Briefing to
NASA TIM

Air Traffic Management Concepts of Operations and Their Impact on the National Airspace System (NAS)

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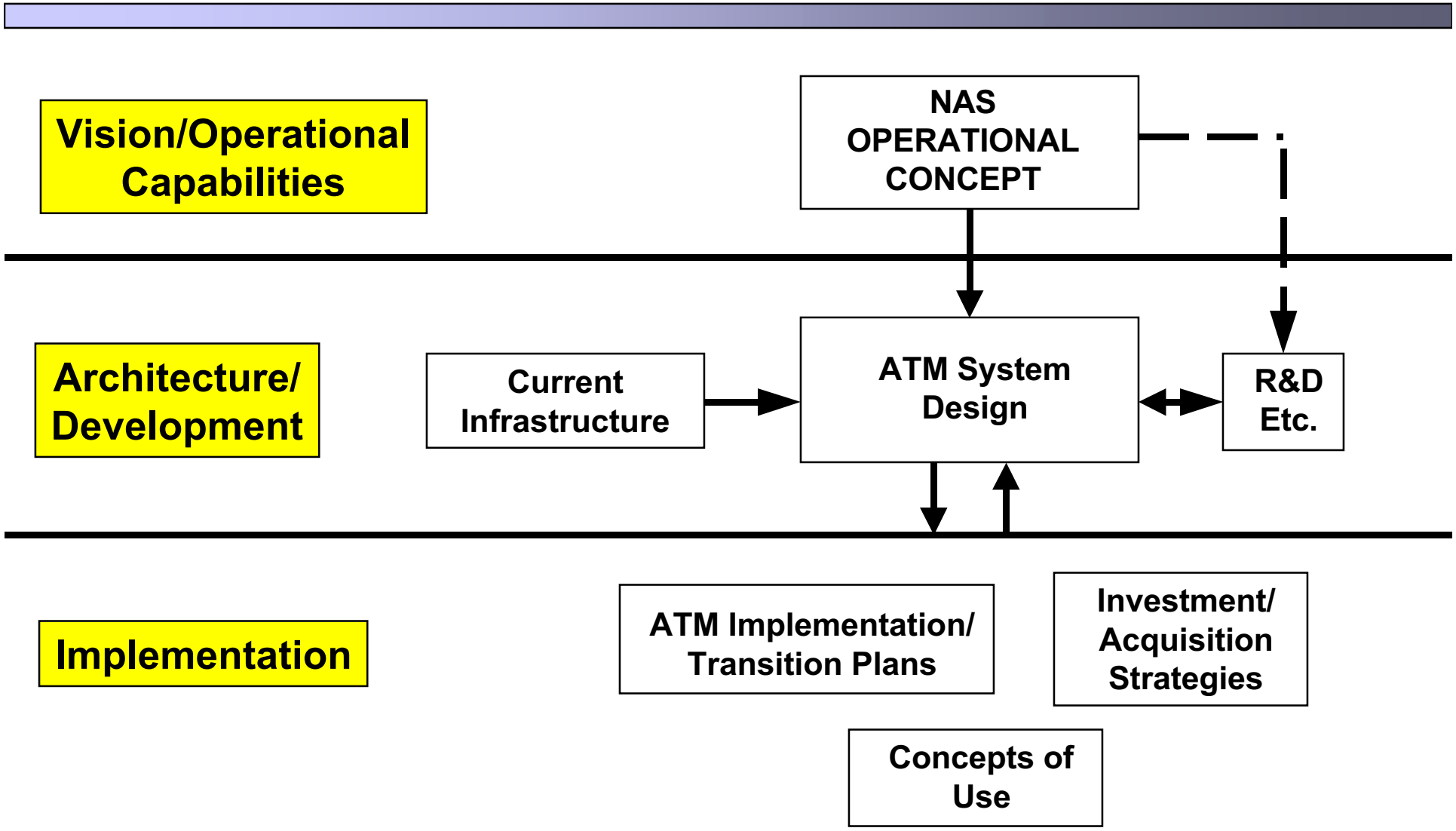
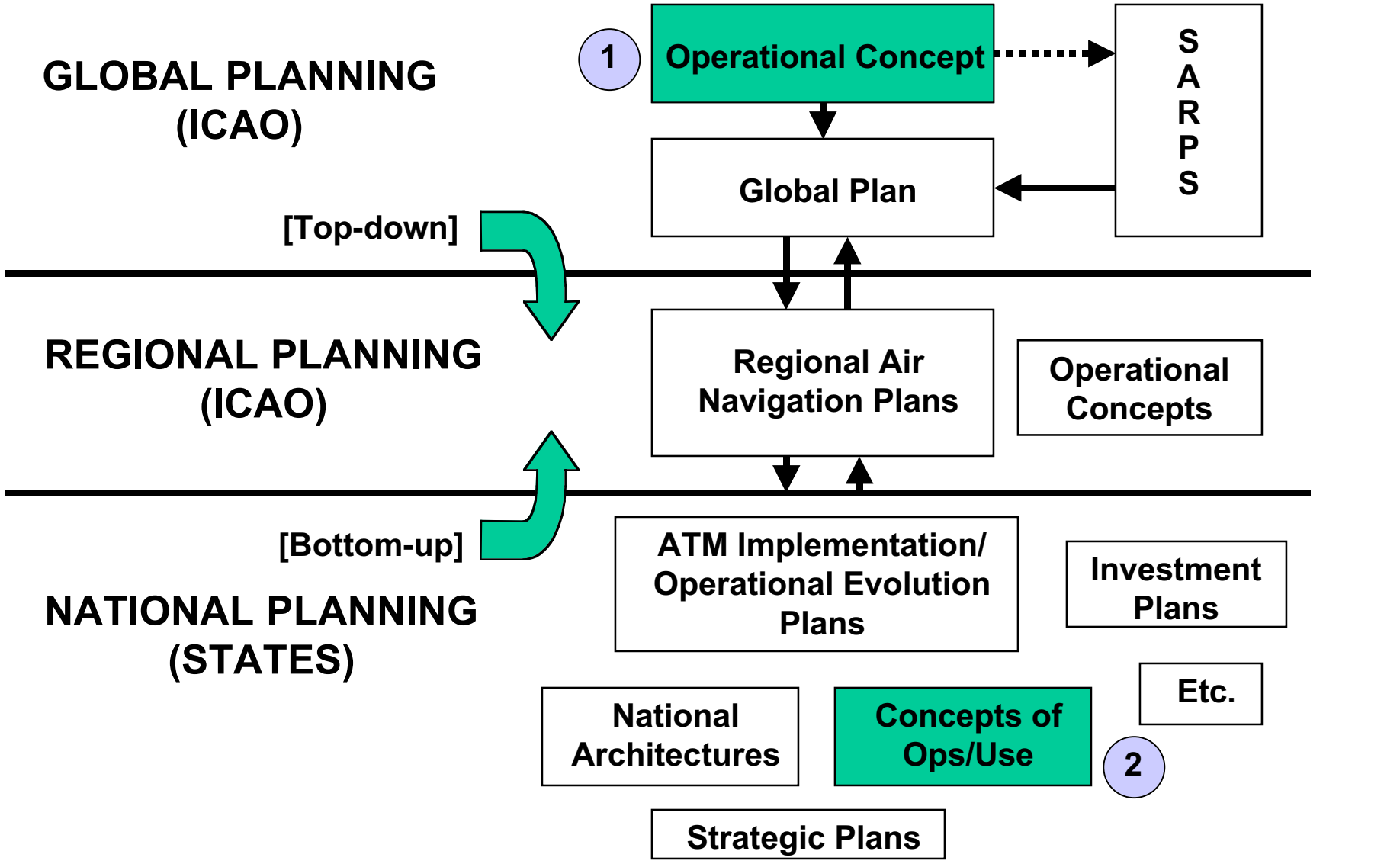
Outline

