International Civil Aviation Organization

Briefings on Agenda Items 1,2 and 3

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AIS to AIM transitions: The AFI challenges

- **The global evolution from AIS to AIM capability is considered an essential and over-arching objective guiding global and Regional developments related to ICAO's Efficiency and Safety Strategic Objectives.**

- **The Roadmap for the transition from AIS to AIM proposed as Guidance material to assist States in planning the scope and prioritizing projects and actions for the transition to AIM.**

OVERVIEW

- The 2003 11th ICAO Air Navigation Conference (AN-Conf/11) established that aeronautical information would be required to be managed efficiently and shared on a system-wide basis, making it available to any participant in the ATM environment whenever and wherever it was required.
- AN-Conf/11 called upon ICAO to define requirements for safe and efficient global Aeronautical Information Management (AIM), adopt a common Aeronautical Information Exchange (AIXM) model, and develop new specifications for ICAO Annex 4—*Aeronautical Charts* and Annex 15—*Aeronautical Information Services* (AIS) that would govern the future availability of aeronautical information and charts.

ICAO Global Operational ATM

- The “glue” that binds ATM components together is the management, utilisation, and transmission of data and information : “**information management**”.
- A function called “information services” is also defined to include:
  - Information management;
  - Aeronautical information;
  - Meteorological information;
  - Other essential services (MIL, S&R, accident investigation, …).

Change from AIS to AIM

- Glue of the future ATM Network

- The AIS-AIM Transition Roadmap document is a plan, to manage and facilitate the global transition from AIS to AIM.

- Evolution, no revolution

- Step 1 consolidation,
- Step 2 databases,
- Step 3 information management.

ICAO Global Operational ATM

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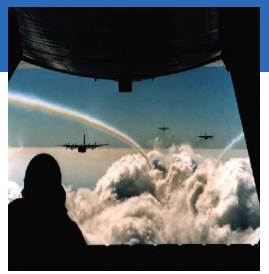
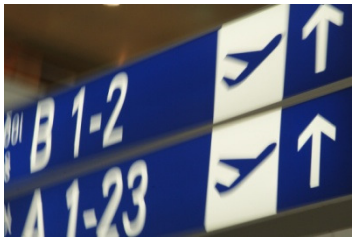
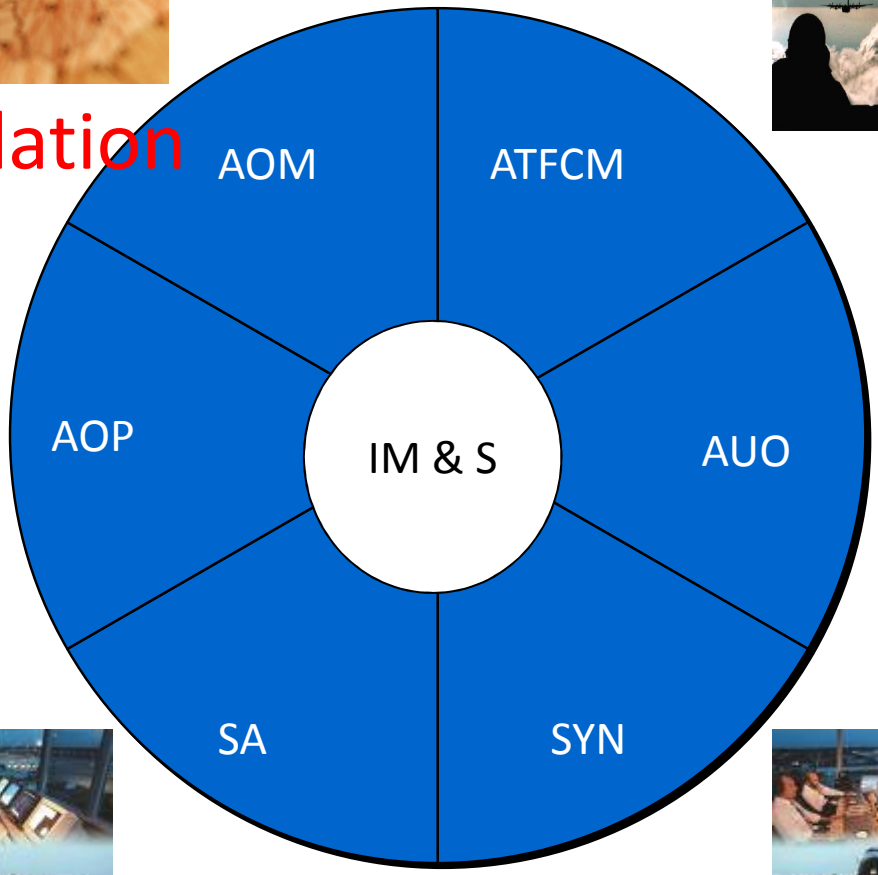
ATM Process Model



