APPENDIX

GLOBAL ATM IMPLEMENTATION ROADMAP

All elements in the Global ATM Implementation Roadmap are contributors to improved ATM safety, efficiency and capacity. The following are key components in the transition to the future Operational Concept. Many of these elements have already been employed in some States and some regions. IATA encourages global implementation based on the Roadmap below. Harmonization, compatibility and interoperability are of critical importance in the global application of the ATM Operational Concept and in the deployment of all new and advanced air traffic systems. This is in line with the IATA "One Sky…. global ATM" strategy.

A. AIRSPACE ORGANISATION

A.1 Adoption of ICAO flight levels

All national authorities should adopt the ICAO cruising level system (ICAO Annex 2 — *Rules of the Air*, Appendix 3) in order to ensure consistent application of vertical separation standards at flight information region (FIR) boundaries. IATA encourages regions to work towards global implementation of reduced vertical separation minimum (RVSM).

A.2 Harmonise ICAO airspace classification of all upper airspace above a common agreed flight level

A common division level between upper and lower airspace should be adopted over the widest possible areas.

A.3 Harmonise and simplify application of ICAO airspace classification

States should establish consistent airspace classes, categories and rules over the widest possible geographical areas in support of seamless international operations.

A.4 Define new airspace classification and reduce the number of categories

Effort should be made to reduce the number of airspace classification categories and tailor them to the minimum required to protect operations.

In the future ATM operational concept, IATA recommends that airspace classifications take into account the ability of airborne systems to continually broadcast position and flight intentions, making possible the evolution towards more autonomous operation.

B. AIRSPACE MANAGEMENT

B.1 Collaborative planning with all airspace users including the military

Both civil and military airspace users should be given access to necessary airspace based on a flexible use of airspace concept, rather than a system based on strict segregation of airspace.

Collaborative airspace management should take place over large geographical areas where civil and military users contribute to all aspects of airspace planning, design, maintenance, update, regulation and legislation.

B.2 Dynamic airspace management

Dynamic airspace management in real-time should be used as the key to user benefits, providing a flexible structure where airspace boundaries are adjusted to particular traffic flows and changing weather conditions.

B.3 Reduction of tactical air traffic flow management through automation

There should be greater development and implementation of automation in ground and airborne systems, as well as full integration of flight management systems in the strategic flow negotiation process.

The tactical flow management process should monitor the progress of individual aircraft and intervene in their flight paths only when required to meet ATM constraints.

B.4 Integrated regional airspace planning

Long-term airspace planning in cooperation with airspace users and inline with the Global ATM Operational Concept should identify specific homogeneous ATM areas and/or major international traffic flows, as a basis for promulgation of ATM infrastructure and CNS implementation.

B.5 Autonomous operations based on airborne separation assurance

Increasing aircraft autonomy should be supported by the gradual transfer of certain procedures and responsibilities from ground-based to airborne separation assurance.

C. CIVIL MILITARY COOPERATION

C.1 Military participation in airspace planning

Civil authorities should include military operators in airspace planning activities at three levels:

- strategic, for establishment of pre-determined airspace structures and agreement of priorities and negotiation procedures;
- pre-tactical, for day-to-day allocation of airspace according to user requirements; and
- tactical, for real time use of airspace and resolution of specific airspace problems and traffic situations in real time.

C.2 Enhanced civil/military cooperation for dynamic airspace allocation

Airspace reserved for military use together with affected ATS routes should be published by NOTAM as active in respect of the duration and extent of scheduled activity and should be declared available to civil users when there is no activity. IATA encourages the move towards a shared and collaborative environment where priority can be given to civil airspace users under certain circumstances such as peak demand or high delays.

D. AIR TRAFFIC MANAGEMENT

D.1 Maximum use of reduced separation minima

Harmonised programs should be established to reduce separation through RVSM and RNP RNAV over the widest possible geographical areas.

A building block approach should be taken towards the use of user-preferred trajectories based on an analysis of costs and benefits. The building blocks include flexible tracks, random routing, dynamic re-routing, free routing and transfer of separation assurance responsibility in designated airspace.

