

# ADS-B Everywhere

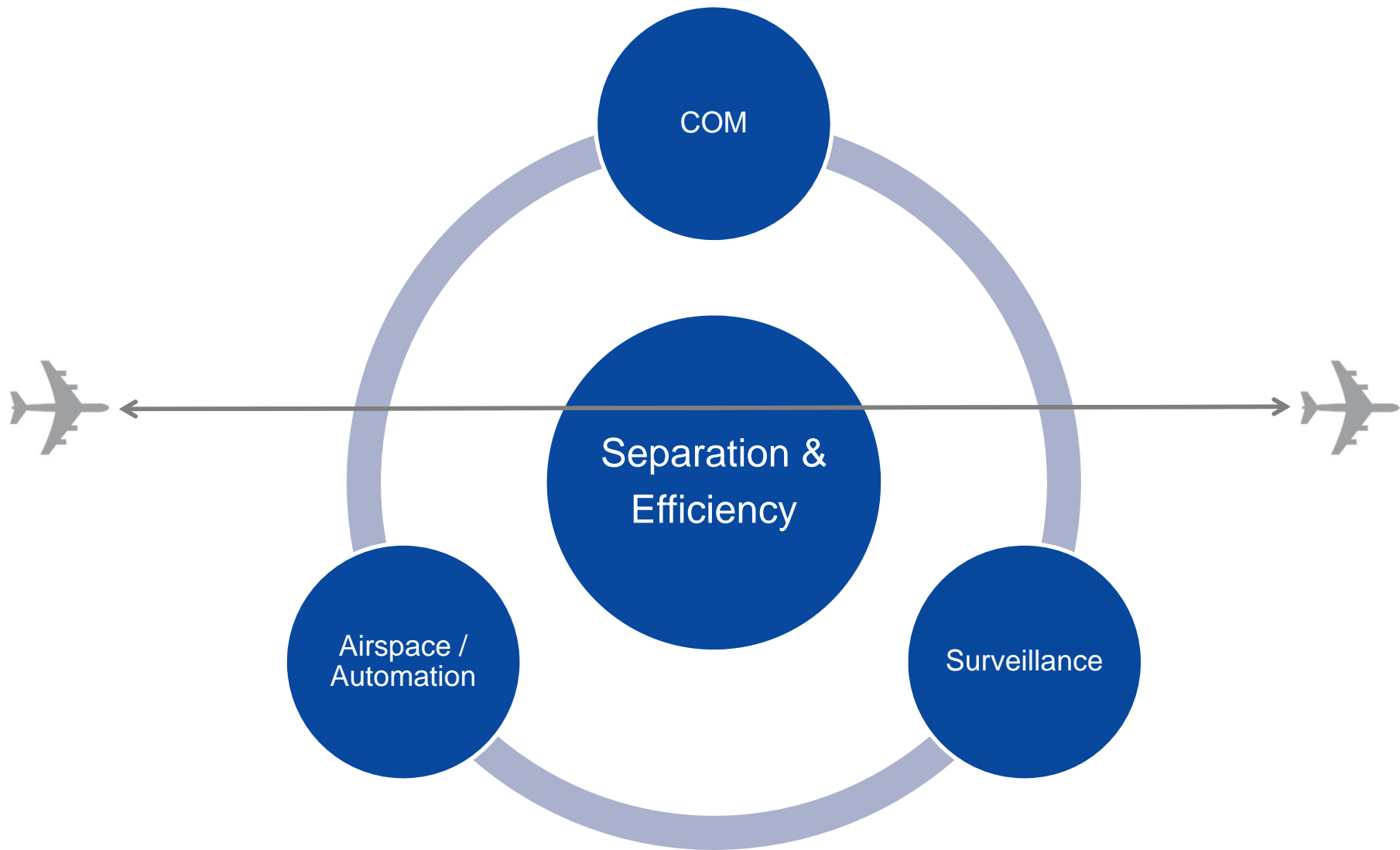
*Cyriel Kronenburg*  
*Vice President*

*Singapore, November 11, 2014*



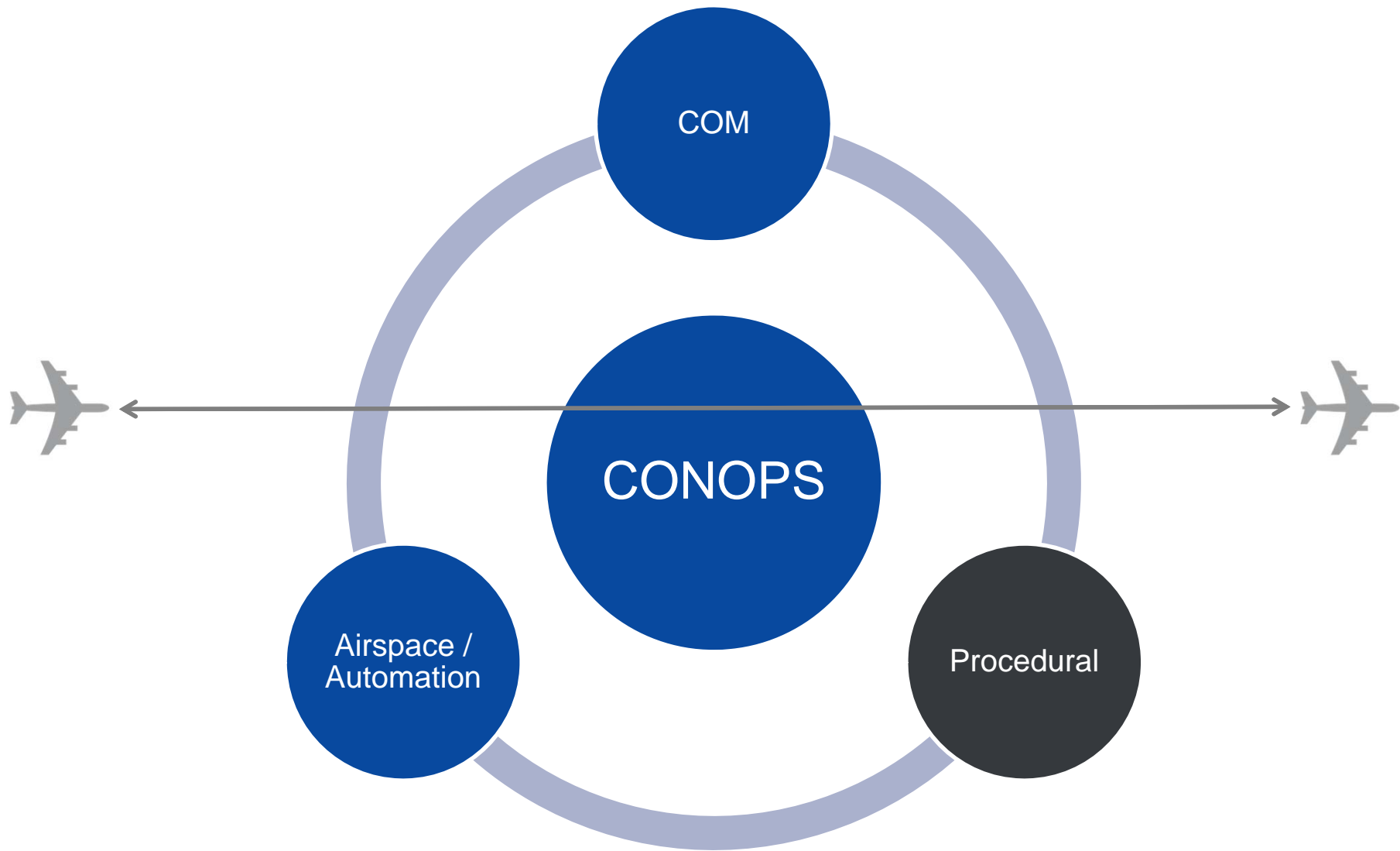


# Conceptual ATM Performance



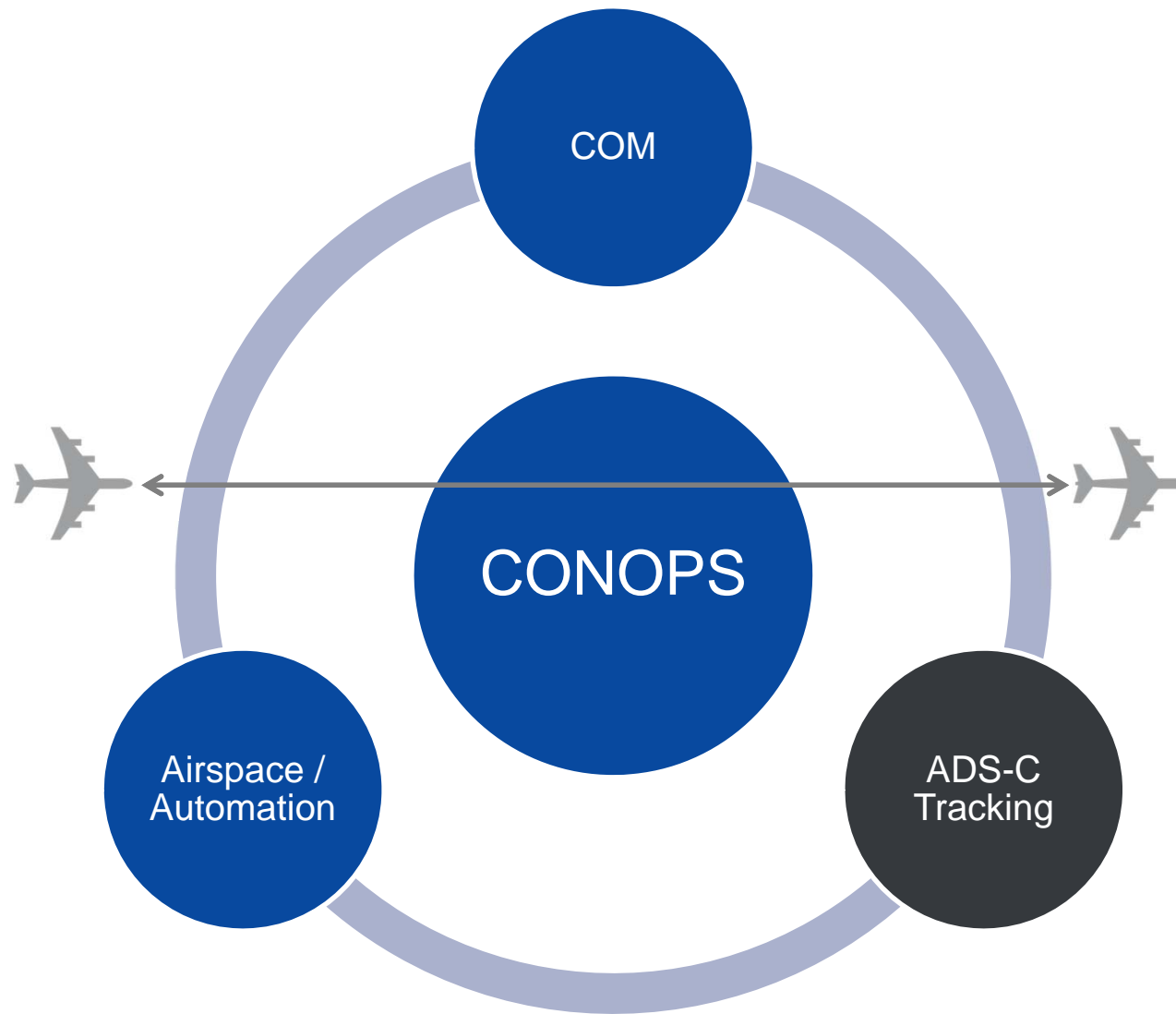


# Conceptual ATM Performance



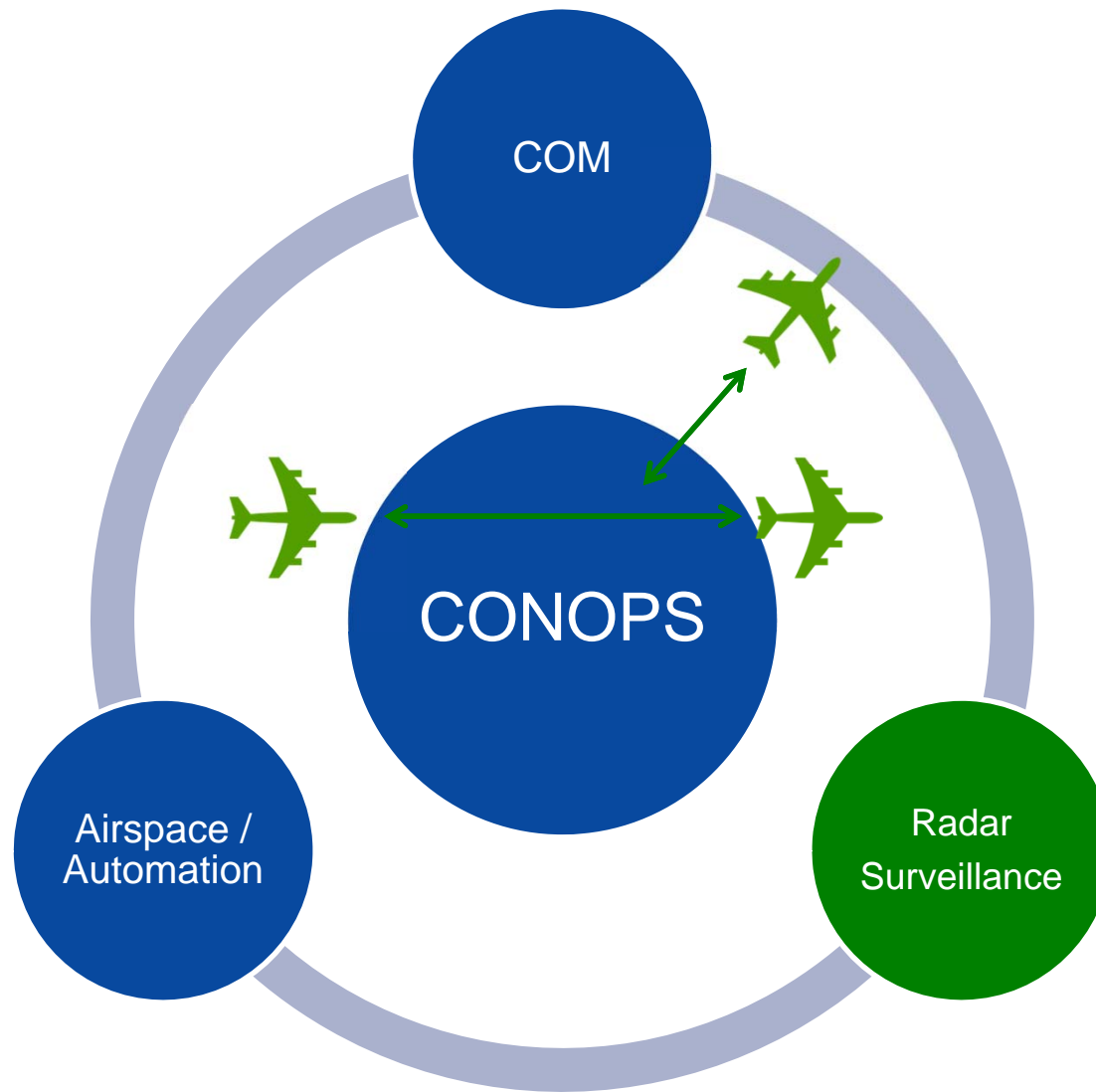


## Conceptual ATM Performance



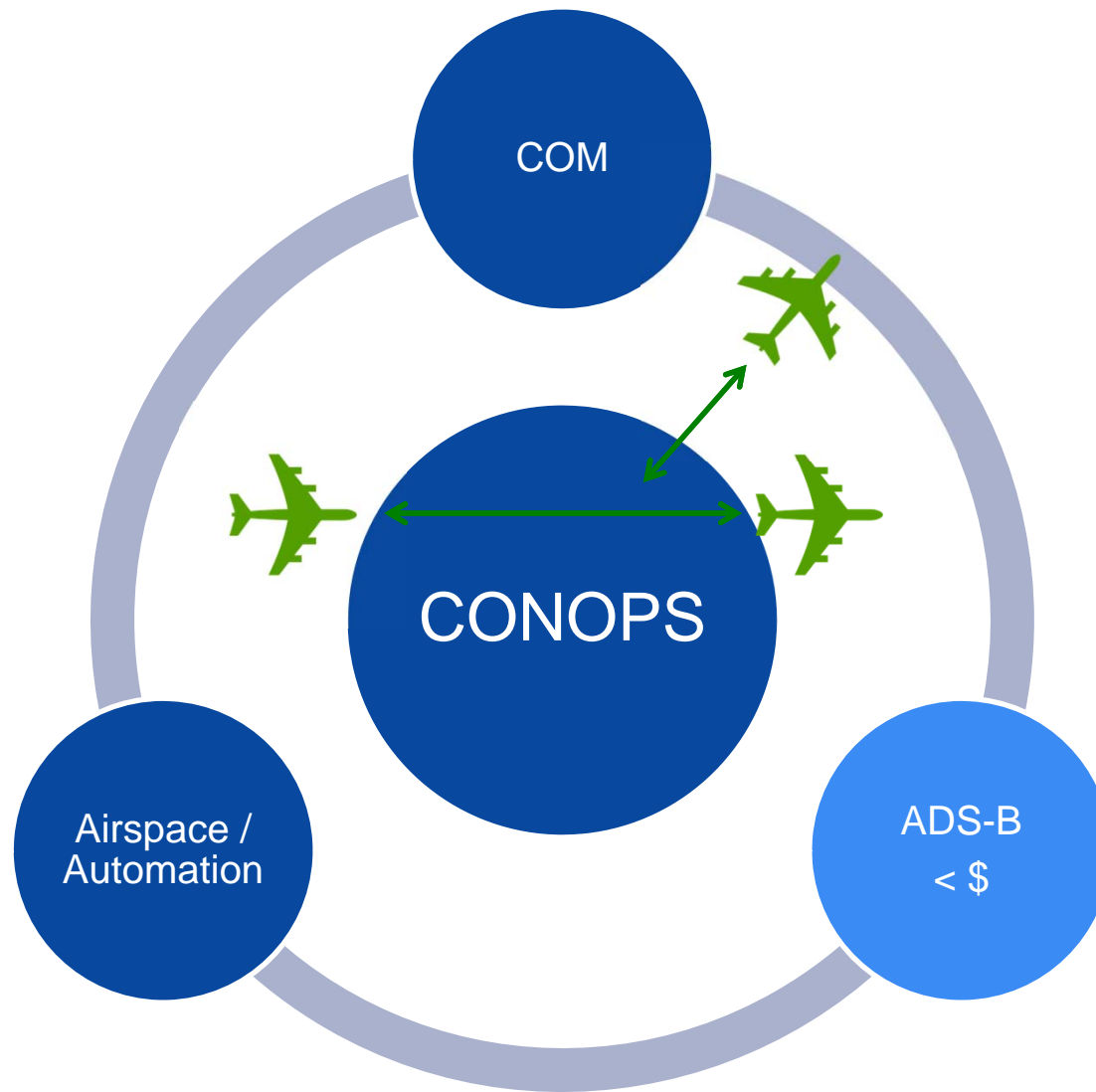


## Enabling ATM Performance



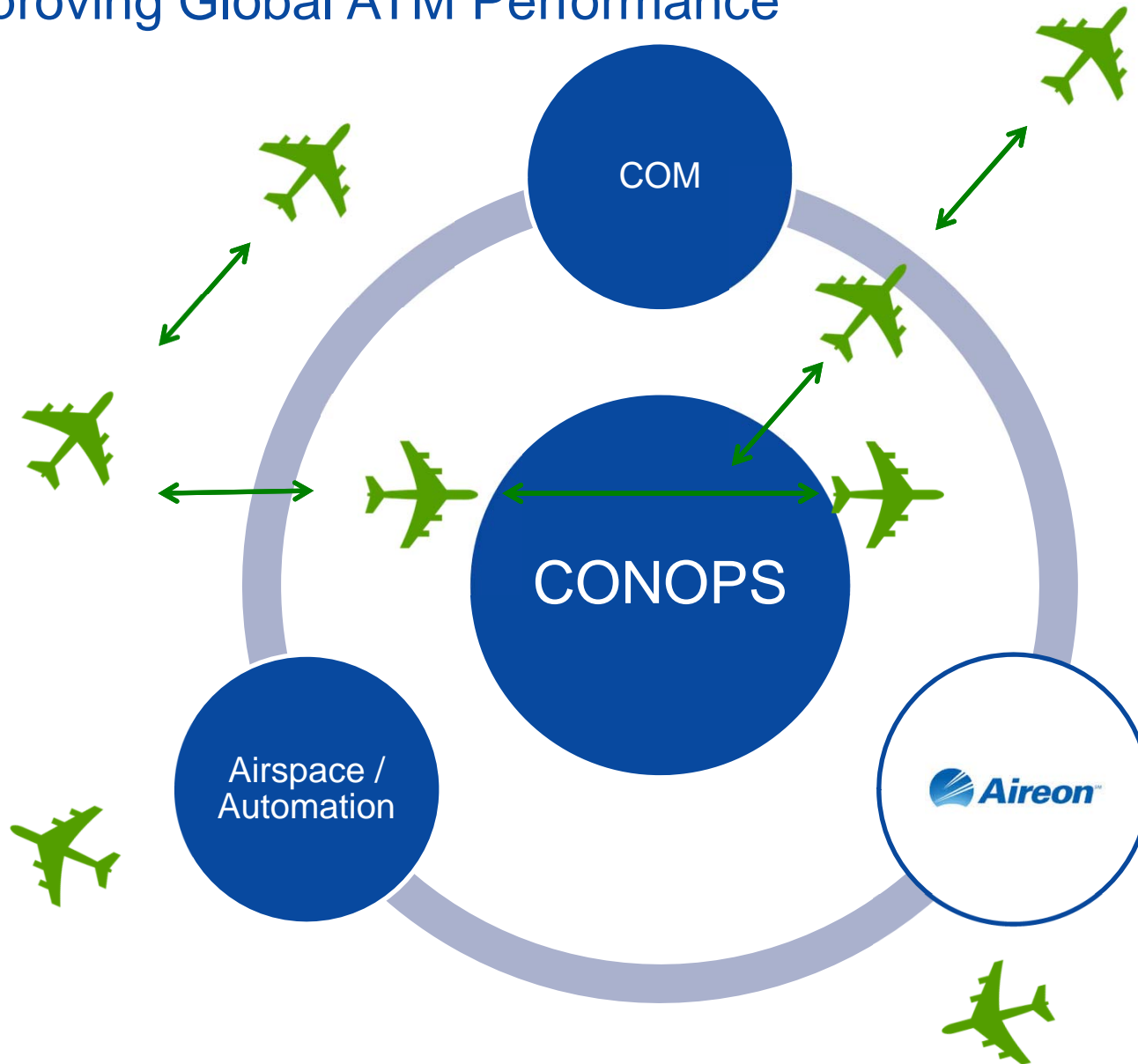


## Improving ATM Performance





# Improving Global ATM Performance





## Today's surveillance challenges:

### Physical:

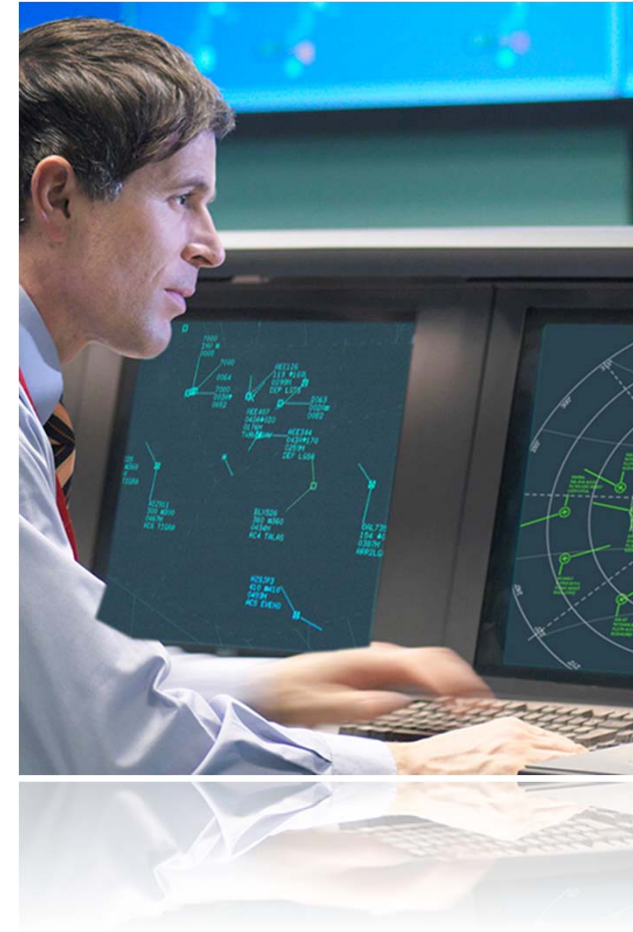
- No surveillance over oceans and remote terrain

### Cost

- Installation cost of radar / ground stations
