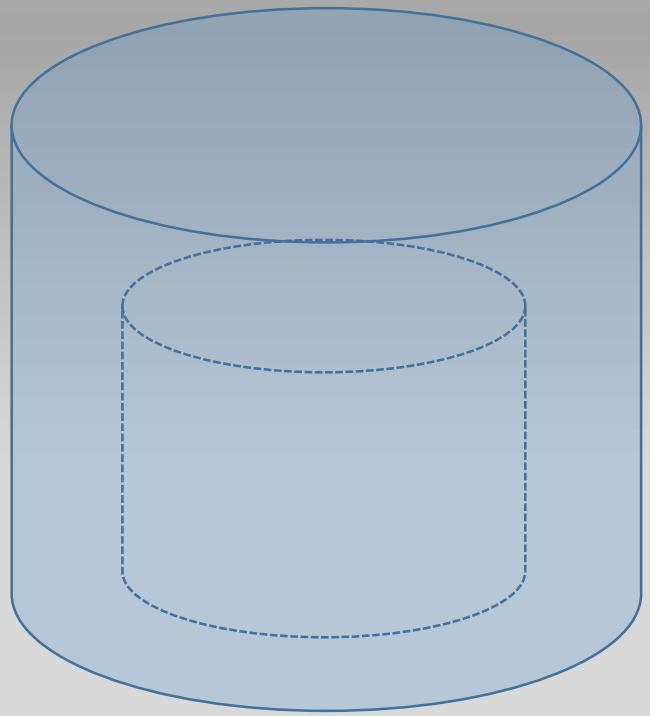
Flexible Use of Airspace

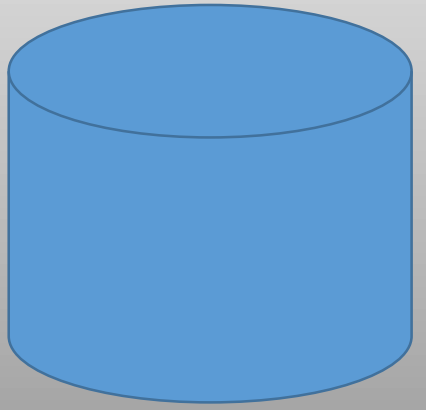
NAM/CAR/SAM Search and Rescue (SAR) Implementation and Civil-military Coordination Meeting (SAR MTG)

Port of Spain, Trinidad and Tobago, 25 to 28 October 2016

What is FUA

Flexible use of airspace (FUA) is an airspace management concept based on the principle that airspace should not be designated as purely civil or military, but rather as a continuum in which all user requirements are accommodated to the greatest possible extent





Military only

Civil/Military Coordination

Civil only

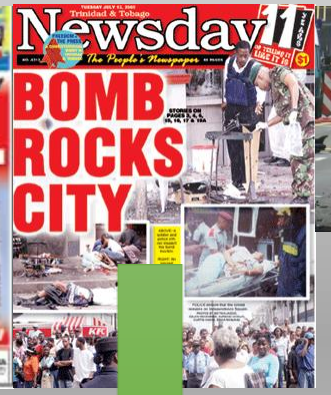
Environment in context

Global air traffic doubles every 15 years

Increase in UAS operations for military activity

A world in conflict

Increased military operations globally



Increase in national crime and acts of terrorism

Increase in aviation operations for national security

Environment in context

Civil Aviation

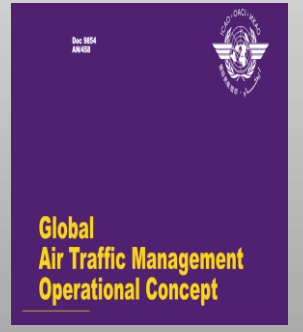
Airspace

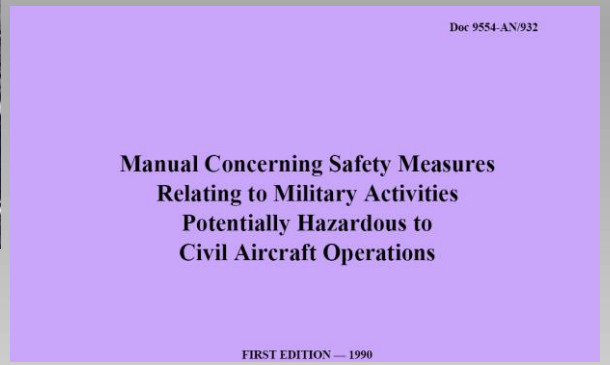
Military/National Security

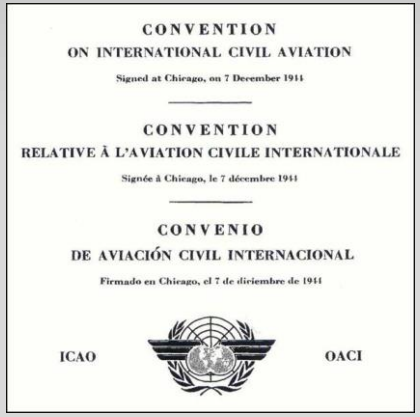
Background on FUA

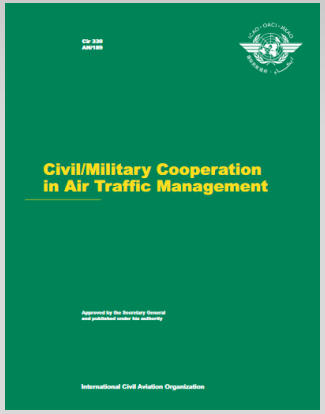
- The Convention on International Civil Aviation was signed in Chicago in 1944
- Article 3, excludes State aircraft used in military, customs and police services from ICAO's regulations
- Resolution A37-15, Appendix O, "Coordination and cooperation of civil and military air traffic" was further articulated
- GPI-1, "Flexible Use of Airspace"
- ASBU PIA 3 – Optimum Capacity and Flexible Flights
- ASBU PIA 4 – Efficient Flight Paths

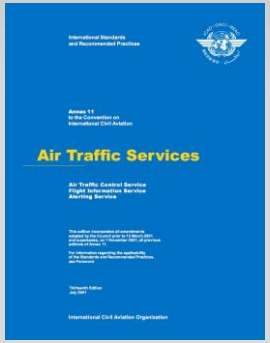
Chicago – 7 December 1944





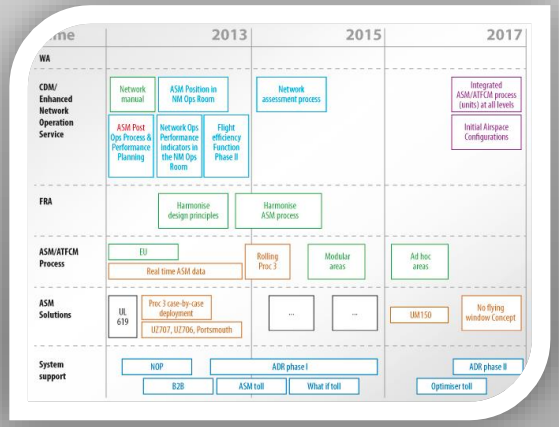






Process to establish FUA

National, high-level civil/military coordination body



National airspace planning process

Letters of agreement

Process for publication

Review and update process

System that allows predictive and timely access to restricted or reserved airspace

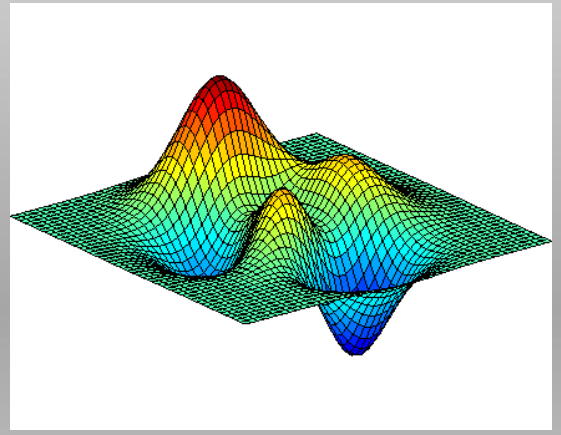
ICAO's Guidelines on Airspace Management (ASM)

- All available airspace should be managed in a flexible manner, whenever feasible;
- Airspace management processes should incorporate dynamic flight paths and provide optimal operational solutions;
- When conditions require segregation, based on different types of operations and/or aircraft, the size, shape and time zones of said airspace should be determined to minimize impact on operations.
- The use of airspace should be coordinated and monitored in order to accommodate the conflicting requirements of all users and minimize any constrains on operations;
- Airspace reservation should be planned in advance with changes made dynamically whenever possible. The system also need to accommodate short-notice unplanned requirements ; and
- The complexity of operations may limit the degree of flexibility.

