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# **AIR TRAFFIC FLOW MANAGEMENT AND FLEXIBLE USE OF AIRSPACE**





- Concept of ATFM and FUA
- Timeline of Implementation
- Why is FUA required
- ATFM and FUA
- About ATFM in India
- CDM Partners involved in processes
- Benefits of FUA
- ATFM and FUA- Practical Process



# Fundamental principle of FUA



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**The airspace should not be designated as either pure civil or military airspace, but rather be considered as a continuum in which all user requirements have to be accommodated to the extent possible.**

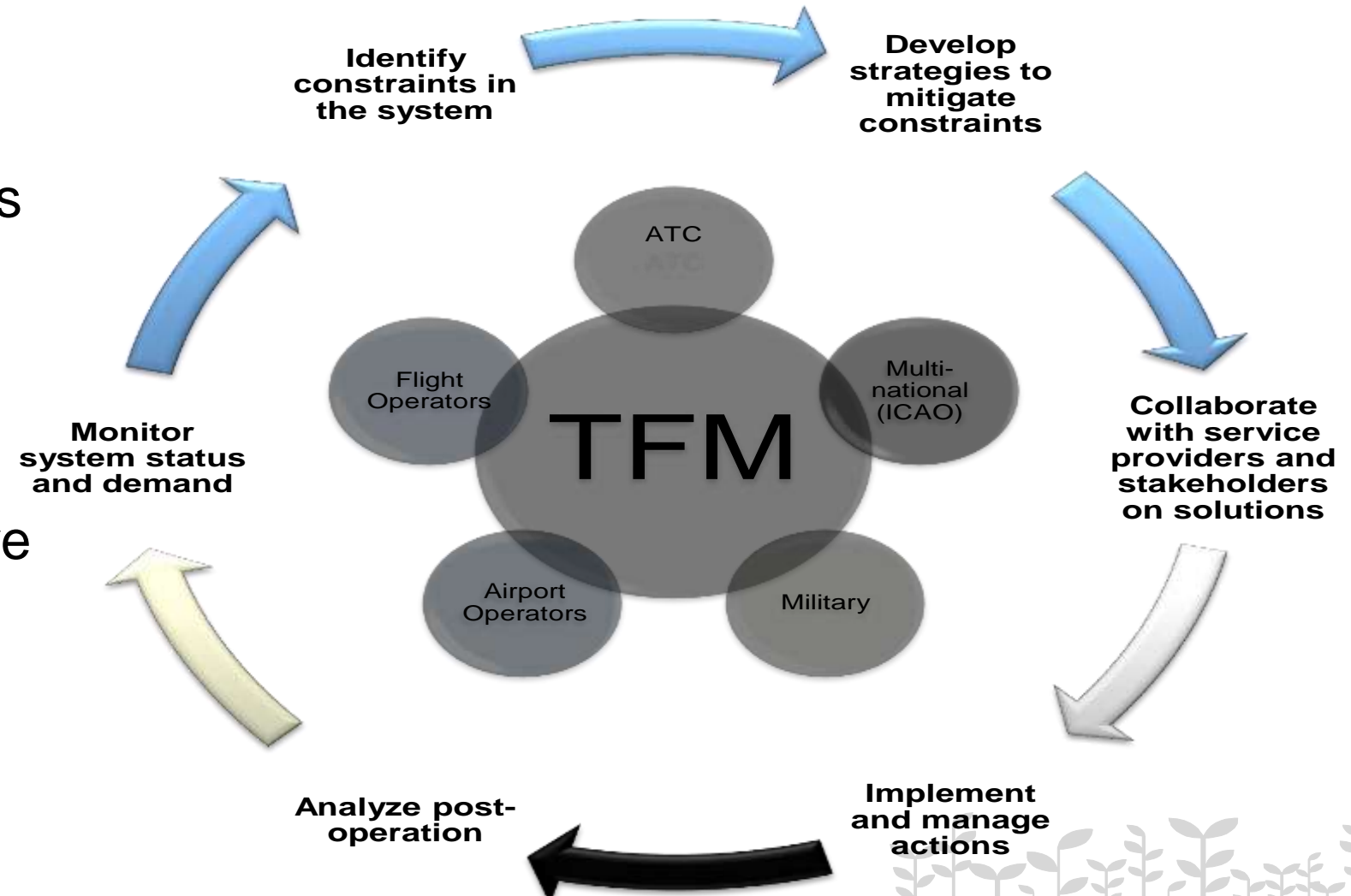


**AIRSPACE RESOURCES BECOME AVAILABLE ON NEED BASIS TO THE STAKEHOLDERS**



# PROCESS of ATFM

- ATFM is a collaborative process involving many stakeholders with diverse goals.
- CDM enables the stakeholders to share the resources optimally.



