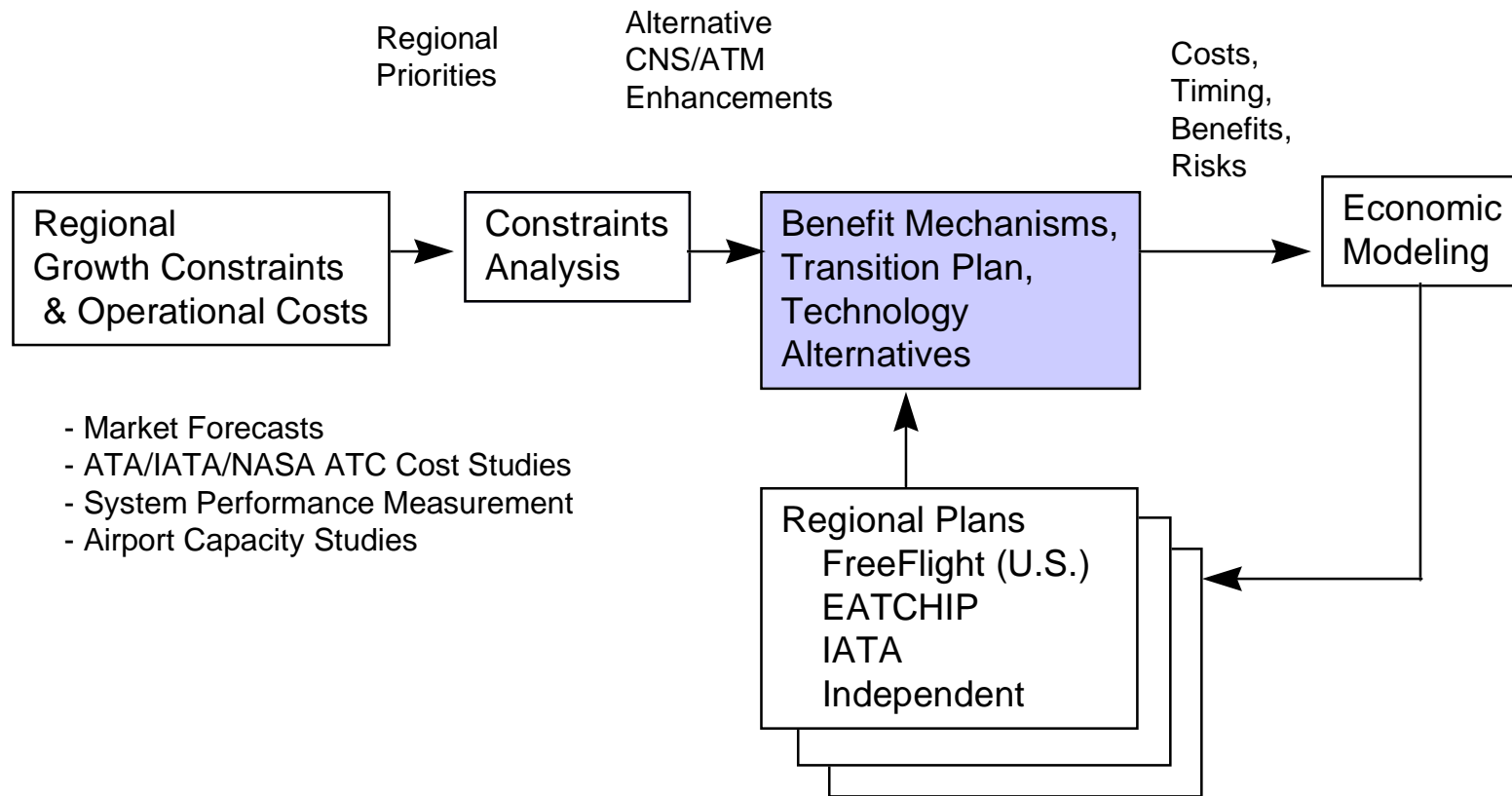


# Transition Logic Diagrams and Operational Concepts

Kathleen Pirotte

# CNS/ATM Focused Team Analysis Process



CNS/ATM Focused Team

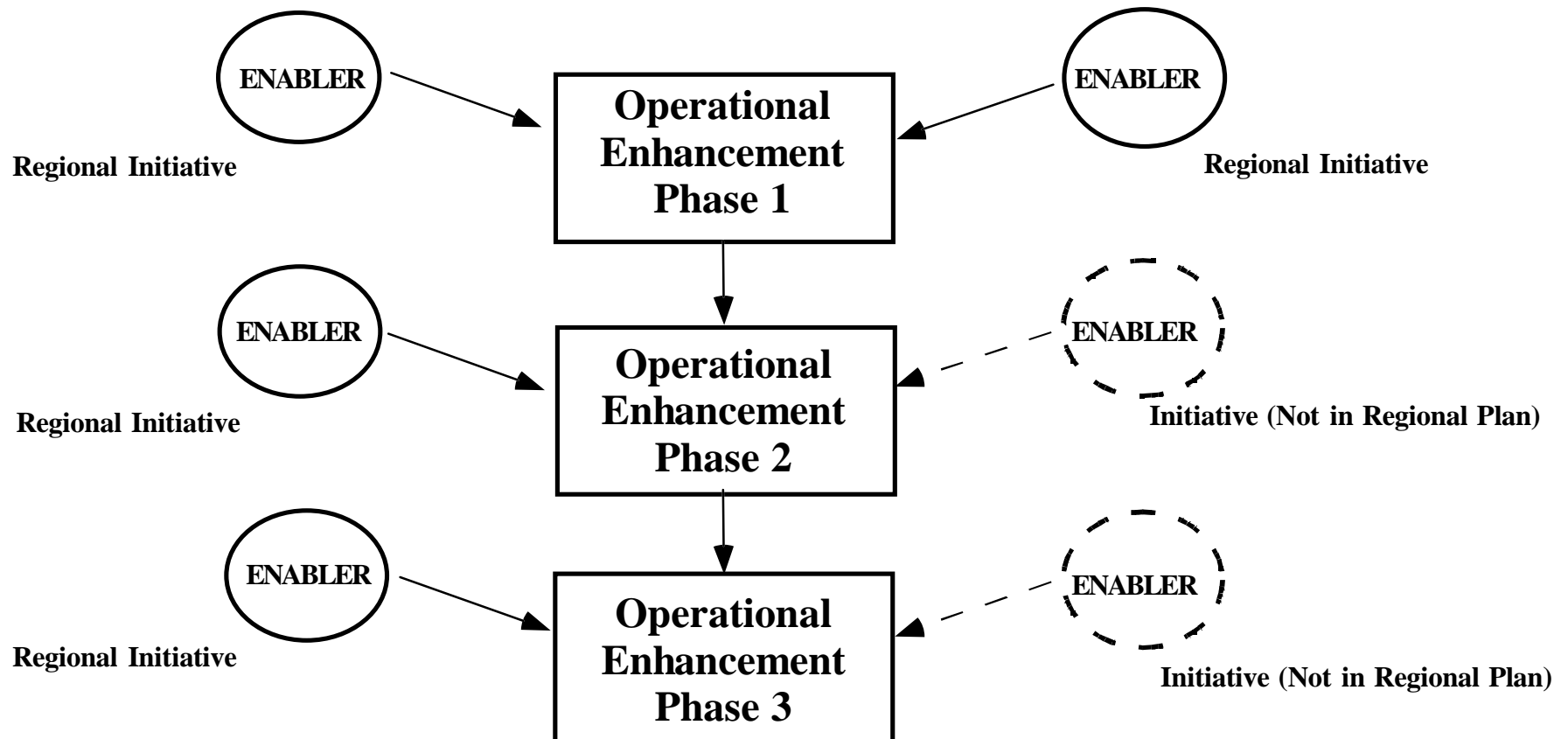
# CNS/ATM Transition Logic Diagram

# REGIONAL PLAN

**Operational Phase**

**Benefit Mechanism**

**Capacity (Efficiency)**



# Definitions

- Benefit Mechanism
  - The manner in which a benefit is achieved, categorized as capacity or efficiency, and by phase of operation.
- Operational Enhancement
  - An operational change leading to increased capacity and/or efficiency. Incremental operational enhancements are grouped by benefit mechanism.
- Enabler
  - Initiatives, such as new technology or procedural change, that support an operational enhancement.

# Groundrules

- Benefit Mechanisms are predicated on current airspace environment, assuming an evolutionary approach to solutions.
- Only primary capacity/efficiency effects are identified.
- Operational enhancement phases were not explicit in the plans, but were created using data from the plans.
- Diagrams were created from the regional plans. They are not recommendations from C/AFT.