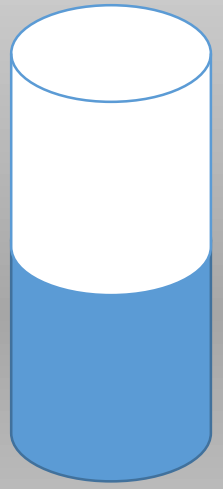
Source: ICAO Cir 330 AN/189
Civil/Military Cooperation
in Air Traffic Management

ICAO’s Guidelines on ASM

Flexible airspace management



Dynamic flight paths



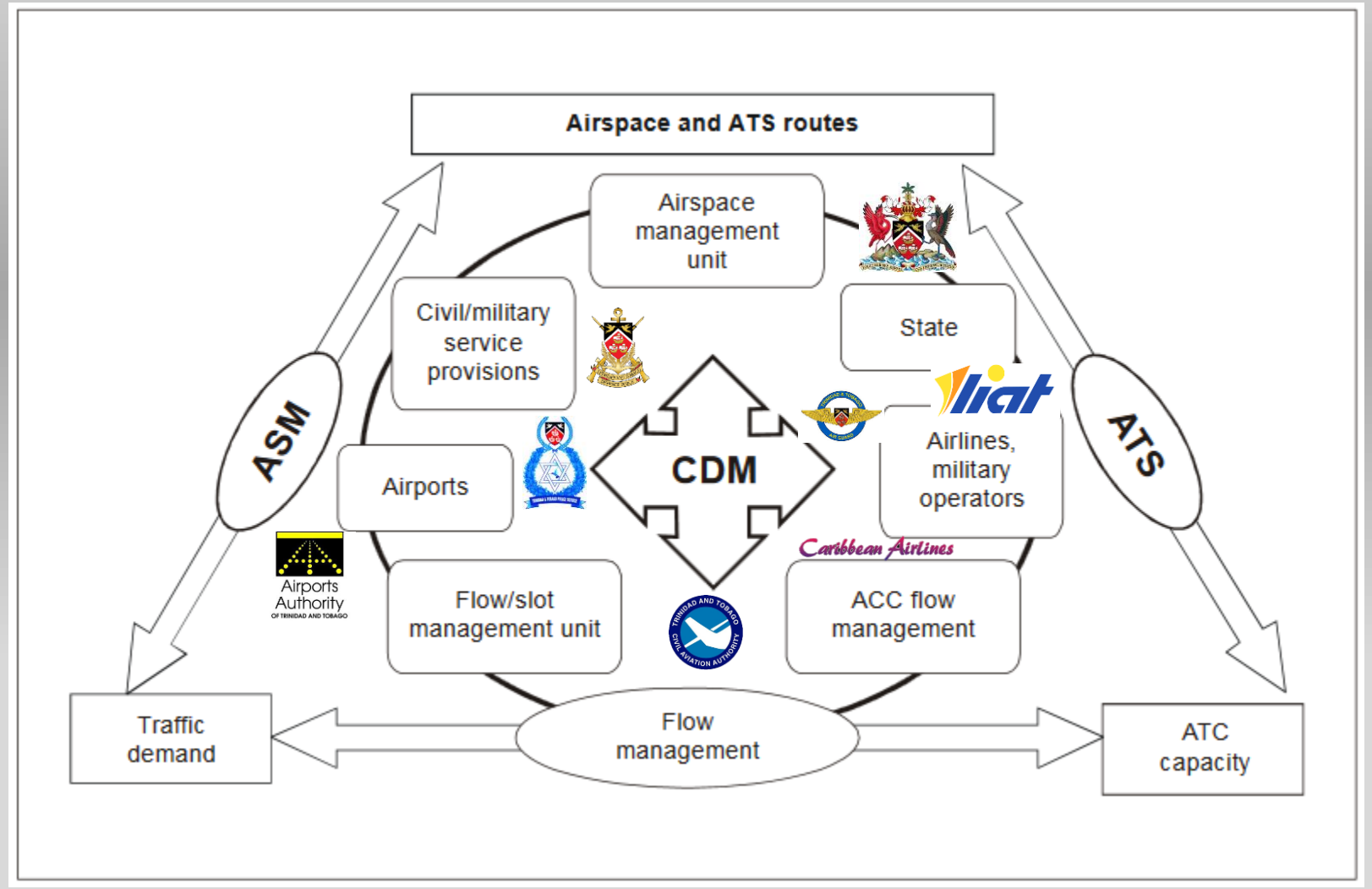
Minimize impact of airspace reservations on operations