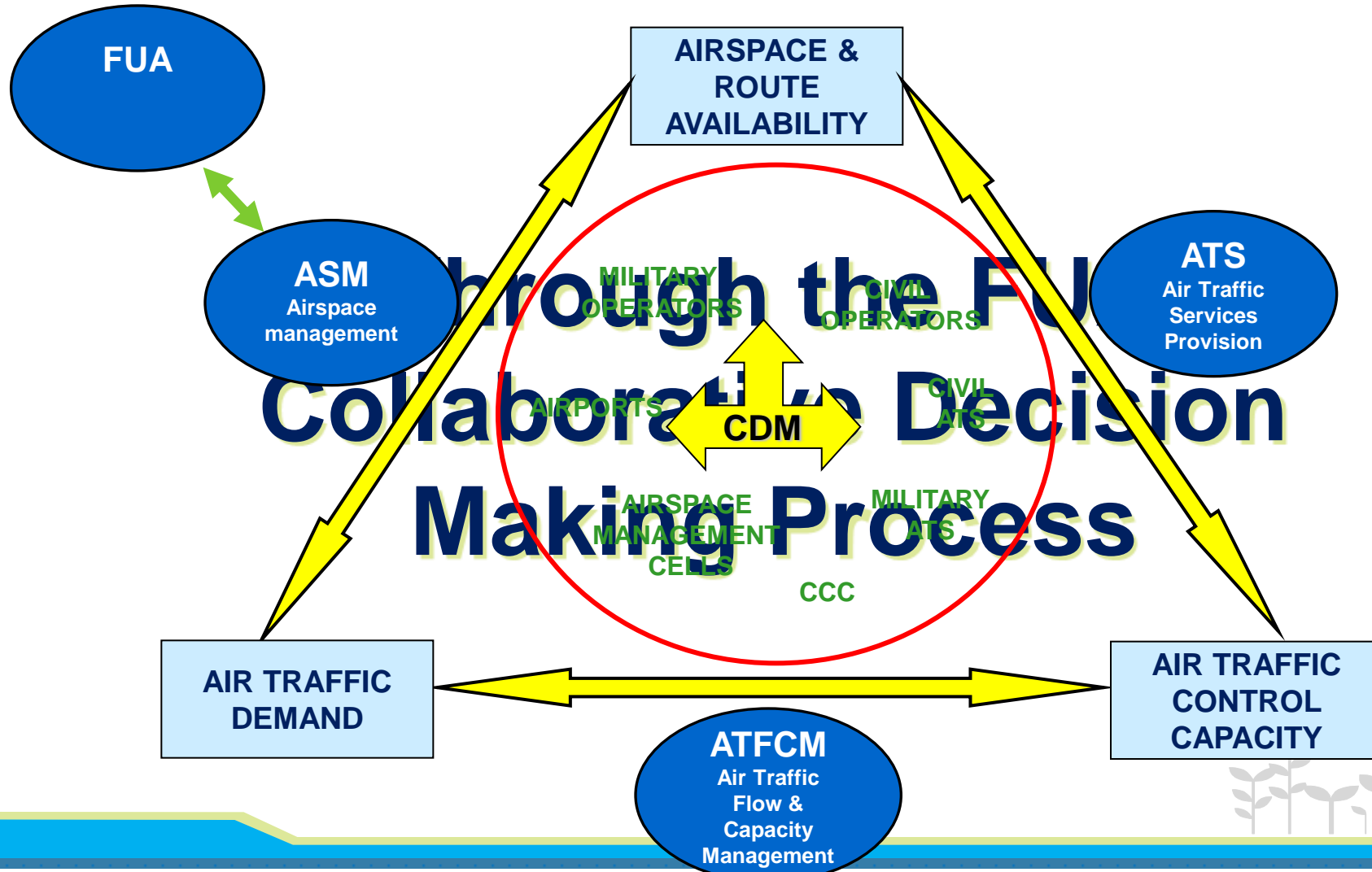
# ASBU B0-NOPS Requirements



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- Provide a solid foundation for regulating traffic flow
- Predict demand and capacity including quantified uncertainty measures
- Improved ATFM and ATFM-AO integration
- Synchronization
- Initial User Driven Prioritization Process (UDPP)
- Full Flexible Use of Airspace (FUA)
- Complexity Management







The Flexible Use of Airspace (FUA) Concept has been developed at the three Levels of Airspace Management that correspond to Civil/Military co-ordination task.

## ● **STRATEGIC COMPONENT ( ASM Level 1 )**

Long term planning – large scale military exercises, significant changes to airspace and route structure and special events. This includes but is not limited to Airshows, Large Scale Events, Trade Fairs, etc.

## ● **PRE-TACTICAL COMPONENT ( ASM Level 2 )**

Airspace users engaged in normal operations e.g.: Aerial Surveys, Para Drop, Fly Past ; Activation of SUAs