D.2 Transfer of separation assurance responsibility

An essential element should be increasing aircraft autonomy by the transfer of certain procedures and responsibilities from ground-based to airborne separation assurance.

For the development of autonomous operations, the following aspects must be addressed: safety and certification considerations; institutional and financial implications; system design and integration; accommodation of varying levels of aircraft equipage; human factors; training; and global transition.

E. TERMINAL AREA OPTIMIZATION

E.1 RNP RNAV arrival and departure procedures optimised for aircraft performance

An increased number of RNP RNAV arrival and departure procedures are required to provide a more flexible and economic route structure. It is recognised that these may continue to be applied with fixed routes (i.e. SIDs and STARs), as opposed to flexible routes, in certain highly congested airspace. While the present RNAV applications are restricted to 2D, as capacity benefits can be demonstrated, they should extend to 3D navigation, enabling profile management to be employed. IATA anticipates full 4D RNAV (3D plus time) will meet the requirements of a more integrated air/ground ATM system.

E.2 Automated tools for arrival and departure sequencing

Introduction of automated decision making tools is required to provide controllers more information on arrival and departure demand/capacity and help sequence aircraft according to user preferences and airport capacity.

E.3 Dynamic management of TMAs

Flexible terminal airspace structures (sector boundaries and arrival/departure routes) should be established in order to respond dynamically to particular traffic flows and peaks in demand.

E.4 VFR capacity in IFR weather conditions

Improved metering, sequencing and spacing of traffic in the terminal area using ground-based tools (metering and spacing devices) and cockpit-based tools (CDTI) should be implemented in order to increase runway capacities in instrument meteorological conditions to a level approaching present runway capacities in visual meteorological conditions. Further, the system must anticipate and adapt quickly to changes in runway configuration.

E.5 Application of 4D RNAV in the terminal area

4D arrivals and departures will minimise environmental impact, ensure efficient timing and accurate and efficient approach sequencing.

F. FLIGHT PLANNING AND OPERATIONAL INFORMATION

F.1 Improved airspace, route availability and MET information

Aeronautical Information Services (AIS) should be fully harmonised and aviation meteorological services (MET) data to support combined automated AIS/MET pre-flight briefing facilities. Features should include:

- Common information presentation;
- Common airspace environment databases;
- Common amendment of aeronautical information;
- Integrated and selective AIS and MET information access; and
- Provision of relevant AIS and MET information, including relevant amendments, to aircraft in flight.

F.2 Collaborative flight planning

In order to support Collaborative Decision Making (CDM), a system-wide information management and sharing strategy is required which involves all suppliers of ATM information so as to assemble the best possible integrated picture of the past, present and planned future state of the ATM situation. This requirement applies to strategic, pre-tactical and tactical planning phases of airspace planning.

F.3 Dynamic flight planning

The future ATM system should be based on up-to-date 4-dimensional flight plans negotiated between the user and the ATM system during actual operations, representing the best accommodation of the user's preferred trajectory given the ATM constraints that apply at the time.

G. AIRPORT SURFACE MOVEMENT

G.1 Maximise runway capacity

Capacity-enhancing air traffic control procedures — such as high intensity runway operations and reduced runway separation — should be introduced on runways and taxiways at busy airports, and their implementation harmonised globally by ICAO procedures.

G.2 Display information of all surface movements to all parties

Increasing levels of collaboration and information sharing between users and ATM providers will create a more realistic picture of airport departure and arrival demand, allowing users to make effective scheduling and flight planning decisions.