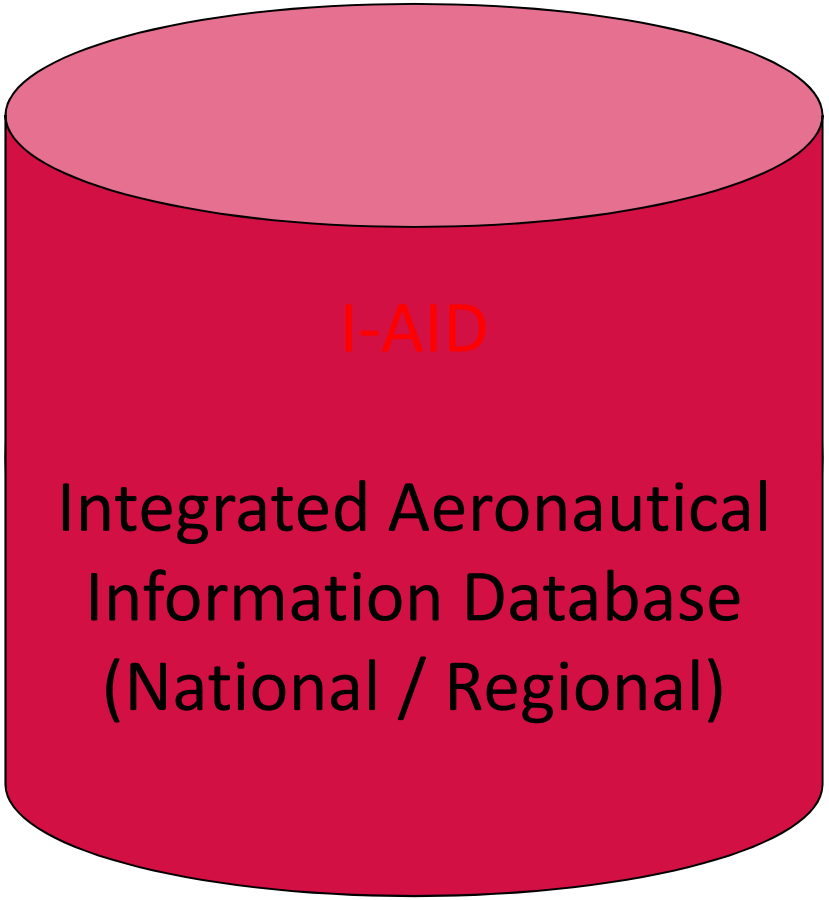
Step 1 consolidation





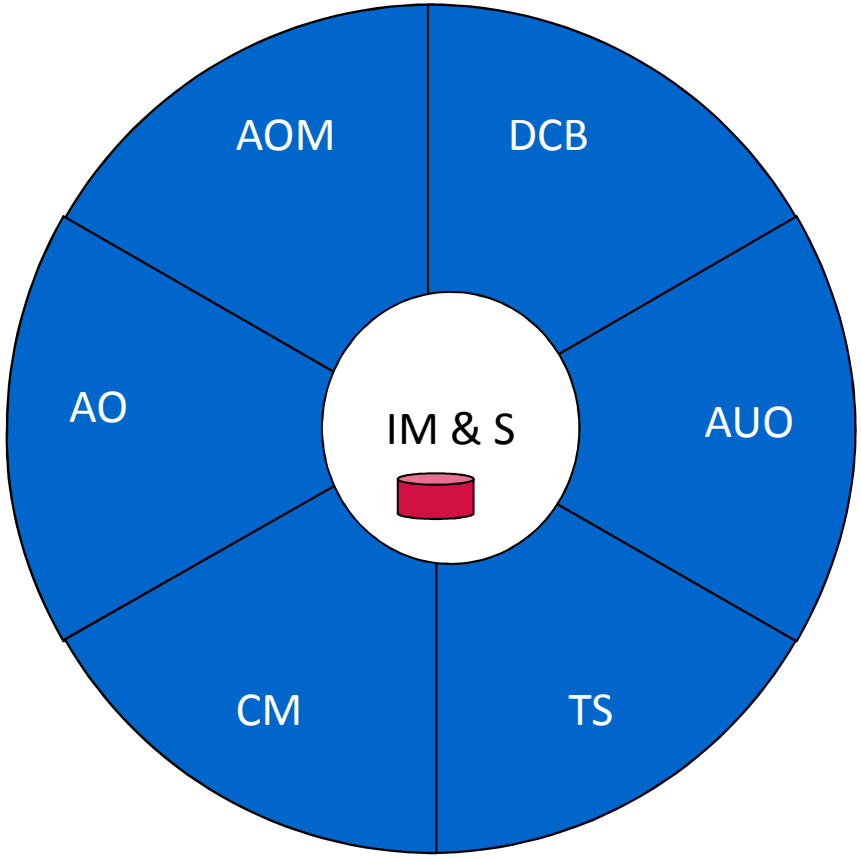
ATM Process Model

Step 2 databases



ATM Process Model

Step 1 consolidation
Step 2 databases



Step 3 Manage Information

Roadmap

Phase 1 - Consolidate:

AIP

QMS