## ● **TACTICAL COMPONENT ( ASM Level 3 )**

Day to day flight operation.





# ASM LEVELS and ATFM Stages



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## ASM Level 1

Establishment  
of pre-determined  
airspace structures

*Strategic Level*



Strategic ATFM  
**PLANNING ;**  
Network  
Operations Plan

## ASM Level 2

Day-today  
allocation of airspace  
according to users'  
requirements

*Pre-tactical Level*



CCC and Local  
FMP ; Impact  
Analysis and  
DAP

## ASM Level 3

Real-time use  
of airspace allowing  
a safe OAT/GAT  
separation

*Tactical Level*



CCC & Local  
FMP ; ATFM  
measures





# Why is FUA required?



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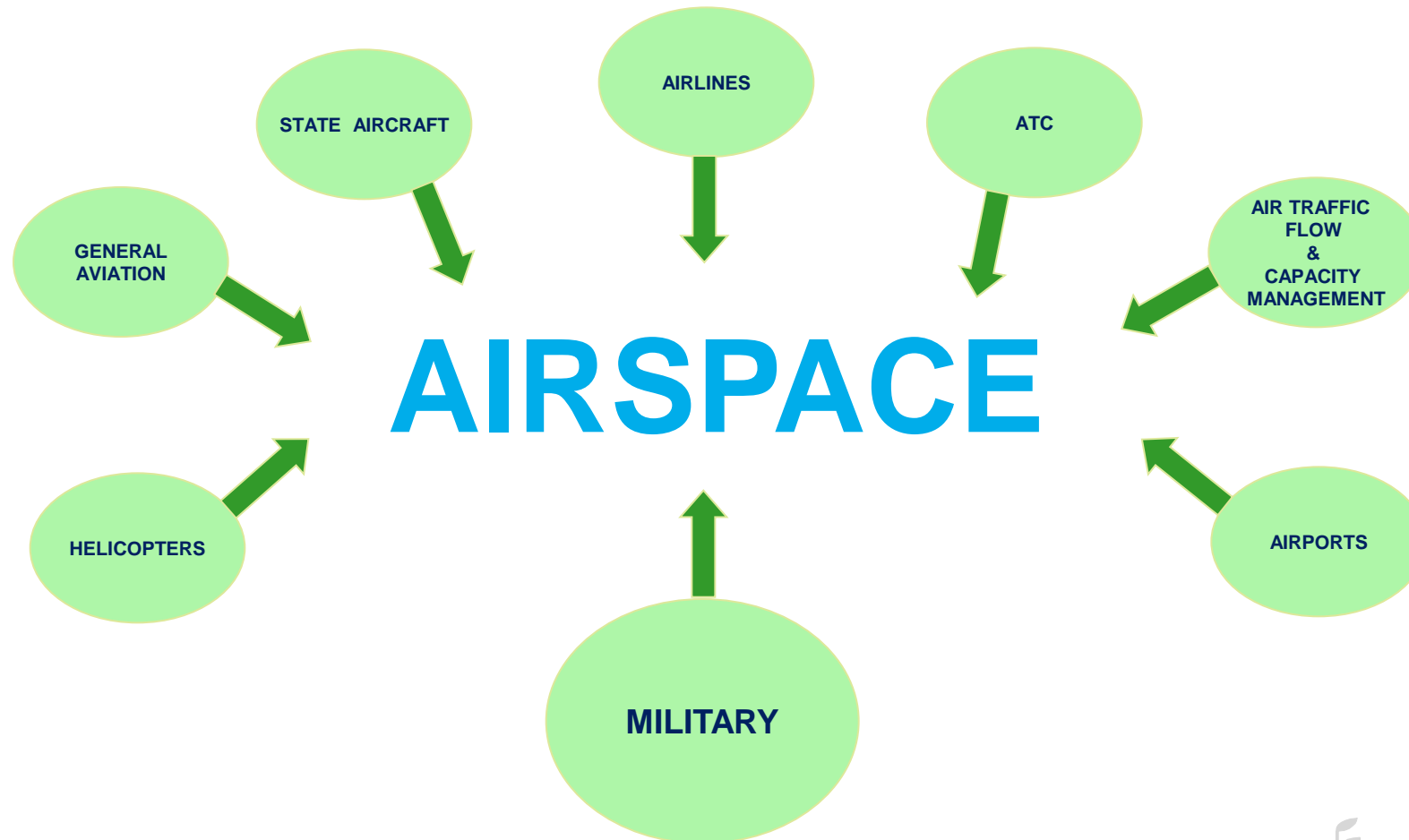
- To ensure all stakeholders affected have full understanding of operations and requirements. ATC-Military.
- To ensure airspace users have sufficient notice of operations via NOTAMs / Supplements.
- Air traffic planning, efficient flow of air traffic.
- Equal airspace usage.