- Maintenance costs for remote sites
- ADS-C Equipage & subscription

### Operational

- SWIM / Data sharing / Border safety
- Flow Management
- Contingency of signals
- Downtime of physical structures
- Lack of harmonization
- Differences in separation standards

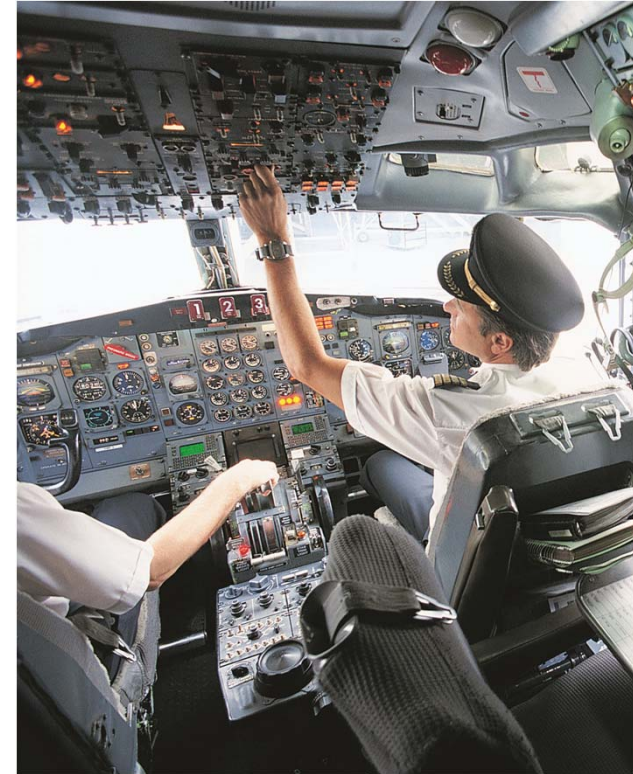






## Resulting in challenges for airlines

- Safety
- High infrastructure costs
- Varying equipage mandates
- Equipage costs
- Inefficient routes based on corridors
- Inefficient separation based on tracking
- No optimum flight paths
- Flow restrictions
- Lack of service predictability
- Situational awareness
- Flight tracking





## “It’s just ADS-B”

*“Don’t develop CONOPS around space based ADS-B but enable ADS-B into the ATM system to work anywhere in your FIR with surveillance performance”*

- **Sole source sensor surveillance**

- Provide a signal, suitable for surveillance, to an ATM system where it currently does not exist to enhance safety, efficiency and operational performance

- **Multi sensor surveillance**

- Augment existing ADS-B or radar surveillance to fill gaps, improve performance, lower infrastructure costs, improve safety, share surveillance data and provide seamless contingency





## Value for ANSPs

- **Instant Surveillance Across Any FIR**

  - Low cost coverage of oceanic and remote areas

  - Fill gaps / Eliminate Line of Sight / MLAT

  - Contingency signal for backup purposes

- **Safety Enhancement**

  - Surveillance where it currently does not exist Extend your visibility across FIR boundaries.

