Objective

To show Block 1 threads as an operational evolution from Block 0 threads.
- Vision

- ASBUs

- Evolution.
To achieve an interoperable global air traffic management system for all users during all phases of flight, that

- meets agreed levels of safety;
- provides for optimum economic operations;
- is environmentally sustainable; and
- meets national security requirements.
Establish Principles and Priorities

**GANP Policy Principles**

Aviation Safety is the Highest Priority

Cost Benefit and Financial issues

Aviation System Block Upgrades (ASBUs), Threads, Elements and Roadmaps
AIRPORT OPERATIONS
- APTA Optimized Airport Accessibility
- WAKE Wake Vortex Separation
- RSEQ Runway Sequencing
- SURF Surface Operations
- ACDM Airport Collaborative Decision Making
- RATS Remotely Operated Aerodrome Control

GLOBALLY INTEROPERABLE SYSTEMS AND DATA (SWIM)
- FICE Flight and Flow Information for a Collaborative Environment
- DATM Integration of Digital ATM Information
- AMET Integration of Meteorological information
- SWIM System Wide Information Management

OPTIMUM CAPACITY AND FLEXIBLE FLIGHTS (GLOBAL COLLABORATIVE ATM)
- FRTO Free Routing
- NOPS Network Operational Planning
- ASUR Initial Capability for Ground Surveillance
- ASEP Airborne Separation
- OPFL Optimum Flight Levels
- ACAS Airborne Collision Avoidance Systems
- SNET Safety Nets

EFFICIENT FLIGHT PATHS (TROUGH TRAJECTORY-BASED OPERATIONS)
- CDO Continuous Descent Operations
- TBO Trajectory-based Operations
- CCO Continuous Climb Operations
- RPAS Integration of Remotely Piloted Aircraft
ASBU Framework

- **Airport Operations**
  - Block 0 (2013)
    - B0-APTA
    - B0-WAKE
    - B0-RSEQ
    - B0-SURF
    - B0-ACDM
  - Block 1 (2019)
    - B1-APTA
    - B1-WAKE
    - B1-RSEQ
    - B1-SURF
    - B1-ACDM
    - B1-RATS
  - Block 2 (2025)
    - B2-WAKE
    - B2-RSEQ
    - B2-SURF
    - B2-ACDM
    - B2-RATS
  - Block 3 (2031+)
    - B3-RSEQ
    - B3-RATS

- **Globally Interoperable Systems and Data (SWIM)**
  - Block 0 (2013)
    - B0-FICE
    - B0-DATM
    - B0-AMET
    - B0-ACDM
  - Block 1 (2019)
    - B1-FICE
    - B1-DATM
    - B1-AMET
    - B1-RATS
    - B1-ACDM
  - Block 2 (2025)
    - B2-FICE
    - B2-DATM
    - B2-AMET
    - B2-SWIM
    - B2-ACDM
  - Block 3 (2031+)
    - B3-FICE
    - B3-DATM
    - B3-AMET
    - B3-SWIM
    - B3-ACDM

- **Optimum Capacity and Flexible Flights (Global Collaborative ATM)**
  - Block 0 (2013)
    - B0-FRTO
    - B0-NOPS
    - B0-ASUR
    - B0-ASEP
    - B0-OPFL
    - B0-ACAS
    - B0-SNET
  - Block 1 (2019)
    - B1-FRTO
    - B1-NOPS
    - B1-ASUR
    - B1-ASEP
    - B1-OPFL
    - B1-ACAS
    - B1-SNET
    - B1-RATS
  - Block 2 (2025)
    - B2-FRTO
    - B2-NOPS
    - B2-ASEP
    - B2-OPFL
    - B2-ACAS
    - B2-SNET
  - Block 3 (2031+)
    - B3-FRTO
    - B3-NOPS
    - B3-ASEP
    - B3-OPFL
    - B3-ACAS
    - B3-SNET
    - B3-RATS

- **Efficient Flight Paths (Trough Trajectory-Based Operations)**
  - Block 0 (2013)
    - B0-CDO
    - B0-TBO
    - B0-CCO
    - B0-RPAS
  - Block 1 (2019)
    - B1-CDO
    - B1-TBO
    - B1-CCO
    - B1-RPAS
  - Block 2 (2025)
    - B2-CDO
    - B2-TBO
    - B2-CCO
    - B2-RPAS
  - Block 3 (2031+)
    - B3-CDO
    - B3-TBO
    - B3-CCO
    - B3-RPAS
**Block 0 and Block 1**

**APTA**

**B0-APTA**
Optimization of Approach Procedures including vertical guidance
First step toward universal implementation of GNSS-based approaches.