Coordination

Plan and schedule

Be aware that complexity may affect flexibility

Collaborative Decision Making (CDM)process



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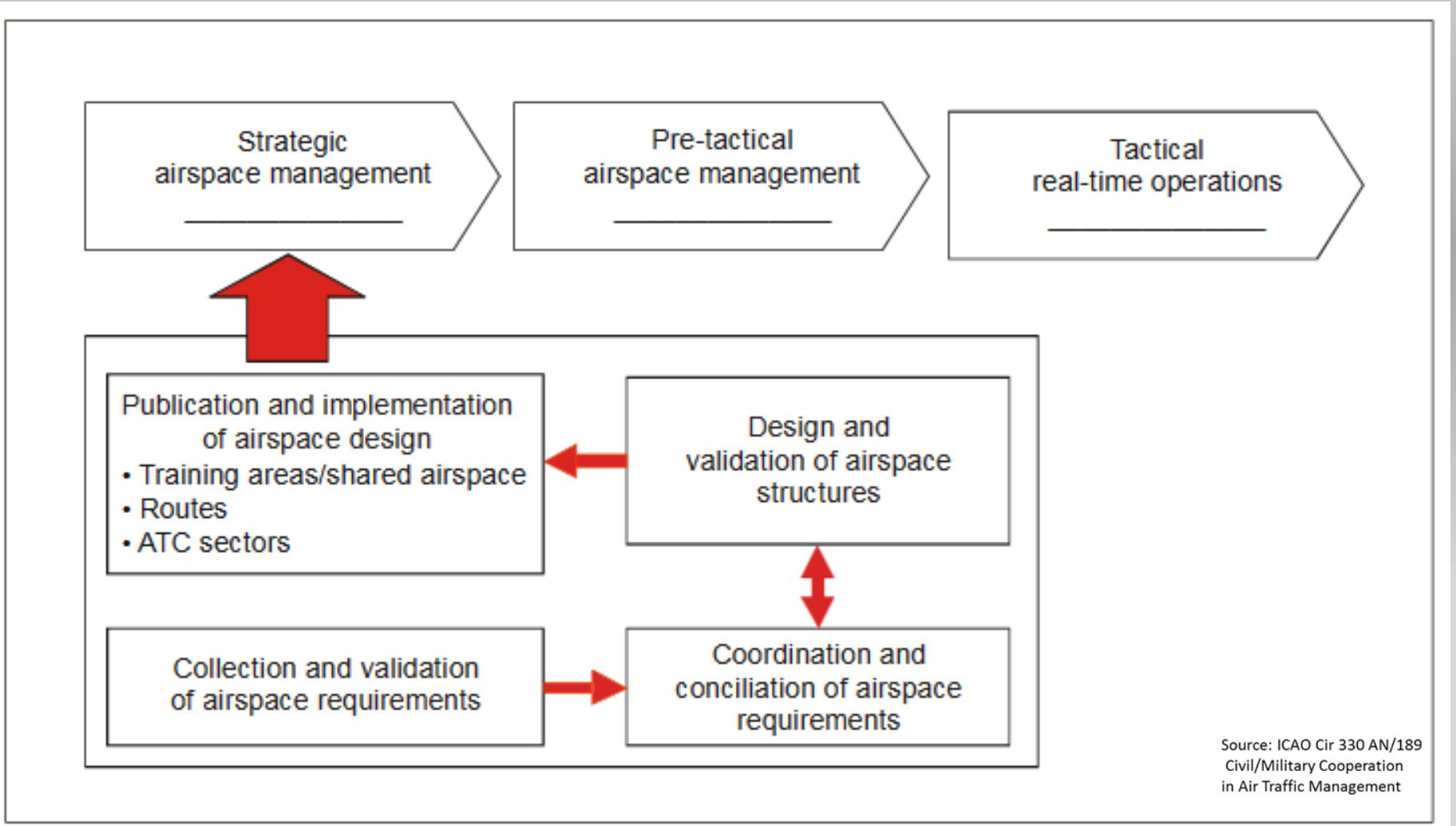
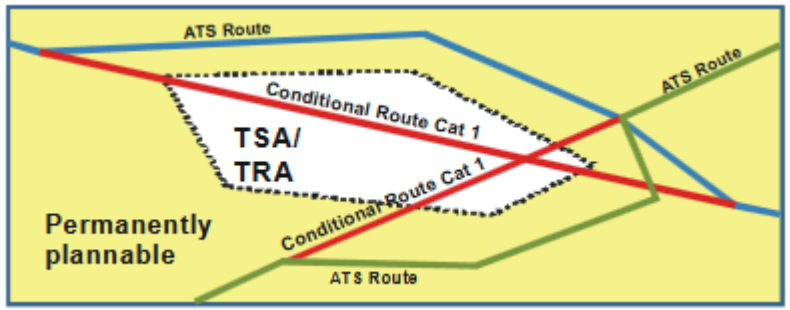
Principles of FUA

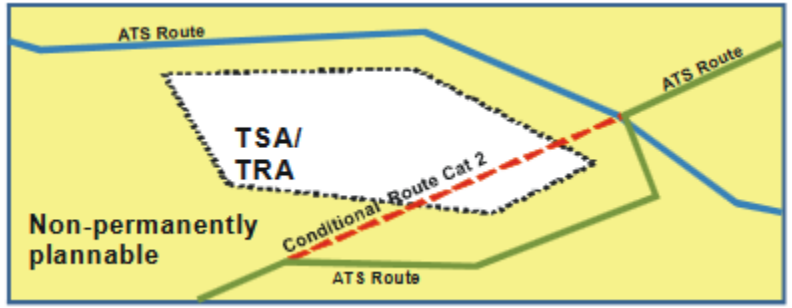


- Coordination between civil and military authorities should be carried out at the strategic, pre-tactical and tactical levels
- Airspace reservations should be of a temporary nature
- Applied across national borders and/or the boundaries of flight information regions (FIRs).

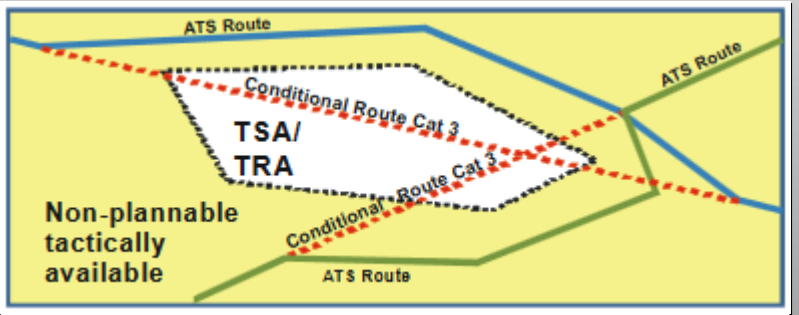
Flexible and adaptable airspace structures and procedures



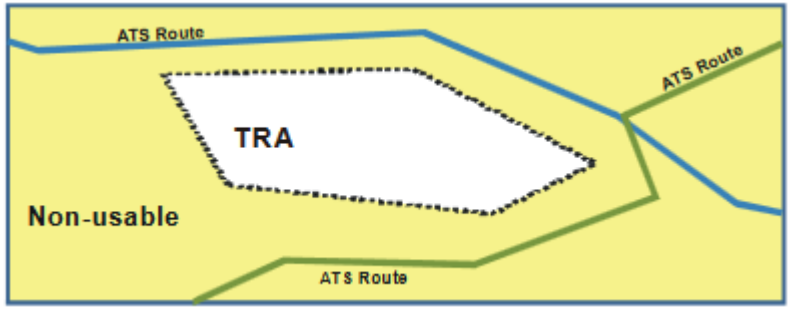
- Permanently plannable during times published in AIP
- Expected to be available for most of the time
- Plannable in the same way as all plannable ATS routes
- ATC tactically reroutes if TSA becomes active on short notice



- Daily allocated based on ATC capacity imbalance



- Usable on ATC instruction only
- Used for short notice routing

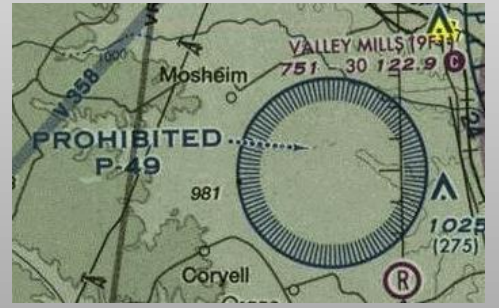


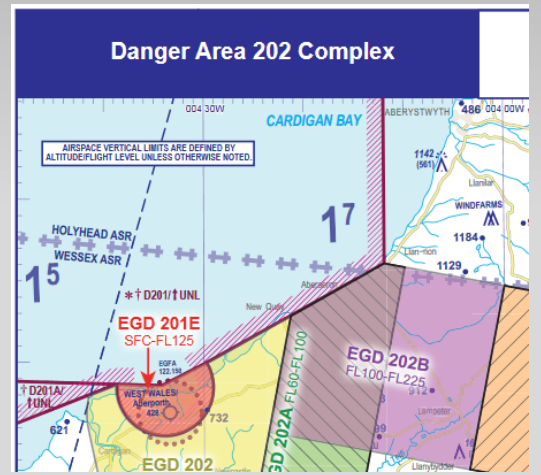
Unusable

Source: ICAO Cir 330 AN/189
Civil/Military Cooperation
in Air Traffic Management

Considerations when designing Special Use Airspace (SUA)

- Many current prohibited areas may be more correctly described as restricted areas
- Restricted areas may not be designated over the high seas or in airspace of undetermined sovereignty
- Restricted areas should be designed to be as small as possible
- Danger areas may be considered in lieu of restricted areas
- SUA should only be activated when required





How does it work?

Without FUA

- **Increase in track miles or operating at flight levels that are not optimum cause:**
  - Increased fuel burn
  - Increased carbon emissions
- **Reduction in airspace capacity cause**
  - Increase in ATC workload
  - Increase in cockpit workload

How does it work?

