



# INTRODUCTION TO AIR SPACE AND AIR TRAFFIC MANAGEMENT

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# CONCEPTUAL FRAMEWORK

- ICAO Chicago Convention
- Standards and Recommended Practices
- Annexes 2, 11, 3, 10, 15
- Documents 4444



# CONCEPTUAL FRAMEWORK

- Air Traffic Services
- Air Spaces: Different Airspaces
  - FIR
  - Advisory Air Space
  - ATS Routes
  - Control Area
  - Control Zone
  - TMA
  - ATZ
- Separation
- Time, space
  - Vertical,
  - Horizontal
  - Lateral



# CONCEPTUAL FRAMEWORK

- Air Traffic Services Units
  - FIC
  - ACC
  - Approach Control Office
  - Aerodrome Control Tower
  - SMC



# CONCEPTUAL FRAMEWORK

- Air Traffic Services
  - ATC Service
  - Alerting Service
  - FIS
- Types of Control
  - Procedural
  - Radar
  - Data



# CONCEPTUAL FRAMEWORK

- CNS/ATM
- Communication
  - HF
  - UHF
  - VHF
- Other Terminologies
- International Emergency Procedures
- Aviation Meteorological Services



# Legal Framework for Air Space and Air Traffic Management: An Overview

- The CNS/ATM System
- Air Traffic Services
- Air Navigation Services
- Meteorological Information
- Liability of States
- Liability of Air Traffic Service Providers
- Satellite Services
- Space Law Applications



## Air Navigation

- Pilotage or Piloting
- Dead Reckoning
- Radio Navigation
- NAV Aids
- Global Positioning Systems
- Airspace/ATM System Development Process
- Human Centered Systems
- Analysis of the Future System Capacity, Safety and Efficiency
- System Technical Requirements
- Technology and Human Factors Analysis
- Transition Planning and Trade Off Analysis





# AERODROME DATA AND WARNING

- Key Terms in Aerodrome Standards and Warnings
- Meaning of Aerodrome Warnings
- ICAO Norms on Aerodrome data and warnings
- Criteria for Aerodrome Warnings



# CLEAR AIR TURBULENCE

- Turbulence and Clear Air Turbulence: Meaning
- Factors causing Clear Air Turbulence
- Impacting Strategies at Airports
- Flight Documentation
- Effect of Air Turbulence on Aircrafts
- Can Turbulence cause plane crash?



# AIR SPACE AND AIR TRAFFIC MANAGEMENT

- Introduction and Historical Evolution
  - The ATM System Functional structure
  - ATM Objectives
- Capacity and Safety of Air Traffic Management
  - Throughput and Efficiency
  - A Functional View of the Throughput and Safety
  - Levels of Flow Planning in the System
  - Levels of Plan Execution in the System



# AIR SPACE AND AIR TRAFFIC MANAGEMENT

- A Functional View of the Current Concept, Throughput and Safety
- Flight and Flow Planning
- Separation Assurance and Technical Performance



# AIR SPACE AND AIR TRAFFIC MANAGEMENT

## ➤ Dense Terminal Airspace

- Efficiency in Dense Terminal Airspace
- Safety in Dense Terminal Airspace
- Separation Assurance and CNS/ATM Technologies
- Efficiency in Low Density Airspace
- Transition from Low to High Density Airspace
- Extended Terminal Areas



# AIR SPACE AND AIR TRAFFIC MANAGEMENT

## ➤ National Flow Management

- Planning for Operator Efficiency and Overload Protection
- Time Horizons and Coordination
- Information Flow
- Collaborative Decision Making



# AIR SPACE AND AIR TRAFFIC MANAGEMENT

- Proposed CNS/ATM Technology Improvements
  - Airspace and Airways
  - Airports
  - Flight Service Stations



# AIR SPACE AND AIR TRAFFIC MANAGEMENT

- Human Factors in Air Traffic Management  
Airspace and Airways
  - The Role of Human Factors In Enabling Change
  - Baseline Data of Human Roles
  - The Search For Greater Throughput And The Demands On The Human
  - Involvement Of Human Factors From Concept Development Through Final Design





## **AIR SPACE AND AIR TRAFFIC MANAGEMENT..**

- Human Factors Support For Implementation, Education, And Training
- Designing To Support Human Performance Across The Entire Range Of System Operating Conditions
- Human Factors Issues Affecting Tactical Control
- Using Structure To Maximize Throughput
- Sharing Responsibility



# AIR SPACE AND AIR TRAFFIC MANAGEMENT

- **Available and Emerging Technology**
  - System Performance
  - Air Navigation
  - Communication Systems
  - Surveillance Systems and Performance



# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

## ➤ **Meaning and Background**

- Historical Development
- Shortcomings of the Earlier System



# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

## ➤ **CNS Systems: An Overview**

- Objectives
- Brief Look at the Existing System
- Benefits of the New System
- Organizational and Financial Issues
- Assistance Requirements and Technical Cooperation



# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

- **ICAO's Planning Structure for the CNS/ATM System**
  - Regional Planning Process
  - National Planning Process
  - CNS/ATM Partners and Tools
  - Relevant ICAO Policies on CNS/ATM
  - ICAO's Role and Responsibility



# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

## ➤ Global Planning Methodology

- Homogeneous ATM Areas and Major Traffic Flows
- Planning Methodology
- Operational Analysis



# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

## ➤ Communication Systems

- Air-Ground Communication
- Ground-Ground Communication
- Aeronautical Telecommunication Network (ATN)
- Future Trends
- Required Communication Performance (RCP)
- General Transition Issues



# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

## ➤ Navigation Systems

- Required Navigation Performance (RNP)
- Global Navigation Satellite System (GNSS)
- Avionics
- WGS-84 Coordinate System And Aeronautical Databases
- Evolutionary Introduction
- Systems To Support Approach, Landing And Departure Operations





# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

## ➤ Surveillance Systems

- Current Surveillance Systems
- Functional Description
- Technical Options Overview
- ATM Requirements For Surveillance
- Airborne Collision Avoidance System (ACAS)
- Required Surveillance Performance (RSP)
- Future Trends



# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

## ➤ **Meteorology**

- Meteorological Support To International Civil Aviation
- Meteorological Systems To Support Global CNS/ATM
- Meteorological Systems To Support The Transition To The New Global CNS/ATM Systems
- Planning And Implementation Of Meteorological Systems



# COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

## ➤ **Aeronautical Information Services**

- AIS and Map Support To International Civil Aviation
- AIS and Map Services To Support Global CNS/ATM Systems
- AIS/Map Systems & New Global CNS/ATM Systems



# ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

## ➤ ICAO Institutional and Regulatory Framework

- Institutional Framework
- Article 3 of the Convention
- Assembly Resolutions
- Existing Regulatory Framework



# ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

## ➤ **Civil and Military Inter-operability**

- Introduction
- Regulation And Standardization
- Operational And Technical Interoperability
- Strategic and/or Political Interoperability



# ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

## ➤ Air Space Organization and Management

- General Principles
- The Flexible Use of Airspace Concept
- FUA Principles
- Flexible and Adaptable Airspace Structures and Procedures
- Collaborative Decision-Making



# ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

- ATM Security and ATM in crisis situation
  - ATM Security
  - ATM In Crisis Situation



# ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

## ➤ State Aircraft Operations

- Introduction
- State Aircraft Roles
- State Non-Aviation Airspace Requirements
- State Aircraft Constraints
- Fully-Compliant Operations
- Partially-Compliant Operations





# ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

- Civil/Military Collaboration — A New Global Challenge
- Legal Issues Concerning Communication/Navigation and Surveillance Systems
  - Introduction
  - Fundamental Principles Of The GNSS Legal Framework
  - Other Legal Issues



# AIR SPACE AND AIR TRAFFIC MANAGEMENT IN INDIA

- Introduction and Historical Evolution
  - An Overview of Air Transport Management in India
  - Airport as Growth Engine
  - Airport as Revenue Generator
  - Identified Challenges
  - Compacting Strategies



# SPACE AND AIR TRAFFIC MANAGEMENT IN INDIA

- Institutional and Organizational Framework to regulate Air Space and Air Traffic Management in India
  - Directorate General Of Civil Aviation
  - Stakeholders Involved In Air Space And Air Traffic Management In India
  - Role Of Airports Authority Of India In Air Space And Air Traffic Management



# SPACE AND AIR TRAFFIC MANAGEMENT IN INDIA

- **Role of Air Traffic Controllers in India**
  - Meaning Of Air Traffic Control
  - Roles And Responsibilities Of Air Traffic Controllers
  - Categories of Air Traffic Controllers



# SPACE AND AIR TRAFFIC MANAGEMENT IN INDIA

- The Future of Air Space and Air Traffic Management in India
  - Introduction
  - Satellite-Based Navigation System Is The Flagship Project
  - Flexible Use Of India's Airspace Will Deliver Significant Efficiencies
  - A National High Level Airspace Policy Board
  - Air Traffic Controllers Employed By Region
  - Growth Challenges Call For A New Governance Structure For The ANSP



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*Thank You*