

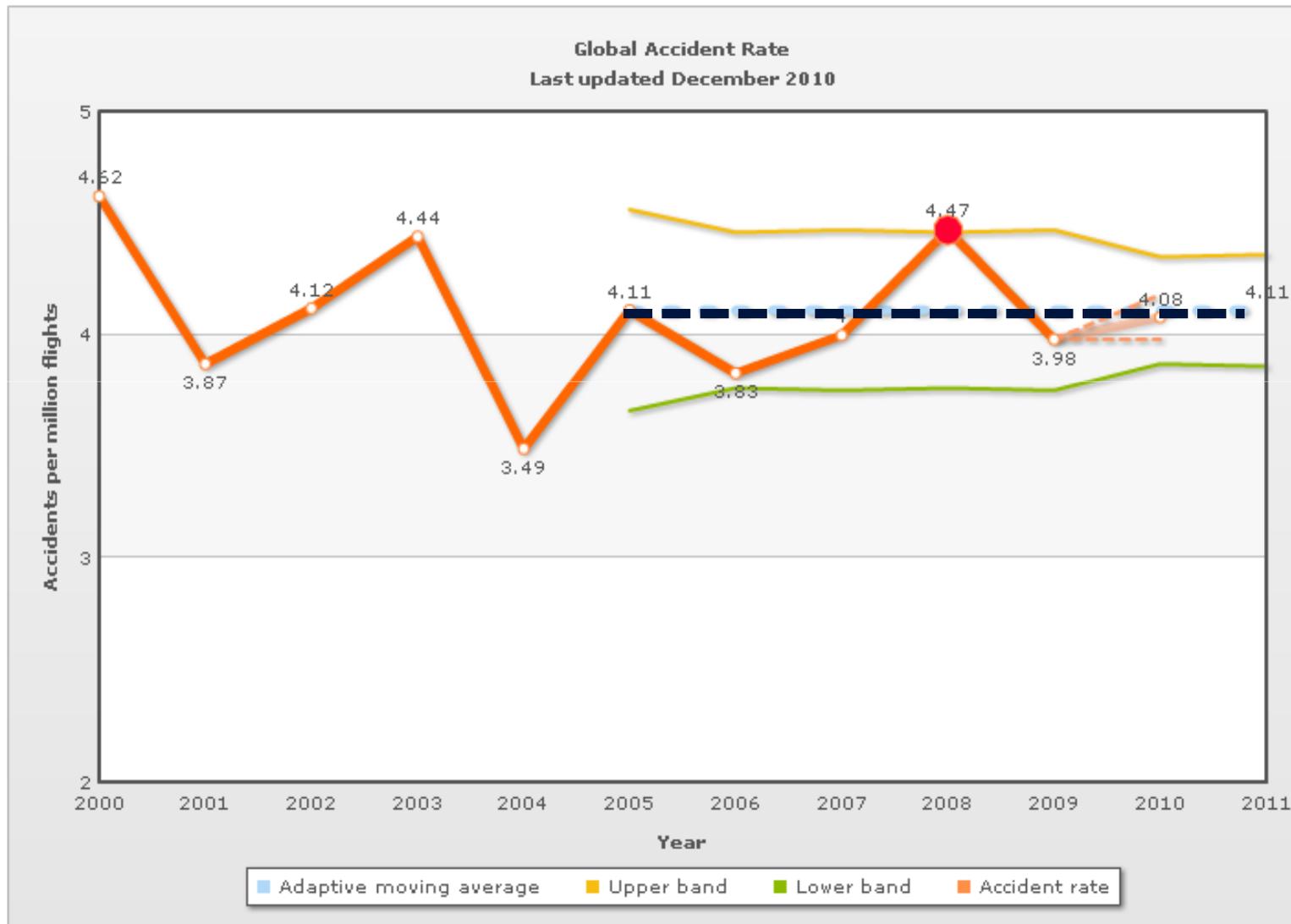


International Civil Aviation Organization

# **Creating Operational Improvements Through Aviation System Block Upgrades**

Global Air Navigation Industry Symposium  
20-23 September 2011

# Our Collective Challenge



# Developing Tomorrow's Aviation System



- Global framework is needed to ensure:
  - Safety is maintained and enhanced
  - ATM improvement programmes are harmonized
  - Barriers to future efficiency and environmental gains are removed, at reasonable cost



# Developing Tomorrow's Aviation System



- Investment certainty is required for:
  - Operators
  - Infrastructure providers
  - Equipment manufacturers
- Regulatory approval process must be outlined
  - Support States in introduction of significant changes



# Developing Tomorrow's Aviation System



- ICAO developed 4-step plan
- Setting the stage for global interoperability



# Step 1

## Get Harmonization on the Global Agenda



- Initial NextGen/SESAR Symposium (2008)
- Convened Standards Organization Roundtable (2009)
- Established working agreements with Standards Organizations on shared work programmes

# Step 2

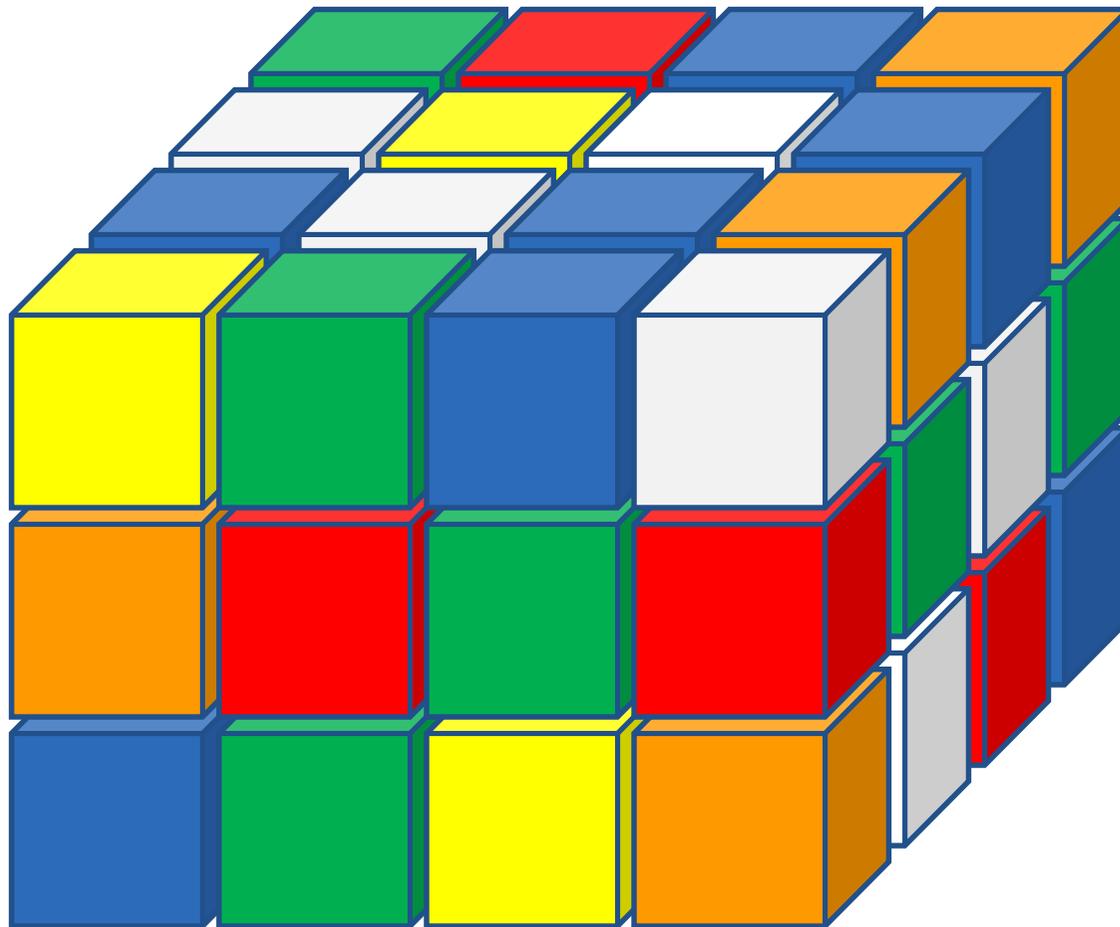
## Global Aviation System Block Upgrades



- Define global aviation system block upgrades
- For interoperability purposes
- Independent of when and where specific ATM improvement programmes are introduced

Why is this approach proposed?