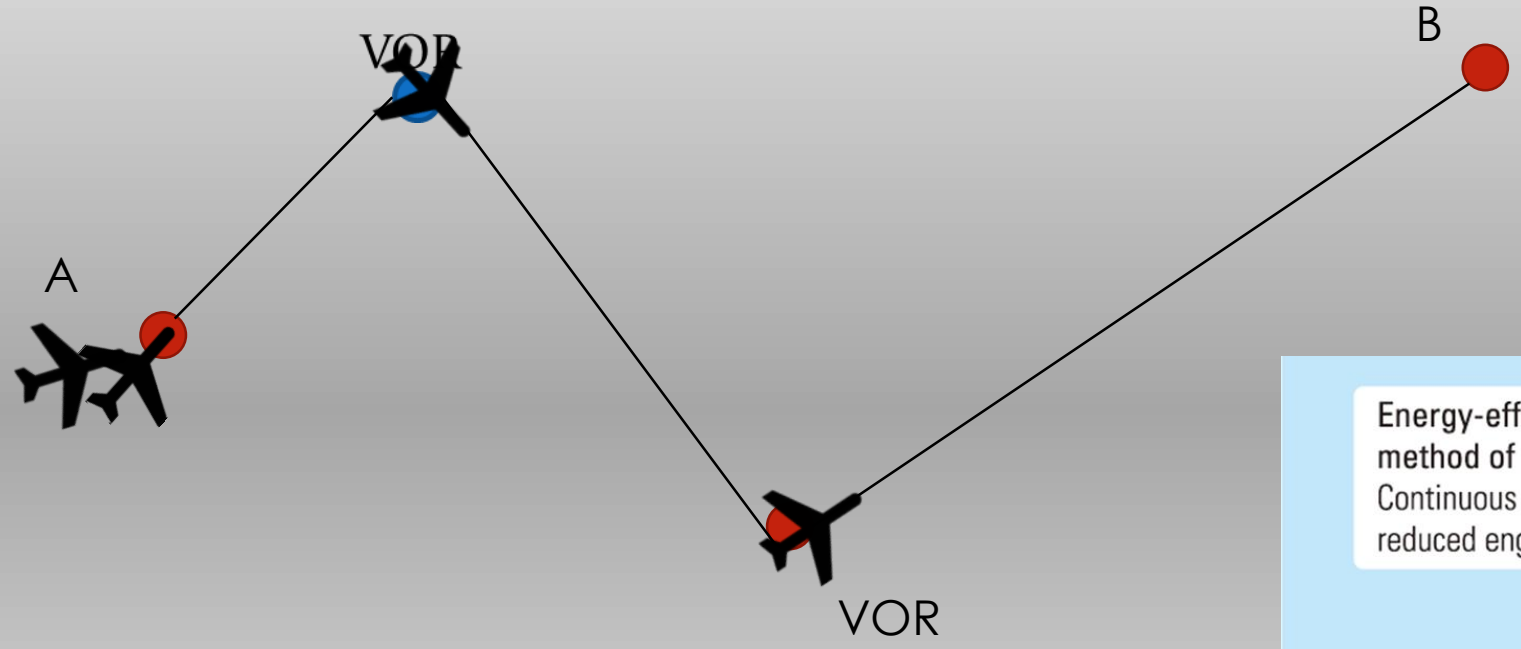
Utilizing FUA Concept

- **Benefits:**
  - Reduced fuel burn
  - Reduced carbon emissions
  - Increase in Airspace Capacity
  - Reduction of complexity for ATCOs and Pilots

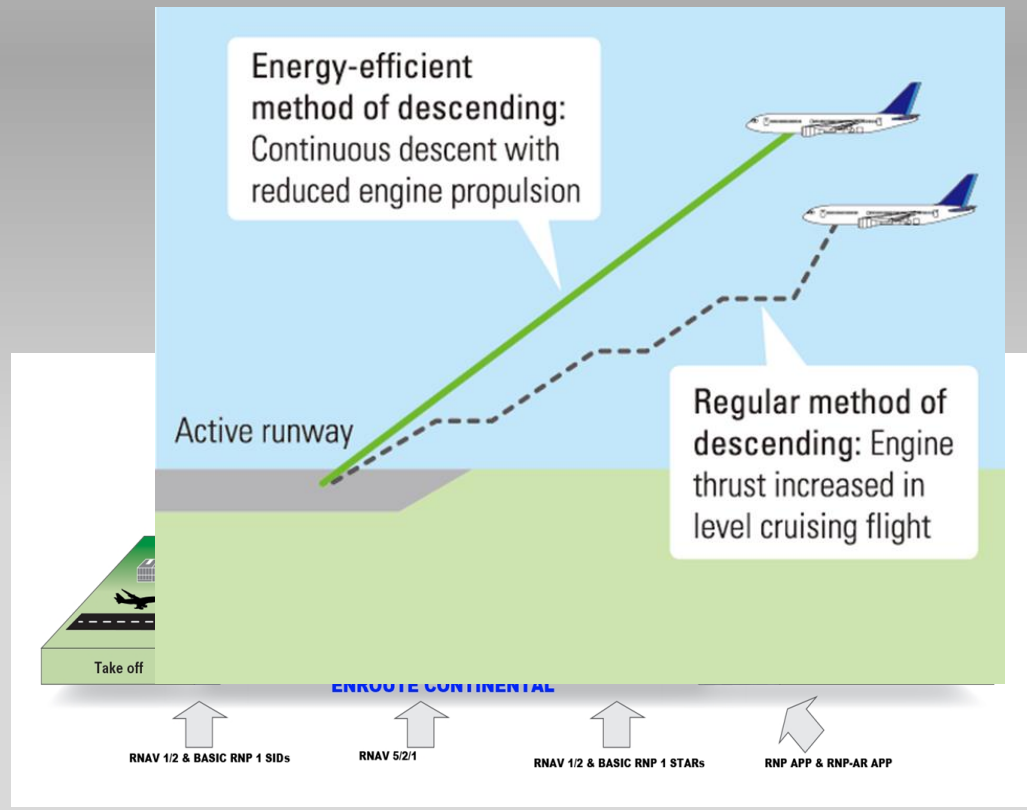
TRA/TSA coordinated with ATS to allow flight at certain times