# Sources

- U.S. Free Flight
  - Final Report of RTCA Task Force 3, Free Flight Implementation
  - Free Flight Action Plan
- Europe EATCHIP Phase III and Phase IV (EATMS)
  - Eurocontrol Convergence and Implementation Programme, Part 2, Status Report
  - EATMS Concept: Progress Report, Edition 1.1
- IATA Regions
  - FANS CNS/ATM Implementation/Transition Plans for: Africa, Asia & Pacific (includes 8 sub-regions), Europe, Latin America, Middle East, and North Atlantic.

# Enabler Groupings

- Airport Enhancements
- Airspace Management
- Air Traffic Management (ATM) Tools
- Communication Enhancements
- Enhanced Flow Management
- Interfacility Communication
- Navigation Enhancements
- Reduced Separation
- Surveillance Enhancements
- Terminal Constraints
- Weather Information Enhancements

# Example Enabler Groupings

<b>Communication Enhancements</b>		
<b><u>Free Flight</u></b>	<b><u>Eurocontrol</u></b>	<b><u>IATA</u></b>
<b>Digital ATIS</b>	<b>Full R/T coverage</b>	<b>AEEC 622</b>
	<b>Optimize 25 kHz channel spacing</b>	<b>ATC/AOC Communication</b>
	<b>Reduced VHF spacing</b>	<b>CPDLC DO219</b>
<b>Datalink</b>	<b>Datalink</b>	<b>FMS Flight Plan Uplink</b>
		<b>SATCOM</b>
	<b>ATN</b>	<b>ATN</b>

# Example Enabler Groupings

Surveillance Enhancements		
<u>Free Flight</u>	<u>Eurocontrol</u>	<u>IATA</u>
Surface Surveillance	Radar	
	Mode-S Enhanced Surveillance	Secondary Surveillance Radar
	Vertical Tracking	
	ARTAS	
	ACAS	
ADS	ADS	ADS
ADS-B	ADS-B	

# IATA Regional Plans

- A composite capacity transition logic diagram was created for Asia and Pacific, Middle East and North Atlantic.
- A composite efficiency transition logic diagram could not be created due to inconsistency between plans.
- African and Latin American plans too immature for analysis. Safety is biggest issue.
- European plan data will be merged with EATCHIP analysis.

