

Ministry of Land Infrastructure Transport and Tourism
CIVIL AVIATION BUREAU OF JAPAN

CARATS 

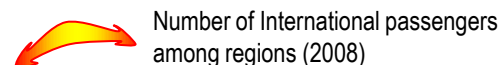
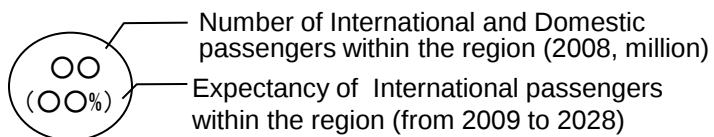
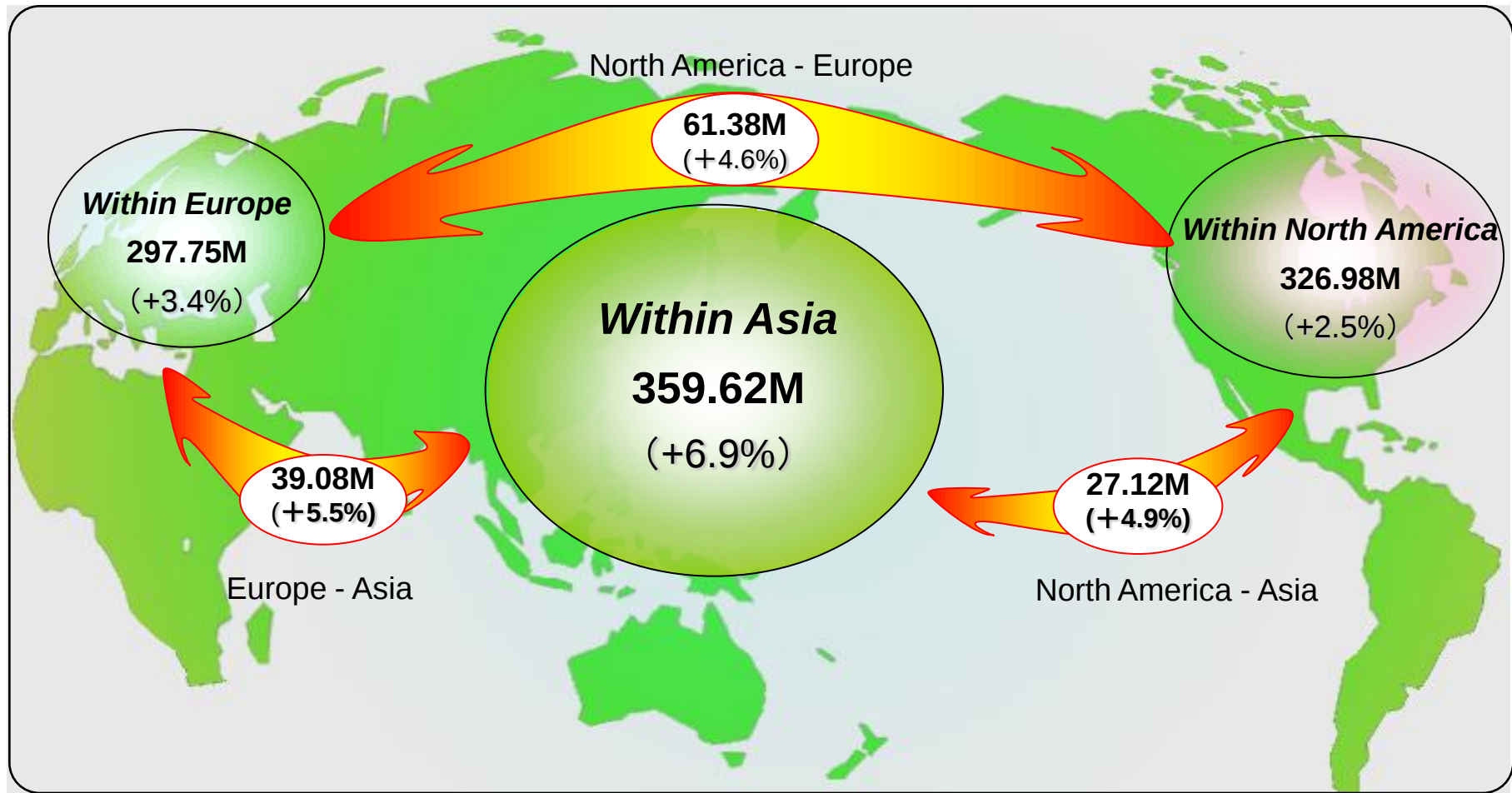
Collaborative Actions for Renovation of Air Traffic Systems

Seamless ATM Perspective and CARATS

Takeshi Imagome
Director, Air Traffic Int'l Affairs Office

Air Traffic Increase in the Asia/Pacific Region

P1

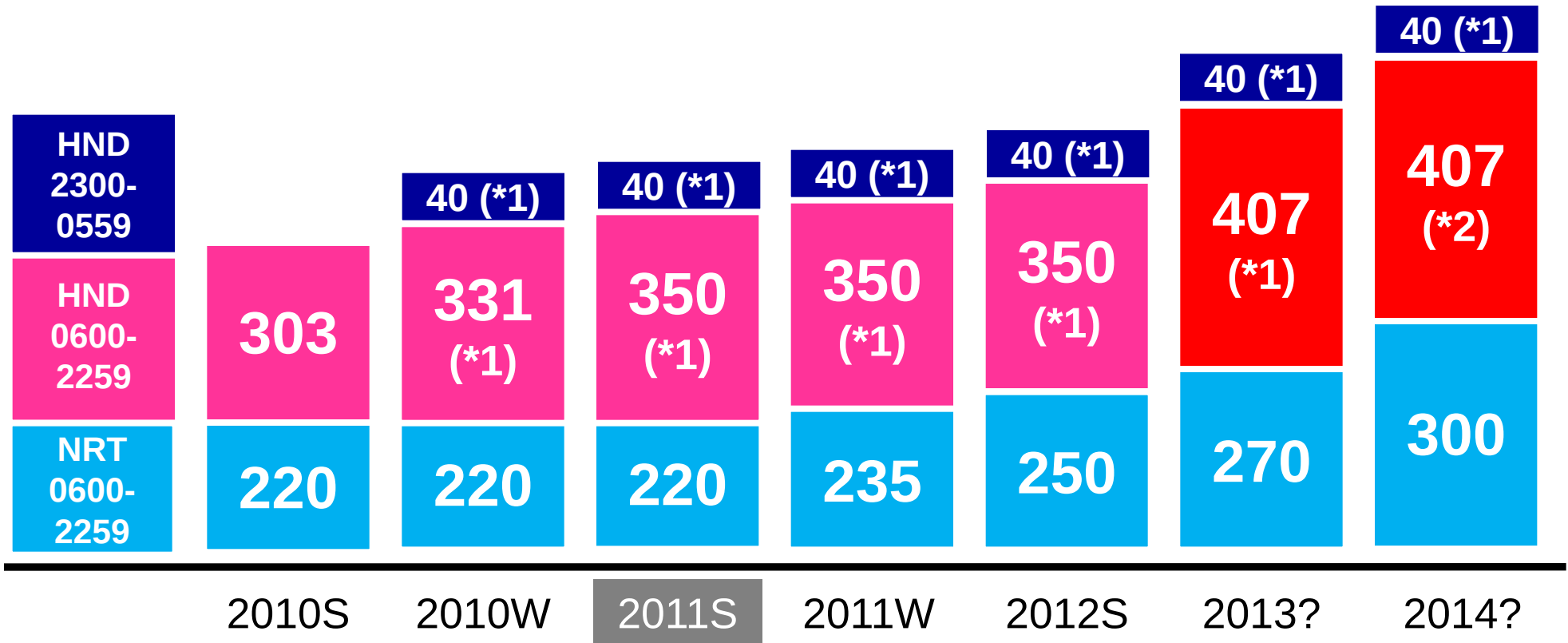


Source: IATA World Air Transport Statistics 53rd Edition
Boeing Current Market Outlook 2009 – 2028