# Stakeholders for FUA



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- **Network Wide View Shared between Civil and Military**
- **Focus areas of cooperation**
  - Inclusion of future civil/military airspace requirements
  - Enhanced cooperation in crisis and contingency situations
  - ASM system support and data management
  - ASM Post Ops and Performance Monitoring
- **Both ASM and FUA will focus on :**
- **Enhanced airspace utilisation by civil and military**
  - Airspace Configurations
  - ASM solutions
  - Procedures
- **Enhanced cooperation at pre-tactical and tactical level**
  - Getting closer together planning and operations
  - Integrating ASM/ATFCM
- **Flexible Route deployment in the Upper Airspace**

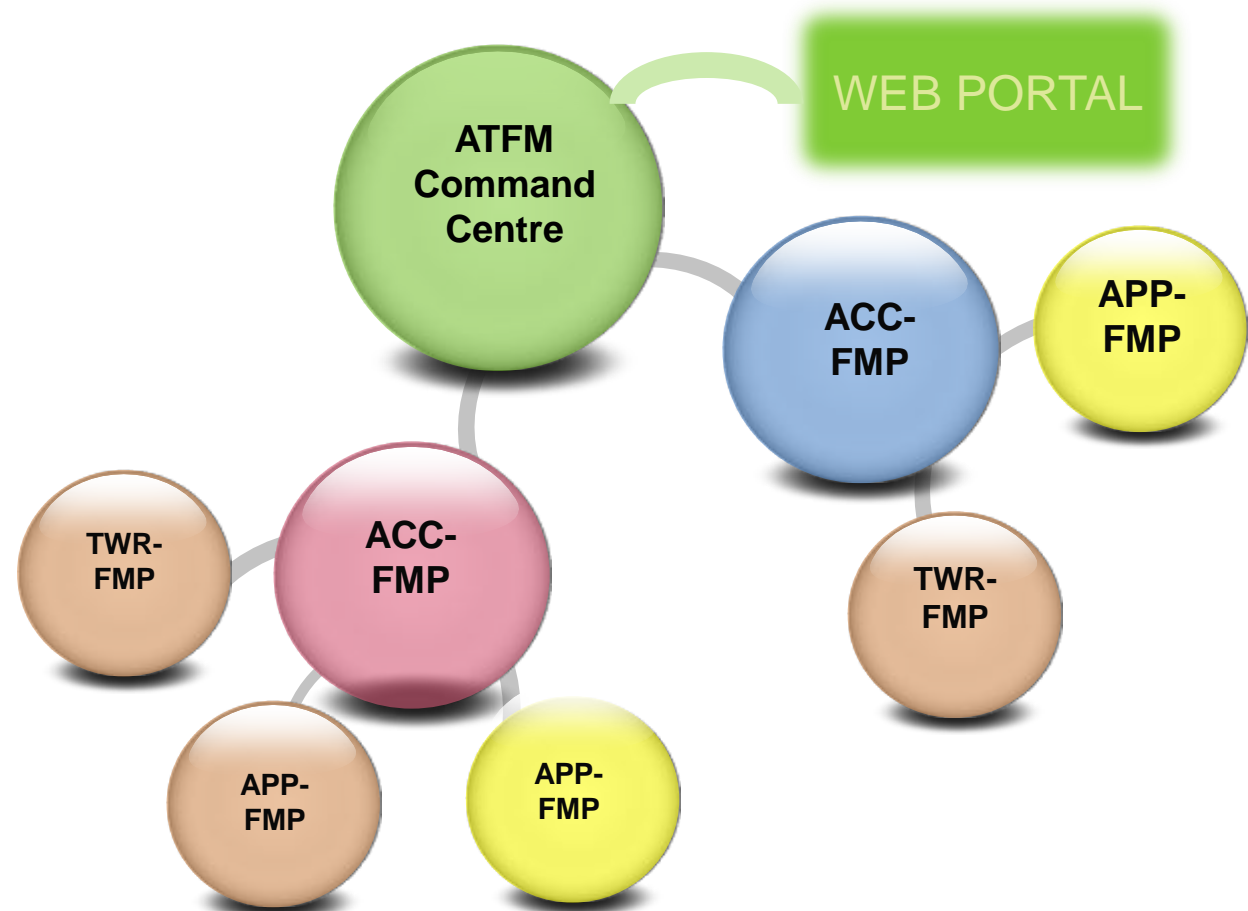


# AAI CENTRAL ATFM STRUCTURE



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- Objective is to manage and optimize traffic flows by actively collaborating with airlines, airport, defense and other stakeholders on daily basis.
- The Central Command Center ( CCC) will receive strategic and tactical FPL , Weather, Airspace ,Traffic, Airport information for accurate Situational Awareness
- Flow Management Position(FMP) will be the unit implementing ATFM program