TRA/TSA coordinated with ATS to allow flight at certain times

PBN Concept

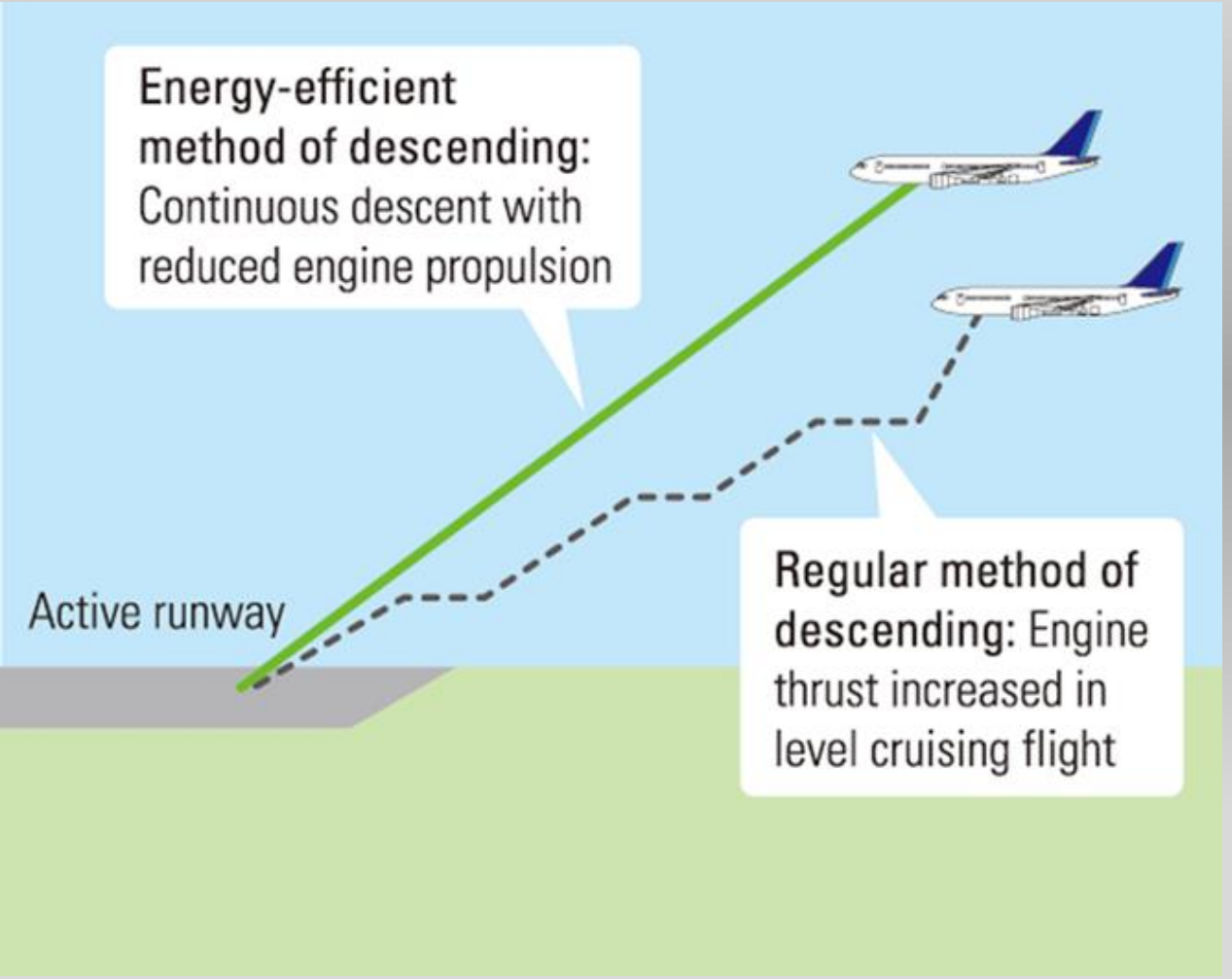


Area Navigation



PBN is more accurate and allows for shorter more direct routes, as well as safer more efficient take-offs and landings. This reduces fuel burn, airport and airspace congestion, and aircraft emissions.

CCOs and CDOs

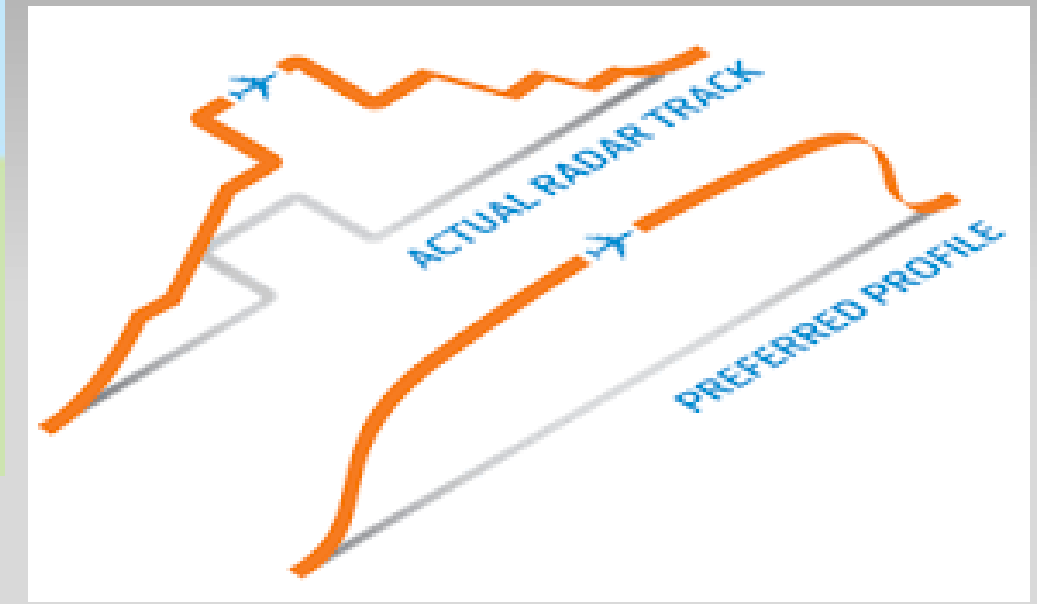


PBN is essential to the implementation of ICAO's Aviation System Block Upgrade (ASBU) performance improvement areas. For example it provides critical support to the imporvement of airport operations through ASBU modules:

B0-APTA – Optimization of Approach procedures including vertical guidance
B1-APTA – Optimized Airport Accessibility.

And is also a major enabler of the Efficient Flight Path concept through Trajectory-based Operations (TBO). In this capacity, PBN further supports the application of modules which contribute to significant efficiency, capacity and environmental benefits, namely:

B0-CDO and B1-CDO – Continuous Descent Operations (CDOs: see diagram, below)
B0-CCO – Continuous Climb Operations (CCOs)



ADS-C & CPDLC

CPDLC

Controller Pilot Datalink Communications

VHF & HF voice radio communications can be supplemented by using CPDLC text messages.

ADS

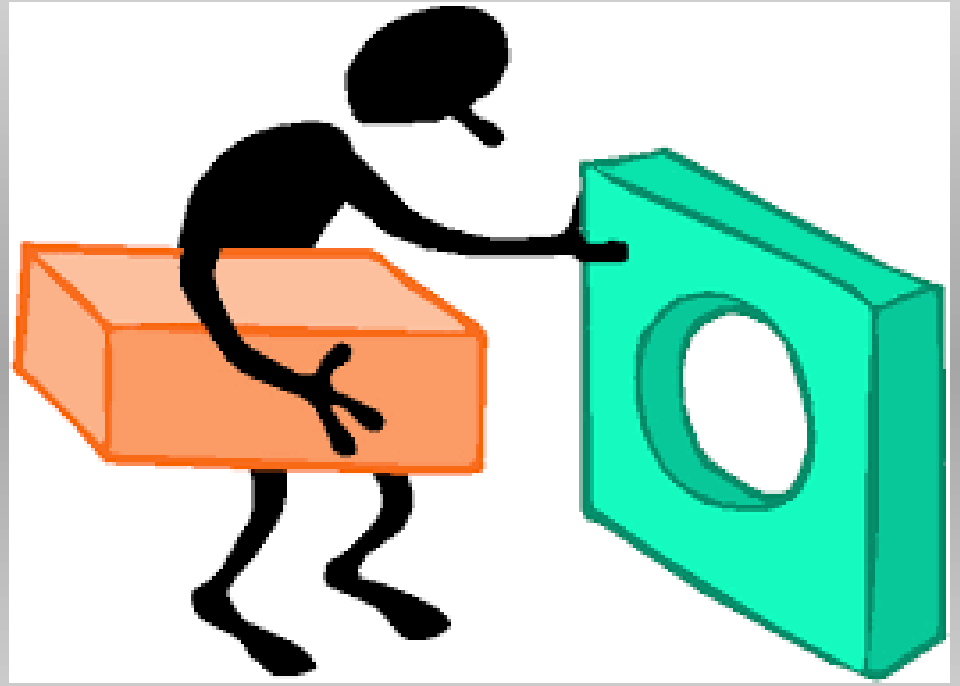
Automatic Dependent Surveillance

Remote regions lacking radar coverage can be supplemented by using digital position reports.