- **Infrastructure Cost Reduction / Avoidance**

  - Reduce or avoid maintenance or replacement costs of physical ground infrastructure

- **Improve Customer Experience**

  - Flexible routing for airlines over ocean and remote regions, enable new route structures





## Value for Airlines

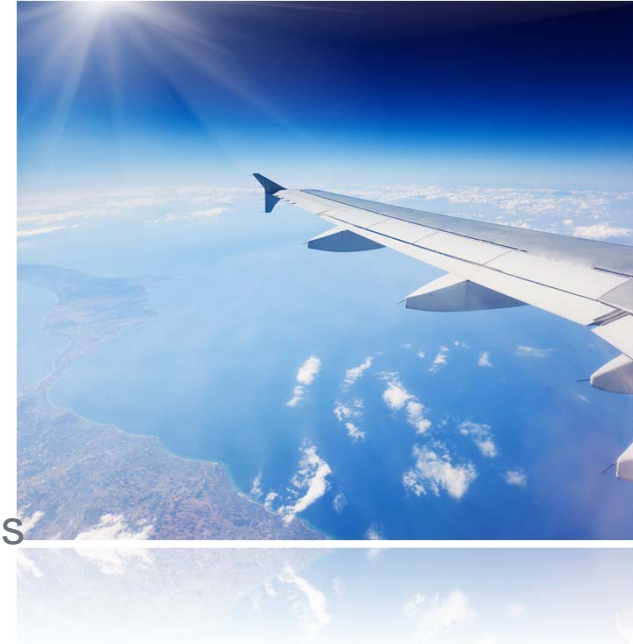
- **No investment: Utilize existing ADS-B equipment**
- **Safety Enhancement**

Eliminate surveillance gaps over oceans and regions with limited/unreliable infrastructure
- **Operational Efficiencies / Fuel Savings**

Optimized flight paths, altitudes, airspeeds.  
More direct routing, allow tactical avoidance
- **Service Predictability**

Global harmonization of surveillance, seamless transitions between FIR's
- **ATM Infrastructure Savings (ANSP Costs)**

Reduction of ground based infrastructure costs  
Avoidance of investments in ground infrastructure





## Cost Benefit Analysis

A standard cost benefit analysis model has been designed in close cooperation with NAV CANADA and our other investors to be used for regional analysis, prospect customers and more detailed business cases.

### **The basics of the service are simple**

- The costs model for space based ADS-B is similar to any other surveillance signal
- ANSPs pay monthly operating costs for radar / ADS-B but also a high upfront costs
- Space based ADS-B will be a signal provided to the ANSP with monthly or annualized costs, charged to the ANSP the same way they pay for radar or ground based ADS-B but without the upfront investment.

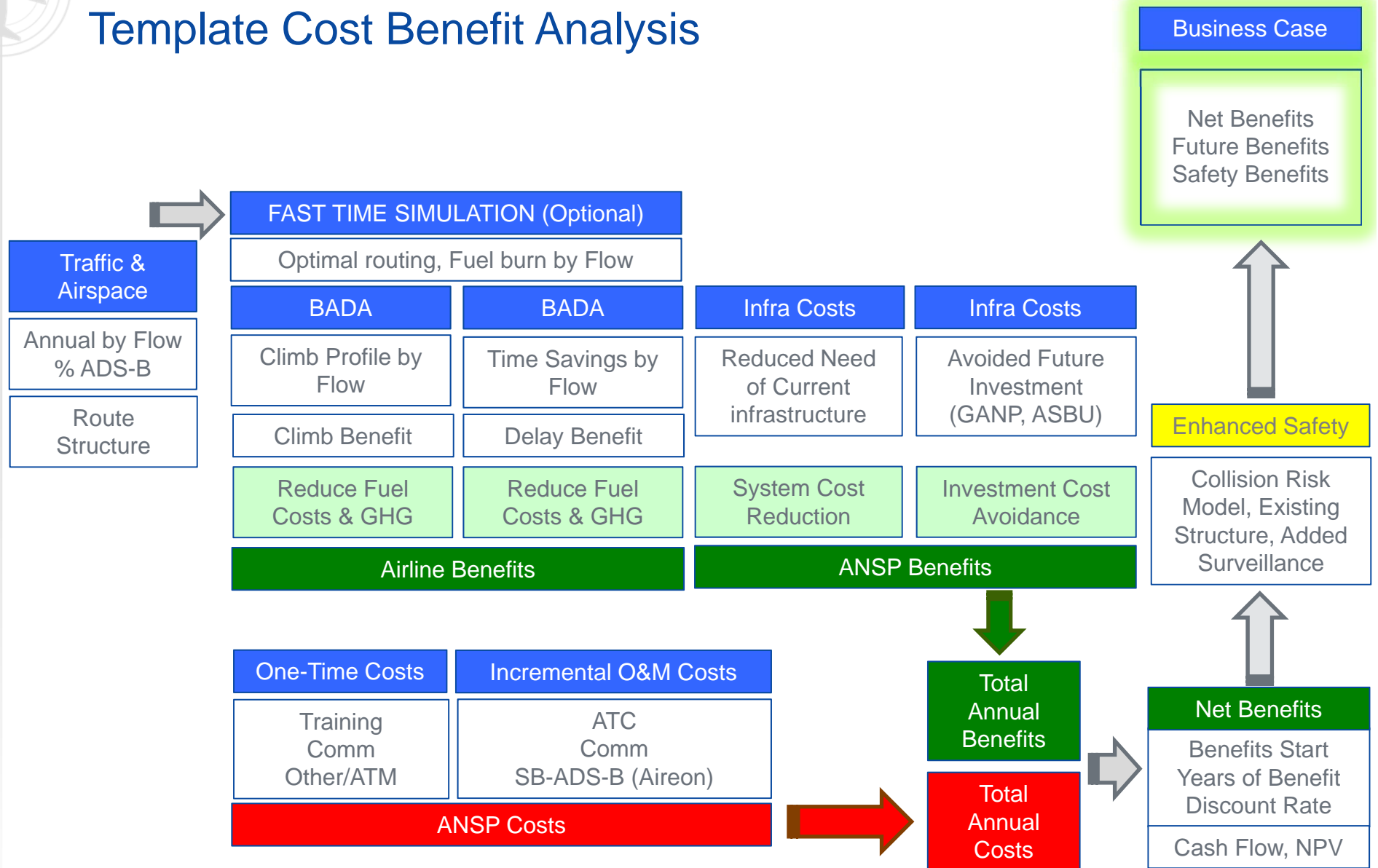
### **Cost Benefit**

- In the case of the North Atlantic it was a no brainer, the fuel benefits far outweigh the costs of the system: 450 litres per NAT crossing, 2.9 billion over the life of the system
- For ANSP benefits we will look at the benefits of not replacing a radar, not investing in new ADS\_B ground, removing ADS-C or VSAT backup, removing expensive SWIM data sharing needs, dual feeds for ACC backup, double coverage