# MAIN FOCUS AREAS FOR INDIAN ATFM



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**FUA**



**ANS STRATEGIC  
PLAN**



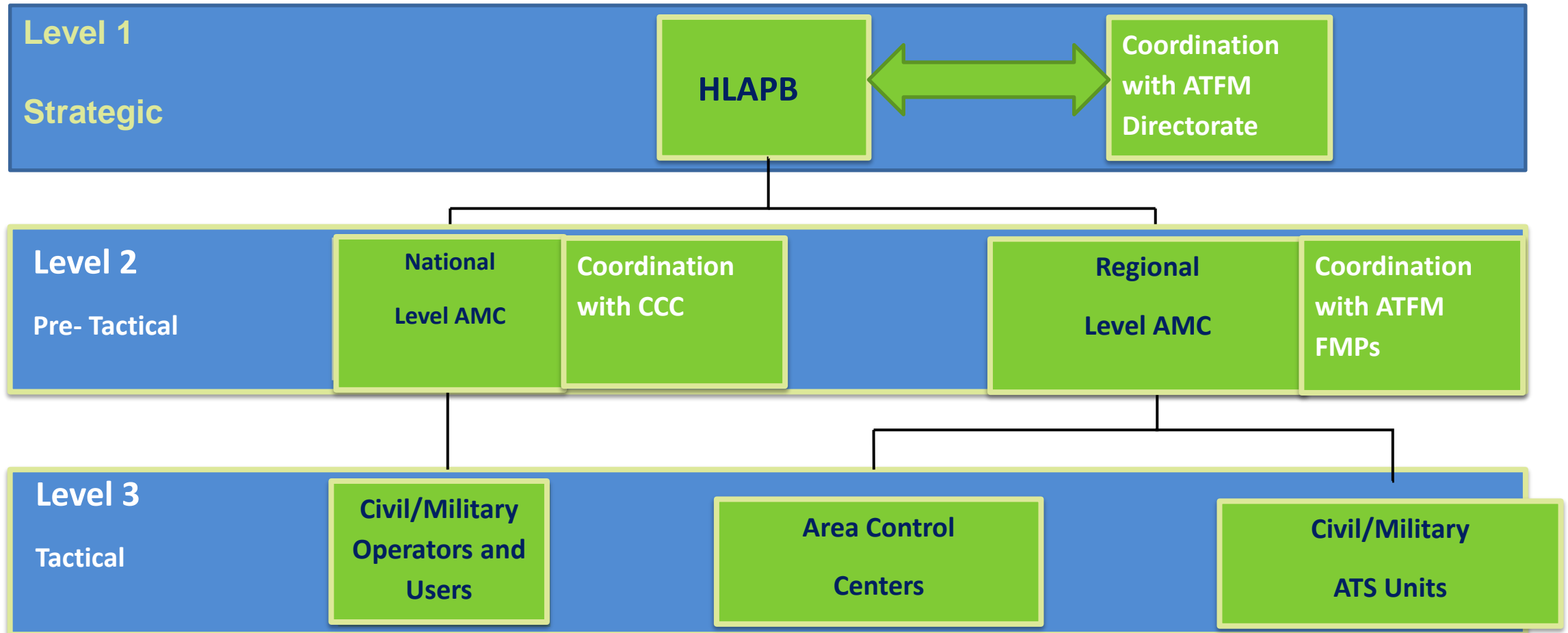
**DETERMINE  
AND MEASURE  
