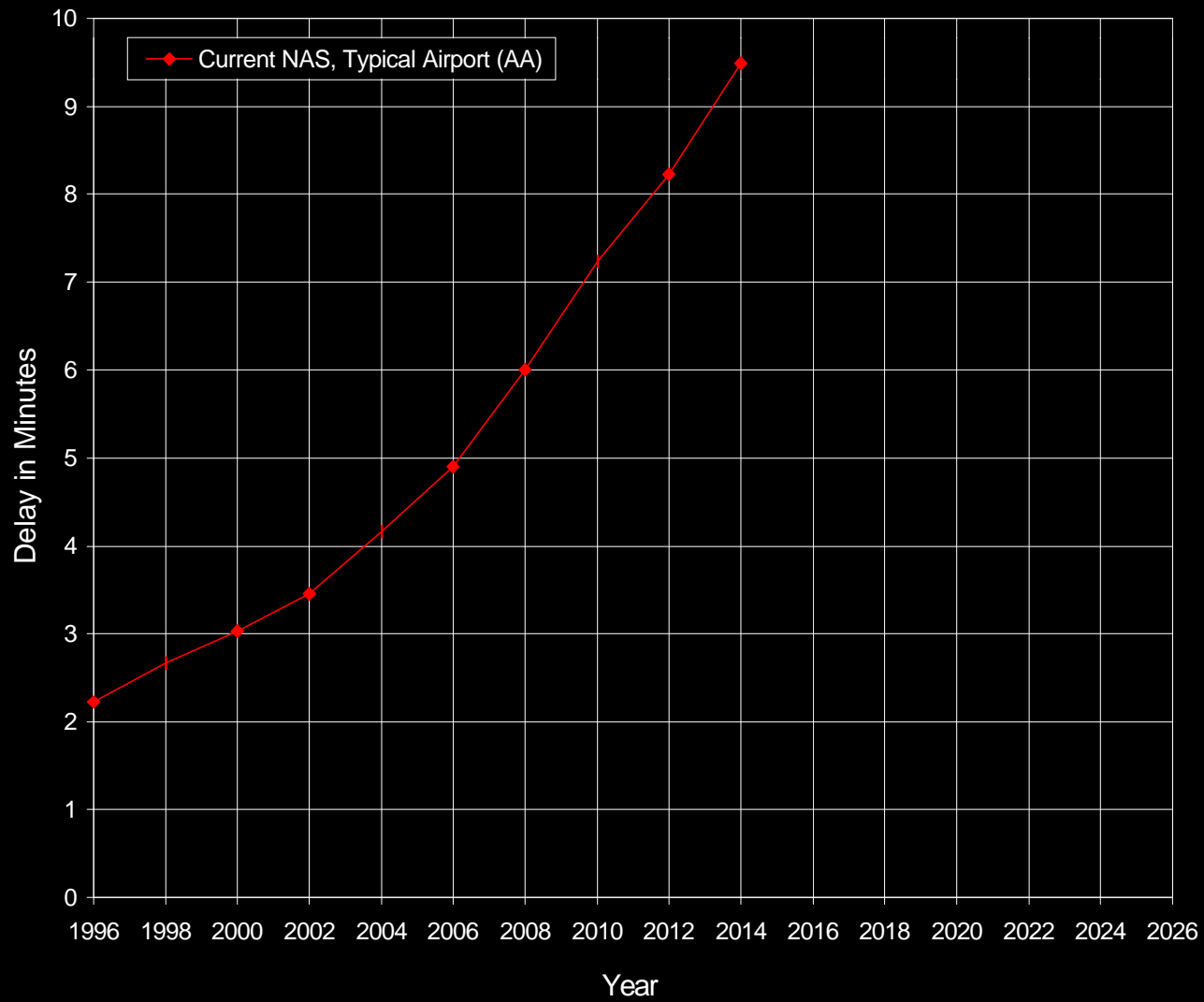


# The Business Side of CNS/ATM

- Airlines' Primary Product - *The Flight Schedule*
  - The ATM system impacts the airlines' ability to plan and operate their schedules.
- Airport and Airspace Capacity
  - Reduce Delays
  - Maximize Runway Usage
  - Minimize ATC Flow Control
  - Mitigate Impact of Adverse Weather
- With projected traffic increases, future investments in CNS/ATM are needed to maintain the integrity of the airline schedule.