# CNS/ATM Transition Logic Diagram

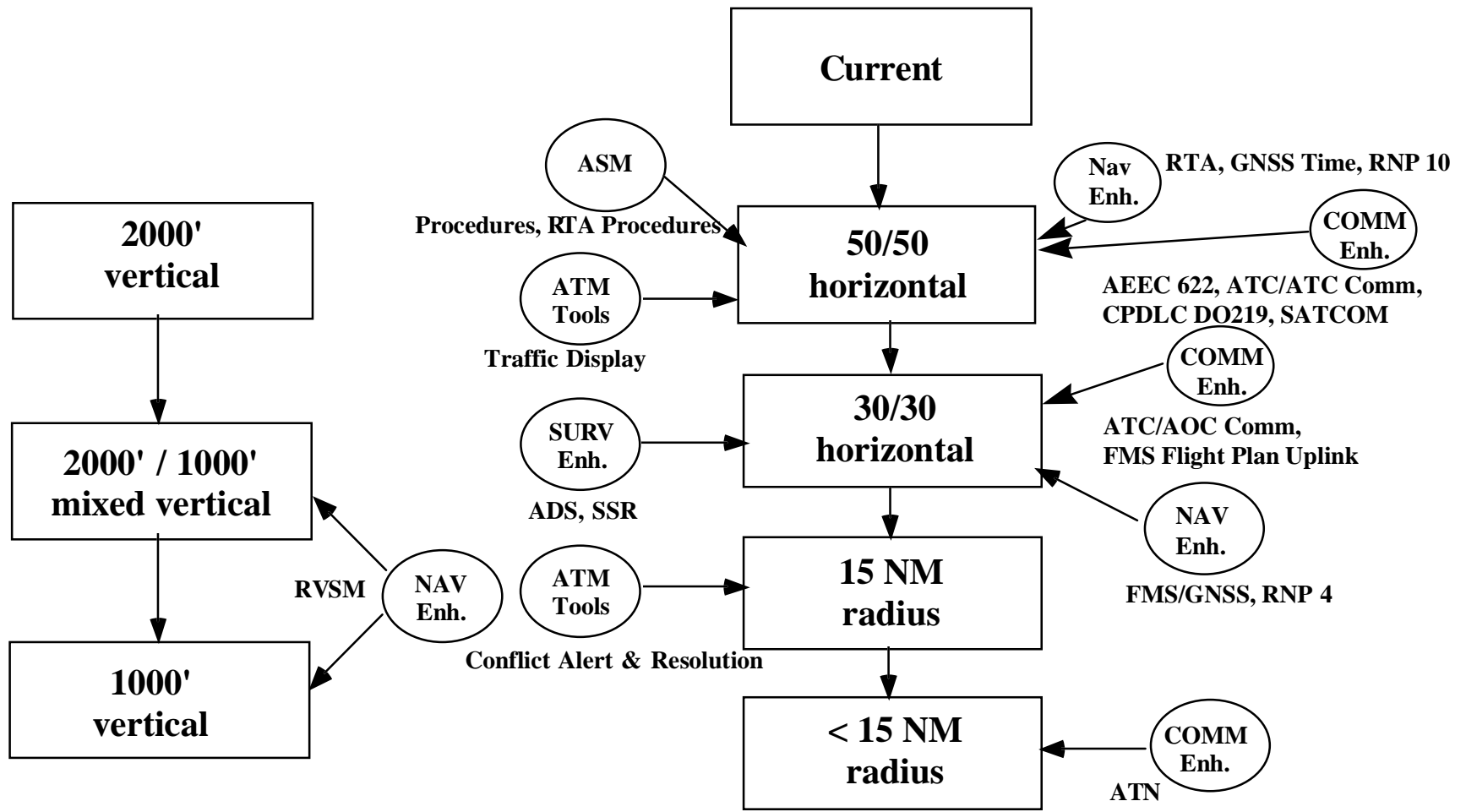
# IATA COMPOSITE

## En Route (6)

## Improved Throughput

## Capacity

Asia and Pacific, North Atlantic, Middle East



CNS/ATM Focused Team

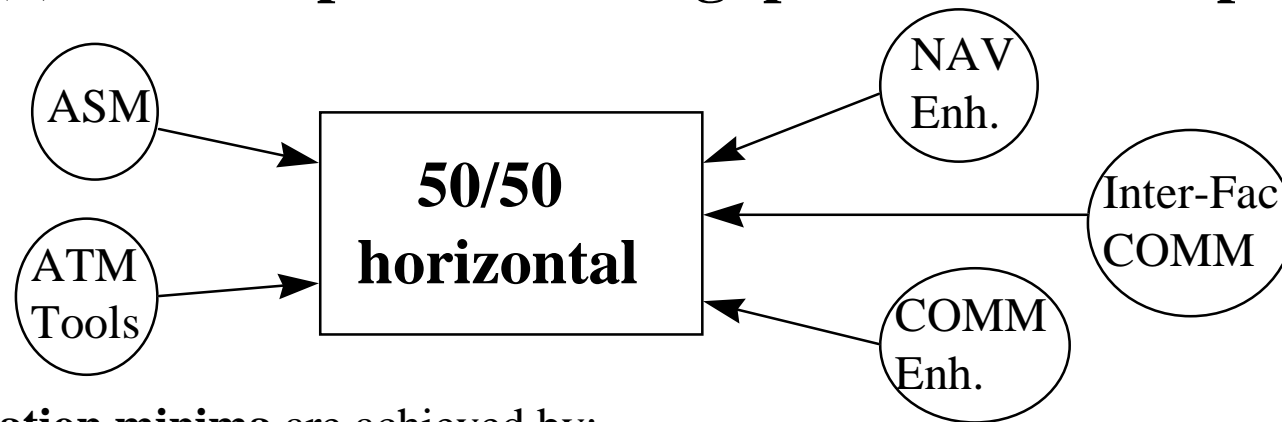
# CNS/ATM Transition Logic Diagram

# IATA Composite

**En Route (6)**

**Improved Throughput**

**Capacity**



Reduced **separation minima** are achieved by:

- Aircraft **follows flight plan more accurately** laterally (RNP10), and longitudinally (synchronized time and direct two-way data link messages).
- ATC can **detect more reliably** (data link pos. reps. and traffic display) and **intervene** (direct two-way data link messages) in case of flight plan deviations.