# The Reality of Our System Today...



# What is a Block Upgrade?



**Measurable  
Operational  
Improvement**



**Air & Ground  
Standards & Procedures**

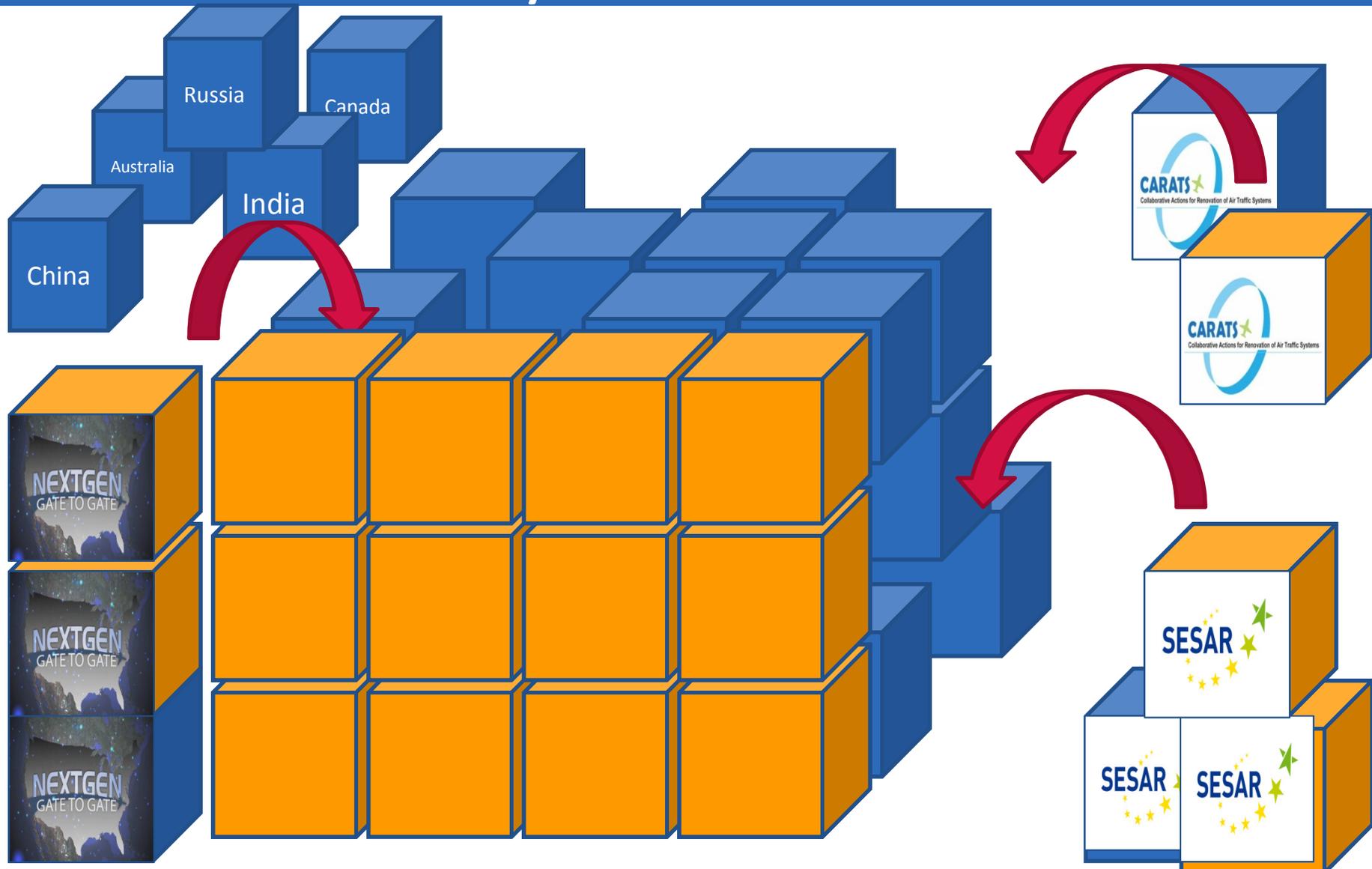


**Air & Ground  
Equipment / Systems  
+ Approvals**

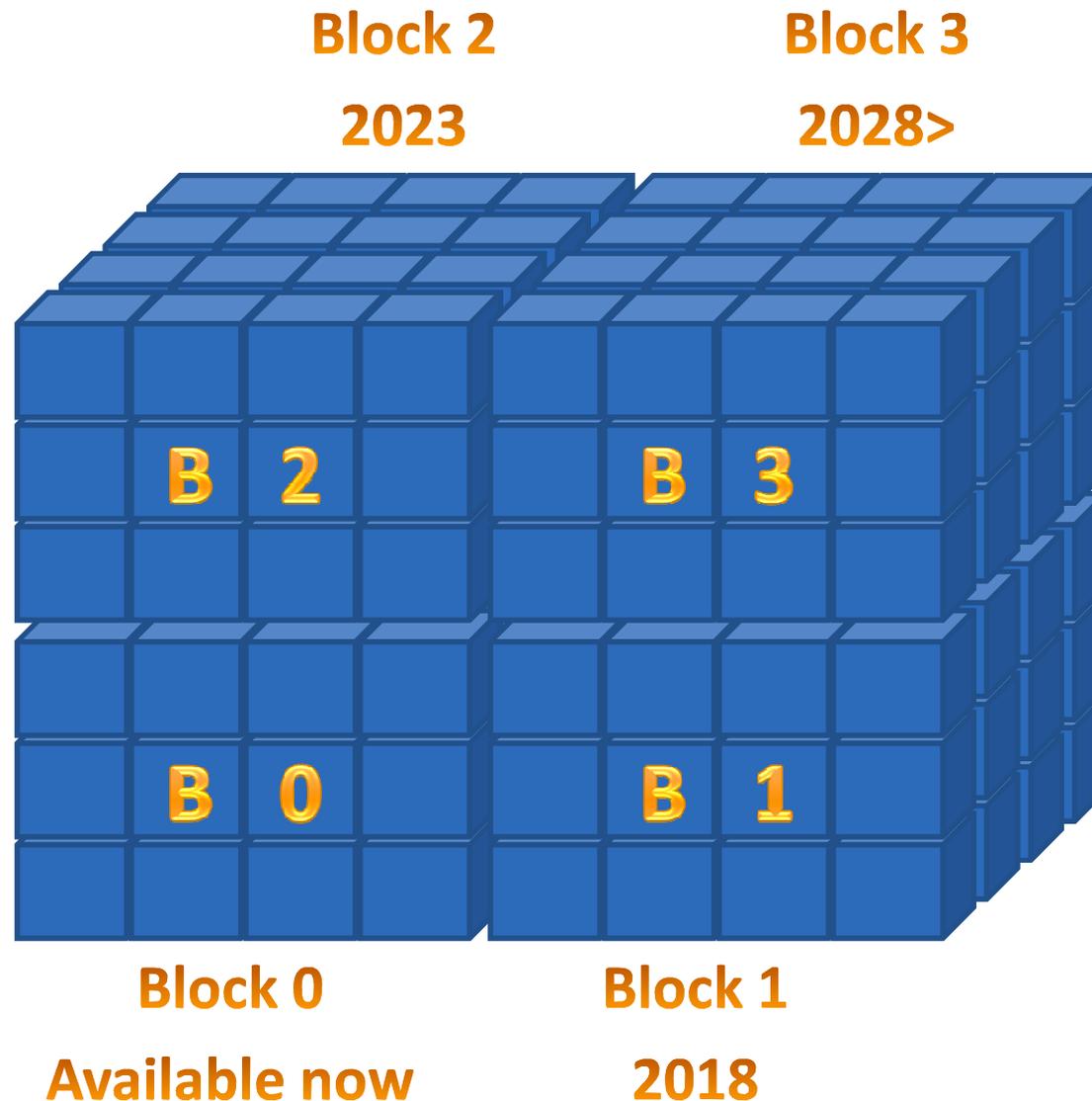


**Positive  
Business Case**

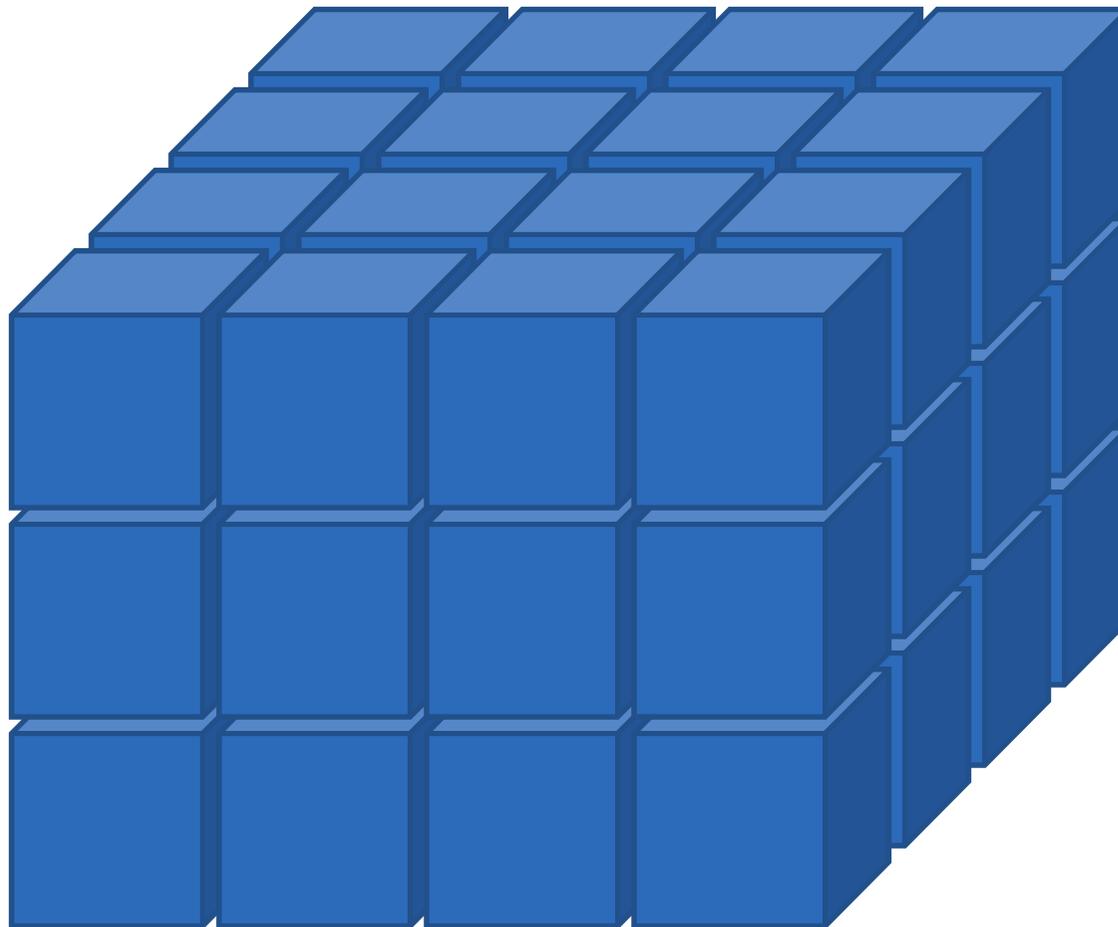
# We Can Benefit From What Is Already Out There...