- GNSS-based PBN approach procedures
  - GNSS + Baro VNAV
  - GNSS + SBAS
  - GNSS + GBAS

**B1-APTA**
Optimized Airport Accessibility
Next step in the universal implementation of GNSS-based approaches.

- Extension of GNSS-based approaches
  - GNSS + GBAS: CAT I capability to category CAT II/III
  - Potential integration of the PBN STAR directly
- Limited factor: emergence of multifrequency/constellation GNSS
**WAKE**

**B0-WAKE**
Increased Runway Throughput through Optimized Wake Turbulence Separation
Revision of current ICAO wake vortex separation minima and procedures.

- RECAT
- Parallel operations
- WIDAO/WTMD

**B1-WAKE**
Increased Runway Throughput through Dynamic Wake Turbulence Separation
Dynamic management of wake turbulence separation minima based on the real-time identification of wake turbulence hazards.

- Leader/follower pair-wise static matrix of aircraft type wake separation pairings
- Use of airport wind information (predicted and monitored)
- Wind prediction/monitoring
Block 0 and Block 1

RSEQ

B0-RSEQ
Improved Traffic Flow through Runway Sequencing (AMAN/DMAN)
Time-based metering to sequence departing and arriving flights.

• AMAN and time-based metering
• DMAN
• Point Merge

B1-RSEQ
Improved Airport Operations through Departure, Surface and Arrival Management
Extension of arrival metering and, integration of surface management with departure sequencing.

• Surface Management
• Departure and surface integration
• Extended arrival metering
• Utilization of RNAV/RNP routes
### Block 0 and Block 1

#### SURF

| B0-SURF | Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2) and Enhanced Vision System (EVS) | Element 1 – A-SMGCS Level 1-2 (Surveillance & alerting)  
Element 2- Enhanced vision systems for taxi operations (e.g. infrared cameras, millimeter wave radar,..) |
|---------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| B1-SURF | Enhanced Safety and Efficiency of Surface Operations- SURF                                      | Element 1: Basic surface situational awareness (SURF)  
ADS-B In or TIS-B  
Cockpit electronic maps |
A-CDM

B0-ACDM
Improved Airport Operations through Airport-CDM
Airport operational improvements through the way operational partners at airports work together.

B1-ACDM Optimized Airport Operations through A-CDM Total Airport Management
Airport and ATM operational improvements through the way operational partners at airports work together.

- Airport Operations Planning (AOP)
- Airport Operations Centre (APOC)
B1-RATS
**Remotely Operated Aerodrome Control**
Remote provision of ATS to aerodromes or remotely operated aerodrome control tower contingency and through visualization systems and tools.

- Element 1: Remote provision of ATS for single aerodromes
- Element 2: Remote provision of ATS for multiple aerodromes
- Element 3: Remote provision of ATS for contingency situations
GLOBALLY INTEROPERABLE SYSTEMS AND DATA (SWIM)

GLOBALLY INTEROPERABLE SYSTEMS AND DATA (SWIM)

Block 0 2013
B0-FICE
B0-DATM
B0-AMET

Block 1 2019
B1-FICE
B1-DATM
B1-AMET
B1-SWIM

Block 2 2025
B2-FICE
B2-SWIM

Block 3 2031+
B3-FICE
B3-AMET
**Block 0 and Block 1**

**FICE**

**B0-FICE**
Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration
Supports the coordination of ground-ground data communication between ATSUs, based on ATS Inter-facility Data Communication (AIDC).