Planned Capacity Increase at Narita and Haneda

P2

Annual movements (x thousand)



(*1) up to 30K slots may be used for int'l scheduled services

(*2) up to 60K slots may be used for int'l scheduled services



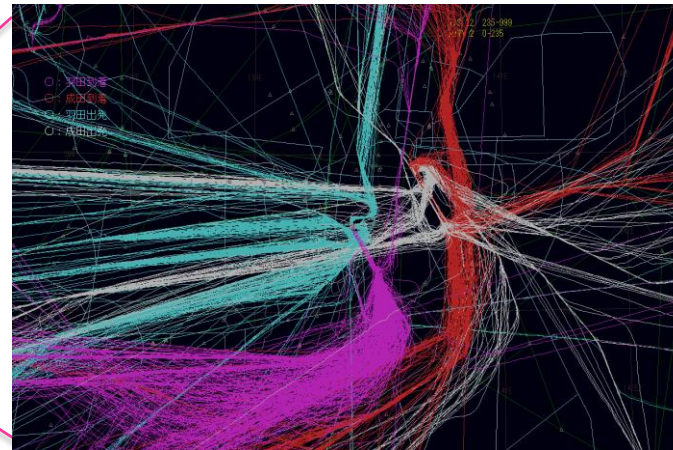
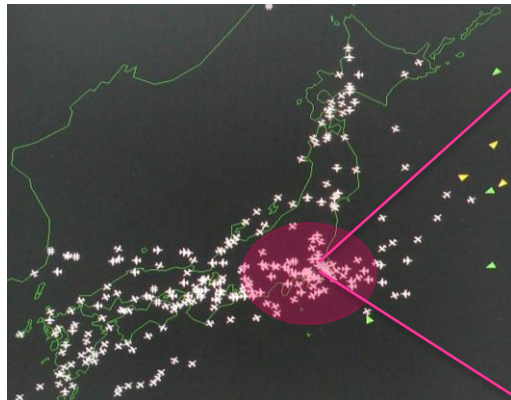
Delays...



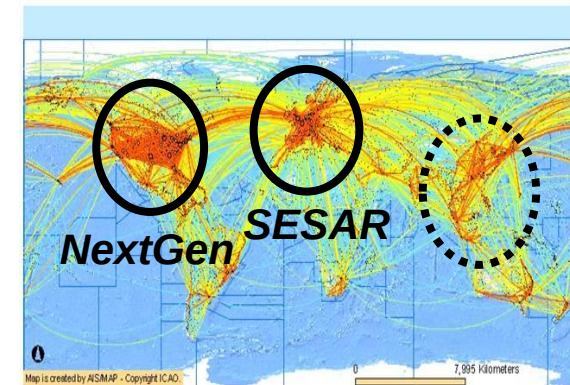
Competition...



Environment...



Congestion at Tokyo area...



Global Harmonization...

**Collaborative Actions for Renovation of Air Traffic Systems
CARATS**

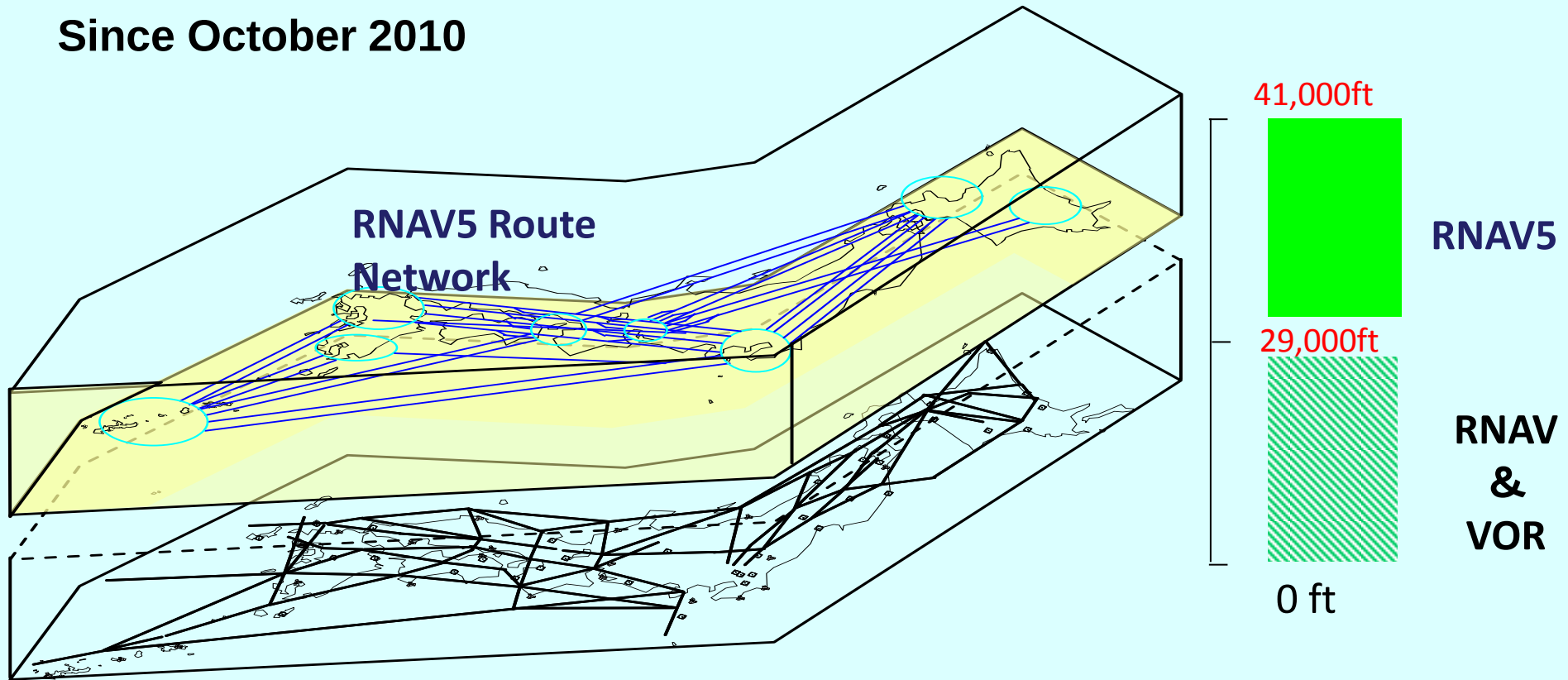
Towards the realization of this future air traffic system

- Step-by-step implementation in accordance with the roadmap, reflecting technology advancements
- How do we finance CARATS?
- Examples of ongoing solutions PBN, UPR, CDO, etc.