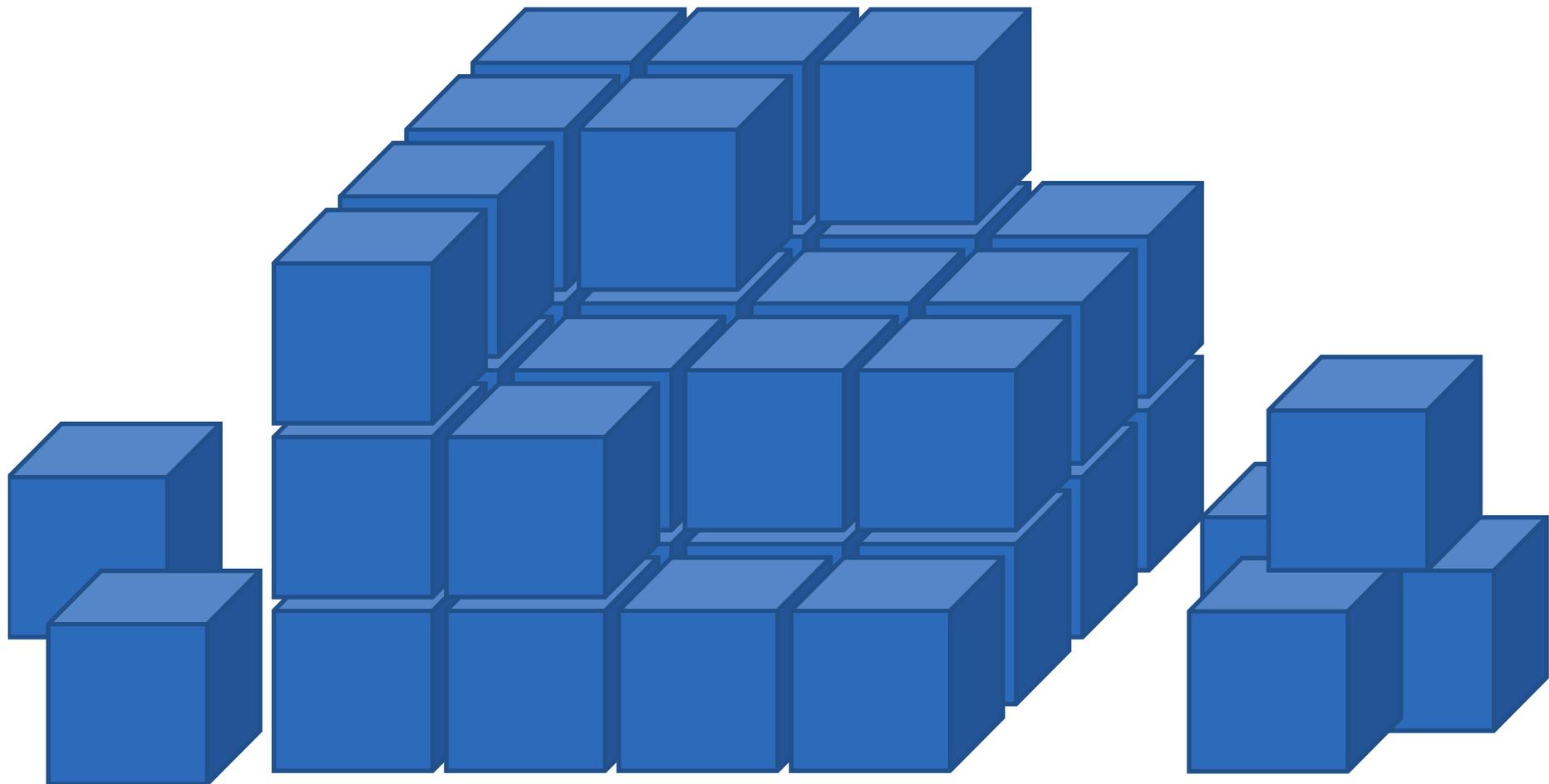
# 4 Blocks Upgrades are Proposed



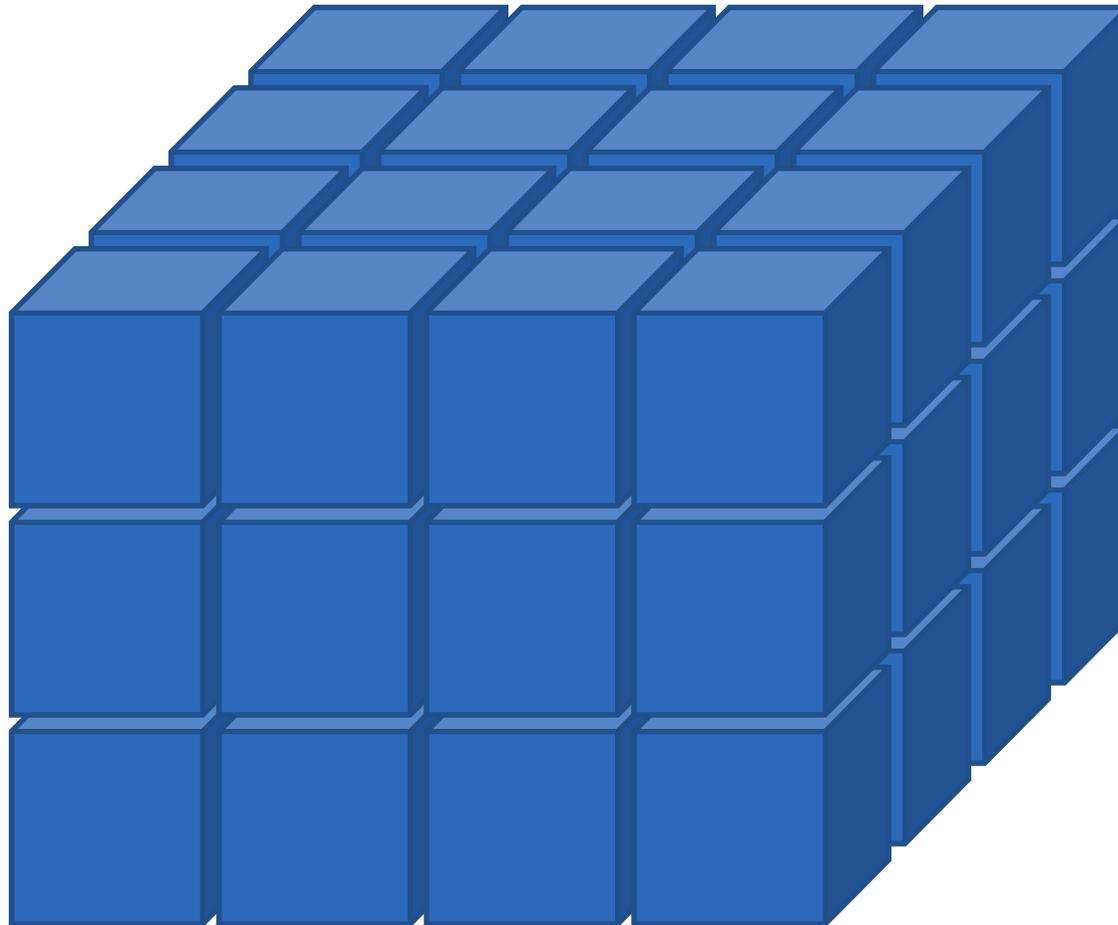
# A Block is Made Up of Modules...



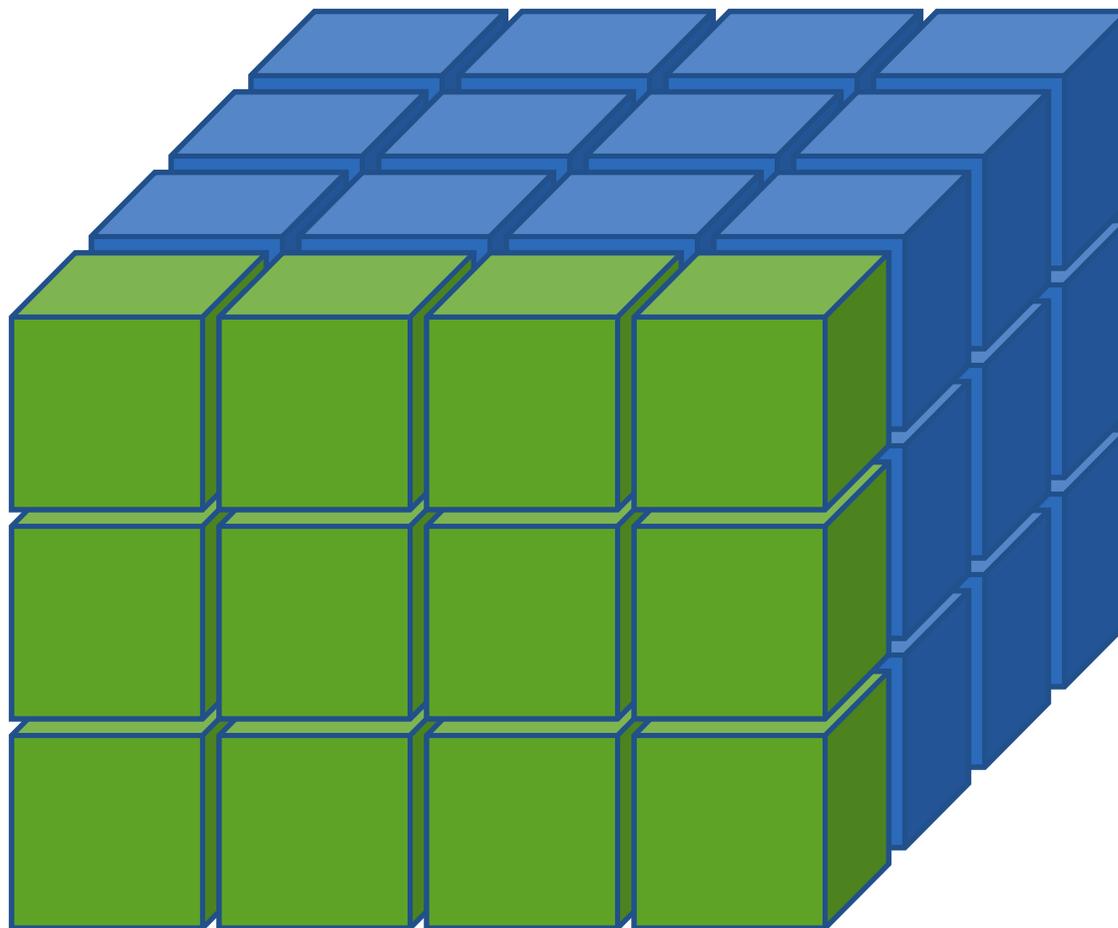
# ...So a Block is Scalable *to Meet Regional or Local Needs*



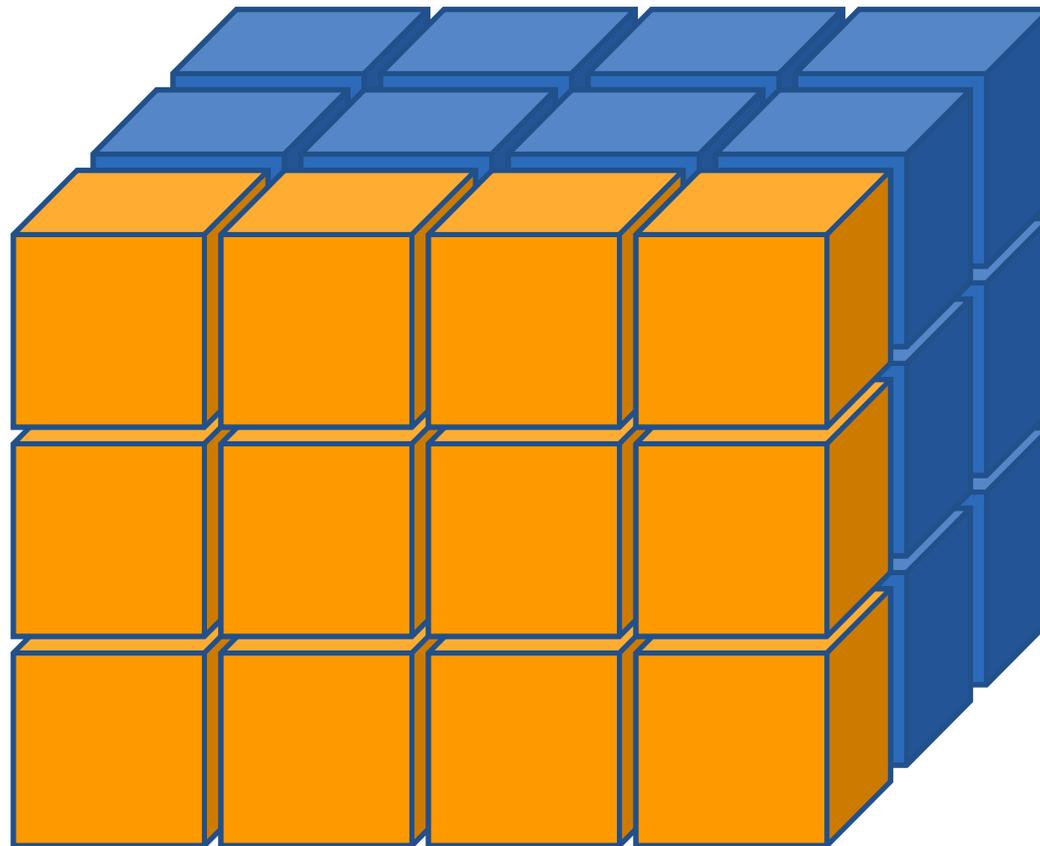
# Modules are Grouped in 4 Performance Improvement Areas



