: eAIP guidance)	AMDT4 (incl: AIXM?)				AMDT5
ANNEX4		● Draft(Final) Review		AMDT57			AMDT58
Chart Manual (Doc8697)		Draft AMDT4	AMDT5				AMDT6

How far Japan has achieved AIM and Issues left

❖ 1st phase：QMS implemented in AIS Center
（issue）CHAIN (total QMS from raw data providers to end users

❖ 2nd phase & 3rd phase：eAIP introduced using common aeronautical information exchange model (AIXM Ver4.5)
（issues）
- eTOD
- Digital NOTAM
- eCHART
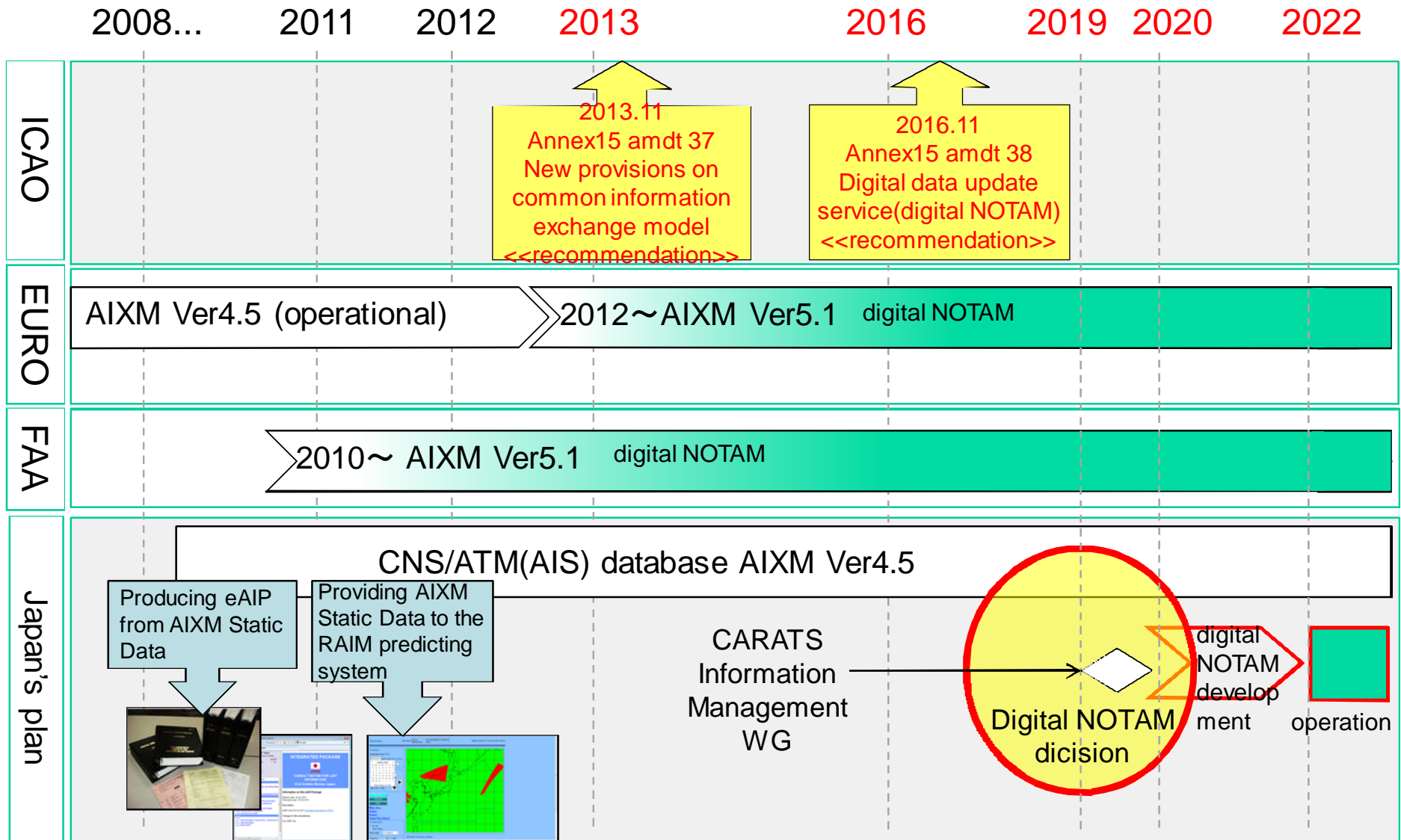- AIXM version up following the decisions of AIXM CCB (Change Control Board)

Implementation plan (draft)

GIS Database

Implementation plan (draft)

Digital NOTAM

	2008...	2011	2012	2013	2016	2019	2020	2022

ICAO

2013.11
Annex15 amdt 37
New provisions on
common information
exchange model
<<recommendation>>

2016.11
Annex15 amdt 38
Digital data update
service(digital NOTAM)
<<recommendation>>

EURO

AIXM Ver4.5 (operational) | 2012～AIXM Ver5.1 digital NOTAM

FAA

2010～ AIXM Ver5.1 digital NOTAM

Japan's plan

CNS/ATM(AIS) database AIXM Ver4.5

Producing eAIP
from AIXM Static
Data

Providing AIXM
Static Data to the
RAIM predicting
system

CARATS
Information
Management
WG

Digital NOTAM
dicision

digital
NOTAM
develop
ment

operation

Any questions?

Thank you