Performance Based Navigation

enRoute

Since October 2010



SID

RNAV1: 19
Basic-RNP1: 2
(# of Airports)

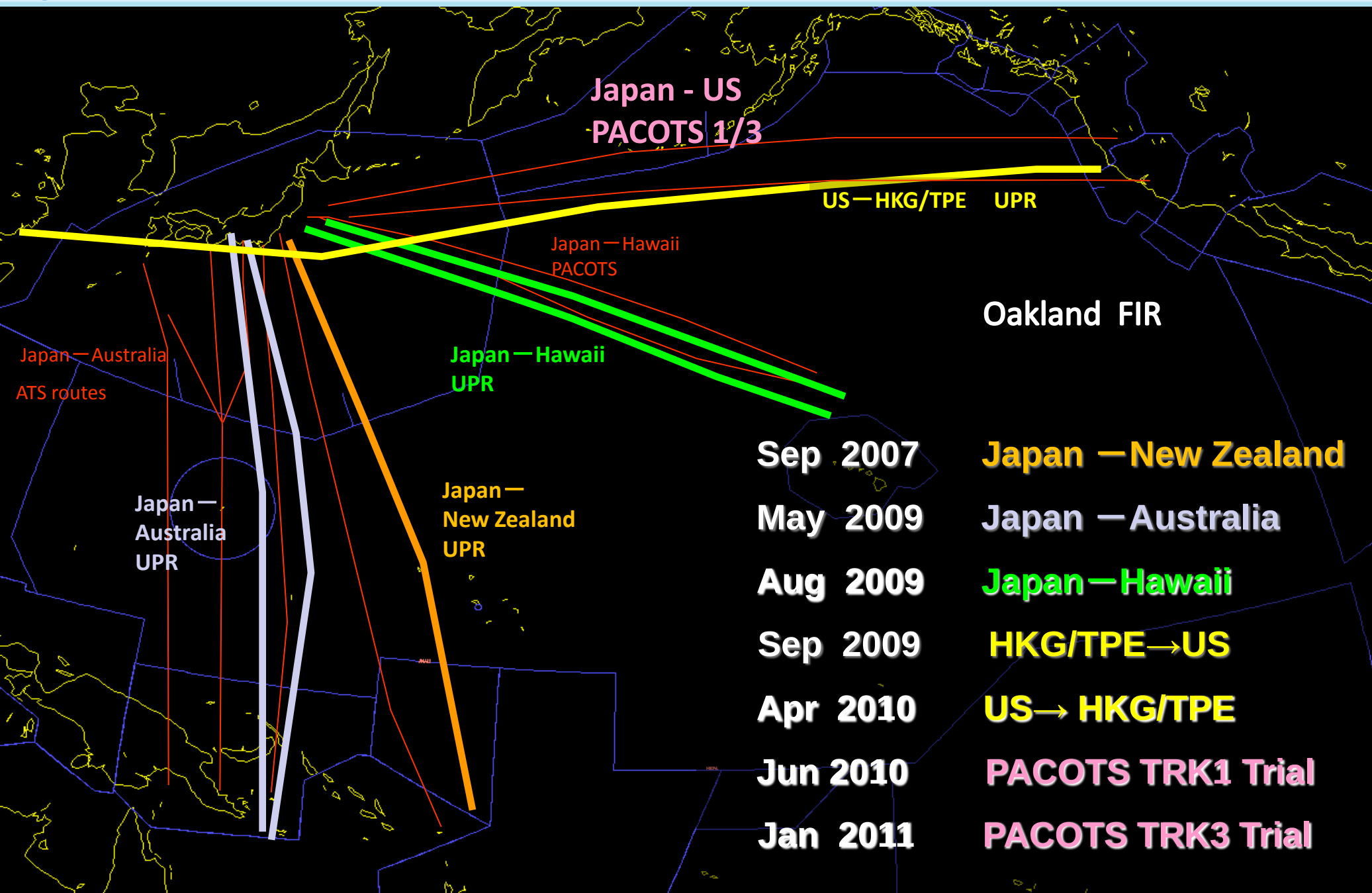
STAR

RNAV1: 20
(# of Airports)

Approach

RNP Approach: 14
RNAV(GNSS): 11
(# of RWY Ends)

User Preferred Routes



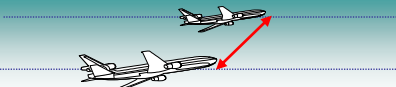
Oceanic Separation Reduction

➤ August 2008

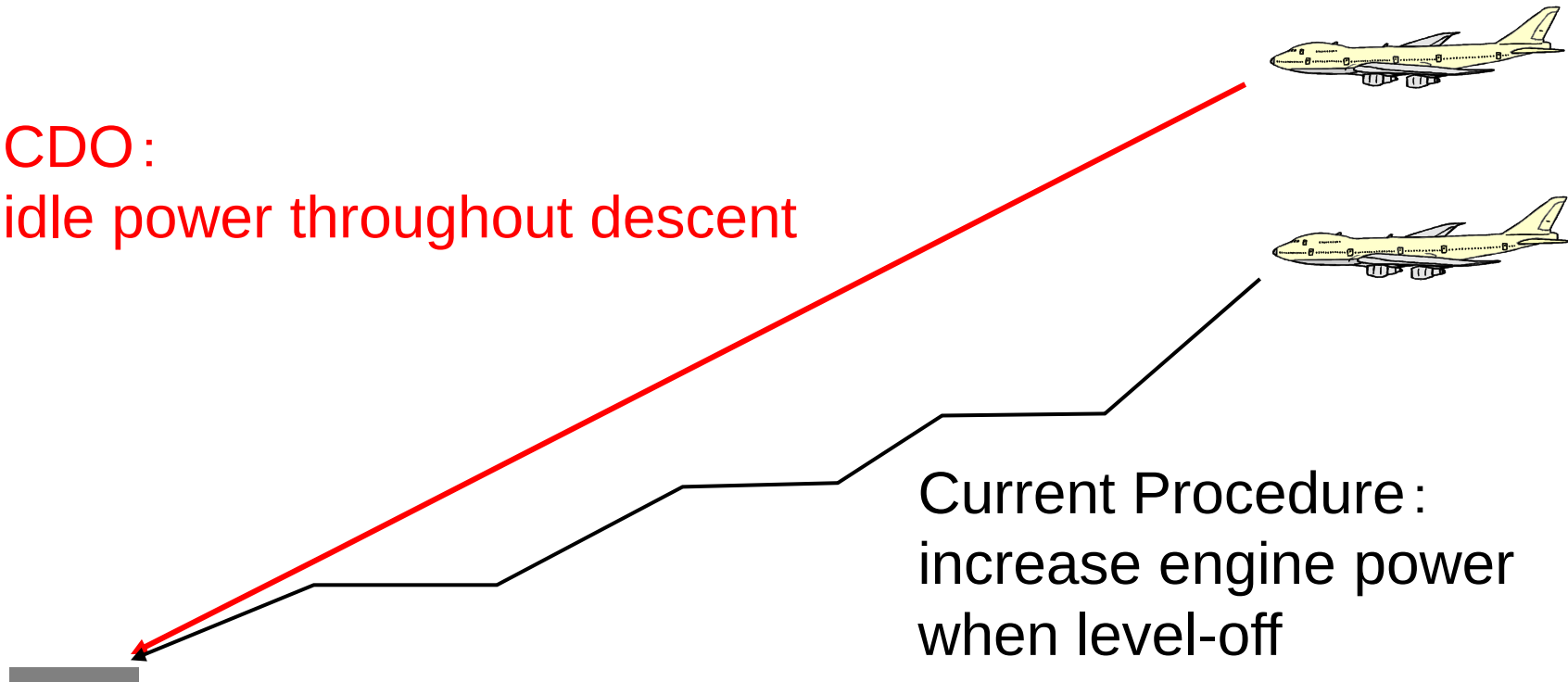
Introduced 30x30 separation within Fukuoka Oceanic for RNP4+ADS. Equipage rate still low (27%)