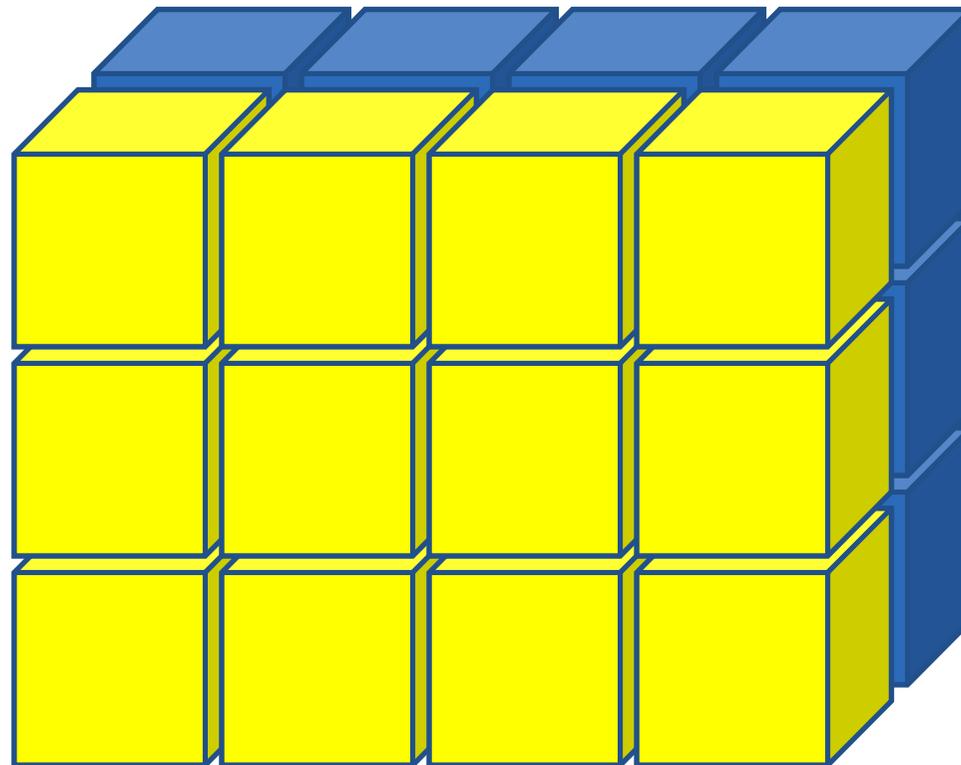
# Greener Airports



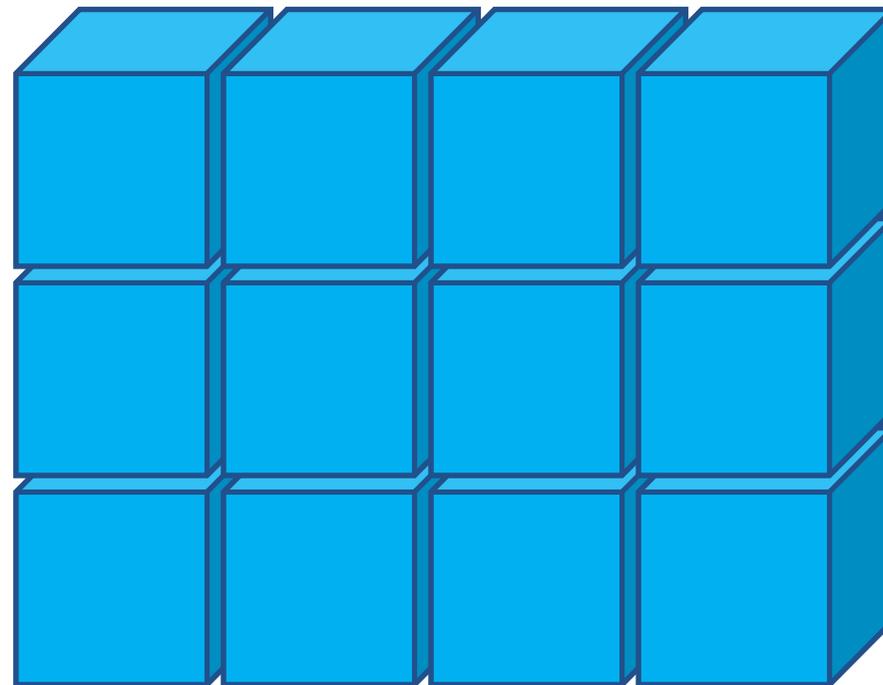
# Global Interoperable Systems & Data



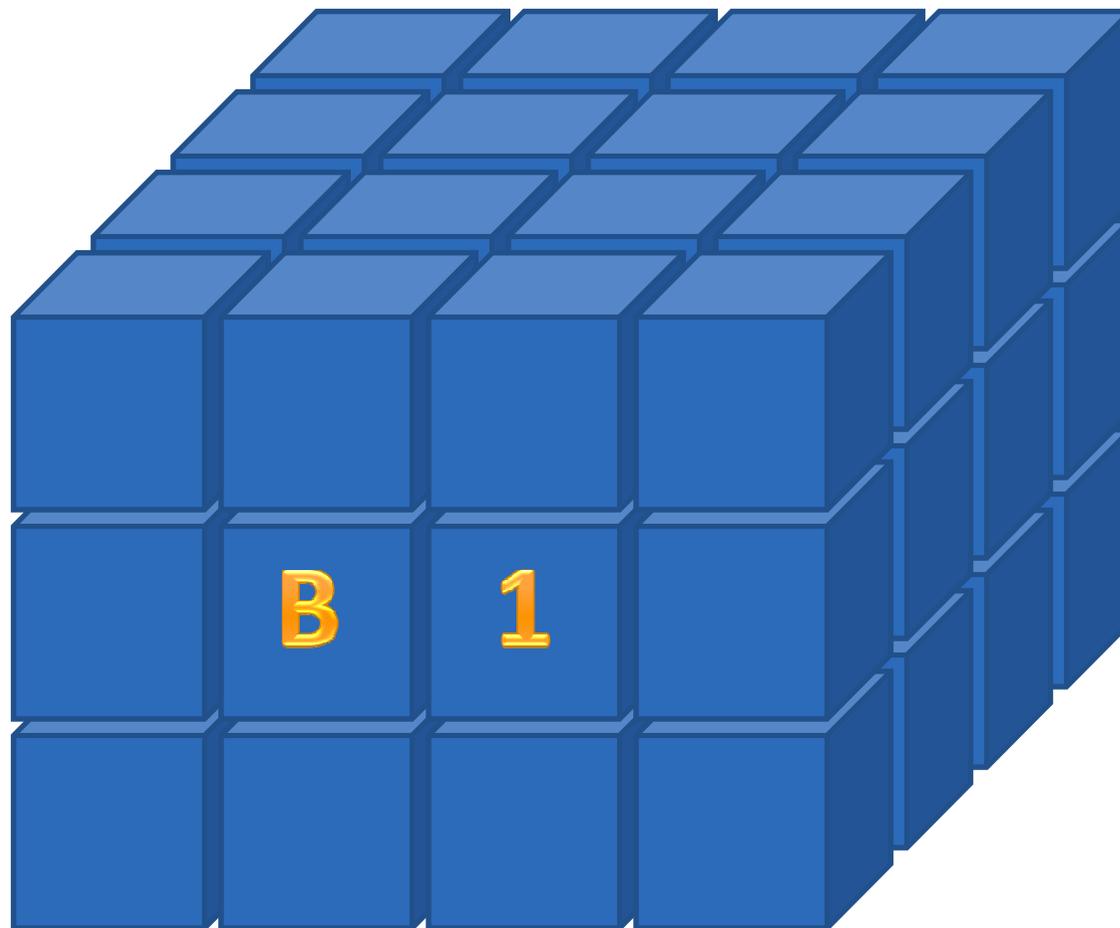
# Optimum Capacity & Flexible Flights



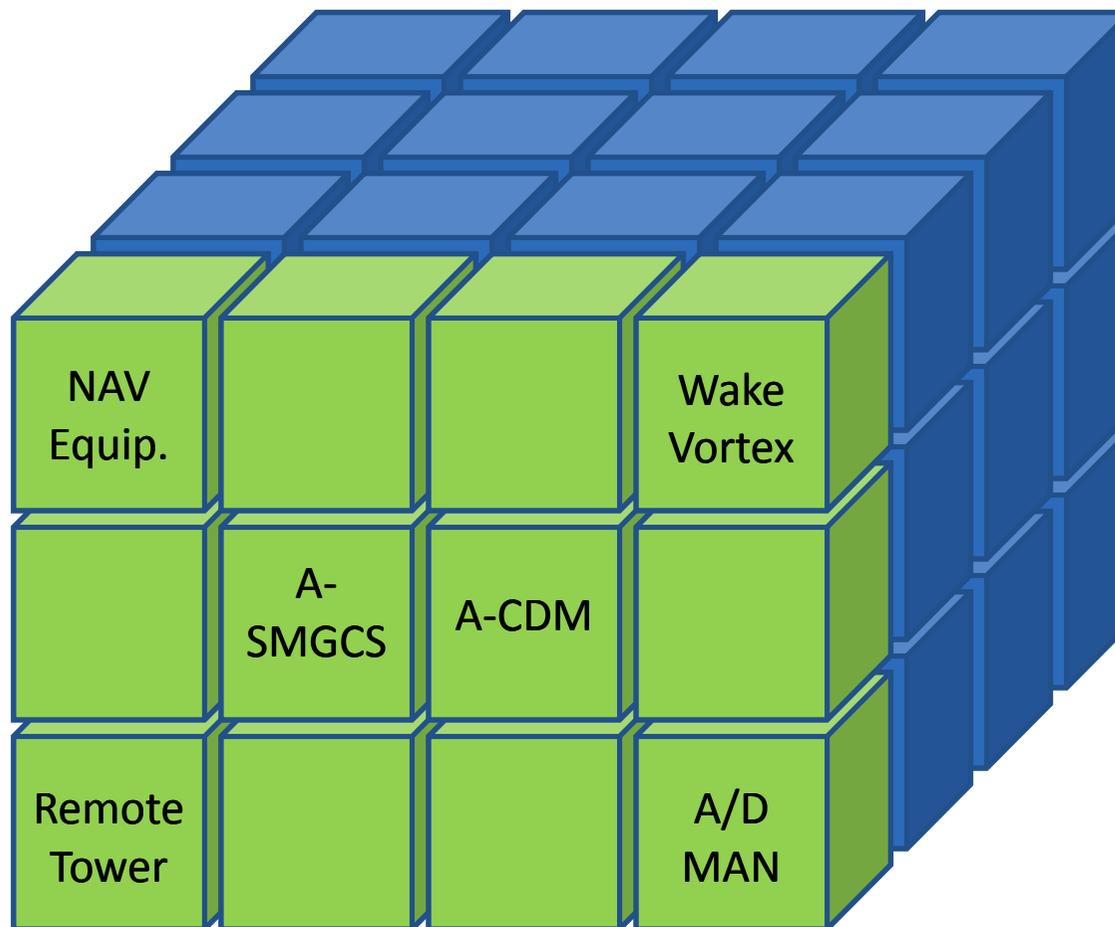