OPERATIONAL  
PERFORMANCE**



# Framework of FUA & ATFM



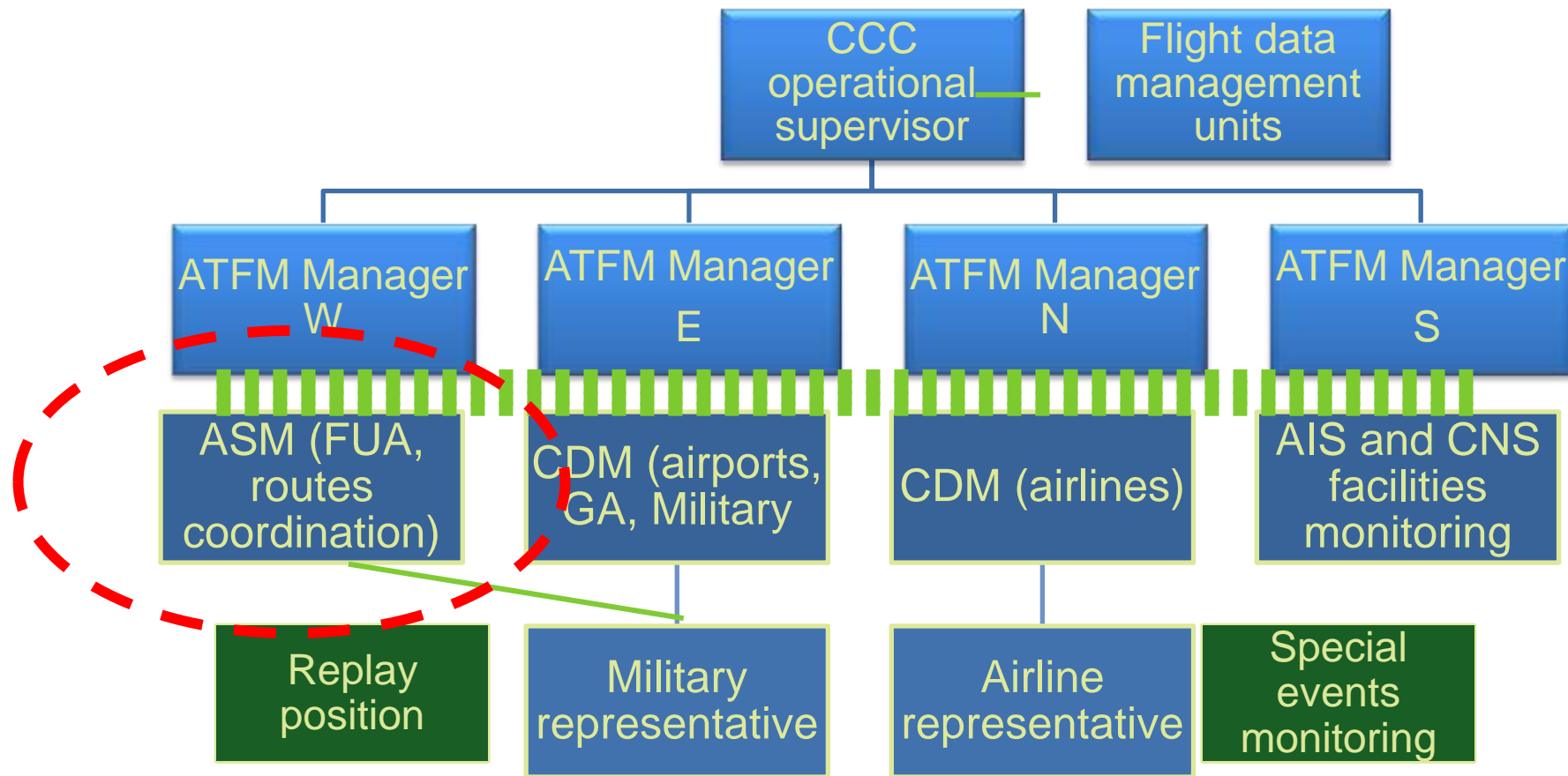
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# CCC POSITIONS