NOTAM

CHARTS

AIRAC

WGS-84

Terrain and Obstacle

Phase 2 – Migration to digital databases:

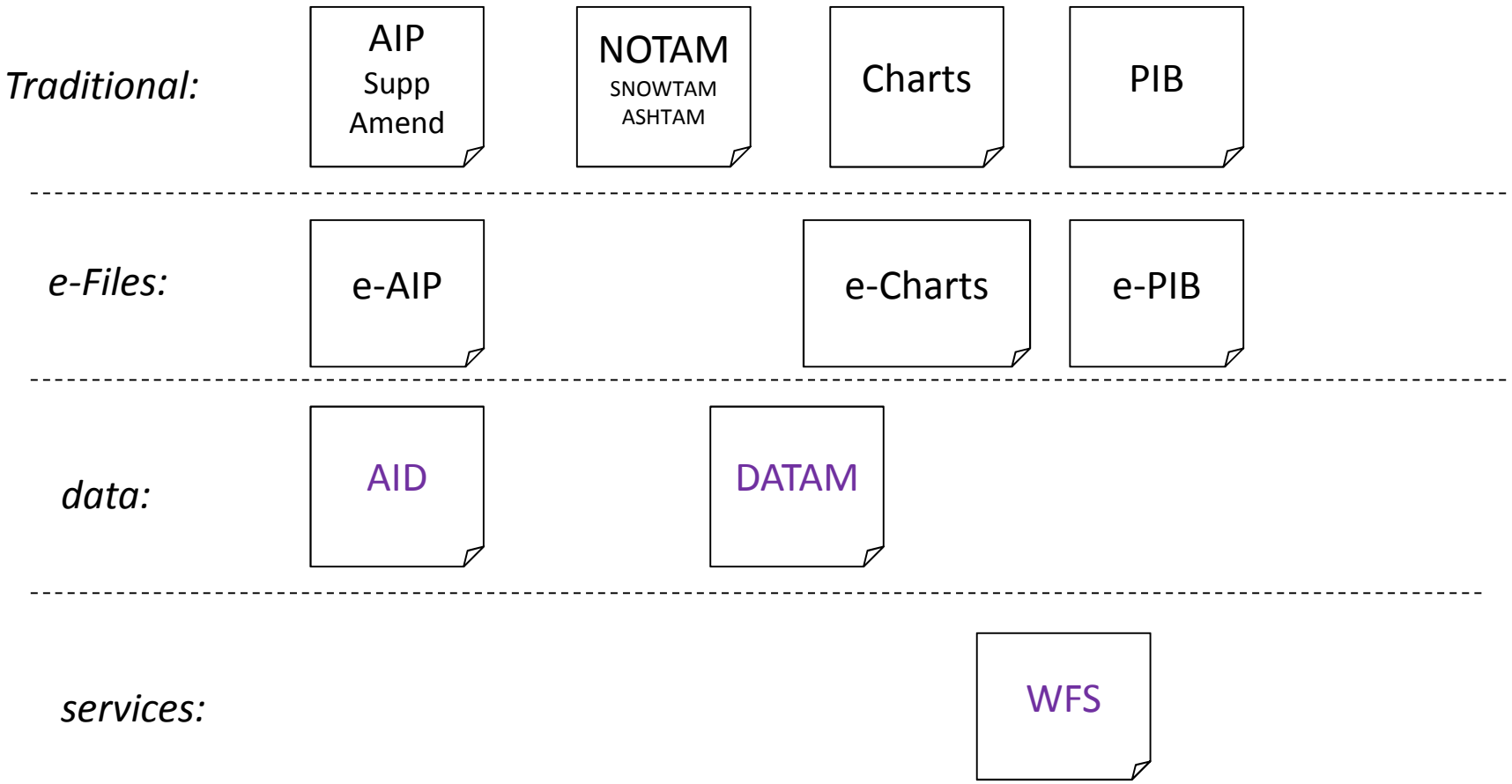
- Establish Integrated Aeronautical Information Database
- Produce electronic version of existing products
- Exchange data to and from I-AID