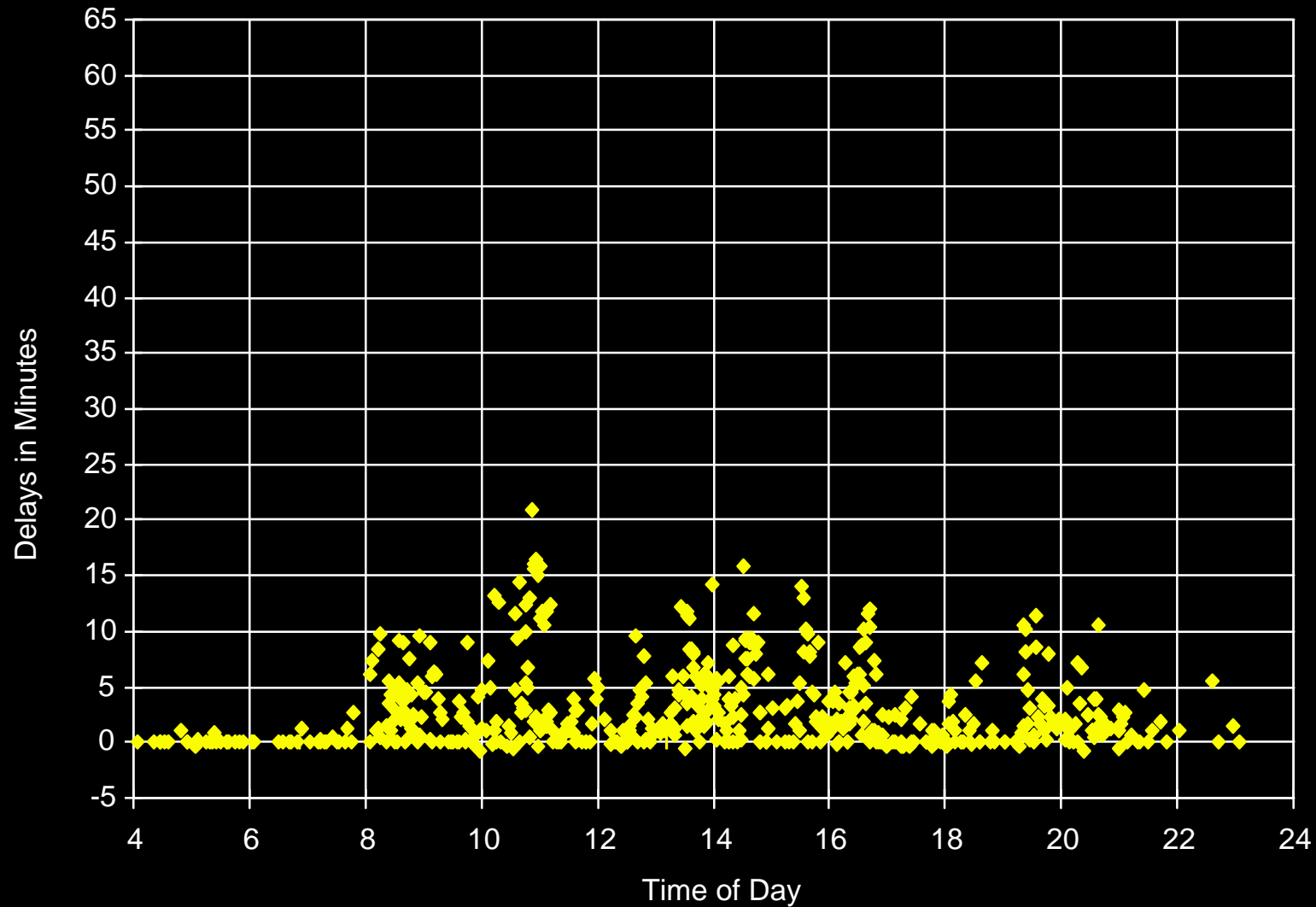
# AA NAS Study Results

## Typical Terminal Delay Per Flight