➤ May 2011

Fukuoka FIR/Oakland FIR seamless 30nm x 30nm

Longitudinal	Before April 2005	From April 2005	From August 2008
	15 min (150 – 120 nm)	50 nm	30 nm
Lateral	Before April 1998	From April 1998	From August 2008
	100 nm	50 nm	30 NM

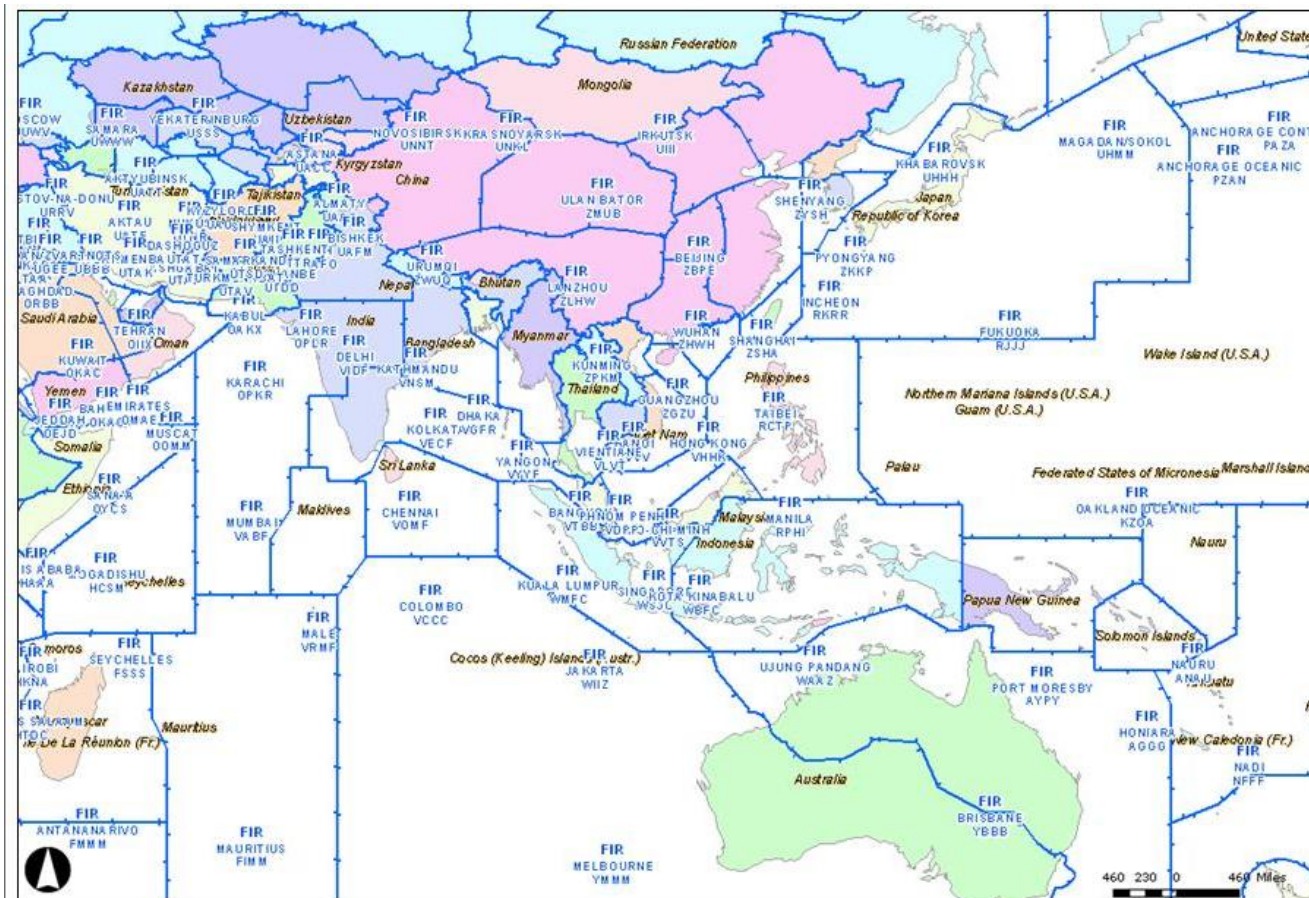
CDO:
idle power throughout descent



Current Procedure:
increase engine power
when level-off

*Less Fuel Consumption
Environmental Friendly*

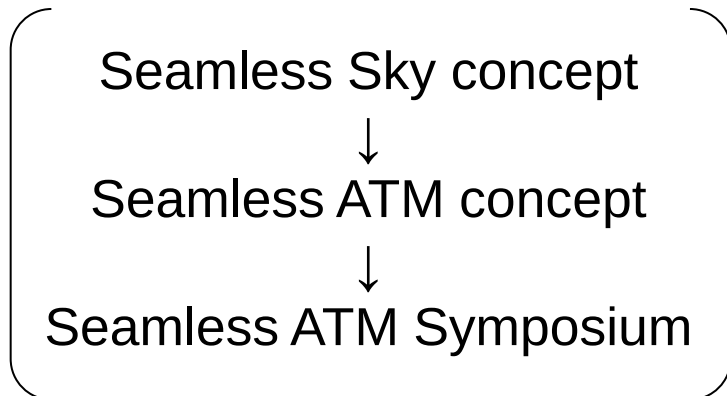
- diversity of culture, language, economy, etc
- jigsaw puzzled airspace, consisting of 50 FIRs of various size



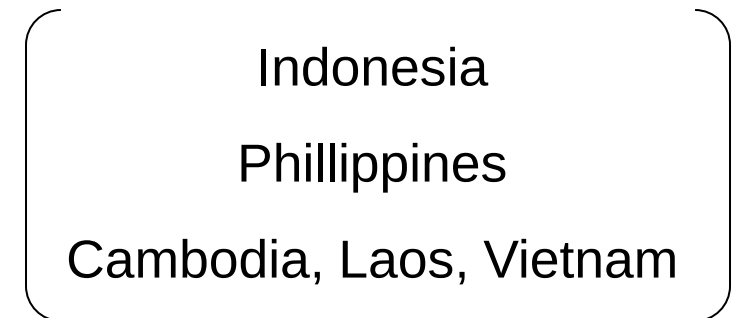
Need to work together for ATM harmonization