# Efficient Flight Path



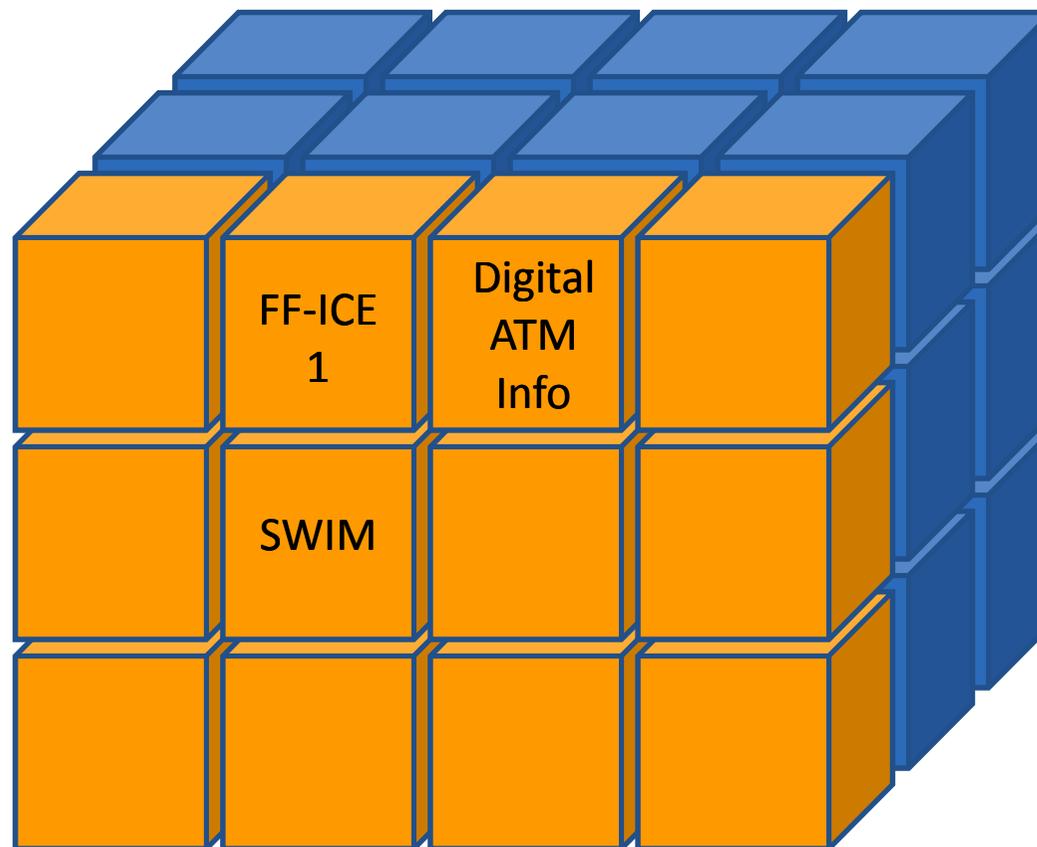
# Let's Focus on Block 1...



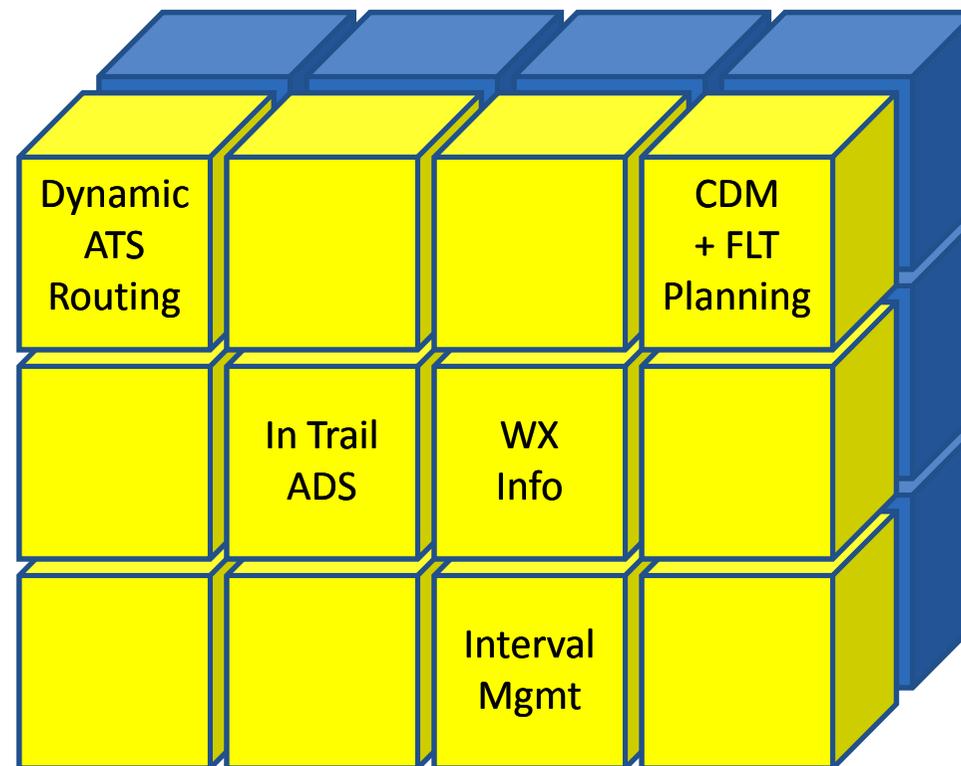
# Block 1 Modules for: Greener Airports



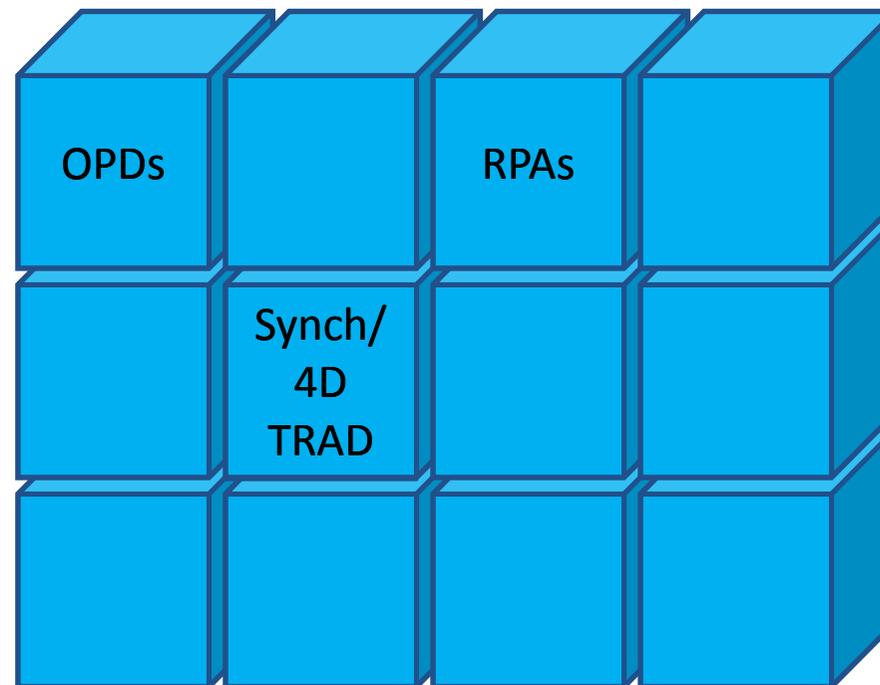
# Block 1 Modules for: Global Interoperable Systems & Data