Phase 3 – Manage Information for the ATM Process Model

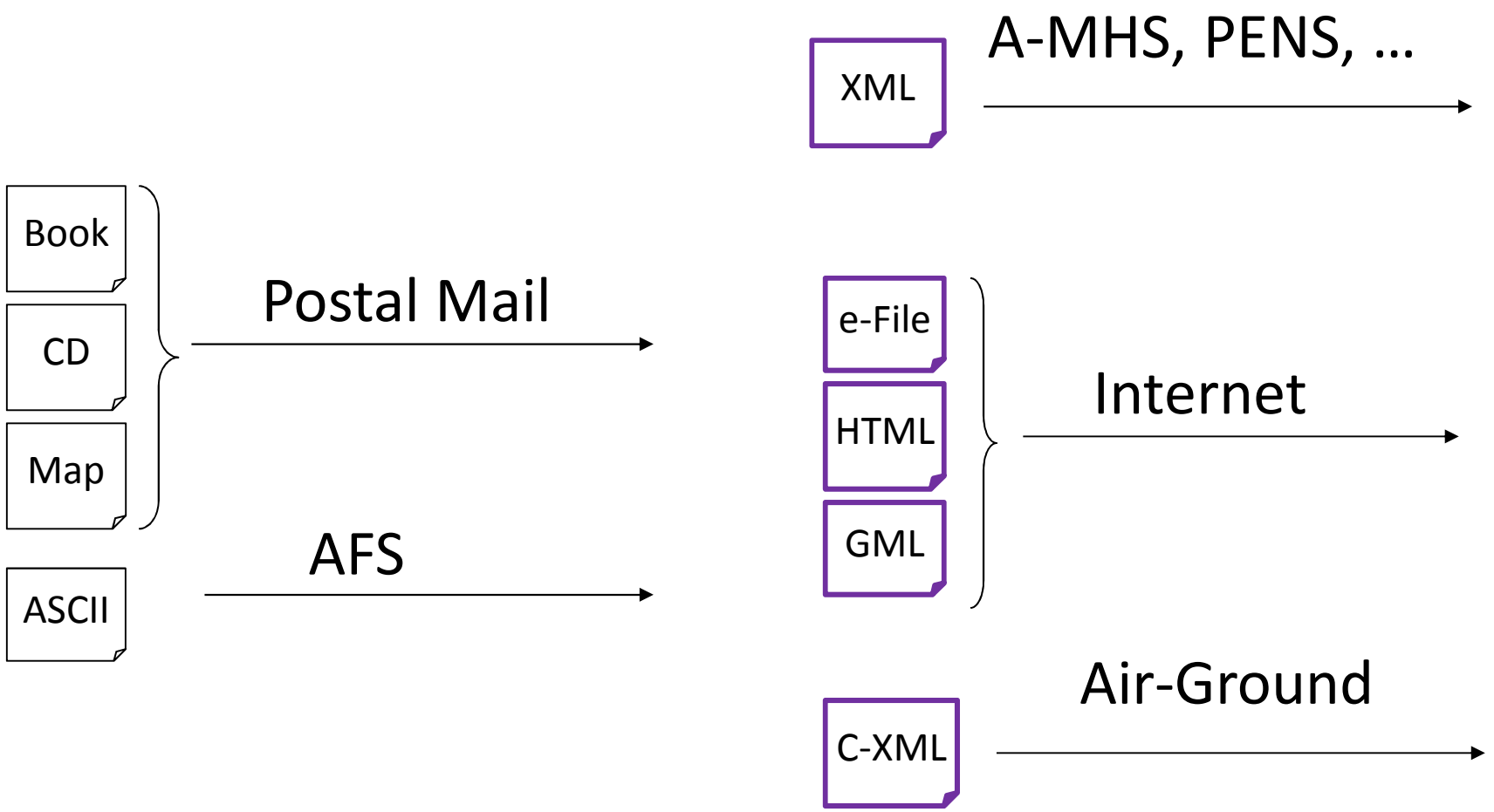
New Standards & Guidance

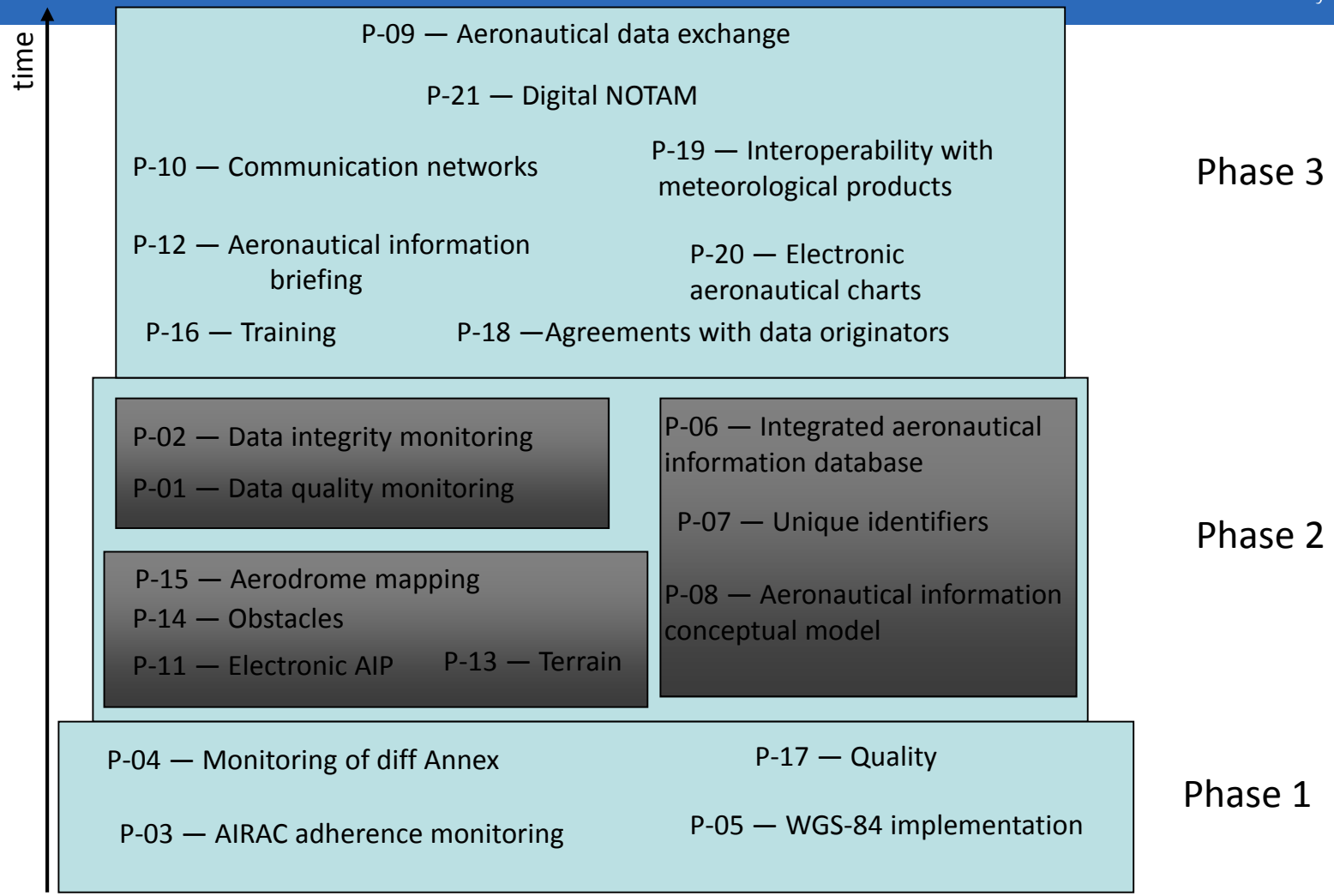
- Phase 1
  - eAIP
  - Update of Doc 8126
  - References to automation more precise
  - Terrain and obstacles
- Phase 2
  - Conceptual Model (based on AICM), …
  - Aerodrome Mapping
- Phase 3
  - Data Exchange model (based on AIXM)
  - Functions and responsibilities (Staff Competencies)
  - Quality and Training Manual (SLAs), …