APAC DGCA Conference in Osaka



JICA CNS/ATM projects



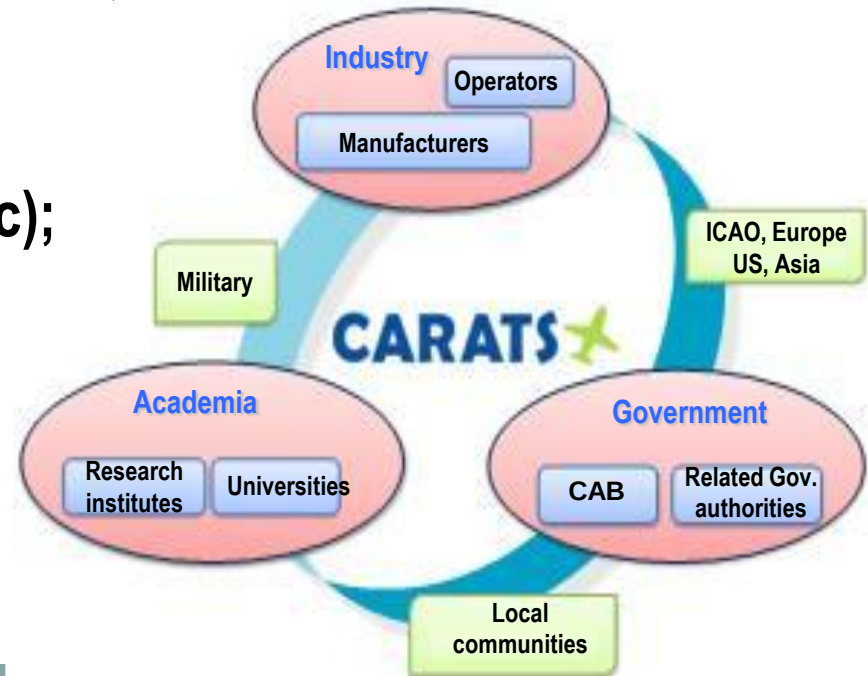
- Signed on 25 October 2006
- Meet twice a year
- Agenda
 1. Update on status of NextGen and CARATS
 2. Data Exchange workshop
 3. TBO workshop
 4. SWIM workshop
 5. Performance Assessment workshop

- Signed on 19 July 2011
- Initially meet once a year
- Possible areas of cooperation
 1. Harmonization of regulations and procedures
 2. Research and development
 3. Synchronization of roadmaps of CARATS & SESAR
 4. Coordination of activities at ICAO and other forum



Collaboration is a key for the success of future ATM:

- ✓ among industry, academia and government;
- ✓ among operators and ANSPs;
- ✓ among air space users (civil/military etc);
- ✓ with local community; and
- ✓ international collaboration to realize seamless ATM



CARATS

Collaborative Actions for Renovation of Air Traffic Systems

7 Targets

1. Enhance safety
5 times Safety
2. Increase ATC capacity
Double Capacity
3. Improve user convenience
+10% Service level
4. Efficient Operation
-10% Fuel Consumption
5. Enhance ATM service efficiency
+50% Productivity
6. Respond to Environmental issue
-10% CO2 emission
7. Strengthen International Cooperation

8 Pillars of Renovation

Trajectory Based Operation

Enhance Predictability

Performance Based Operation

Satellite Based Navigation

Improve Situational Awareness

Automation System and Human

Information Sharing & CDM

High Density Operation

Realizing the renovation

Lay out a roadmap, representing step-by-step implementation of the measures required to build the future air traffic systems

Clarify the roles of the industry, academy and government partners.

Consider and set index for achievement analysis of numerical goals .

1. Increase safety level by 5 times

- Reduce the number of accident while increasing air traffic volume;
- Reduce human errors by automated support systems;

2. Double ATC capacity in congested airspace

- Eliminate any bottleneck in the metropolitan area;
- 4DT, ATFM, Dynamic Airspace Management, etc;

3. Improve service level by 10%

- Customer satisfaction, on-time performance and over all user convenience;
- Compete with other transport modes;

4. Reduce fuel consumption/CO2 emission per flight by 10%

- ATM modernization, UPR, CDA, etc;
- Contribute to reduce of the operational cost;

④ Realizing Satellite-based Navigation for All Flight Phases

Determining position and time accurately in all FIR of Japan

① Realizing Trajectory-based Operation (TBO)

Fly regularly on a pre-coordinated trajectory from departure to arrival
Accurate time control

③ Promoting Performance-based Operation (PBO)