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- **Temporary reserved area (TRA)** :An airspace temporarily reserved and allocated for the specific use of a particular user during a determined period of time and through which other traffic may be allowed to transit ATC Clearance.
- **Temporary segregated area (TSA)** :An airspace temporarily segregated and allocated for the exclusive use of a particular user during a determined period of time and through which other traffic will not be allowed to transit.
- **Conditional Routes:** A conditional route is a non-permanent ATS route or portion thereof which can be planned and used under specified conditions



# Effect of FUA on ATFM



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NO FUA ( NORMALLY PUBLISHED AS NOT AVAILABLE H-24 )	FUA	EFFECT ON ATFM
 PROHIBITED	PROHIBITED	NO EFFECT
 DANGER	<b>TSA:</b> RELEASED AS SOON AS ACTIVITY STOPS	AIRSPACE CAPACITY INCREASES
 RESTRICTED	<b>TRA:</b> CROSSING POSSIBLE WHEN ACTIVE / RELEASED AS SOON AS ACTIVITY STOPS	AIRSPACE CAPACITY INCREASES



# CDR Categorisation



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**CDR 1**

Permanently plannable during the times published in AIP

- Expected to be available most of the time
- Plannable same way as permanent ATS routes

**CDR 2**

Non-permanently plannable

- Daily allocated as negotiated
- Plannable only in accordance with daily AUP/CRAM
- Part of pre-defined routing scenario

**CDR 3**

Not Plannable

- Usable upon ATC instructions only as short notice routing



# Benefits of FUA



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- Access and Equity
- Participation by the ATM Community
- Predictability
- Safety
- Security
- Efficiency





## How does it work in practice?



## ASM Level 1

- Formulate the national policy for airspace management,
- Periodically assess the national airspace structure and ATS route network for flexible airspace structures and procedures in the upper and lower airspace
- Formulate and periodically review the procedures and efficiency of ASM Level 2 and Level 3 operations
- Ensure a framework for effective co-ordination between both civil and military ATS, ASM and ATFM at the three ASM Levels .
- Approve the airspace change process from Civil/Military for ensuring optimum utilization of Airspace.