**B1-FICE**
Increased Interoperability, Efficiency and Capacity though FF-ICE, Step 1

Introduction of FF-ICE step 1, to implement ground-ground exchanges before departure using common flight information reference model, FIXM, XML and the flight object used.
- New Flight Information Mechanism
**Block 0 and Block 1**

**DATM**

**B0-DATM**
Service Improvement through Digital Aeronautical Information Management
Initial introduction of digital processing and management of information, by the implementation of AIS/AIM making use of AIXM, moving to electronic AIP and better quality and availability of data.

**B1-DATM**
Service Improvement through Integration of all Digital ATM Information
Increase in information integration and support on a new concept of ATM information exchange fostering access via internet-protocol-based tools Exchange models such as AIXM, FIXM, WXXM and others relate their concepts to the AIRM fostering convergence, re-use, and collaborative alignment.
**Block 0 and Block 1**

**AMET**

**B0-AMET**
Meteorological information supporting enhanced operational efficiency and safety

- Meteorological information provided in support of flexible airspace management.

**B1-AMET**
Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service)

Meteorological information supporting automated decision process or aids, involving.

- Element 1: Meteorological information
- Element 2: Meteorological information translation
- Element 3: ATM impact conversion
- Element 4: Meteorological information integrated decision support

Meteorological information supporting automated decision process or aids, involving.
B1-SWIM
Performance Improvement through the application of System-Wide Information Management (SWIM)
Implementation of SWIM services (applications and infrastructure) creating:
- the aviation intranet based on standard data models, and internet-based protocols to maximize interoperability.
- Applications of SWIM on the ground
  Air ground data exchanges will remain based on point-to-point communication.
OPTIMUM CAPACITY AND FLEXIBLE FLIGHTS (GLOBAL COLLABORATIVE ATM)

Block 0
2013
- B0-FRTO
- B0-NOPS
- B0-ASUR
- B0-ASEP
- B0-OPFL
- B0-ACAS
- B0-SNET

Block 1
2019
- B1-FRTO
- B1-NOPS
- B1-ASEP
- B1-SNET

Block 2
2025
- B2-NOPS
- B2-ASEP
- B2-ACAS

Block 3
2031+
- B3-NOPS
**Block 0 and Block 1**

**OPFL, ACAS, ASUR**

**B0-OPFL**
Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B
This module enables an aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety.
- In-trail procedure (ITP)

**B0-ASUR**
Initial Capability for Ground Surveillance
Ground surveillance supported by ADS-B OUT and/or wide area multilateration systems. This capability will be expressed in various ATM services, e.g., traffic information, search and rescue and separation provision.
- Element 1: ADS-B
- Element 2: Multilateration (MLAT)

**B0-ACAS**
ACAS Improvements
To provide short term improvements to existing airborne collision avoidance systems (ACAS) to reduce nuisance alerts while maintaining existing levels of safety.
FRTO

B0-FRTO
Improved Operations through Enhanced En-Route Trajectories
To allow the use of airspace which would otherwise be segregated (i.e., special use airspace) along with flexible routing. Element 1: Airspace planning
Element 2: Flexible use of airspace (FUA)
Element 3: Flexible routing

B1-FRTO
Improved Operations through Optimized ATS Routing
Introduction of free routing in defined airspace, where the flight plan is not defined as segments of a published route network or track system to facilitate adherence to the user-preferred profile. Element 1: Free routing
Element 2: Reduced route spacing
Element 3: Dynamic sectorization
**Block 0 and Block 1**

**NOPS**

**B0-NOPS**
**Improved Flow Performance through Planning based on a Network-Wide view**
Collaborative ATFM measure to regulate peak flows involving departure slots, managed rate of entry into a given piece of airspace for traffic along a certain axis, requested time at a way-point or and FIR/sector boundary along the flight, use of miles-in-trail to smooth flows along a certain traffic axis and re-routing of traffic to avoid saturated areas.