New Products and Services



Communication Media




time
P-09 — Aeronautical data exchange
P-21 — Digital NOTAM
P-10 — Communication networks
P-19 — Interoperability with meteorological products
P-12 — Aeronautical information briefing
P-20 — Electronic aeronautical charts
P-16 — Training
P-18 —Agreements with data originators
Phase 3
P-02 — Data integrity monitoring
P-01 — Data quality monitoring
P-06 — Integrated aeronautical information database
P-07 — Unique identifiers
P-15 — Aerodrome mapping
P-14 — Obstacles
P-11 — Electronic AIP
P-13 — Terrain
P-08 — Aeronautical information conceptual model
Phase 2
P-04 — Monitoring of diff Annex
P-17 — Quality
P-03 — AIRAC adherence monitoring
P-05 — WGS-84 implementation
Phase 1

Roadmap Timeline

- **December 2008** **Phase 1 — Consolidation**
- **November 2009** **Phase 2 – Going digital** will begin by the development of new guidance material related (electronic AIP, aeronautical information conceptual model, training, quality)
- **November 2010** Amendment 36 of Annex 15 and Amendment 56 of Annex 4 would become applicable.
- **October 2011** **Phase 3 — Information management**, will begin with the fourth meeting of the AIS-AIMSG.
- **November 2013** Amendment 37 to Annex 15 and Amendment 57 to Annex 4 would become applicable,Possible divisional-type meeting in order to finalize the transition to AIM.
- **November 2016** **Amendment 38** to Annex 15 and **Amendment 58** to Annex 4 would become applicable.

Need for the Roadmap

- **<u>Need for the Roadmap</u>**

- The Global Air Navigation Plan (Doc 9750) contains near- and medium-term guidance on air navigation system improvements necessary to support a uniform transition to the air traffic management system envisioned in the Global Air Traffic Management

Function of the Roadmap

- **Function of the Roadmap**
- **• High level strategic document**
- **• Practical guidance and advice to regional planning groups and States for development of AIS-AIM implementation and funding strategies.**
- **• Identifies the major milestones recommended for a uniform evolution across all regions of the world.**
- **• Specifies steps that need to be achieved and timelines for implementation.**
- **• Places the future AIM in a position to better serve airspace users and ATM in terms of their information management requirements.**

Importance and what will change

- **Importance and what will change**
- • Why aeronautical information matters
- • How information is distributed today
- • The objective of the transition to AIM
- • What will change
- – Users
- – Data
- – Products
- –AIRAC cycle

Eight Guiding Principles

- Eight guiding principles

- • 1. comply with the process for amendments to Annexes;

- • 2. support aeronautical information which improves the safe and cost-effective accessibility of ATS;

- • 3. foundation for measuring performance and outcomes linked to quality assured aeronautical information;

- • 4. assist States to make informed choices about their aeronautical information services and the future of AIM;

Eight Guiding Principles

- <u>Eight guiding principles</u>

- • 5. build upon developments and acknowledge that the transition to AIM is a natural evolution – not a revolution;

- • 6. provide over-arching and mature standards;

- • 7. guided by the Global Air Navigation Plan; and

- • 8. solutions are internationally harmonized / integrated.

Roadmap 3 Phases

- **Roadmap - 3 Phases**

- 2008 2009 2010 2011 2013 2014 2015 2016

- Consolidation

- Going Digital

- Information Management

Roadmap Phase 1

- **Roadmap –Phase 1**

- **Consolidation**
- **• Refine and strengthen existing Standards and ensure implementation**

- **AIRAC adherence**

- **WGS 84**

- **Quality requirements**

- **Provision of digital terrain and obstacle data**

- **2008 2009 2010 2011 2013 2014 2015 2016**

AIS/AIM Roadmap **Phase 1: Consolidation**

- **Phase 1: Consolidation**
- **P-03 AIRAC Adherence monitoring**
- **P-04 Monitoring Annexes 4, 15 differences**
- **P-05 WGS-84 Implementation**
- **P-17 Quality Management System**

Phase 1 Consolidation

- **Phase 1: Consolidation**

- • **P-03 — AIRAC adherence monitoring**

- • **The standard regulation and control mechanisms for the distribution of aeronautical information is an**
- **essential element ensuring that each person involved makes decisions based on the same information.**

- • **P-04 — Monitoring of States' differences to Annex 4 and Annex 15**

- • **Adherence to Standards is an ongoing effort. The transition to AIM offers an opportunity to increase the focus on implementation and on reviewing differences in the application of the Standards by States.**

- • **P-05 — WGS-84 implementation**

- • **The target of expressing 100 per cent of coordinates in the WGS-84 reference system is achievable. This is one of the first steps to achieve in the transition to AIM.**