Reduced **spacing buffers** when crossing and merging:

- ATC **plans separation** at common crossing point (direct two-way data link messages) and aircraft **executes accurately** (RNP10 and synchronized time).

More **efficient handoffs** through direct ATC interfacility communications.

CNS/ATM Focused Team

# CNS/ATM Transition Logic Diagram

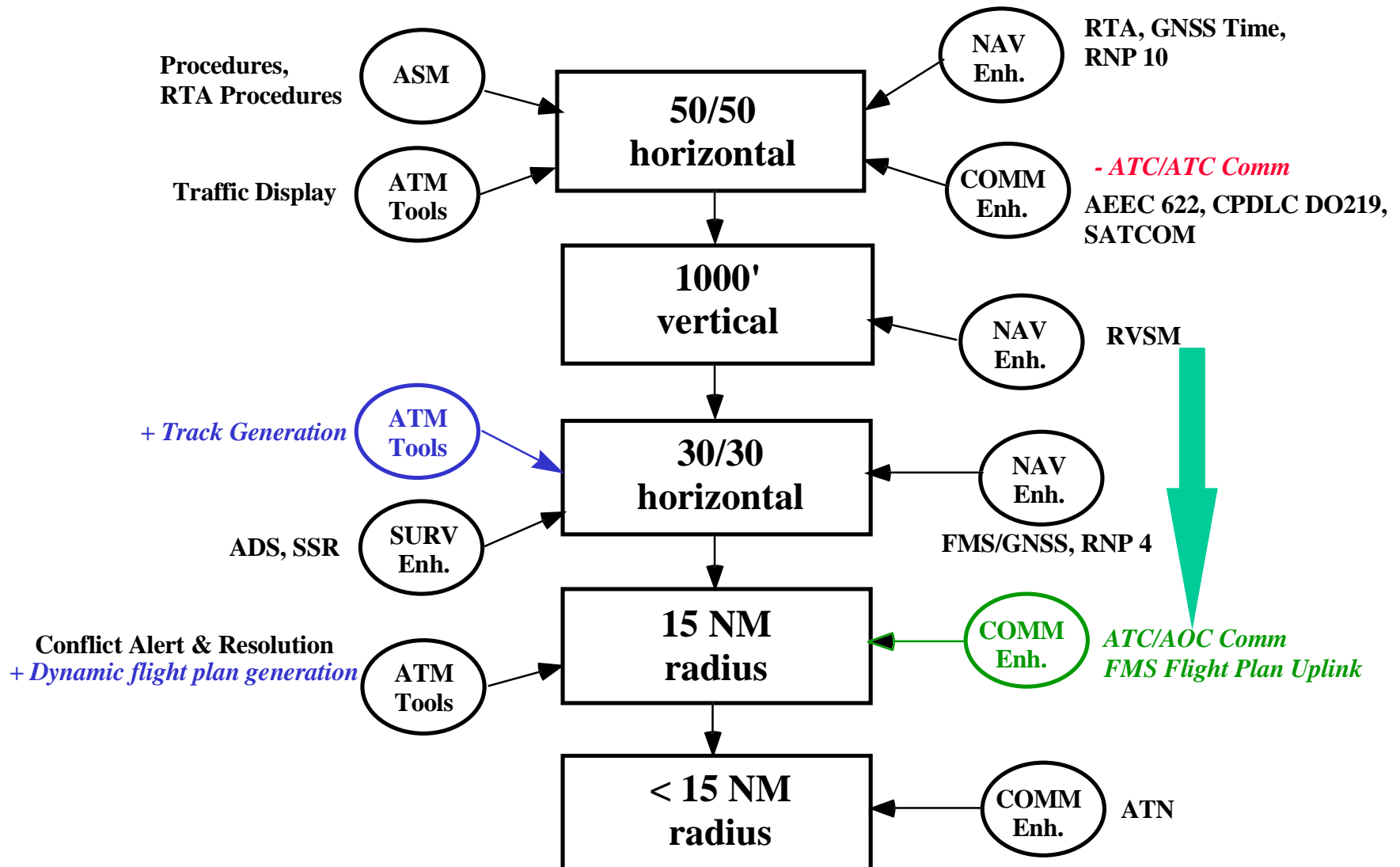
IATA ASIA CAISC

## En Route (6)

## Improved Throughput

## Capacity

Current: 2000' / 100 NM / 15 min



# U.S. and European Plans

- Have common operational enhancement transitions
- Free Flight emphasis:
  - En Route Efficiency
  - GPS, ADS-B, Data Link
- European emphasis:
  - En Route Capacity
  - RNP, Radar, VHF/ATN