⑤ Enhancing Situational Awareness on the Ground and in the Air

Integrated information-sharing between the ground facility and the aircraft

A highly automated and comprehensive ATC support system

⑧ Realizing High-density Operation in Congested Airports and Airspace

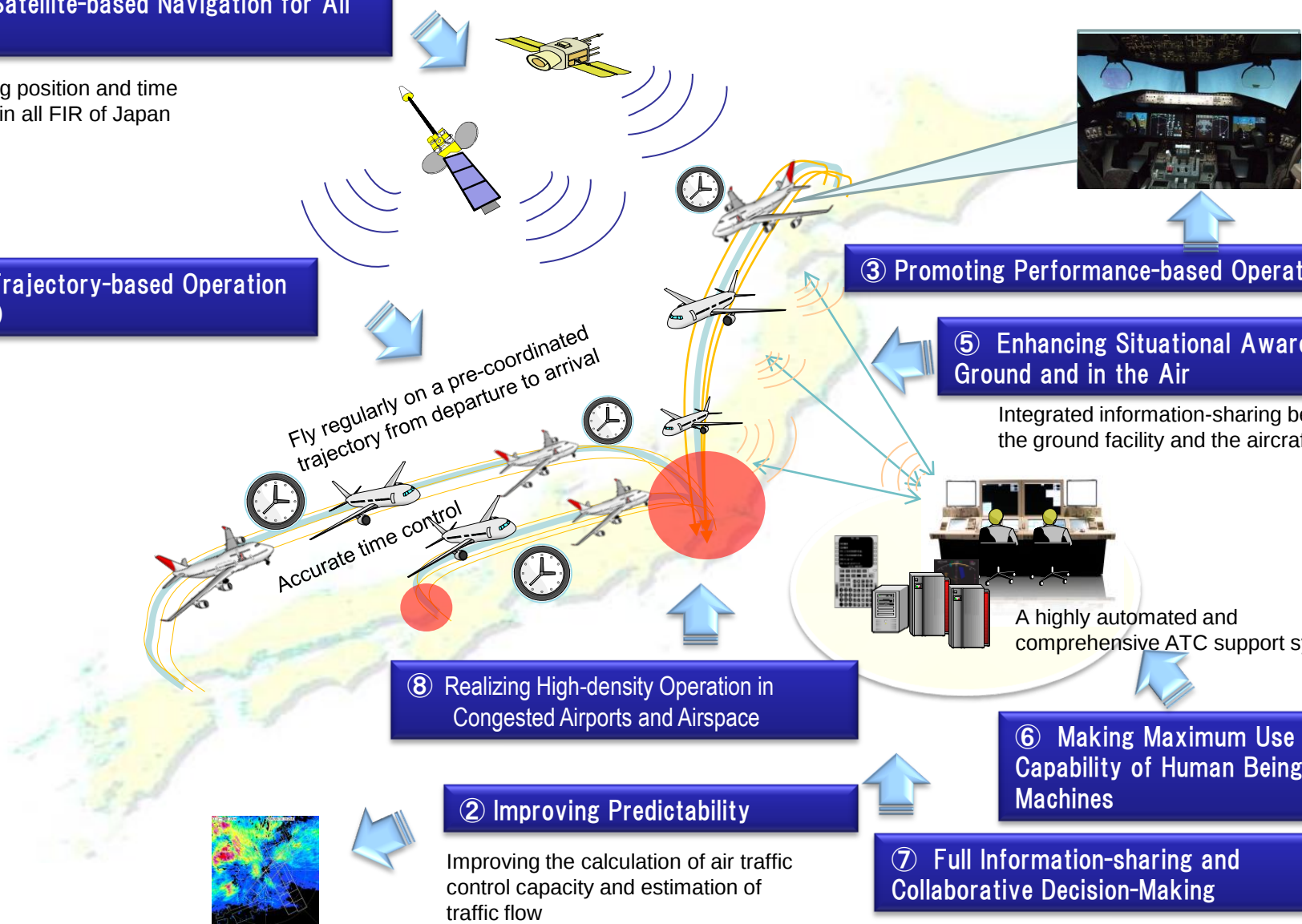
② Improving Predictability

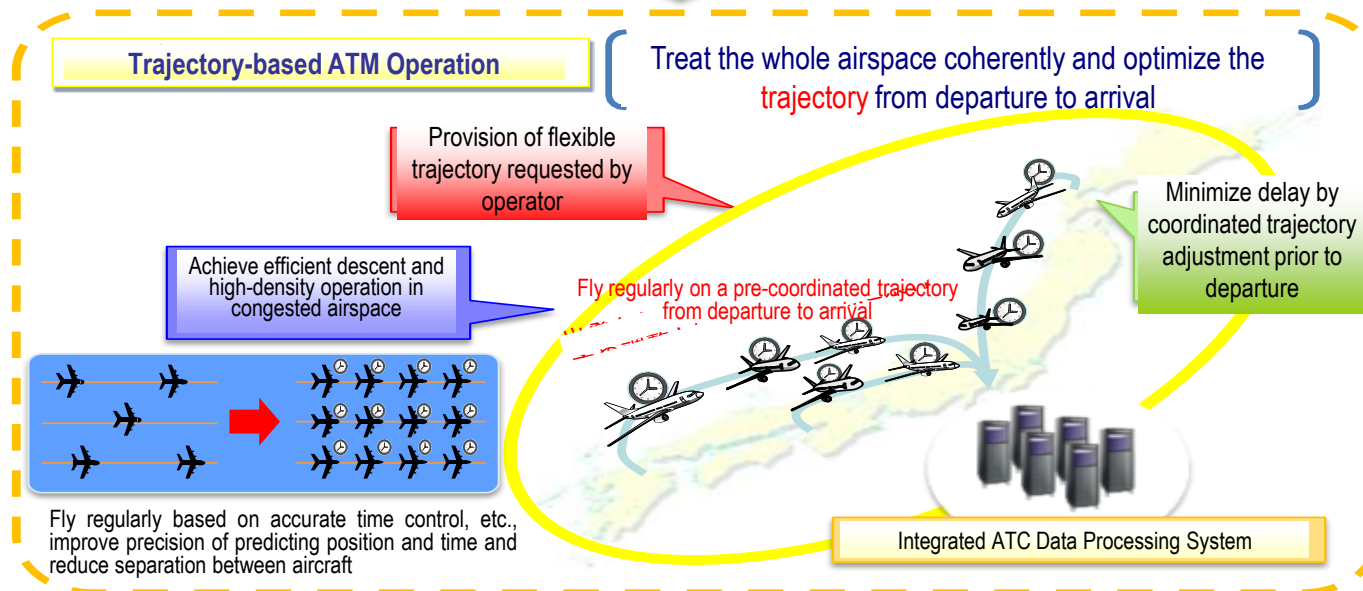
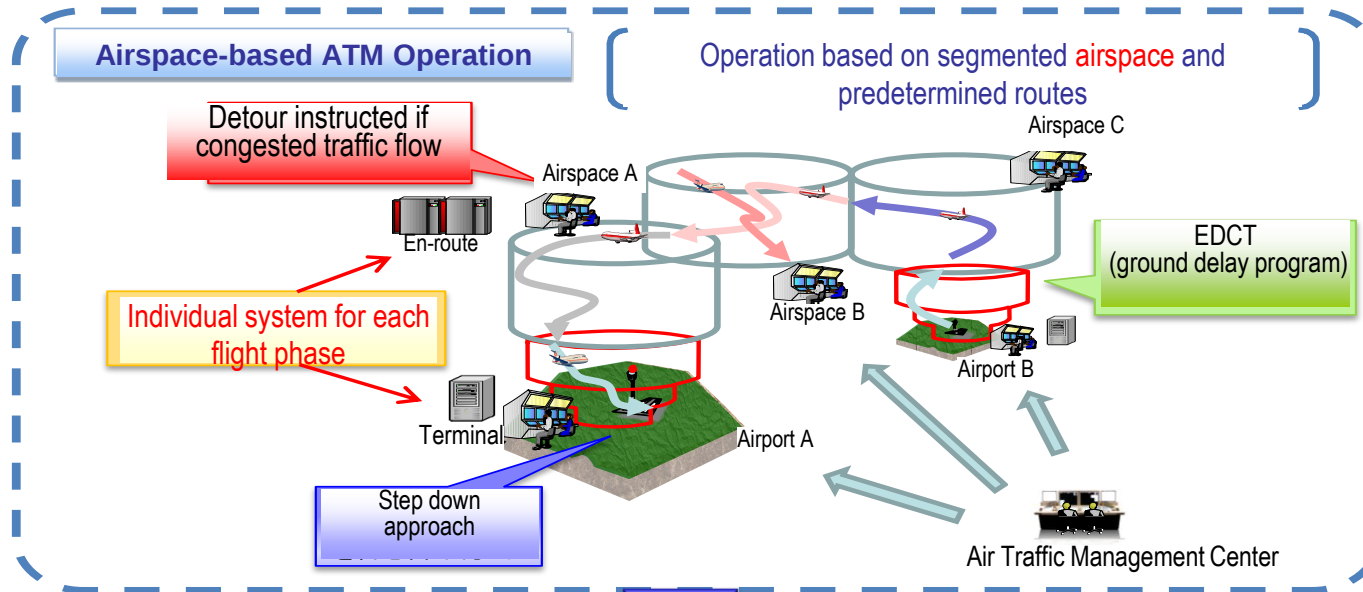
Improving the calculation of air traffic control capacity and estimation of traffic flow