# Block 1 Modules for: Optimum Capacity & Flexible Flights



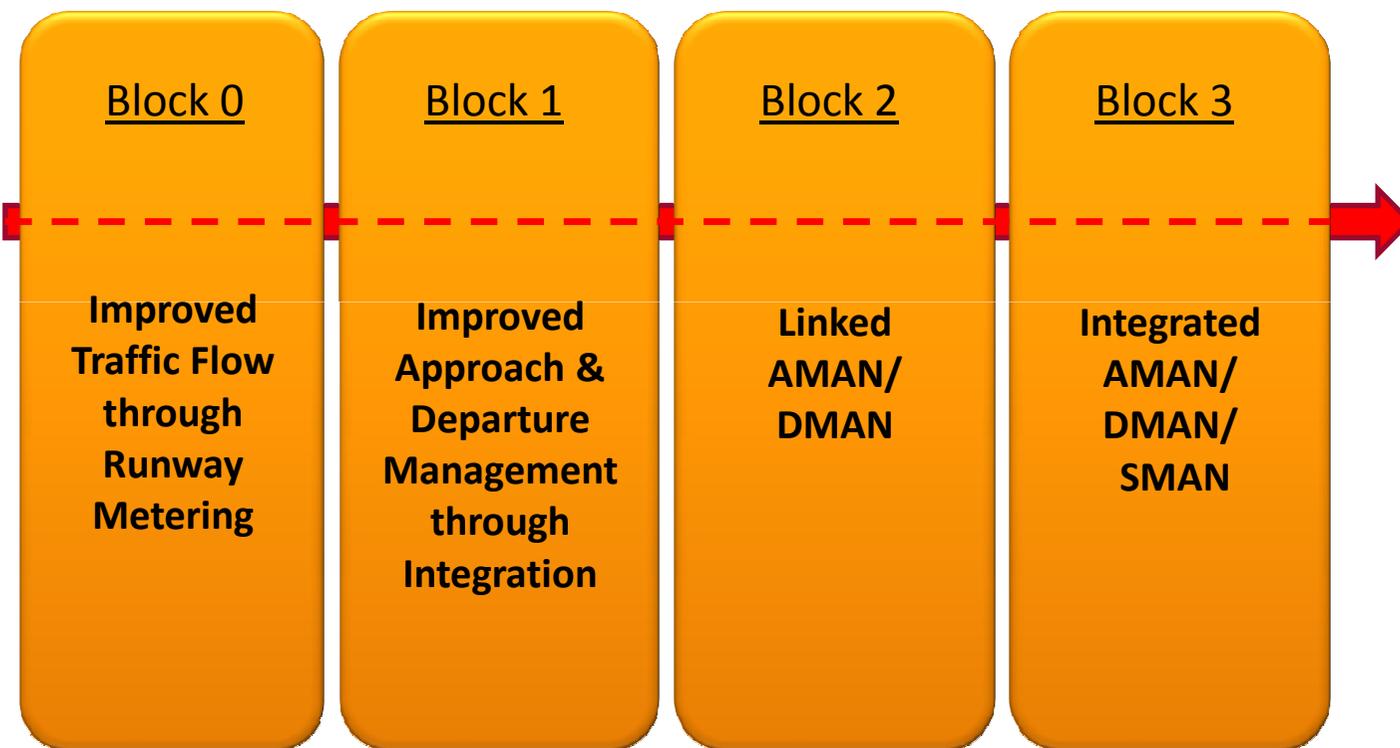
# Block 1 Modules for: Efficient Flight Path



# Threads Between Modules... and Across Blocks



## Greener Airports



Available Now

2018

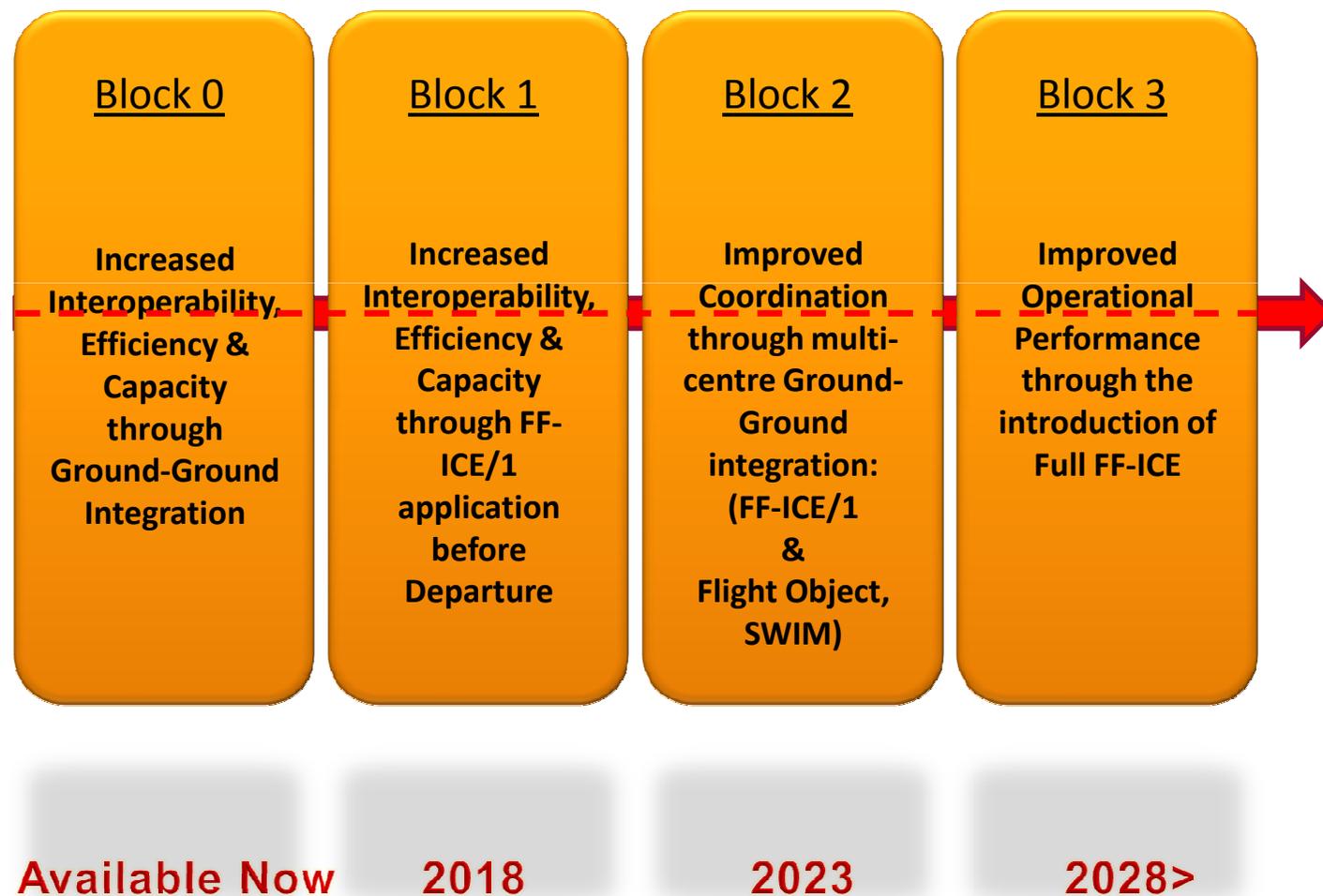
2023

2028>

# Threads Between Modules... and Across Blocks



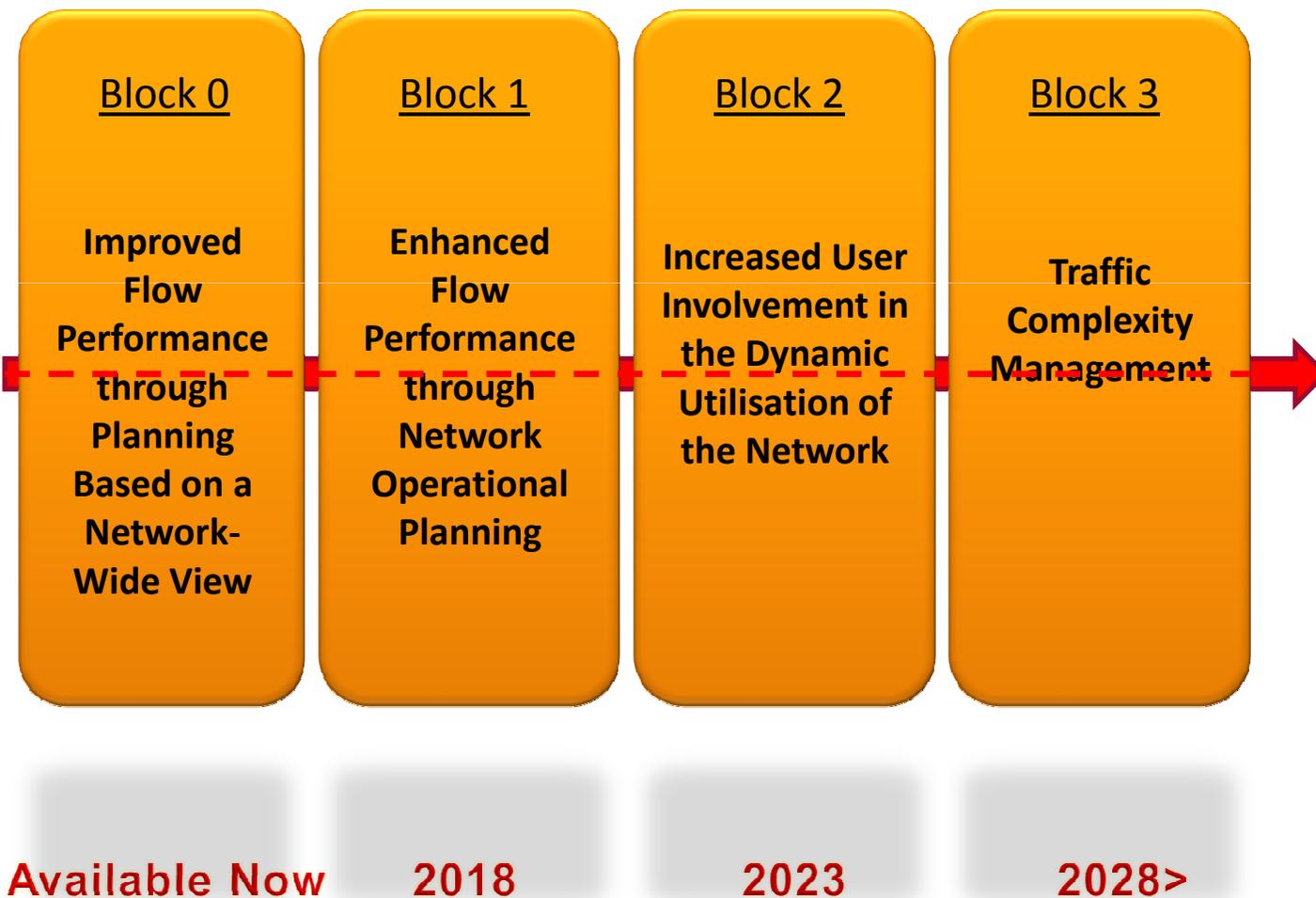
## Global Interoperable Systems & Data *Through Global SWIM*