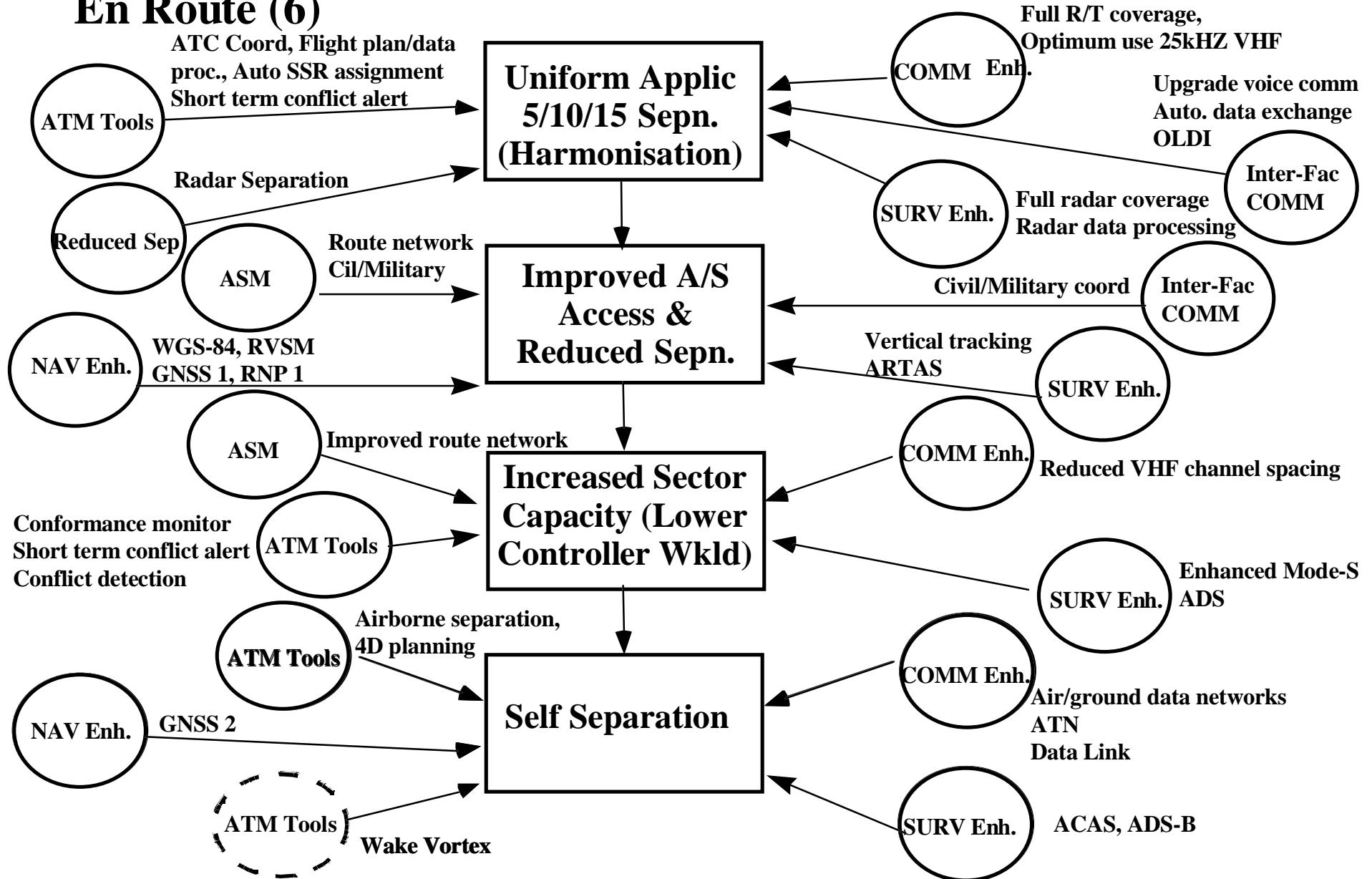
# CNS/ATM Transition Logic Diagram

# EATCHIP

**TMA Arr / Dep (5)  
En Route (6)**

**Improved Throughput**

**Capacity**



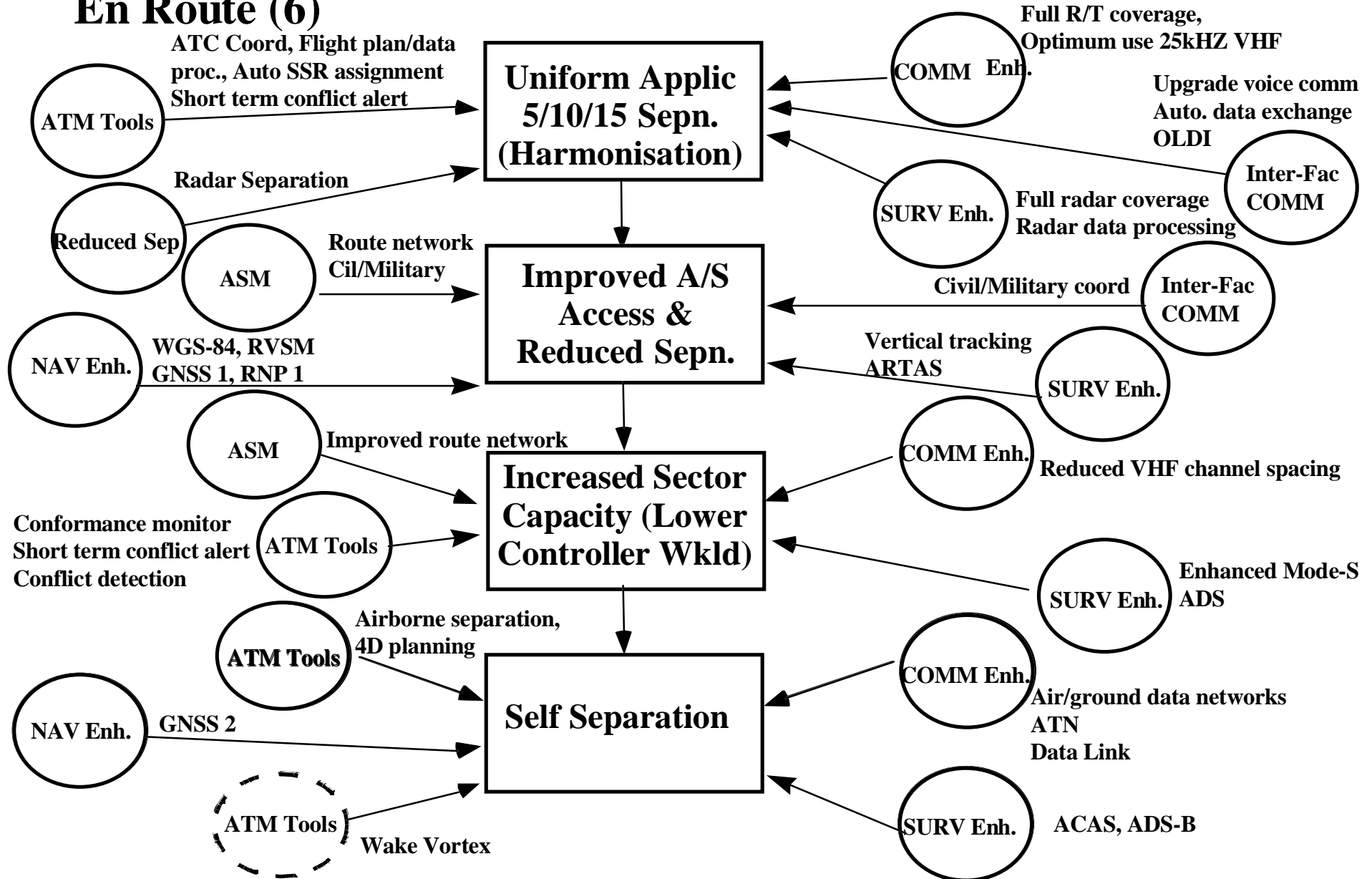
# CNS/ATM Transition Logic Diagram

# EATCHIP

**TMA Arr / Dep (5)  
En Route (6)**

**Improved Throughput**

**Capacity**



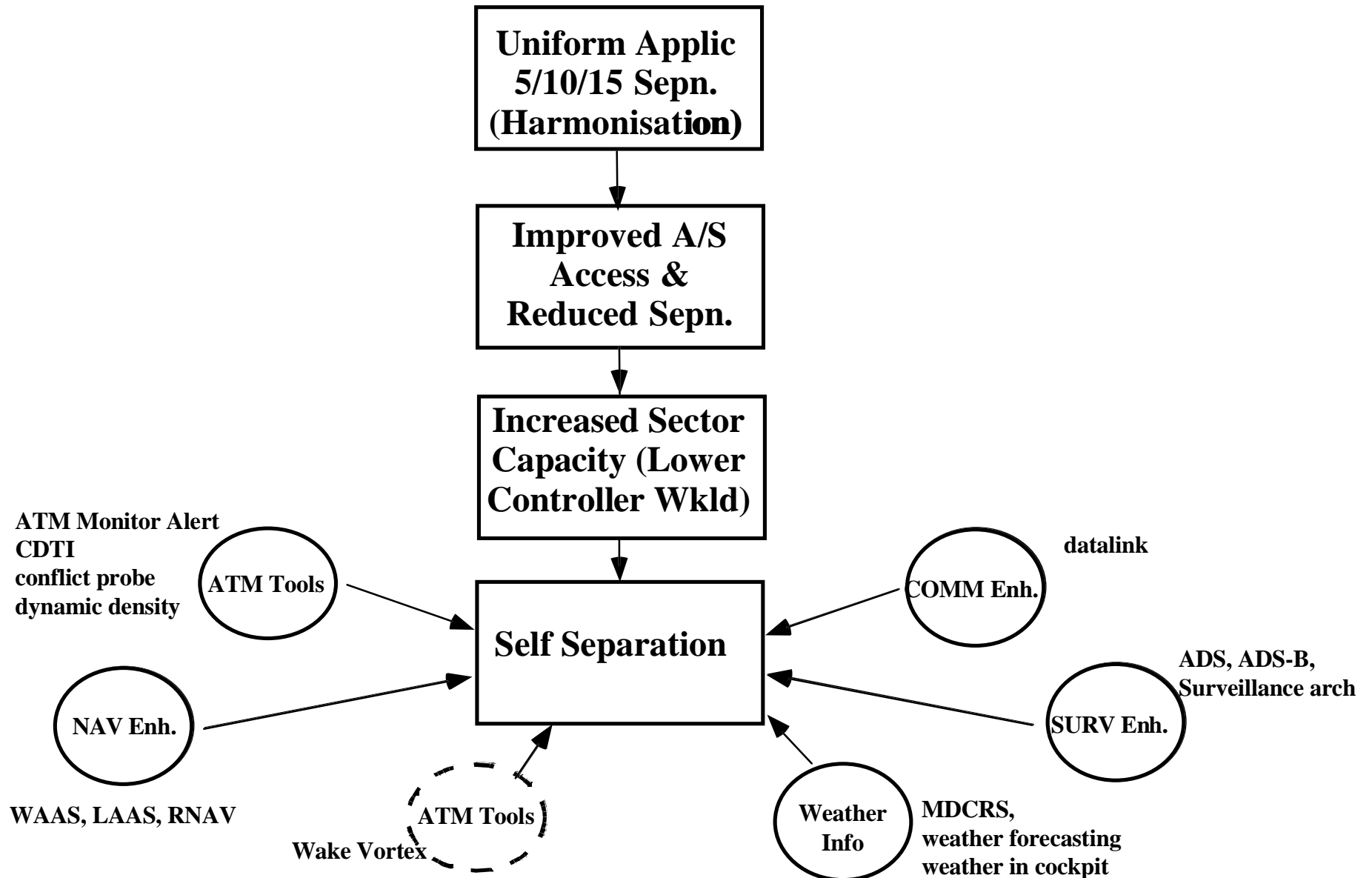
# CNS/ATM Transition Logic Diagram

# FREE FLIGHT

**TMA Arr / Dep (5)  
En Route (6)**

**Improved Throughput**

**Capacity**





# U.S. and European Plans

- Have common operational enhancement transitions
- Free Flight emphasis:
  - En Route Efficiency
  - GPS, ADS-B, Data Link
- European emphasis:
  - En Route Capacity
  - RNP, Radar, VHF/ATN

# Recommendations

- Industry participation is needed to ensure that the benefit mechanisms and operational transitions are accurate and representative of industry interests.
- The C/AFT process may then be used to develop a set of transitions towards which regional planning groups may be driven.