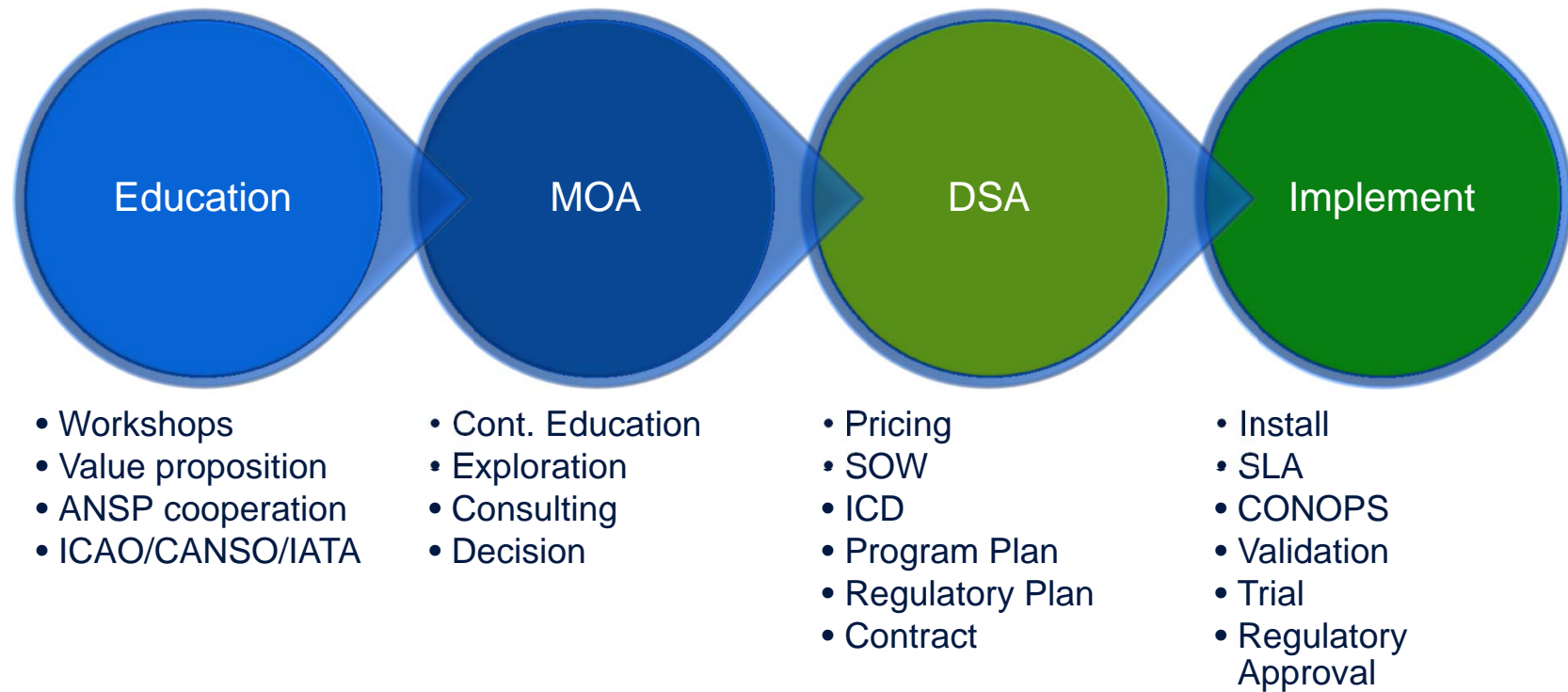


# Template Cost Benefit Analysis





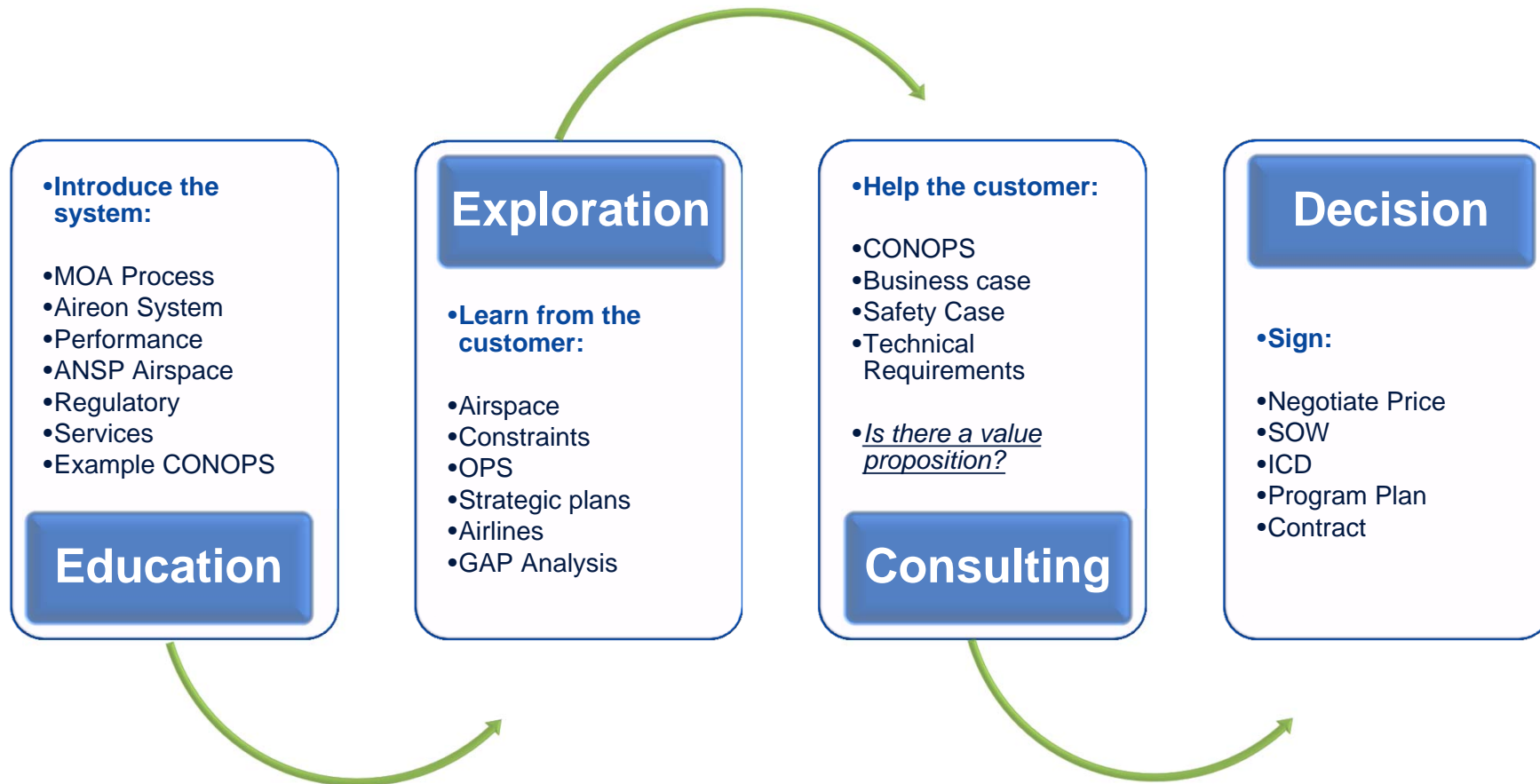
# ANSP Implementation Roadmap







# MOA Process





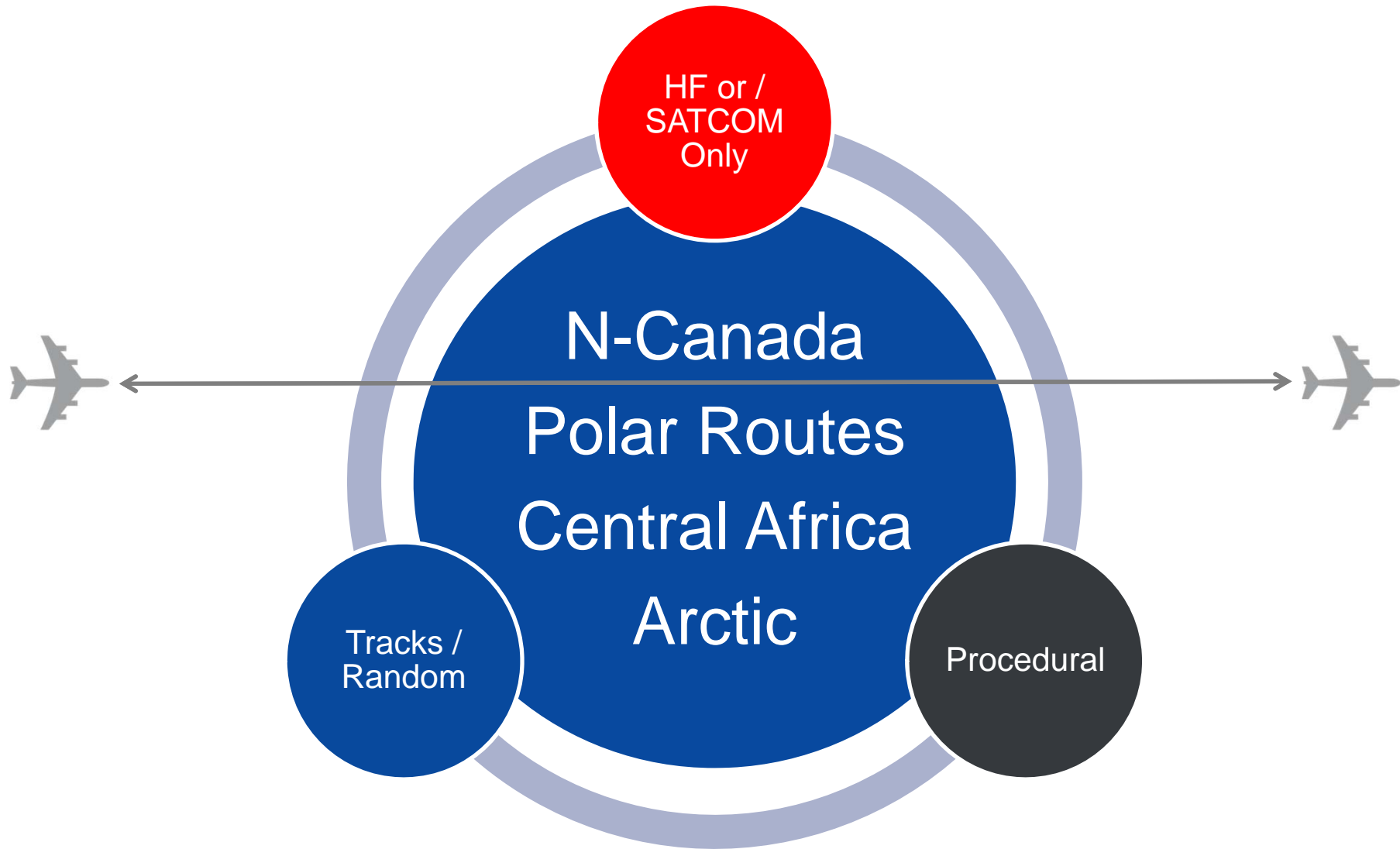