Increases Safety by providing situational awareness and data link communication in remote or oceanic areas

Considerations for ASM team

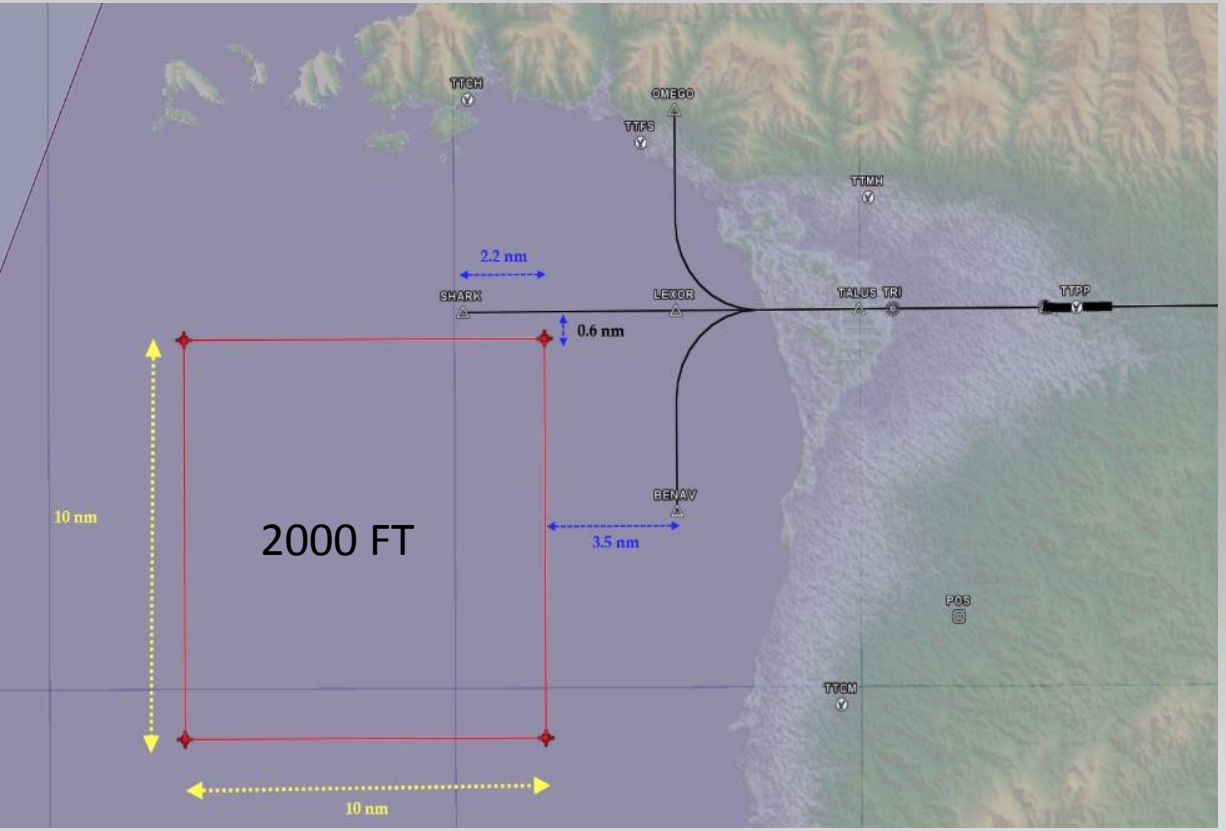
- Performance Based Navigation (PBN) concept allows for greater flexibility for aircraft operations
- FANS 1/A (ADS-C/CPDLC) allows for more efficient operations
- However, some military ACFT may not have the appropriate equipage on board
- This may result in lack of interoperability between Civil ANSPs and Military Operations

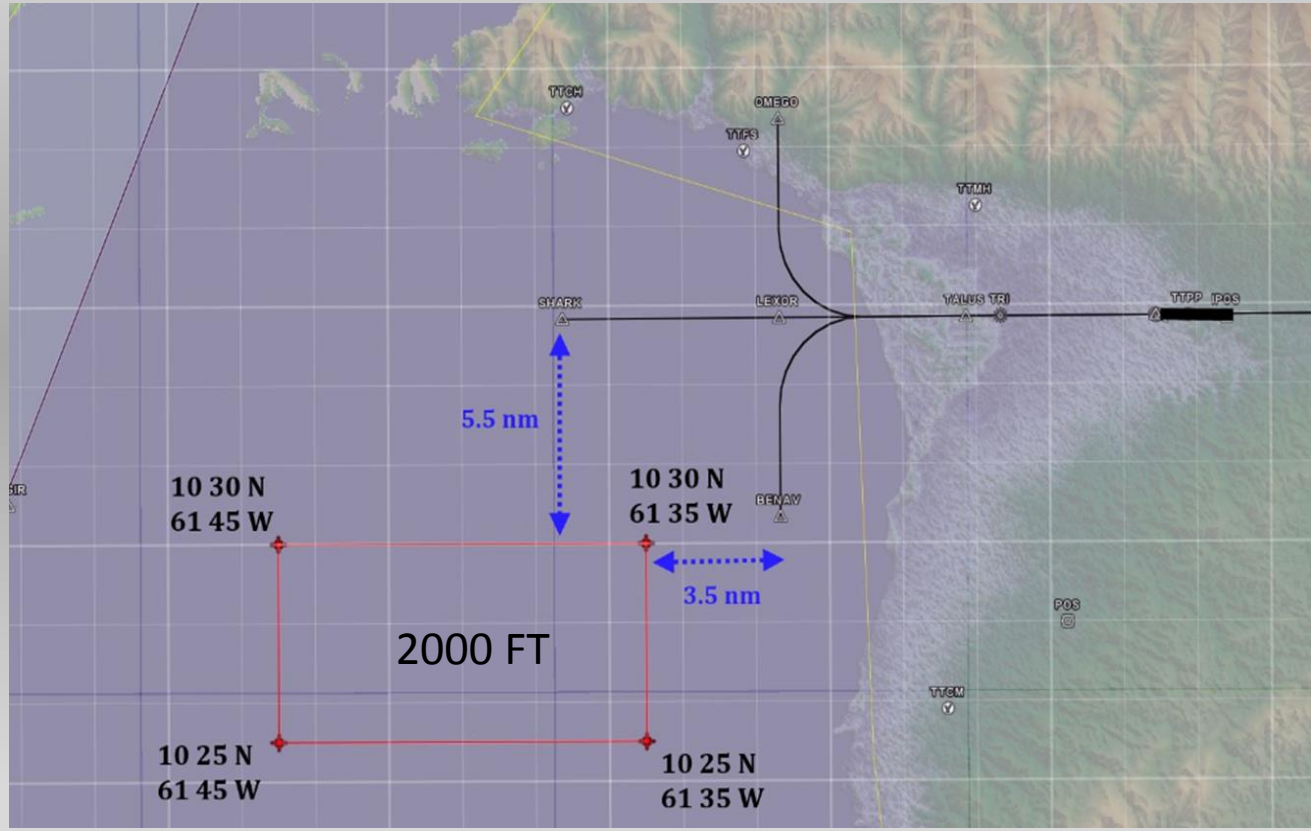


Constraints on Military Operations

- Lengthy military procurement cycles
- Public budget constraints
- Lack of space in the cockpit for extra avionics
- Absence of supporting military requirements
- Lack of recognized certification processes
- Security and institutional aspects
- Difficulty monitoring civil CNS/ATM developments