Upgrading meteorological information

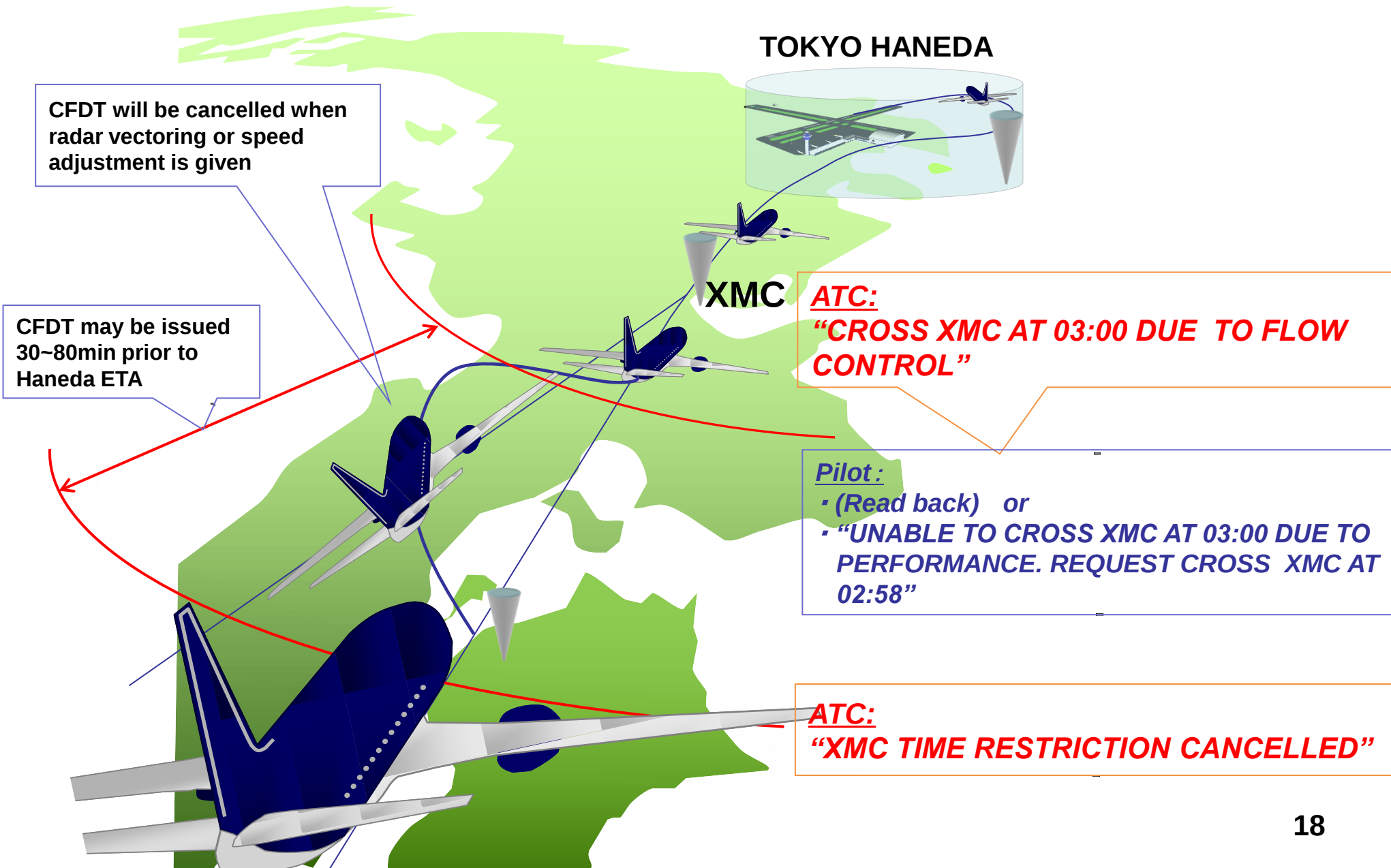
⑦ Full Information-sharing and Collaborative Decision-Making

⑥ Making Maximum Use of the Capability of Human Beings and Machines



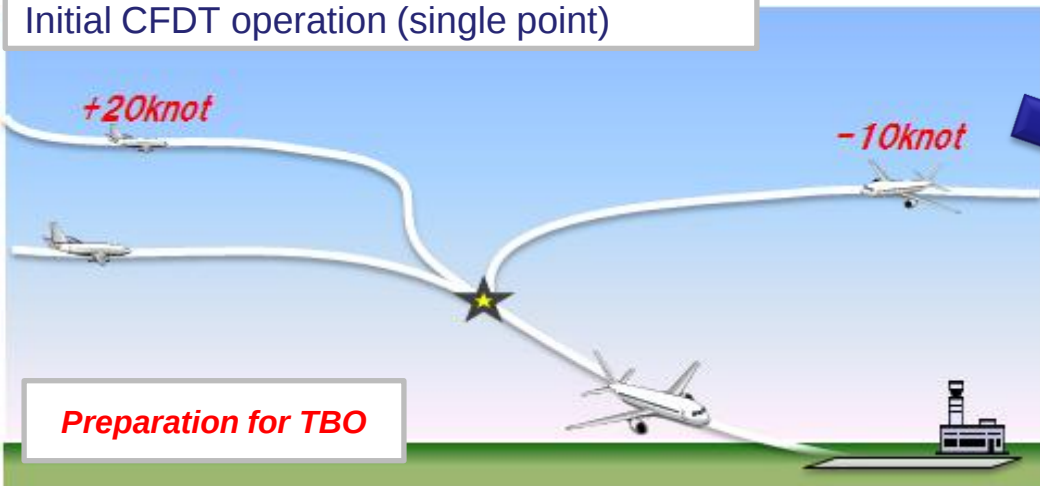


CFDT Operational Trial (AIC Nr 029/11)

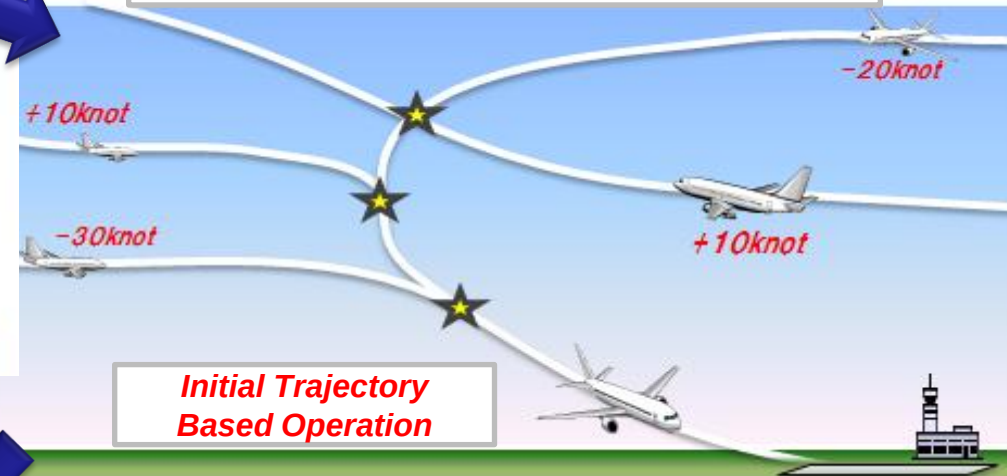


CFDT : Calculated Fix Departure Time

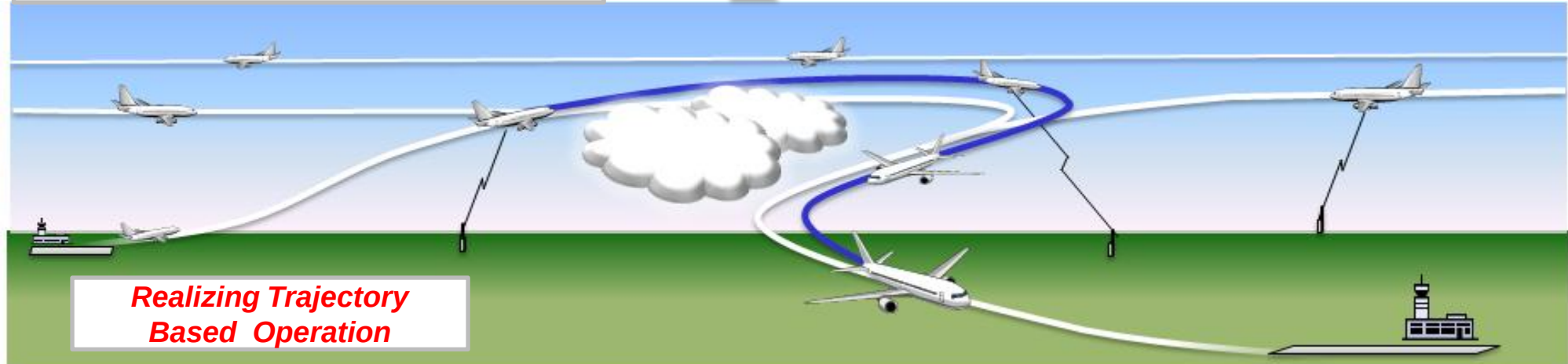
From 2012
Initial CFDT operation (single point)