Phase 1 Consolidation

- Phase 1: Consolidation

- • P-17 — Quality

- Quality management measures will be re-enforced to ensure the required level of quality of the aeronautical information. In order to assist States in the implementation of an efficient quality management system, guidance material for the development of a quality manual is being developed

Roadmap Phase 2

- **Roadmap –Phase 2**
- **Going digital**
- **• Introduction of database driven processes**
- **• Provision of data and information products**
- **2008 2009 2010 2011 2013 2014 2015 2016**

Phase 2: Going Digital

- **Phase 2: Going digital**
- • **P-01** **Data Integrity monitoring**
- • **P-02** **Data Quality monitoring**
- • **P-06** **Integrated aeronautical information Database**
- • **P-07** **Unique identifiers**
- • **P-08** **AICM**
- **P-11** **Electronic AIP**
- • **P-13** **Terrain**
- • **P-14** **Obstacles**
- • **P-15** **Aerodrome mapping**

Phase 2 : Going Digital

- **Phase 2: Going digital**

- • **P-01 — Data quality monitoring**

- • An ongoing challenge for organizations producing information is to ensure that the quality of the information suits its intended uses and that data users are provided with the appropriate information about data quality.

- • **P-02 — Data integrity monitoring**

- • Data integrity requirements introduced by safety objectives must be measurable and adequate.

Phase 2 Going Digital

- **Phase 2: Going digital**

- • **P-06 — Integrated aeronautical information database**

- • The establishment and maintenance of a database where digital aeronautical data from a State are integrated and used to produce current and future AIM products and services is the main step in Phase 2 of the transition to AIM.

- • A database may be operated by States or by regional initiatives under delegation from States. The design of such a database will not be identical in all States or regions because local technical or functional requirements must be considered.
- • Material provided under Steps P-08 and P-09 (AICM-AIXM) will provide guidance that may be used to validate the design for facilitating the future data exchange

Phase 2 : Going Digital

- **<u>Phase 2: Going digital</u>**
- • **P-07 — Unique identifiers**
- • Improvements to the existing mechanisms for the unique identification of aeronautical features are required to increase the effectiveness of information exchange without the need for human intervention. (eg 5 letter name codes for significant points)

- • **P-08 — Aeronautical information conceptual model**
- • Defining the semantics of the aeronautical information to be managed in terms of digital data structures is essential for introducing interoperability.

- • The existing documentation developed by States and international organizations and considered mature enough for global applicability will be used to produce common guidance material. This may serve as a reference for the database design needed in P-06 for States that do not yet have a database.

Phase 2 : Going Digital

- **Phase 2: Going digital**

- **• P-11 — Electronic AIP (eAIP)**

- **• The integrated aeronautical information package will not be phased out. On the contrary, it will be adapted to include the new data products needed during the transition to AIM.**

- **• The electronic version of the AIP will be defined in two forms: a printable document and one that can be viewed by web browsers.**

- **• Guidance material will be required to help States implementing the web browser form of the electronic AIP in order to avoid the proliferation of different presentations of AIP information over the Internet.**

Phase 2 Going Digital

- **Phase 2: Going digital**
- **• P-13 — Terrain**
- **• The compilation and provision of terrain data sets is an integral part of the transition to AIM.**
- **• P-14 — Obstacles**
- **• The compilation and provision of obstacle data sets is an integral part of the transition to AIM.**
- **• P-15 — Aerodrome mapping**
- **• There is a new requirement emerging from industry for traditional aerodrome charts to be complemented by structured aerodrome mapping data that can be imported into electronic displays.**

Roadmap Phase 3

- **Roadmap –Phase 3**
- **Information Management**
- **• Development of new products and services**
- **• Full implementation of QMS processes**
- **• Development and implementation of Standards**
- **• Continuous improvement**

- **2008 2009 2010 2011 2013 2014 2015 2016**

AIS-AIM transition roadmap - Phase 3

- **Phase 3: Information Management**

- **•P-09 Aeronautical Data Exchange**
- **•P-10 Communication networks**
- **•P-12 Aeronautical Information Briefing**
- **•P-16 Training**
- **•P-18 Agreements Data Originators**
- **•P-19 Interoperability with MET products**
- **•P-20 Electronic Aeronautical charts**
- **•P-21 Digital NOTAM**