# Threads Between Modules... and Across Blocks



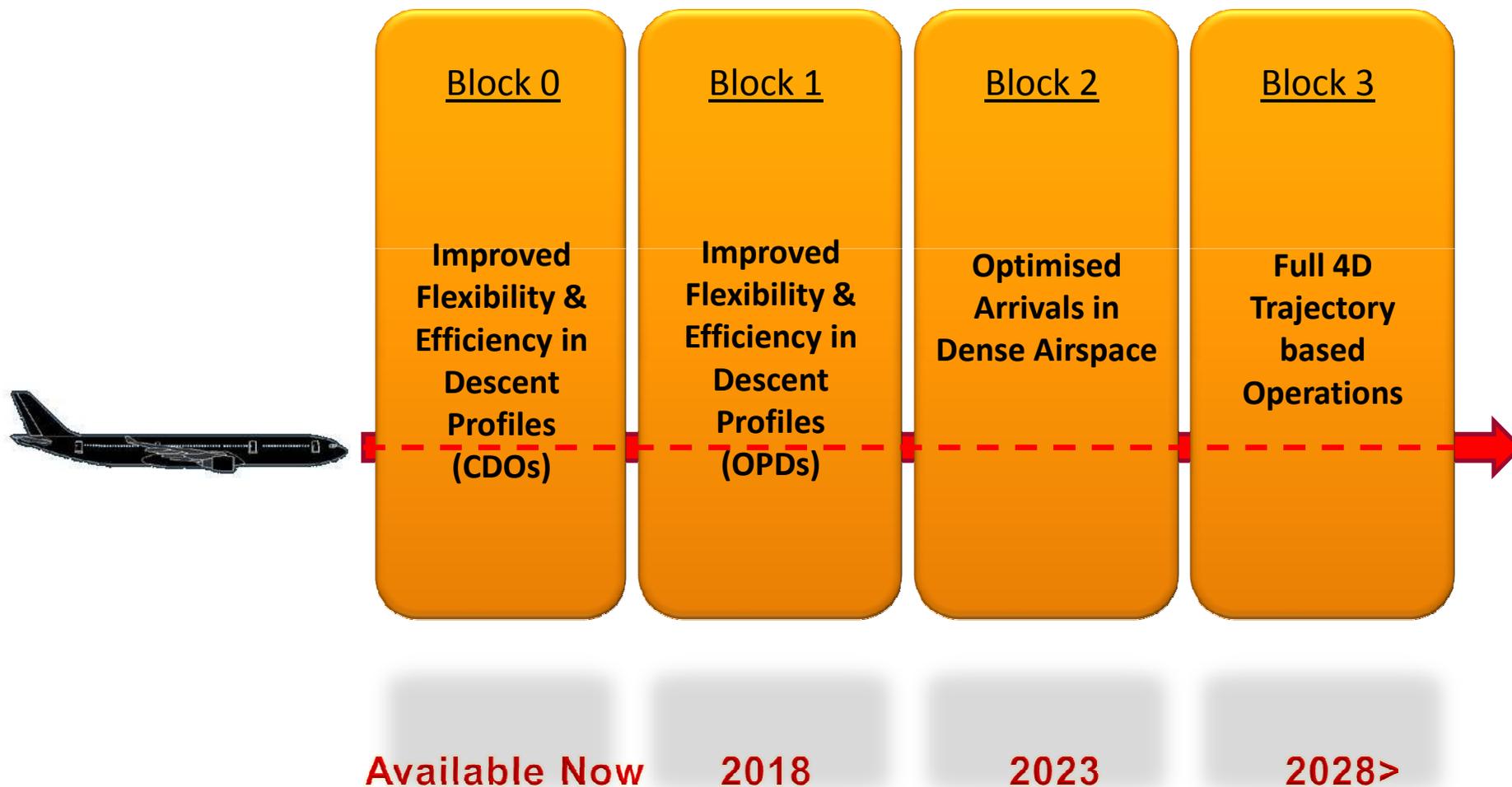
Optimum Capacity & Flexible Flights  
*Through Global Collaborative ATM*



# Threads Between Modules... and Across Blocks



## Efficient Flight Plan *Through Trajectory-based Operations*



# Step 3

## Global Rollout & Feedback at GANIS



- Platform to enable feedback
- States' voice is critical in our planning
- Essential preparation for AN-Conf/12
- GANIS Working Document posted on website

<http://www2.icao.int/en/GANIS/Pages/Documentation.aspx>

# Step 4

## International Agreement at AN-Conf/12



- Montréal, 19-30 November 2012
- Opportunity to formalize future of infrastructure & equipage
- Strategies for longer-term requirements
- Agreement of first series of block upgrades
  - Level of certainty for all stakeholders
  - Encourage more efficient implementation
- Revised GANP
  - Operational capabilities to manage ATM system requirements



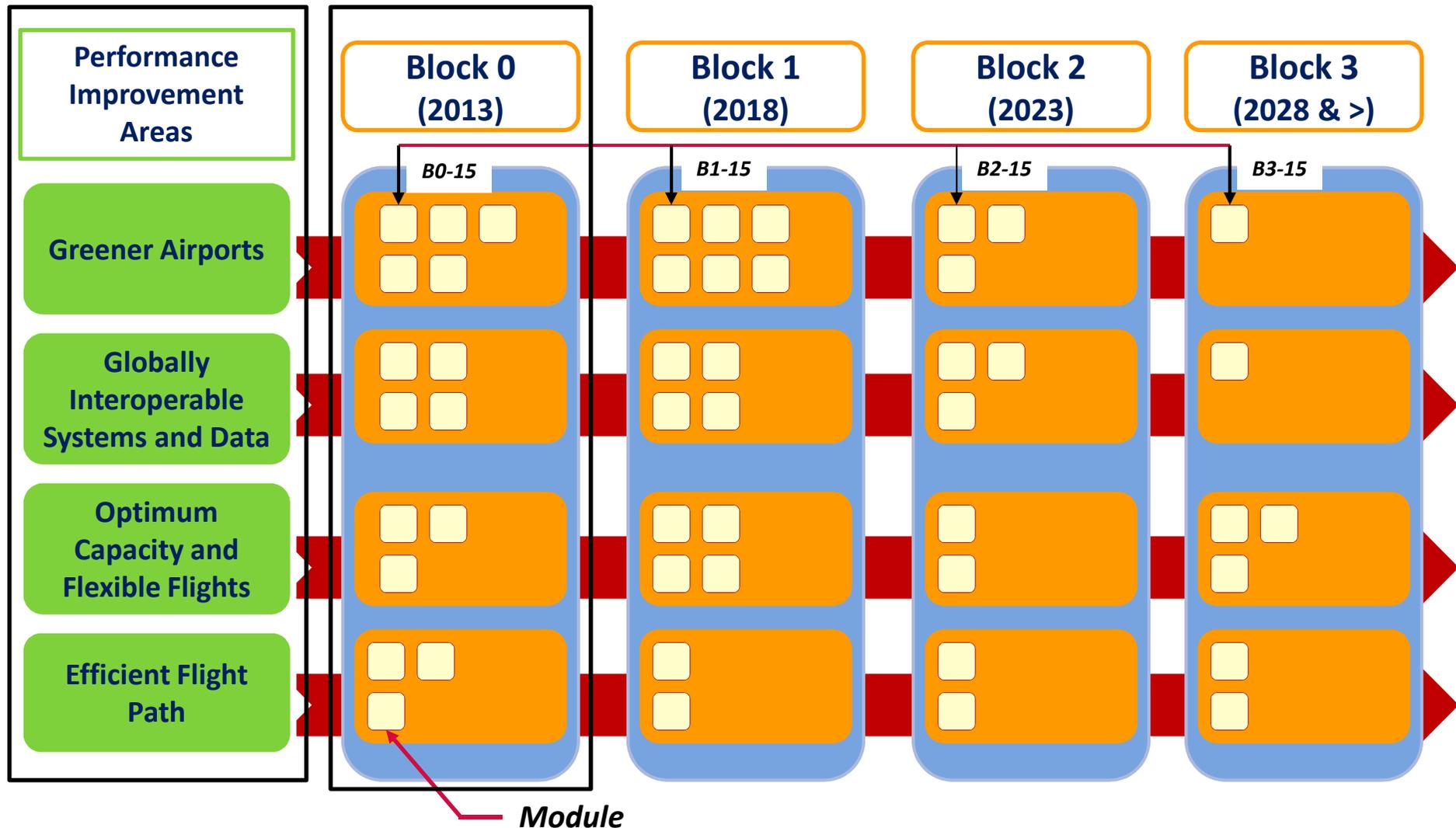


International Civil Aviation Organization

Making the most of what we have today.

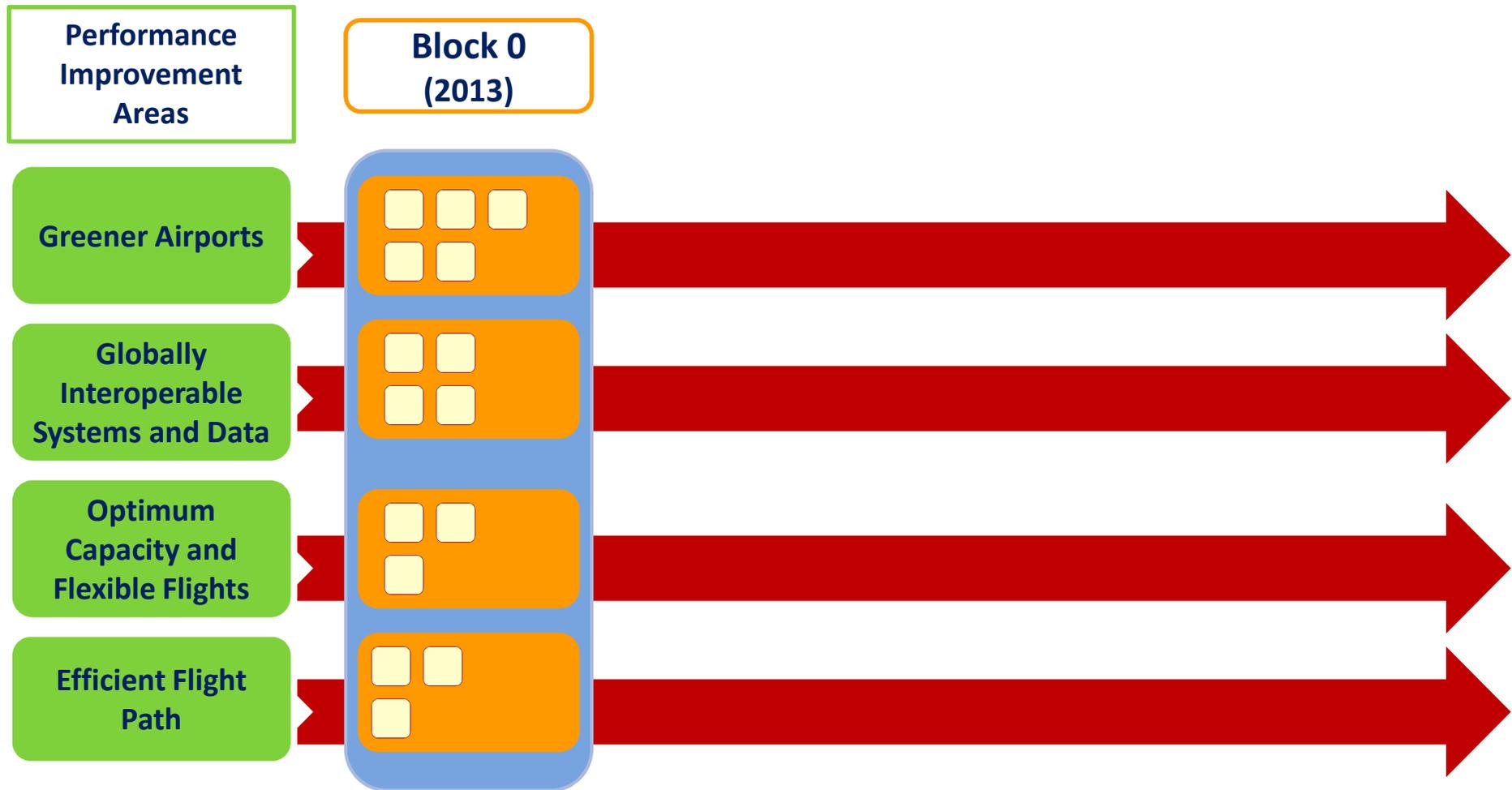
# Block 0

# Understanding the Relationships





# Focus on Block 0



# Global Readiness Checklist



Global Readiness Checklist		Status (ready or date)
	Standards Readiness	√
	Avionics Availability	√
	Infrastructure Availability	√
	Ground Automation Availability	√
	Procedures Available	√
	Operations Approvals	√