From 2019
CFDT operation (multiple points)

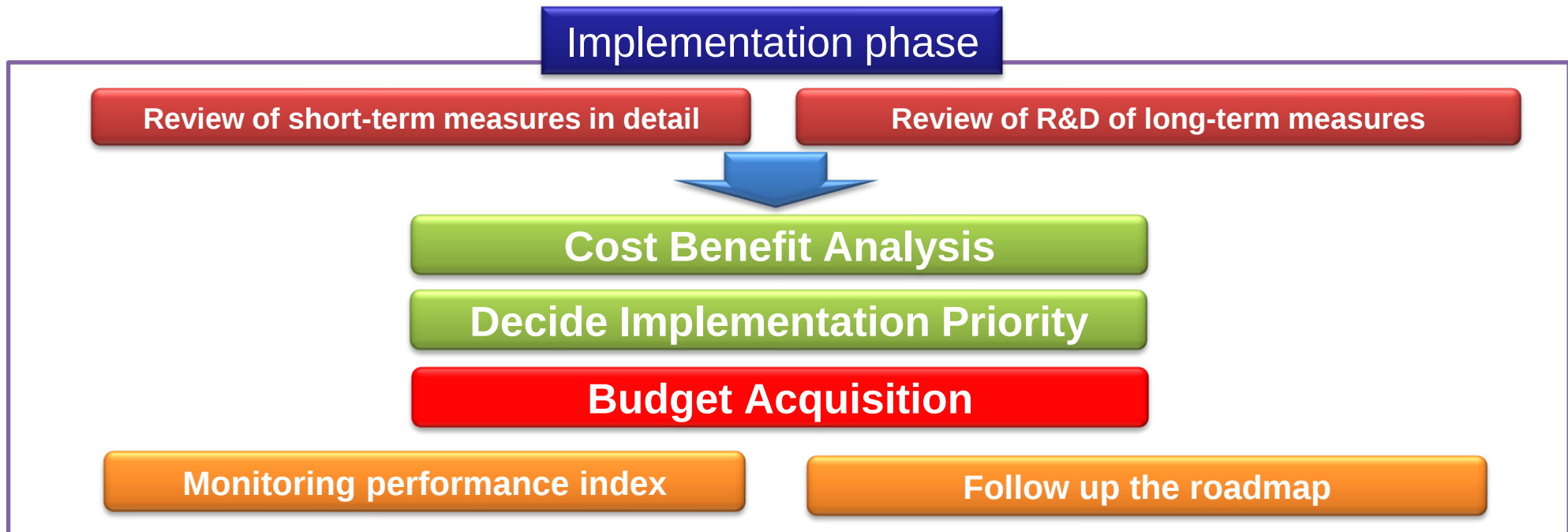
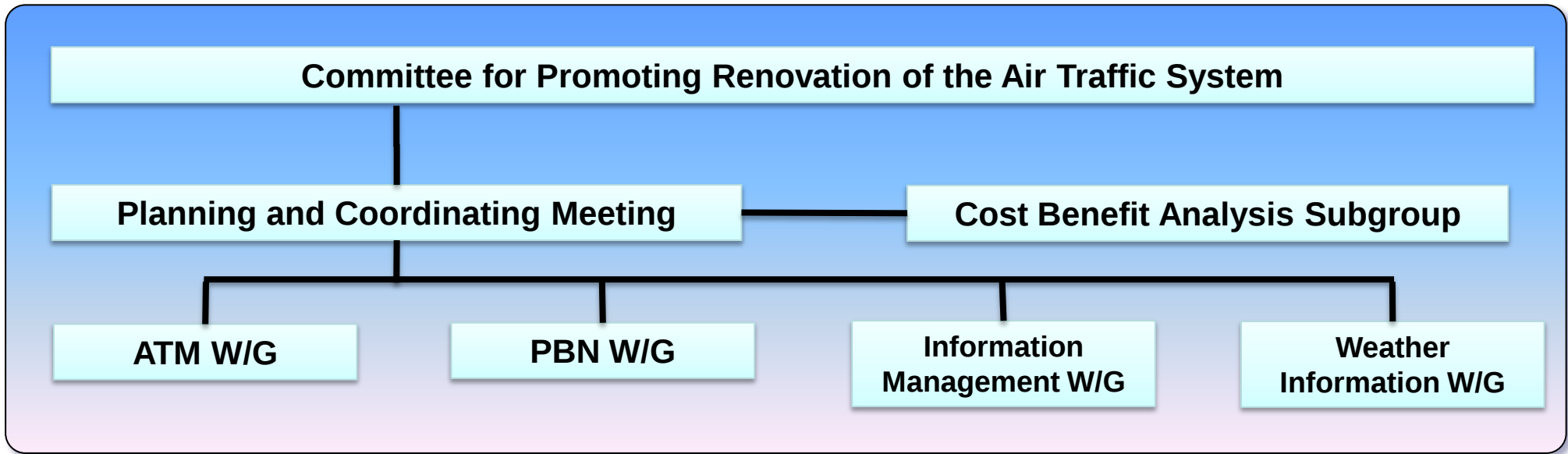


From 2025
Real time trajectory revision



39 Operational Improvements (OI) and 16 Enablers (EN) to implement CARATS

Category			Number of measurements	2015		2020		2025		
OI	Airspace organization	Flexible use of airspace	8	Variable sector boundaries		Dynamic variable use of terminal airspace		Dynamic variable airspace organization		
				Flex use of mil airspace		Free routing for high altitude airspace		Flow corridor		
	Pre-flight	Performance based operations	4	RNP AR app and dept		RNP operations with high accuracy including the "time" element				
				In-flight	Collaborative trajectory generations	5	CDO and CCO		Collaborative coordination of trajectories prior to the flight operations	
	Trajectory-Based Operation	5	Initial CFDT (single point)				CFDT (multiple points)		TBO	
			High density operations	14		Optimize off-block time		Air-to-Air surveillance (ASAS)		
	Improved capacity of ATC using datalink for routine communications									
	Improved information services	2	Enhanced information in the cockpit							
			Post-flight	Sharing and utilizing safety related information	1	Sharing and utilizing safety related information		Real time risk management		
EN	Information management	3				FODB		FF-ICE		
			Weather information	3	Improved weather capabilities					
					Navigation	2	Facilitation of SBAS & GBAS to be reviewed			
			Surveillance	8			WAM (gnd) & ADS-B (UAT)		WAM (enroute/airport)	



Thank you for your attention