Phase 3: Information Management

- **P-09 — Aeronautical data exchange**
- **• Defining the syntax of the aeronautical data to be exchanged in terms of field names and types is essential for introducing interoperability.**
- **• The exchange of data and the mechanisms to exchange or access the new digital products or services will be defined by an exchange model.**
- **• The content of the model will be driven by the aeronautical information conceptual model (top-down) and by requirements coming from technological choices (bottom-up);**
- **• The evolution of the model will be coordinated in order to balance the need for innovation with the need for protecting investments.**
- **• The use of the Internet as a communication media is, for example, one important bottom-up driver in the definition of the model.**
- **• The use of well-established, geographic information standards also applied in non-aeronautical domains is another important technological choice.**

Phase 3: Information Management

- **• P-10 — Communication networks**

- **• More data will be exchanged on ground networks and the current data will be exchanged in a form that will require more bandwidth.**

- **• It is envisaged that a transition of the network to one based on Internet protocol (IP) will be required to cope with these future needs.**

- **• For the transition to AIM to be effective, the needs of future AIM will have to be declared in terms useable for network specification.**

- **• Which data network will be used to distribute the new data products and services; what information can be exchanged via the Internet; and what information requires a secured network reserved for aviation are open questions that will need to be answered for the transition to be effective.**

Phase 3: Information Management

- **P-12 — Aeronautical information briefing**

- **Fine tuning of the current NOTAM format by introduction of new selection criteria is needed to improve the selectivity of the information presented to pilots in the pre-flight information bulletin. (This can be done in Phase 1.)**

- **The combination of graphical and textual information in a digital net-centric environment will be used to better respond to the airspace users requirements for aeronautical information in all phases of flight when the new digital data products are specified and made available (in Phase 3).**

Phase 3: Information Management

- **• P-16 — Training**
- **• The training of personnel will be adapted to the new requirements on skill and competencies introduced by the transition to AIM.**
- **• A new training manual is being developed to reflect the new competencies required.**
- **• P-18 — Agreements with data originators**
- **• Data of high quality can only be maintained if the source material is of good quality.**

  States will be required to better control relationships along the whole data chain from the producer to the distributor.

- **• May require template service level agreements with data originators, neighbouring States, information service providers or others.**

Phase 3: Information Management

- • **P-19 — Interoperability with meteorological products**
- • **Future MET data products will be combined with the AIM data products to form the future flight briefings and the new services provided to all ATM components.**
- • **This will require that MET data be made available in a similar format to the other aeronautical data that are clearly focusing on the use of open standards (such as XML and GML) for the implementation of table-driven data validation built into the data exchange mechanism**
- • **Current meteorological data products for aviation are based on simple alphanumeric codes.**
- • **Now that the bandwidth of telecommunication links and space for digital storage devices are no longer limiting factors, the move towards net- centric and system-wide information management is becoming feasible for the wider distribution of meteorological forecast data from the world area forecast centres in a format that will not require considerable effort for the learning and configuration of decoding software, thereby ensuring true interoperability.**

Phase 3: Information Management

- • **P-20 — Electronic aeronautical charts**
- • **New electronic aeronautical charts, based on digital databases and the use of geographic information systems, will be defined to complement some paper charts and to replace others that have become obsolete and need to be improved to satisfy user needs.**
- • **These new products deployed over the Internet.**
- • **P-21 — Digital NOTAM**
- • **One of the most innovative data products that will be based on the Standard for an aeronautical data exchange model will be a digital NOTAM .**
- • **Will provide dynamic aeronautical information to all stakeholders with an accurate and up-to-date common representation of the aeronautical environment in which flights are operated.**
- • **The digital NOTAM will be defined as a data set that contains information included in a NOTAM in a structured format that can be fully interpreted by a computer system for accurate and reliable updates of the aeronautical environment representation both for automated information equipment and for aviation personnel.**

Timeline for ICAO actions

- **• December 2008 starts Phase 1 —Consolidation**
- **– AIS-AIMSG work starts, ANNEX 15 Amendment 36, Doc 8126**
- **• November 2009 starts Phase 2 –Going digital**
- **– Development of related guidance material (electronic AIP, aeronautical information conceptual model, training, quality)**
- **• October 2011 starts Phase 3 —Information management**
- **– AIS-AIMSG will finalize proposals for amendment 37 to Annex 15. This amendment will be setting the scene for the future requirements on States to produce data sets.**

CONCLUSIONS

CONCLUSIONS

- Re-enforcing the value of current products by going digital will provide more functionality for current users and better availability of the information;

- Towards a common Information Reference Model for ATM with quality procedures for the management of the information flow between systems.

THE END

- THANK YOU
- MERCI