**B1-NOPS**
**Enhanced Flow Performance through Network Operational Planning**
ATFM techniques that integrate the management of airspace, traffic flows including initial user driven prioritization processes for collaboratively defining ATFM solutions based on commercial/operational priorities.
- Element 1: Improved ATFM and ATFM-AOM integration
- Element 2: Synchronization
- Element 3: Initial user driven prioritization process (UDPP or fleet prioritization)
- Element 4: Full flexible use of airspace (FUA)
- Element 5: Complexity management
AEP

B0-AEP
Air Traffic Situational Awareness (ATSA)
Two ATSA applications which will enhance safety and efficiency by providing pilots with the means to enhance traffic situational awareness and achieve quicker visual acquisition of targets.
- Element 1: ATSA-AIRB
- Element 2: ATSA-VSA

B1-AEP
Increased Capacity and Efficiency through Interval Management
Interval Management (IM) improves the management of traffic flows and aircraft spacing. Precise management of intervals along with more efficient aircraft fuel burn.
**Block 0 and Block 1**

**SNET**

**B0-SNET**

*Increased Effectiveness of Ground-based Safety Nets*

This module monitors flights while airborne to provide timely alerts to air traffic controllers of potential risks to flight safety.

- Element 1: Short-term conflict alert (STCA)
- Element 2: Area proximity warning (APW)
- Element 3: Minimum safe altitude warning (MSAW)

**B1-SNET**

*Ground-based Safety Nets on Approach*

To enhance safety by reducing the risk of controlled flight into terrain accidents on final approach through the use of approach path Monitor (APM). APM
EFFICIENT FLIGHT PATHS
(TRAJECTORY-BASED OPERATIONS)

Block 0 2013
- B0-CDO
- B0-TBO
- B0-CCO

Block 1 2019
- B1-CDO
- B1-TBO
- B1-RPAS

Block 2 2025
- B2-CDO
- B2-RPAS

Block 3 2031+
- B3-TBO
- B3-RPAS
**CDO**

**B0-CDO**
Improved Flexibility and Efficiency in Descent Profiles (CDO)
Deployment of performance-based airspace and arrival procedures that allow an aircraft to fly its optimum aircraft profile taking account of airspace and traffic complexity with continuous descent operations (CDOs)

- Element 1: Continuous descent operations
- Element 2: Performance-based navigation

**B1-CDO**
Improved Flexibility and Efficiency in Descent Profiles (CDOs) using VNAV
To enhance vertical flight path precision during descent, arrival, and enables aircraft to fly an arrival procedure not reliant on ground based equipment for vertical guidance.
**Block 0 and Block 1**

**TBO**

**B0-TBO**
Improved Safety and Efficiency through the initial application of data link and SATVOICE En-Route
Implementation of an initial set of data link applications for supporting surveillance and communications in air traffic services.
- Element 1: ADS-C over Oceanic and remote areas
- Element 2: CPDLC

**B1-TBO**
Improved Traffic Synchronization and Initial Trajectory-Based Operation.
Improve traffic flows synchronization at en-route merging points and optimize approach sequence through the use of 4DTRAD capability and airport applications (RTA).
- Element 1: Initial 4D operations (4D TRAD)
- Element 2: Data link operational terminal information service (D-OTIS)
- Element 3: Departure clearance (DCL)
- Element 4: Data link TAXI (DTAXI)
**Block 0 and Block 1**

**CCO**

**B0-CCO**

*Improved Flexibility and Efficiency in Departure Profiles - Continuous Climb Operations (CCO)*

Deployment of departure procedures that allow an aircraft to fly its optimum aircraft profile taking account of airspace and traffic complexity with continuous climb operations (CCOs).
**Block 0 and Block 1**

**RPAS**

**B1-RPAS**  
Initial Integration of Remotely Piloted Aircraft (RPA) into non-segregated airspace  
Implementation of basic procedures for operating RPA in non-segregated airspace.

- Streamline process to access non-segregated airspace
- Defining airworthiness certification for RPA
- Define operator certification
- Define remote pilot licensing requirements
- Define detect and avoid technology performance requirements
- Vision

- ASBUs

- Evolution.
Objective

To show Block 1 threads as an operational evolution from Block 0 threads.
Thank You