## Possible scenarios

*Developing new CONOPS with ANSP partners*



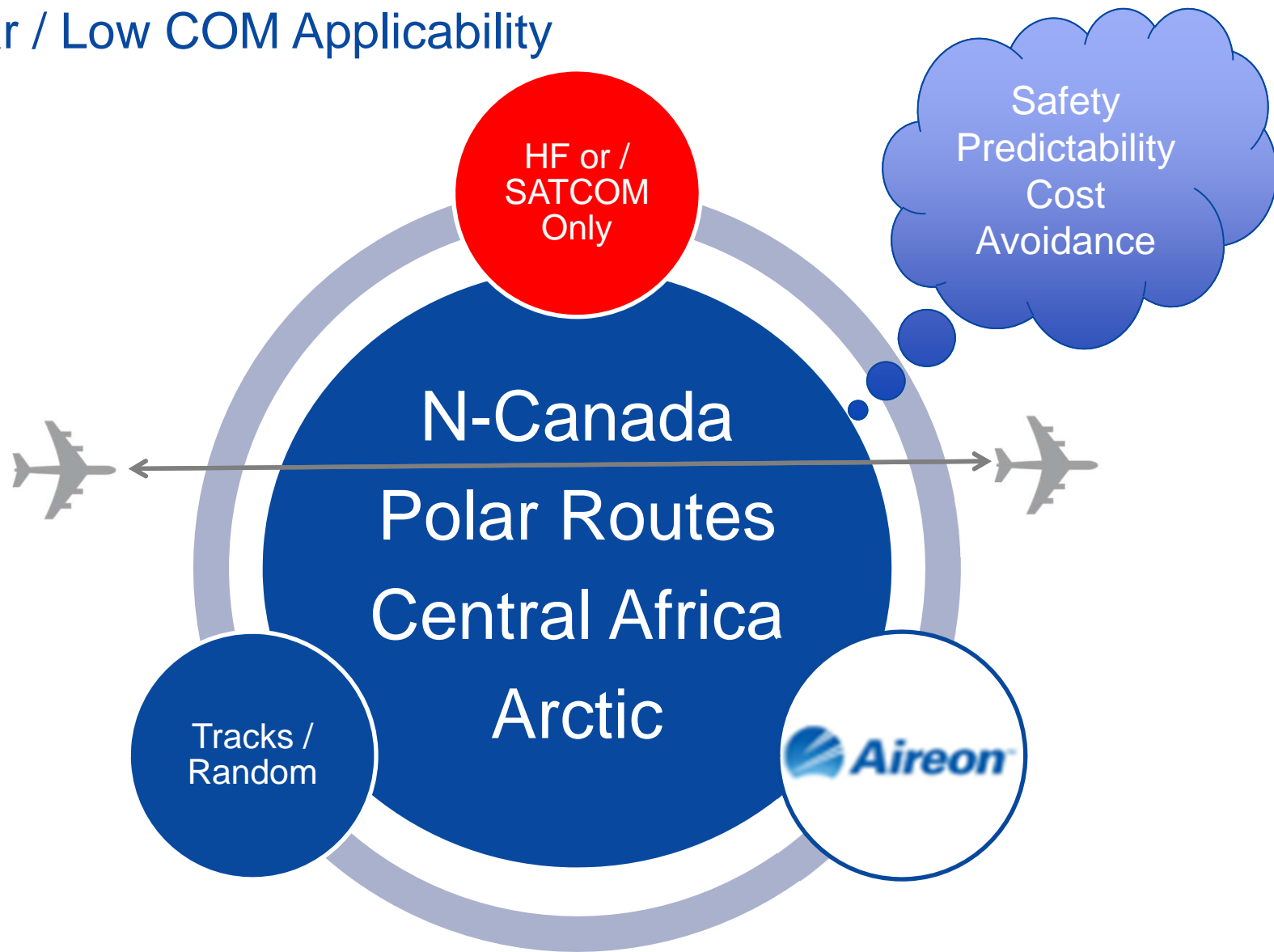


## Polar / Low COM Applicability





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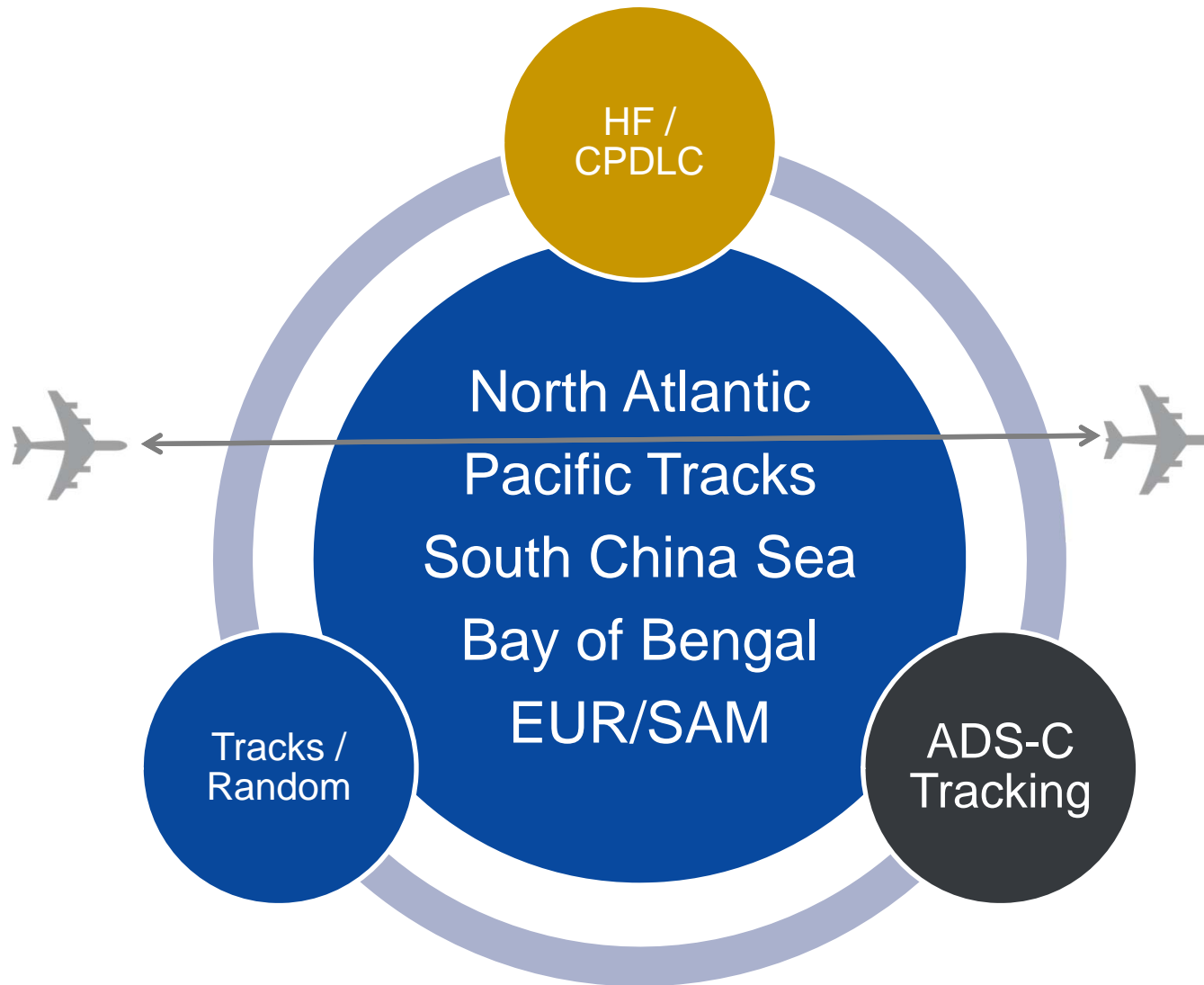