- CONOPS Introduction
- NAS Modernization Process
- ICAO ATMCP Work Program
  - ICAO Operational Concept Document
  - Invariant Processes
  - Key Conceptual Changes
- RTCA NAS Concept of Operations
- Where Do We Go From Here & Summary

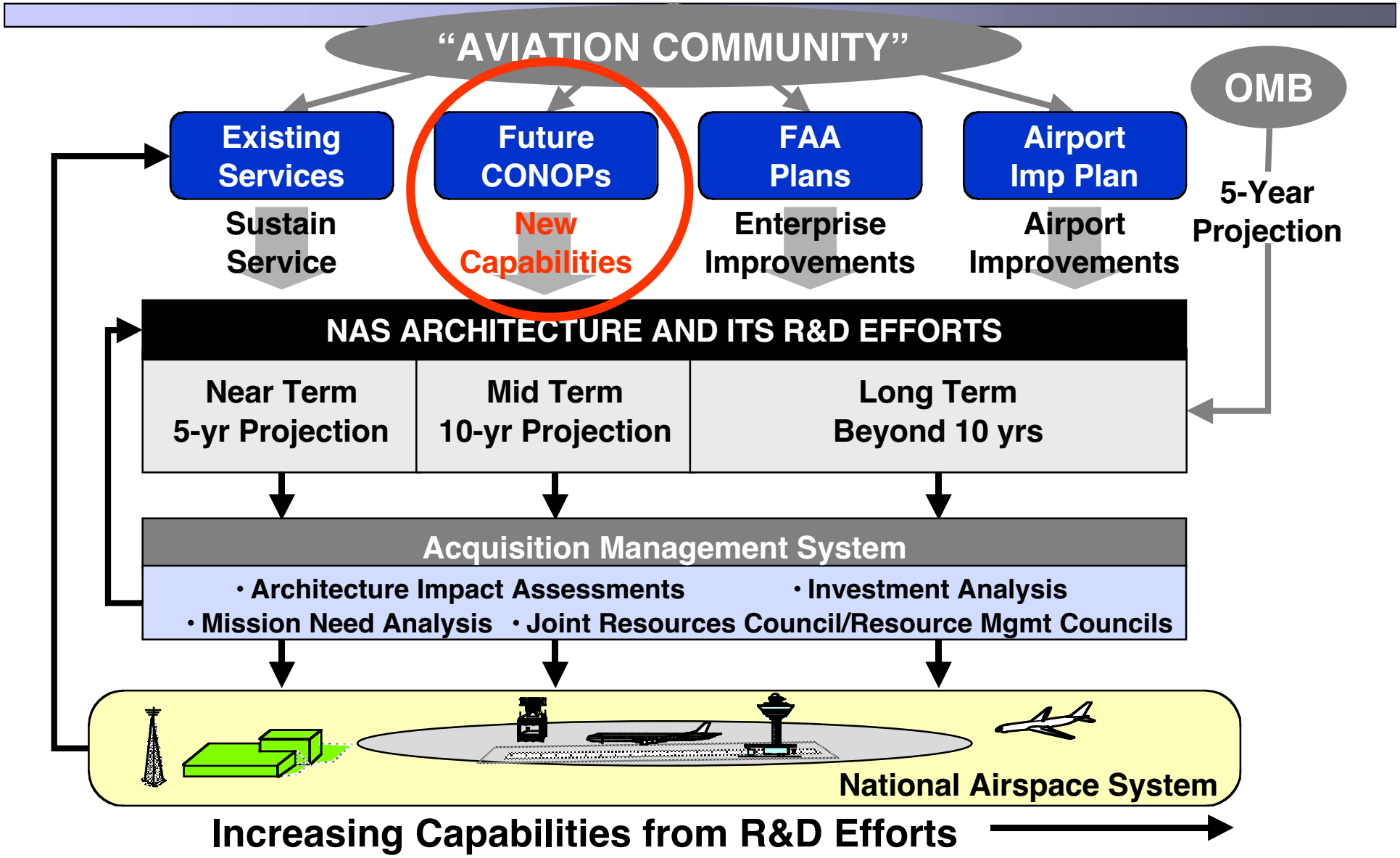
CONOPS Introduction



CONOPS Introduction



NAS Modernization Process



ICAO ATMCP Work Program

✈Develop and Describe, in Sufficient Clarity and Detail, a Gate-to-Gate ATM Operational Concept That Will Facilitate the Evolutionary Implementation of a Seamless, Global ATM System.

✈The ATM Operational Concept Should:

- ✈ be visionary in scope;
- ✈ not be limited by the present level of technology;
- ✈ lead to realization of all the benefits expected from CNS/ATM systems;
- ✈ provide the basis for cost-benefit analyses associated with the introduction of ATM systems.

ICAO Operational Concept - Invariant Processes

The Operational Concept Document lays out the foundation for the concept components and provides a general picture of the future performance of air traffic management based on the operational concept.

- **Airspace Organisation & Management**
- **Aerodrome Operations**
- **Demand & Capacity Balancing**
- **Traffic Synchronisation**
- **Airspace User Operations**
- **Conflict Management**
- **ATM Service Delivery Management**

Information Services

Key Conceptual Changes

- AIRSPACE ORGANIZATION AND MANAGEMENT
  - All airspace will be the concern of ATM;
  - Dynamic and flexible airspace management; and
  - Any airspace restrictions are transitory.