Example of CDM between TTCAA and TTDF



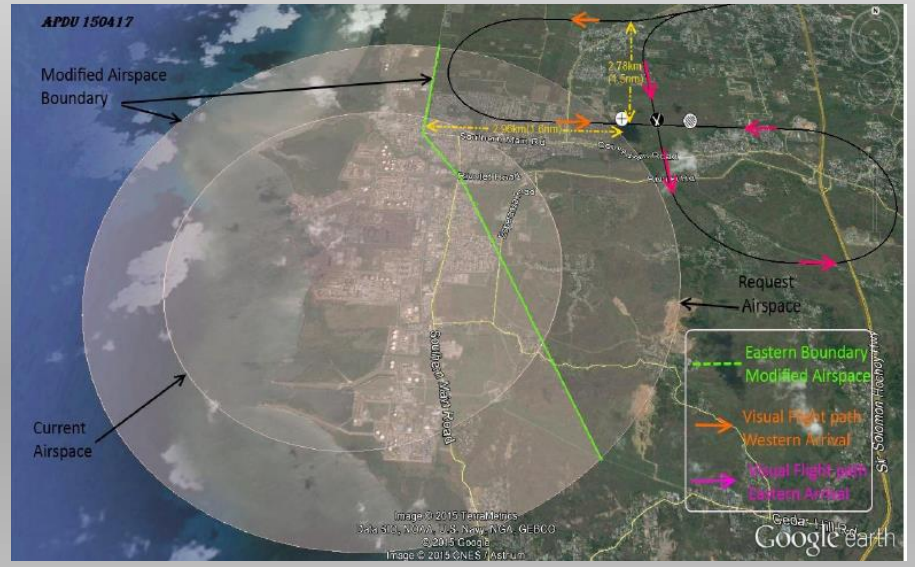


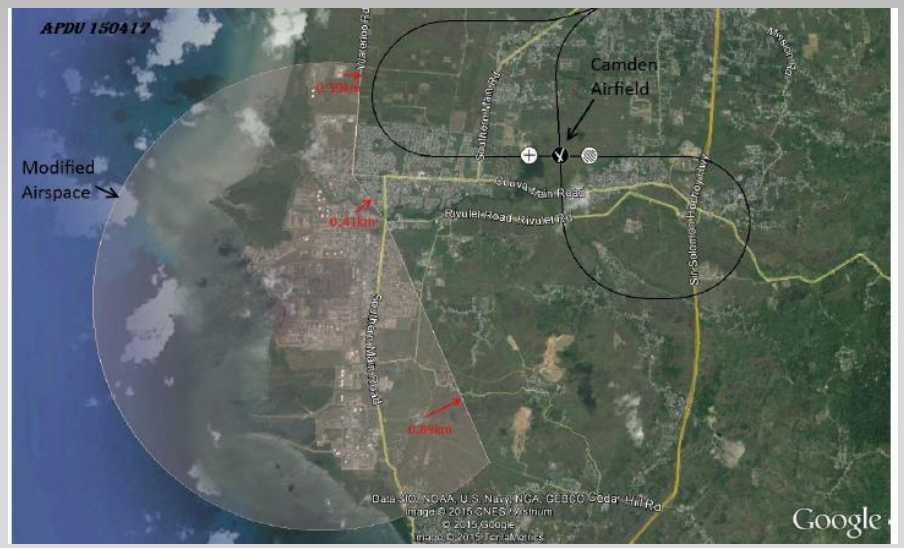
Requested restricted airspace

Restricted airspace agreed to

Example of the CDM process in Trinidad and Tobago

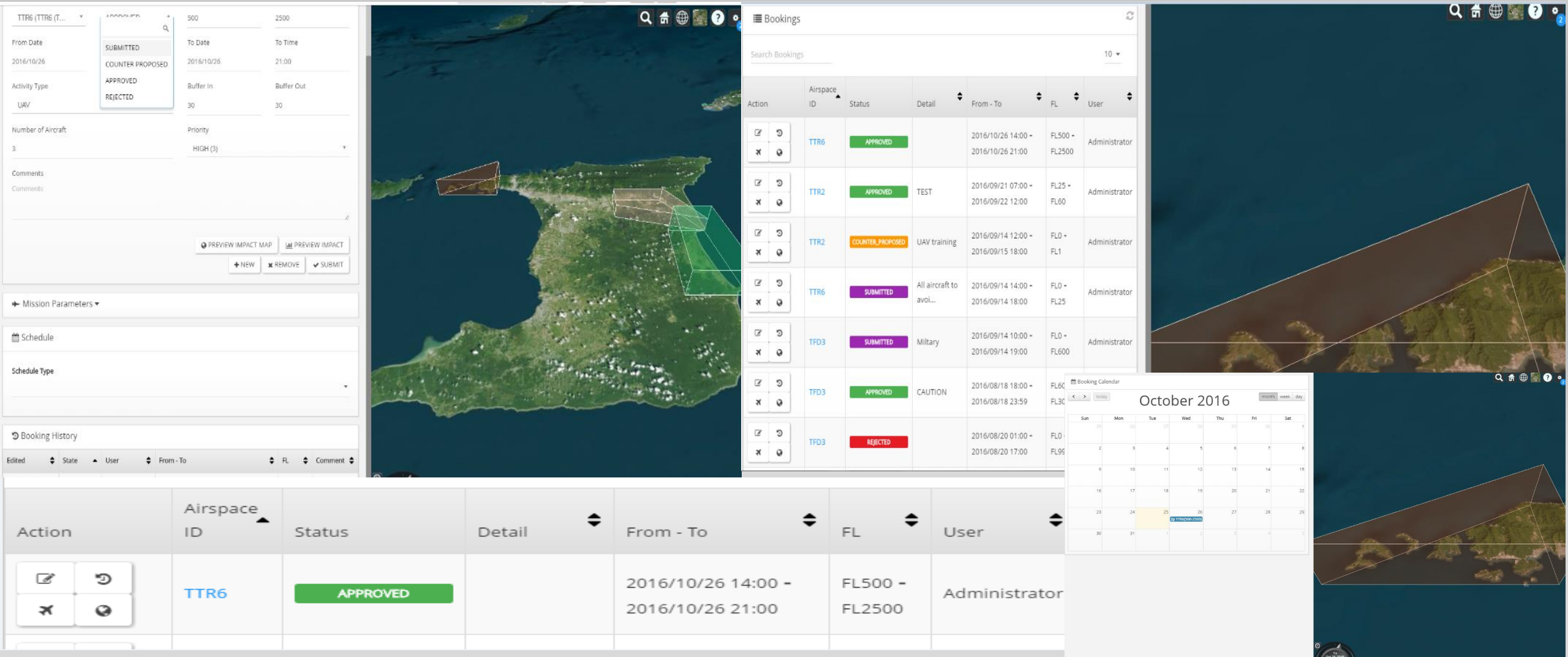
- Request received to increase restricted airspace
- Request infringed on helicopter operations