## Strategic Phase of ATFM

- A Phase for gathering and analysing Capacity and Demand data:
    - Flight Schedule Data:
    - Assess, review and publish:
      - Airport capacity
- The Strategic Network Plan may recommend (for DCB)
- **Airspace capacity**
  - Major events: Sports events, Elections, Trade Fairs .....
  - Weather: long term prediction
  - **in the modification of the organization of airspace,**
    - **Special Use Airspaces activation / deactivation**
    - Airline schedule updates,
    - Alternate/mandatory route activation and ;
    - reporting of possible measures to contain demand as well as the estimated time delay expected in each departure;





## ASM LEVEL 2

- Consists of the day-to-day management and temporary allocation of airspace
- AMC at National level, integrated with C-ATFM Central Command Centre
- AMCs at regional level in four Upper Area Control Centers at Chennai, Delhi, Kolkata and Mumbai.
- AMCs shall strictly adhere to the policies formulated by the HLAPB

## PRE TACTICAL PHASE of ATFM

- CCC at the **national level manages the airspace resource** since civil military co-ordination is necessary and since arbitrations can also be necessary between different civil requests.
- **FMPs at the ACC level along with the AMCs** manage other resources such as actual rostering, sector configuration etc.
  - FPL
  - Events
  - Conditional routes
  - Rerouting – scenarios if necessary







## ASM LEVEL 3

- To activate, deactivate or reallocate in real time the airspace allocated at level 2.
- Real time ASM level 3 coordination is an essential element to achieve the goals of FUA .
- Quick and efficient coordination and data sharing preferably achieved through integration of both Civil and Military ATS Automation systems
- The ASM Level 3 activities maximize the potential for traffic re-routing in real time to use those CDRs that are made available at short notice.

## TACTICAL PHASE of ATFM

- CCC monitors DCB at all nodes and initiates action when necessary.
- The resources are mainly managed at the ACC / Airport level since the real time workload on the ATC sectors is an essential element.
  - FPL
  - Aircraft Operators (AO) messages (CHG, DLA, FCM, SWM)
  - ATC messages (REA, AFP)
  - Capacity changes
  - Regulations slots
  - Re-Routeing Proposals (RRP)
  - CDR-3



# A PRACTICAL CASE



## SCENARIO

- Air Exercise Planned by IAF
- Airspace Reservation Requisition sent to AAI
- AAI analysis of Air Traffic impact (based on report from ATFM system)
- AAI and IAF mutually agree on the proposal.
- AAI initiates necessary notifications.

## Action By ATFM

- Area of Exercise created in ATFM system
- Air Traffic Impact on activation is analyzed.
- Suggest any modification/realignment of Area of Exercise, if necessary.
- On finalization , CCC initiates a CDM exercise and initiates necessary ATFM measures ( ground delay, reroutes )
- The concerned FMP executes the plan.



# SAMPLE REPORT



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## Report (EXP3 - VIDF GROUP)

State (=):Preview/Finished

Total:55

Interval (=):1 Min

Operation (=):All

Activation (=)All

Plan Type (=):FPL, RPL, Flight Schedule

Begin Time (>=):

End Time (<):

Level (>=):

Level (<=):

ADEP (=):

ADES (=):

Interval (=):

Acft. Type (=):

Equip

Wake Turb:

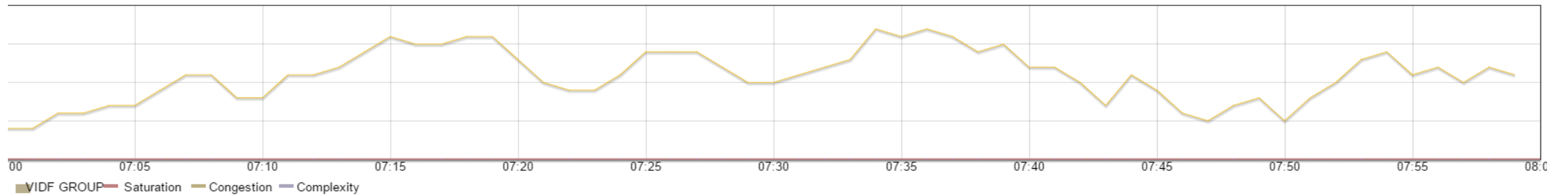
EOBT (=):

EET (=):

Takeoff (=):

Arrival (=):

Airline (=):



# Next Steps-Establishing Effective Civil-Military Coordination

AAI



MOD



**Automation System –to–Automation System**  
**Automated Tool for FUA Coordination**





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