- AERODROME OPERATIONS
  - Runway occupancy time reduced;
  - Safe maneuvering in all weather conditions;
  - Precise surface guidance; and,
  - Position and intent of all vehicles and aircraft will be known.

- DEMAND & CAPACITY BALANCING
  - Assets optimised to maximise throughput;
  - Adjustments made to mitigate imbalance; and,
  - Dynamic adjustments to the organization of airspace.

Key Conceptual Changes

- TRAFFIC SYNCHRONIZATION
  - Dynamic 4-D trajectory control and negotiated conflict-free trajectories;
  - Chokepoints eliminated; and,
  - Optimization of traffic sequencing.

- AIRSPACE USER OPERATIONS
  - Accommodation of mixed capabilities and worldwide implementation needs;
  - ATM data available as needed;
  - Relevant airspace information available;
  - Dynamically-optimized 4-D trajectory planning;
  - Impacts on ATM taken into timely account; and,
  - Aircraft designed with ATM system optimization a key consideration.

Key Conceptual Changes

- CONFLICT MANAGEMENT
  - Strategic conflict management reduces separation provision;
  - The pre-determined separator is the airspace user;
  - The role of separator may be delegated;
  - Separation provision intervention capability;
  - Conflict horizon extended; and,
  - Collision avoidance systems part of safety management.

- ATM SERVICE DELIVERY MANAGEMENT
  - Services delivered on an as-required basis;
  - ATM design determined by CDM, safety, business cases;
  - Services balance and optimize user-requested trajectories; and,
  - Management by trajectory.

- INFORMATION SERVICES
  - Information Management, Meteorological Information Service and Other Essential Services

RTCA NAS CONOPS

- Is NAS-specific (At the National Planning Level)
- Incorporates the Needs and Requirements of NAS Users and Service Providers.
- Based on Free Flight concept – thus, further development and validation of Free Flight will Impact RTCA Concept
- Operational Concept:
  - Safety is First Priority
  - Environmental Considerations are Taken Into Account
  - Implementation of Any New Technologies Must Improve the Safety and Efficiency of the Operational Environment
  - Human-in-the-Loop
  - Quality of Data, Information Exchange and CDM
  - Separation Assurance Remains the Responsibility of the Service Provider (Authority Can be Delegated to Flight Crews for Specific Operations)

RTCA NAS CONOPS

- NAS Operational Concept:
  - Divided into Near-term (2005), Mid-term (2005-2010) and Far-term (2010-2015) – Global Operational Concept based on 2025
  - Mentions Specific Systems (e.g., ILS, MLS, GPS, EGPWS, CDTI, etc.). Mentions Specific Facilities (e.g., ATCSCC, AOC, FOC, etc.). Mentions Specific Procedures (DPs, etc.). Mentions Specific Solutions (e.g., Pre-Departure Clearances, ATIS-type messages, etc.) – Global Operational Concept is technology-independent – no system acronyms!
  - Is written with Civil Users, DoD Users and Space Transportation Users as the only community impacting or depending upon use of the NAS. - Global Operational Concept Defines “ATM Community” as Including the Airport Operators, the Support Industry, Regulatory Authorities, etc.

Where Do We Go From Here?

- Draft ICAO Operational Concept Document to be Released for Comment in June/July to all Member States
- ATMCP Next Step: Preparing Operational Capabilities/Needs/Requirements Based on OCD
- RTCA Currently Working on Next Version of NAS CONOPS.

Summary

- CONOPS are crucial to understanding future direction of the NAS
- CONOPS should be the basis for Research & Development and Requirements Development to ensure focus on operational needs not necessarily technical capabilities.

Continued Industry and Aviation Community Involvement is Vital to Success

BACKUP SLIDES

Working Definitions

"OPERATIONAL CONCEPT"

- A High Level Description of the Set of ATM Processes and Services Necessary to Accommodate Traffic at a Given Time Horizon.
- A Description of the Anticipated Level of Performance Required From, and the Interactions Between, the ATM Processes and Services, as Well as the Objects They Affect.
- A Description of the Information to be Provided to Agents in the ATM System.

more

cont.

Working Definitions

"OPERATIONAL CONCEPT" UNIQUENESS

The ATM Operational Concept Differs From "Architecture" and "Concepts of Use"

Architecture Includes the Infrastructure and a Technical System Description Including the Specific Technologies and the Functions of Personnel.

A "Concept of Use" is a More Detailed Description of HOW a Particular Functionality or Technology Could Be Used.