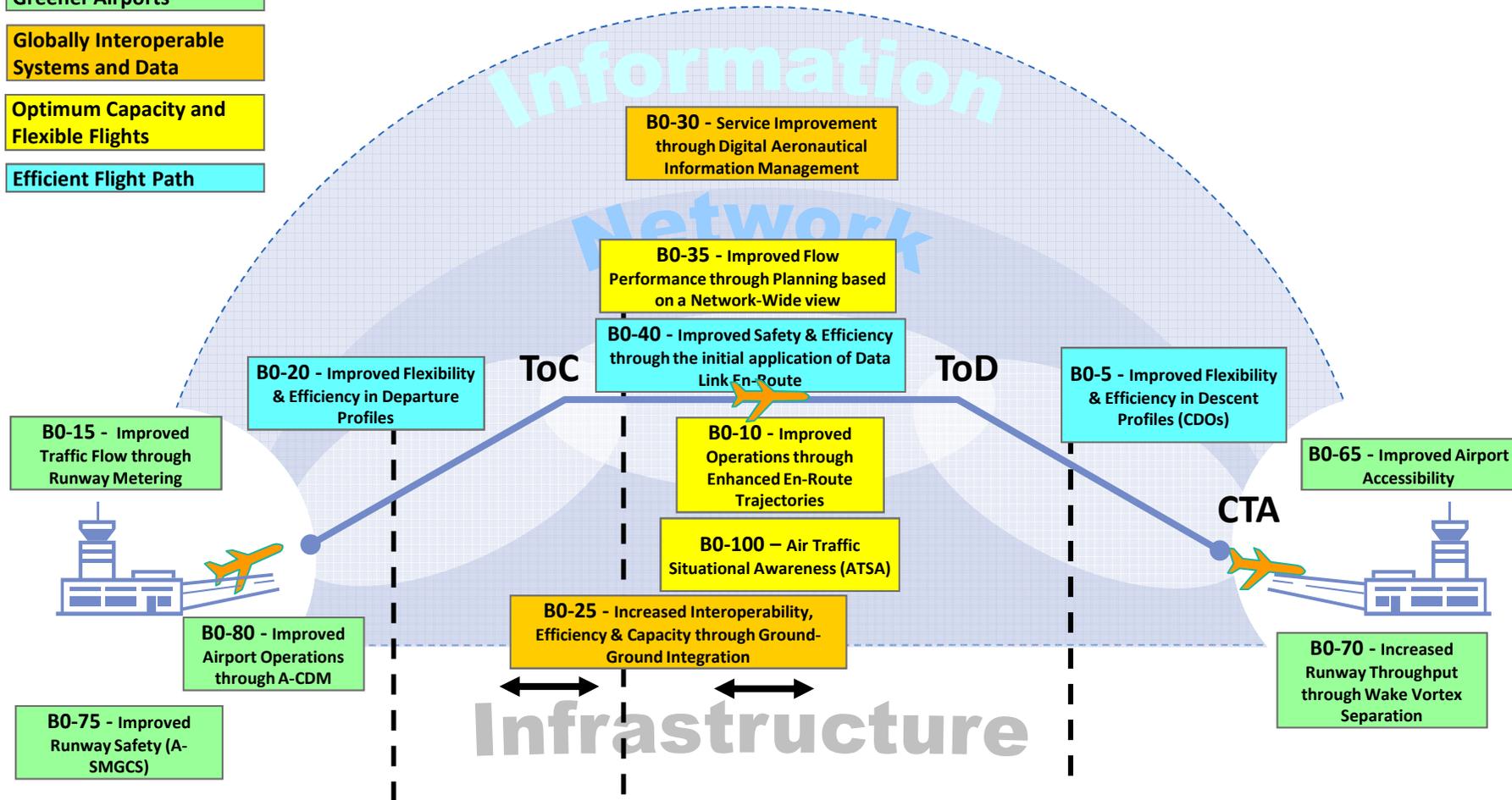
- Each Module is evaluated for its readiness
- If any component is not found to be ready it moves to a future Block for implementation
- Those Modules that are not specifically ready at a Block release are noted as “dates of readiness”

***All Block 0 Modules Have Met the Readiness Criteria***

# Block 0 in Perspective

## Performance Improvement Areas

- Greener Airports
- Globally Interoperable Systems and Data
- Optimum Capacity and Flexible Flights
- Efficient Flight Path





# Greener Airports

## **B0-15**

### **Improved Traffic Flow through Runway Metering**

Time-based metering to sequence departing and arriving flights

## **B0-65**

### **Improved Airport Accessibility**

This is the first step toward universal implementation of GNSS-based approaches

## **B0-70**

### **Increased Runway Throughput through Wake Vortex Separation**

Improved throughput on departure and arrival runways through the revision of current ICAO wake vortex separation minima and procedures (re-categorisation, CSPR and WIDAO)

## **B0-75**

### **Improved Runway Safety (A-SMGCS)**

Airport surface surveillance for ANSP

## **B0-80**

### **Improved Airport Operations through ACDM**

Airport operational improvements through the way operational partners at airports work together

***The combined Block 0 Modules reduce fuel consumption and noise by improving arrival efficiencies and improving information sharing***



# Globally Interoperable Systems and Data

## **B0-25**

### **Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration**

Supports the coordination of ground-ground data communication between ATSU based on ATS Inter-facility Data Communication (AIDC) defined by ICAO Document 9694

## **B0-30**

### **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

*In Block 0 we improve overall operations and continue to enable Collaborative Decision Making through improved inter-facilities communications using standard information formats*



# Optimum Capacity and Flexible Flights

## **B0-10**

### **Improved Operations through Enhanced En-Route Trajectories**

Implementation of performance-based navigation (PBN concept) and flex tracking to avoid significant weather and to offer greater fuel efficiency, flexible use of airspace (FUA) through special activity airspace allocation, airspace planning and time-based metering, and collaborative decision-making (CDM) for en-route airspace with increased information exchange among ATM stakeholders

## **B0-35**

### **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 waypoint or an 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

## **B0-100**

### **Air Traffic Situational Awareness (ATSA)**

ATSA provides a cockpit display of a graphical depiction of traffic to assist the pilot in out-the-window visual acquisition of traffic:

- AIRB en-route phase; is used to assist the out-the-window visual acquisition of airborne traffic for enhancing flight crew situational awareness and air traffic safety
- VSA approach phase (supporting the flight crew to acquire and maintain own separation from the preceding aircraft when performing a visual approach procedure)

***Using procedural concepts (e.g. RNP, FUA, etc.) and Air Traffic Situational Awareness - combined with enhanced planning tools and information sharing, the enroute phase of flight supports additional capacity and flexibility using the Modules of Block 0***



# Efficient Flight Path

## **B0-05**

### **Improved Flexibility and Efficiency in Descent Profiles (CDOs)**

Deployment of performance-based airspace and arrival procedures that allow the aircraft to fly their optimum aircraft profile taking account of airspace and traffic complexity with continuous descent operations (CDOs)

## **B0-20**

### **Improved Flexibility and Efficiency in Departure Profiles**

Deployment of departure procedures that allow the aircraft to fly their optimum aircraft profile taking account of airspace and traffic complexity with continuous climb operations (CCOs)

## **B0-40**

### **Improved Safety and Efficiency through the initial application of Data Link En-Route**

Implementation of an initial set of data link applications for surveillance and communications in ATC

*The use of procedurally based Optimized Profile Climbs and Descents as well as an initial Data Link Capability helps to establish a Block 0 capability for improved operational efficiencies*



# Challenges - How to Get There?

- It is all about managing risk
- Block 0 risks are minimum
  - Global Readiness Checklist is complete
  - The Modules are well understood and supported
- But risks do exist
  - States may not be capable of ensuring successful deployment of Block 0
  - If Block 0 is not implemented as a foundation, certain functionalities may not be available as enablers for future blocks
  - We must Identify and resolve policies necessary to enable the future blocks now

# Implementation – The Time is Now



- The Modules of Block 0 are ready for implementation today
  - Standards are ready
  - Avionics are ready
  - Procedures and Operational Approvals are in place
  - The Infrastructure is available
  - Ground Automation is ready
- Establishing the foundation for the future is now
- Care was taken to ensure that regional implementation of the Blocks or the Modules are well described and ready for implementation

# Preparation for the 12<sup>th</sup> ANC



- Review the Modules, Blocks, and Performance Improvement Areas
- Use the Feedback Form to provide comments and guidance
- We will take this guidance and work in the communities best interest to prepare a structured plan that can become part of the recommendations and guidance from the 12<sup>th</sup> ANC

# Summary and Conclusions



- The “Aviation System Block Upgrades” initiative is the best approach to reach our goals:
  - Enables global interoperability (which is our goal)
  - Develops clear solutions (block upgrades)
  - Establishes a transition plan (it’s a well thought out way for going forward)
  - Support the development of a Global CNS/AIM and avionics roadmaps
- Block 0 is ready for deployment



**Thank you  
for your attention**

# ICAO

Uniting Aviation on

Safety | Security | Environment



# ICAO

Uniting Aviation on

Safety | Security | Environment

Global Air Navigation Industry Symposium