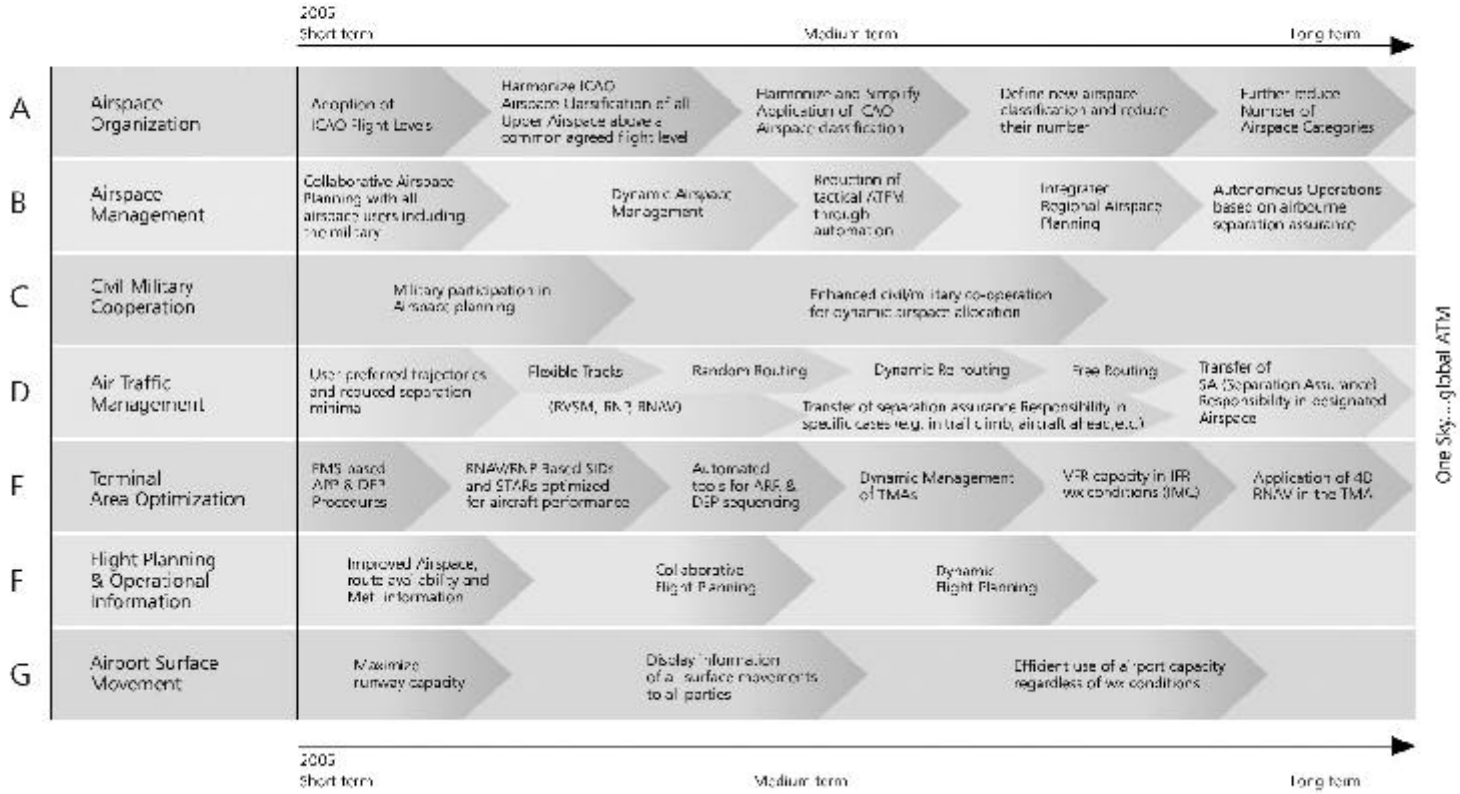
Full realisation of the potential airside capacity gains is also dependent on efficient landside operations, such as passenger and baggage handling and access routes, and these should be adapted accordingly.

G.3 Efficient use of airport capacity regardless of weather conditions

The introduction of surface management guidance and control systems should be encouraged, in order to provide the basis for efficient movement of ground traffic in poor visibility conditions to a level approaching that achieved during good weather

Global Implementation Roadmap

Note:
This diagram is the top level ATM Roadmap. All elements of the Roadmap are contributors to improved ATM safety, capacity and efficiency. The enablers including supporting systems are identified separately. Timescales are intentionally approximate, because the Roadmap describes an implementation sequence and not absolute events in time. The implementation schedule will vary according to market forces involving airspace users.



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