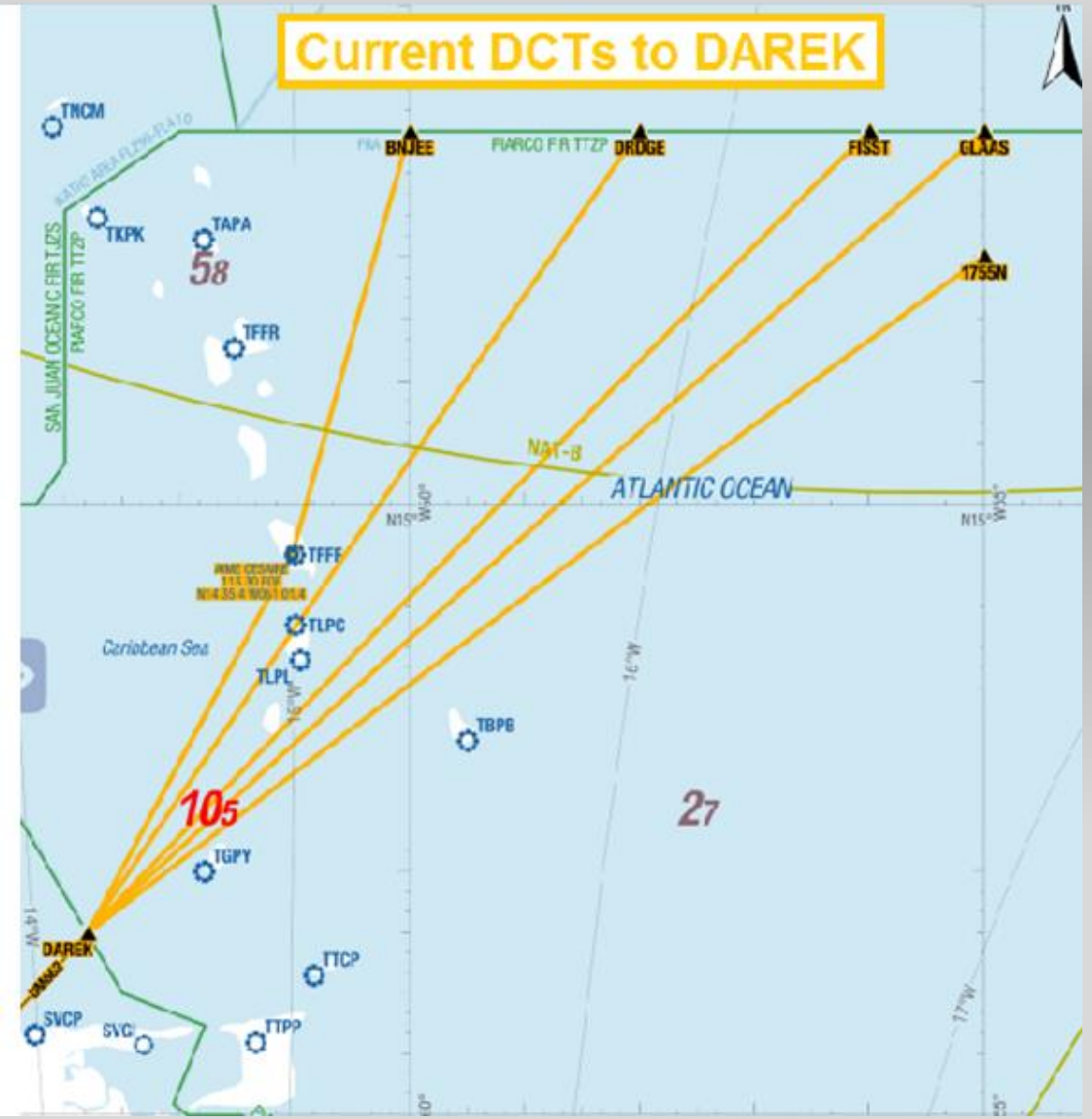


- Procedure designers designed a modified restricted airspace which was agreeable to both parties

Trinidad and Tobago's ATFM system has capability to provide platform for FUA



Flex Route Trials with KLM Airlines



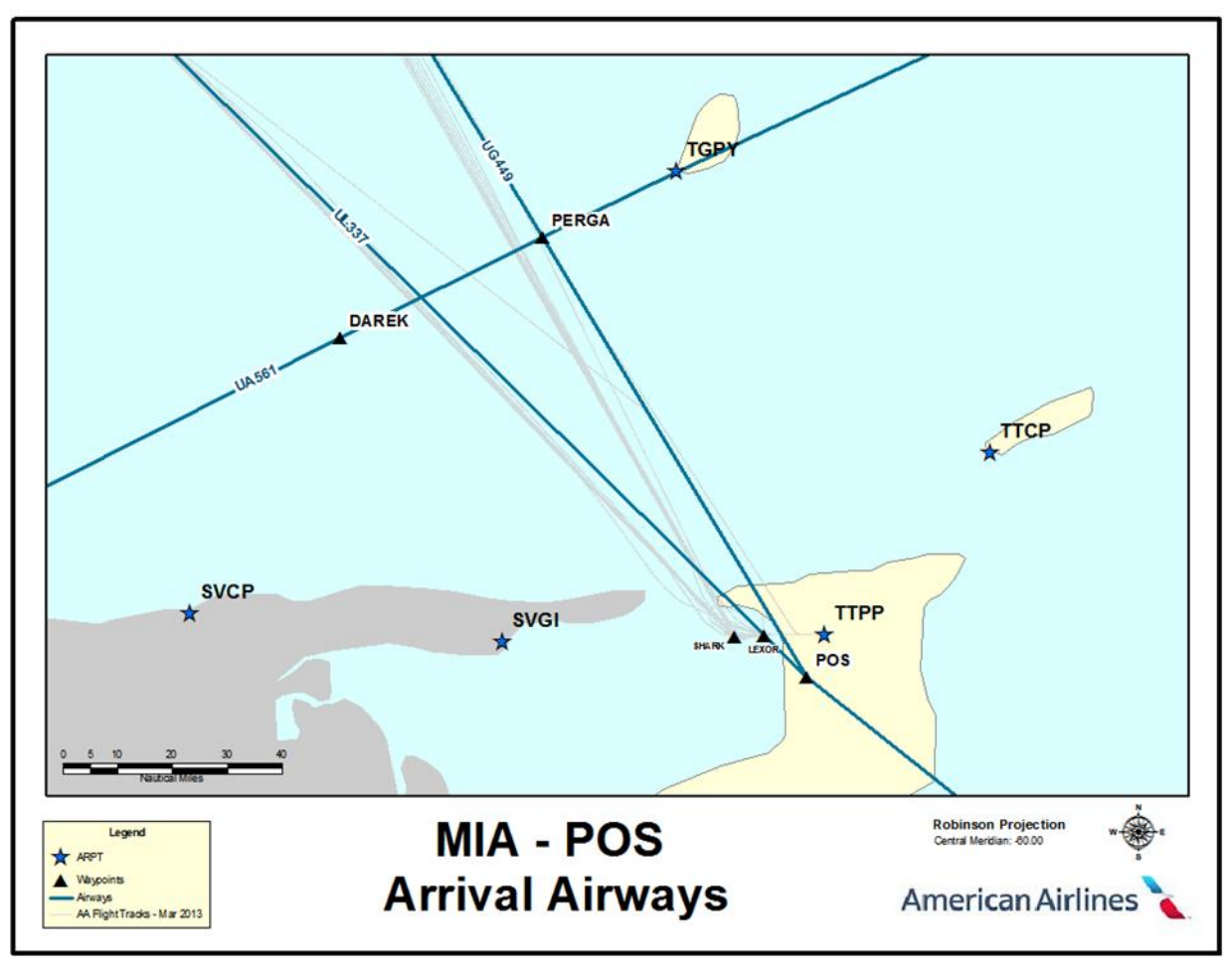
Total reductions from Mar – May were:

- Mileage 1238 NM
- Time 162 minutes
- Fuel burn 24760 kgs
- CO2 emissions 78242 kgs

Total reductions from Jun – Aug were:

- Mileage 1809 NM
- Time 241 minutes
- Fuel burn 35891 kgs
- CO2 emissions 113416 kgs

CDM with American Airlines for CDO



777-300ER

	Time (min)	Fuel (lbs)	Dis (NM)
CDO Descent	17.2	1188	96.7
Step at FL190 for 1 min	20.9	1967	102.0

Notes Beginning at FL370 and 555,000lbs

A319 w/ Sharklets

	Time (min)	Fuel (lbs)	Dis (NM)
CDO Descent	15.9	318	93.5
Step at FL190 for 1 min	19.2	704	98.8

Notes Beginning at FL370 and 138,000lbs

Benefits of FUA

Questions?