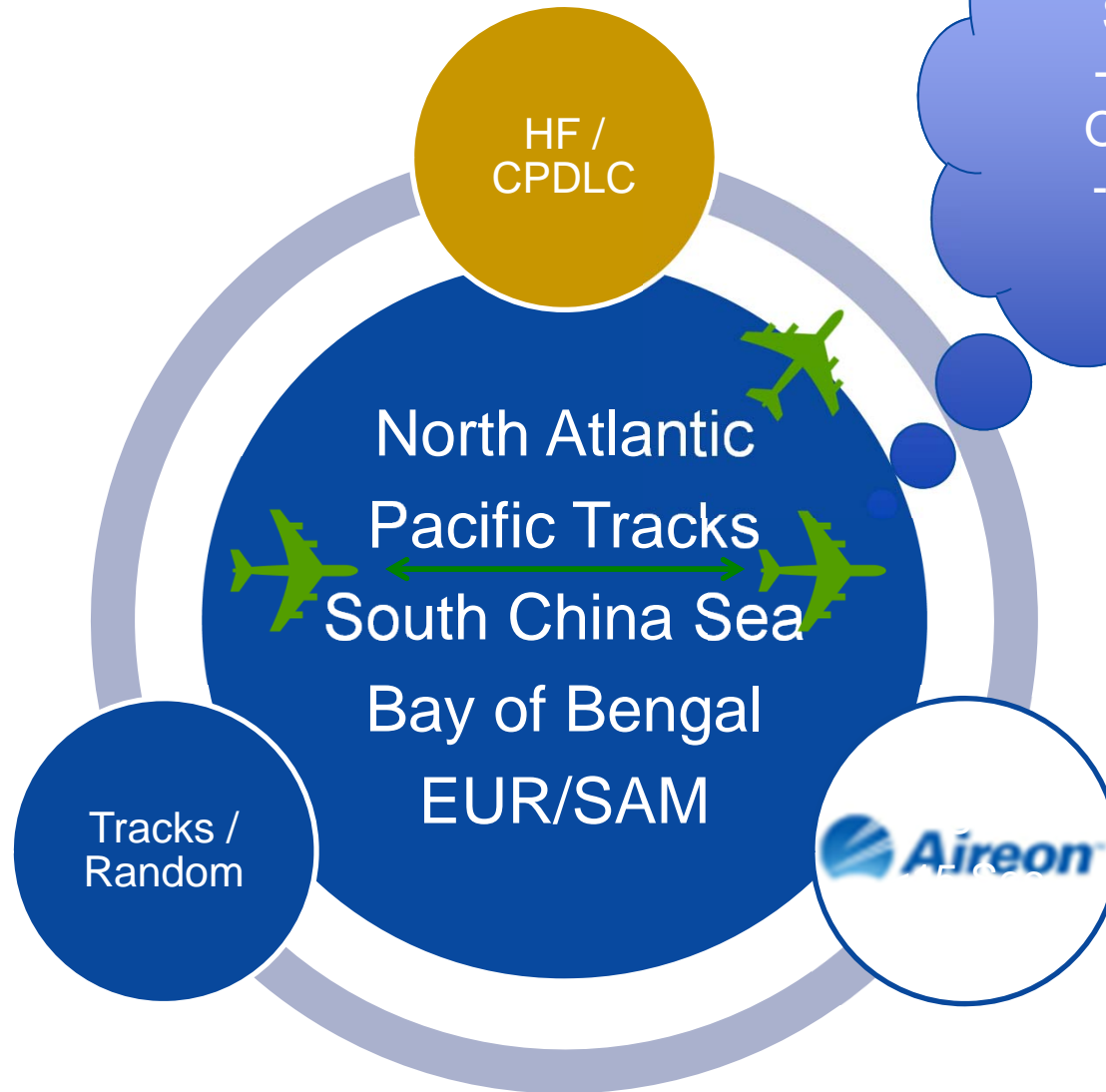


## Oceanic / Remote Applicability





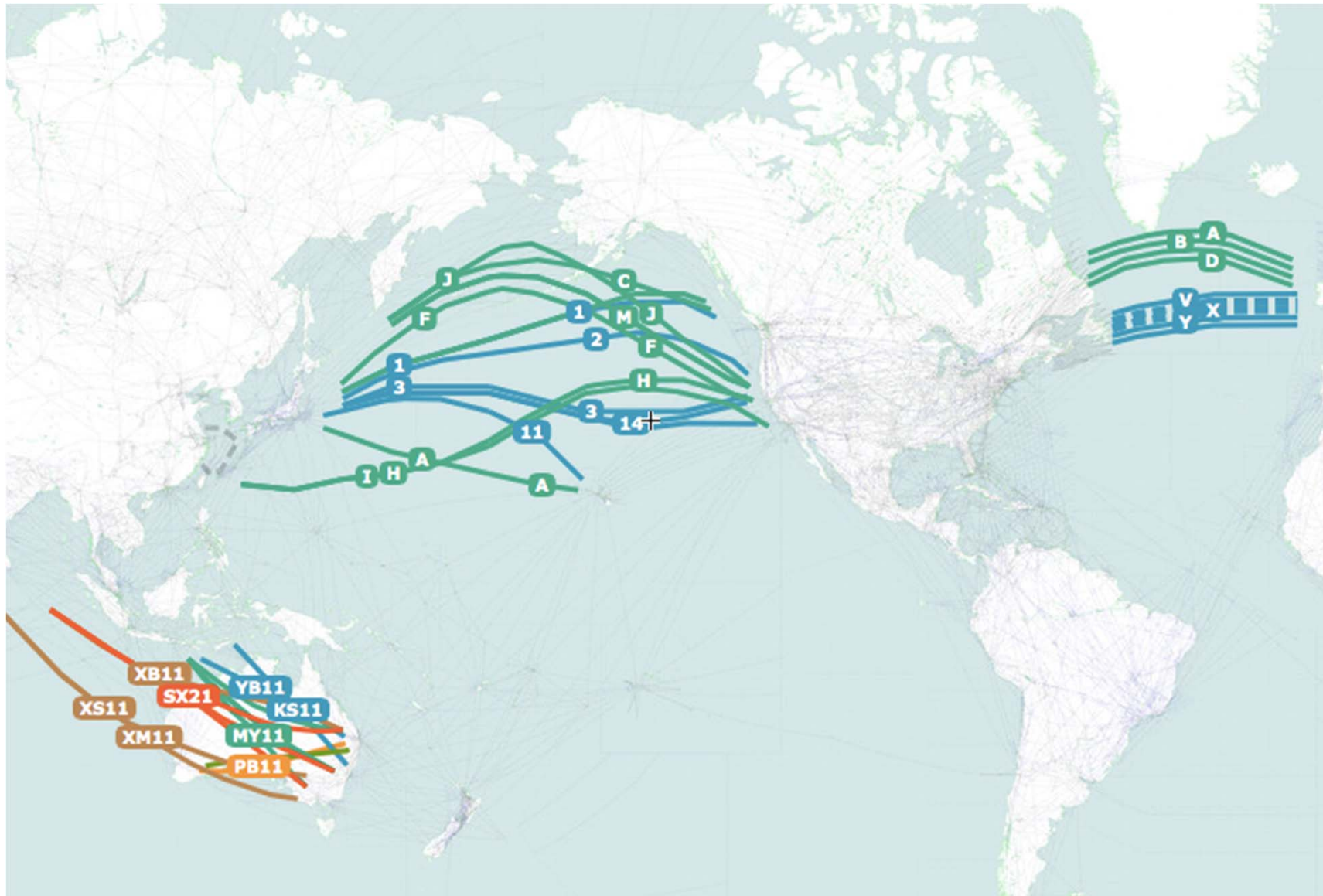
## Oceanic / Remote Applicability







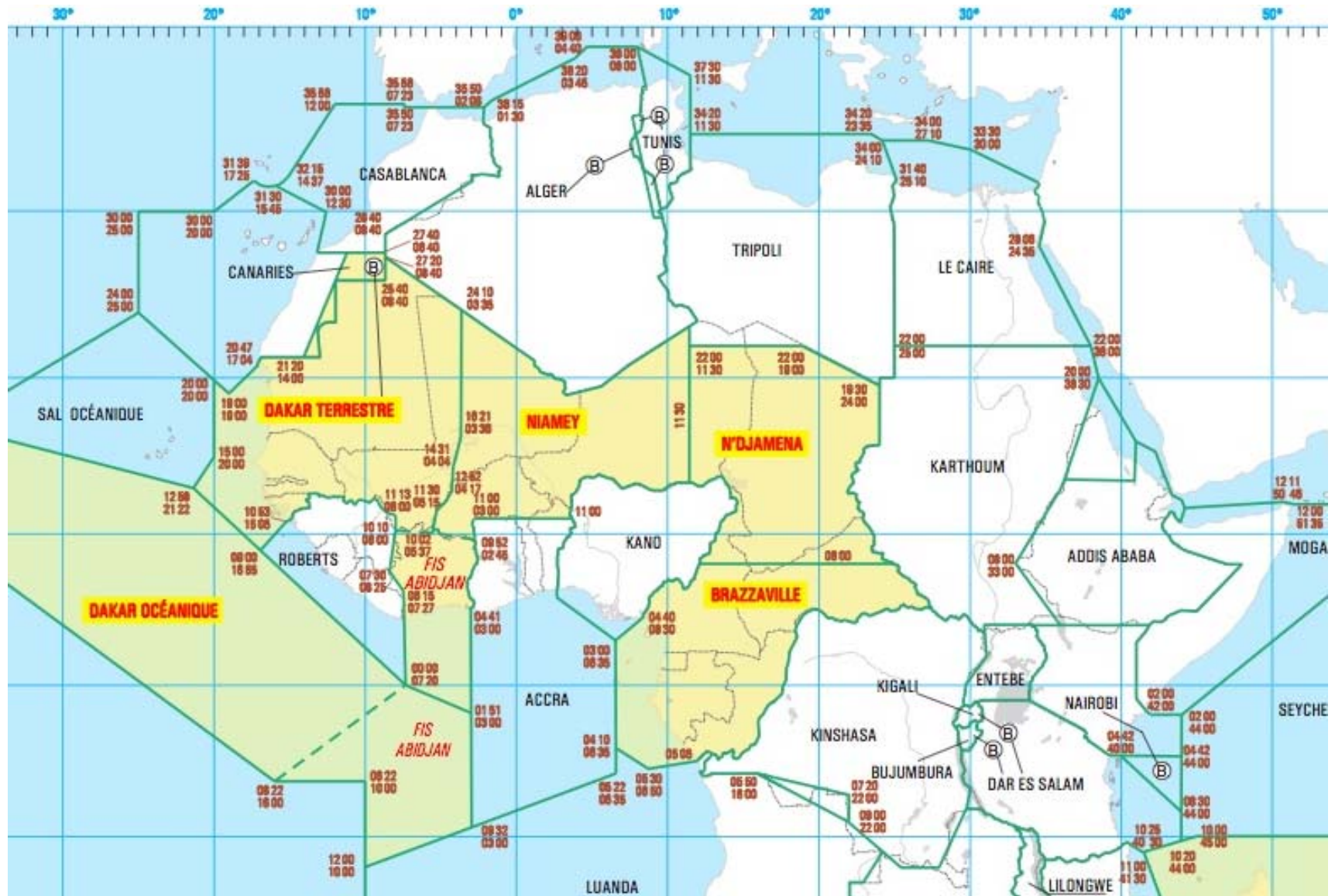
# Oceanic







# Remote

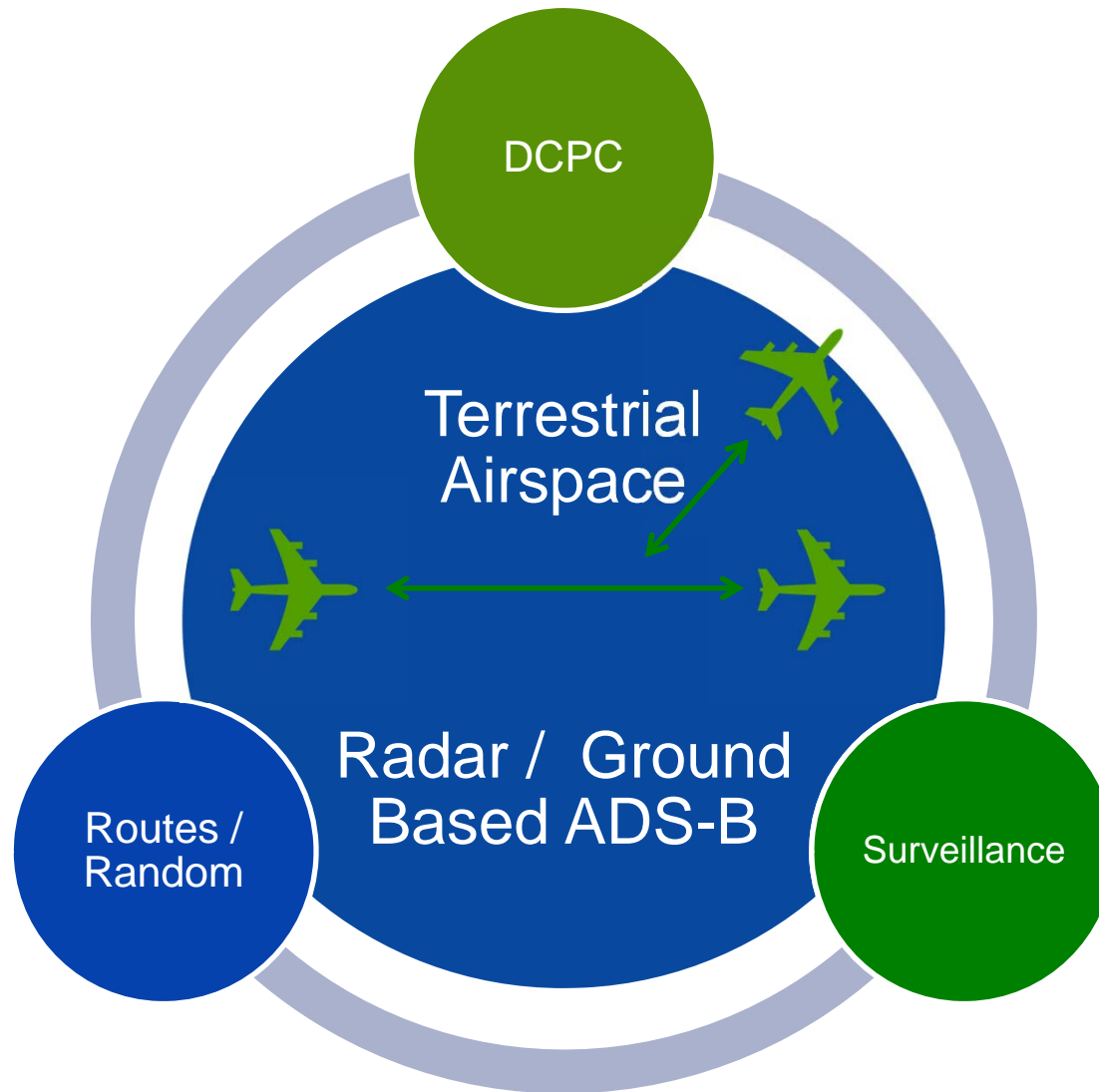






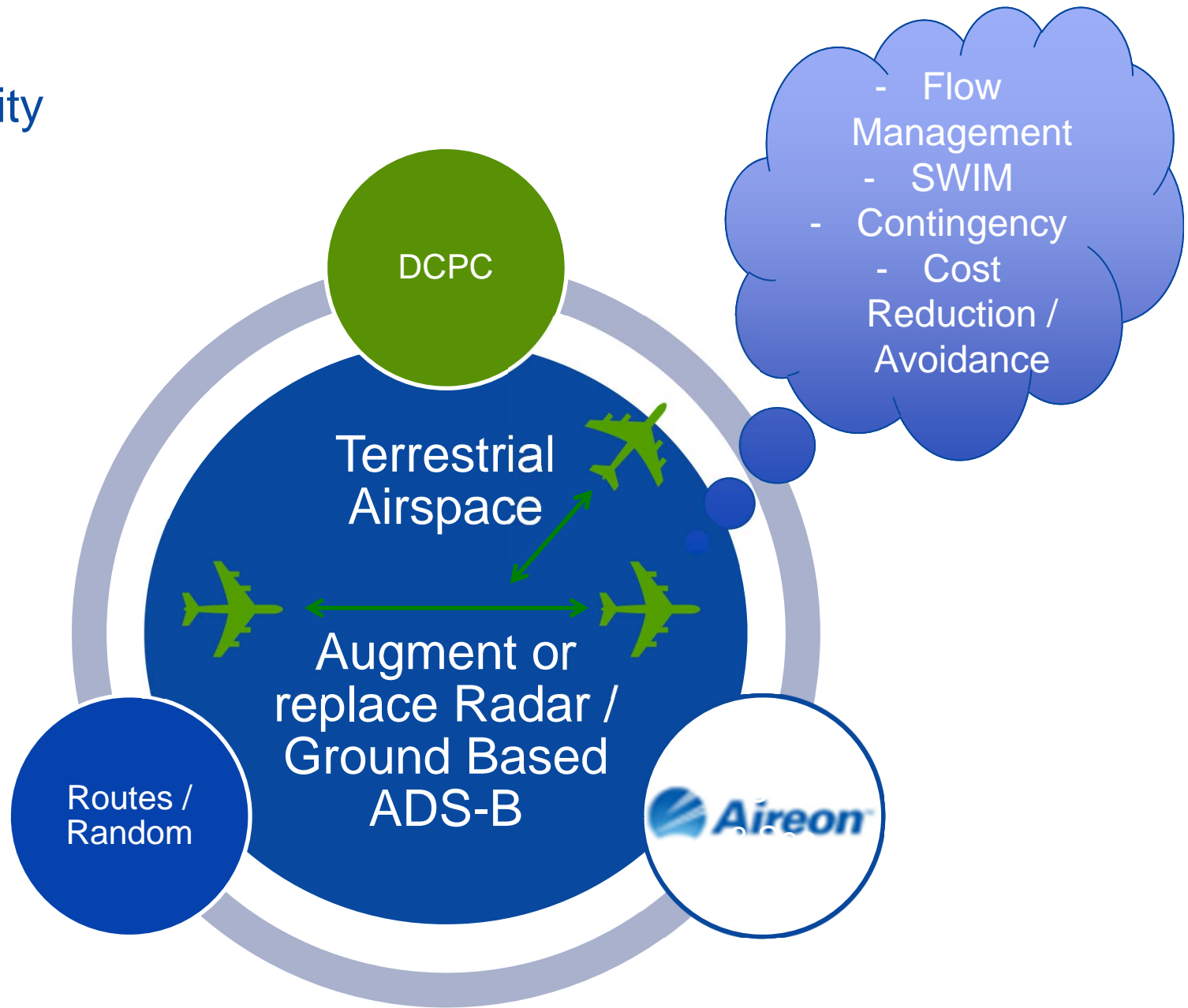


# Applicability





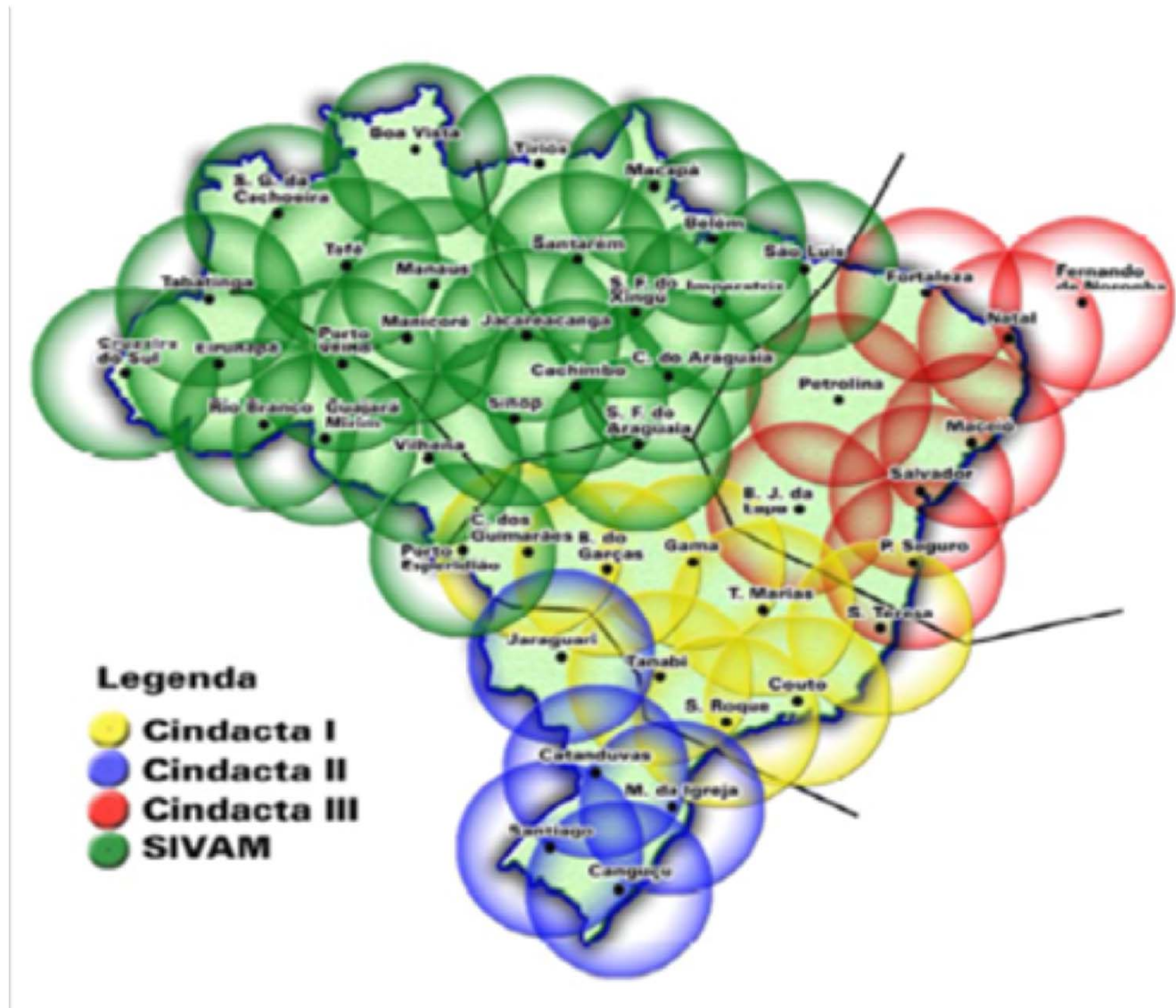
## Applicability







# Terrestrial









Making it a reality

*The path to implementation*







## Early ANSP engagement is key

- Partnership approach
- Development of operational requirements
- Identification of quick wins
- Identification of airline / ANSP benefits
- Early engagement of regulators / ICAO
- Introduction into regional ATM plans
- Development of cross border agreements
- Airline equipage, deliver early benefits
- Validation & Operational Trials
- Regulatory Approval
- Implementation







# Transforming the way you see the sky



Investors Partners Innovators



Engineered by