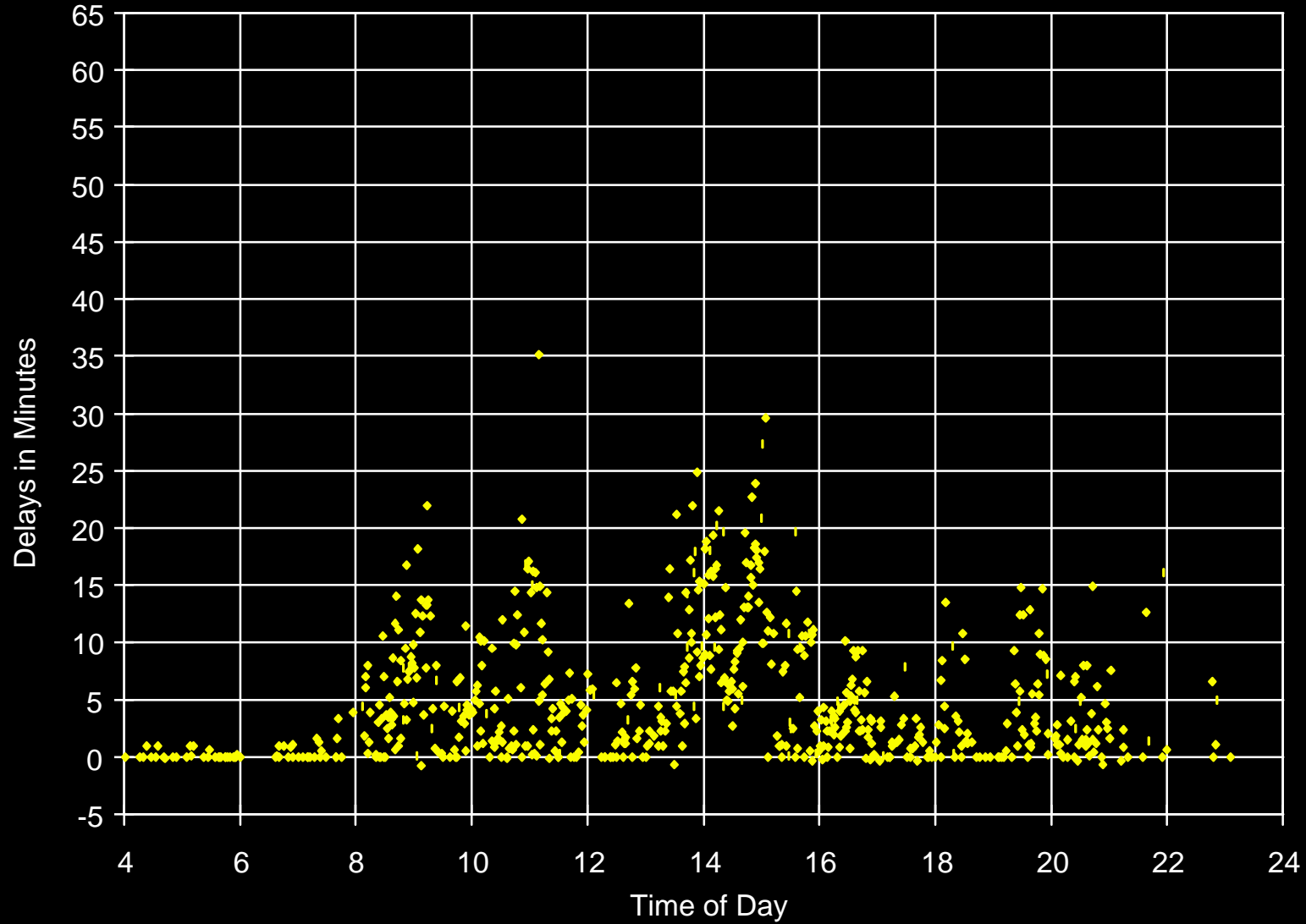
# AA NAS Study

## Arrival Dependability - 4.1 Minutes Avg Delay



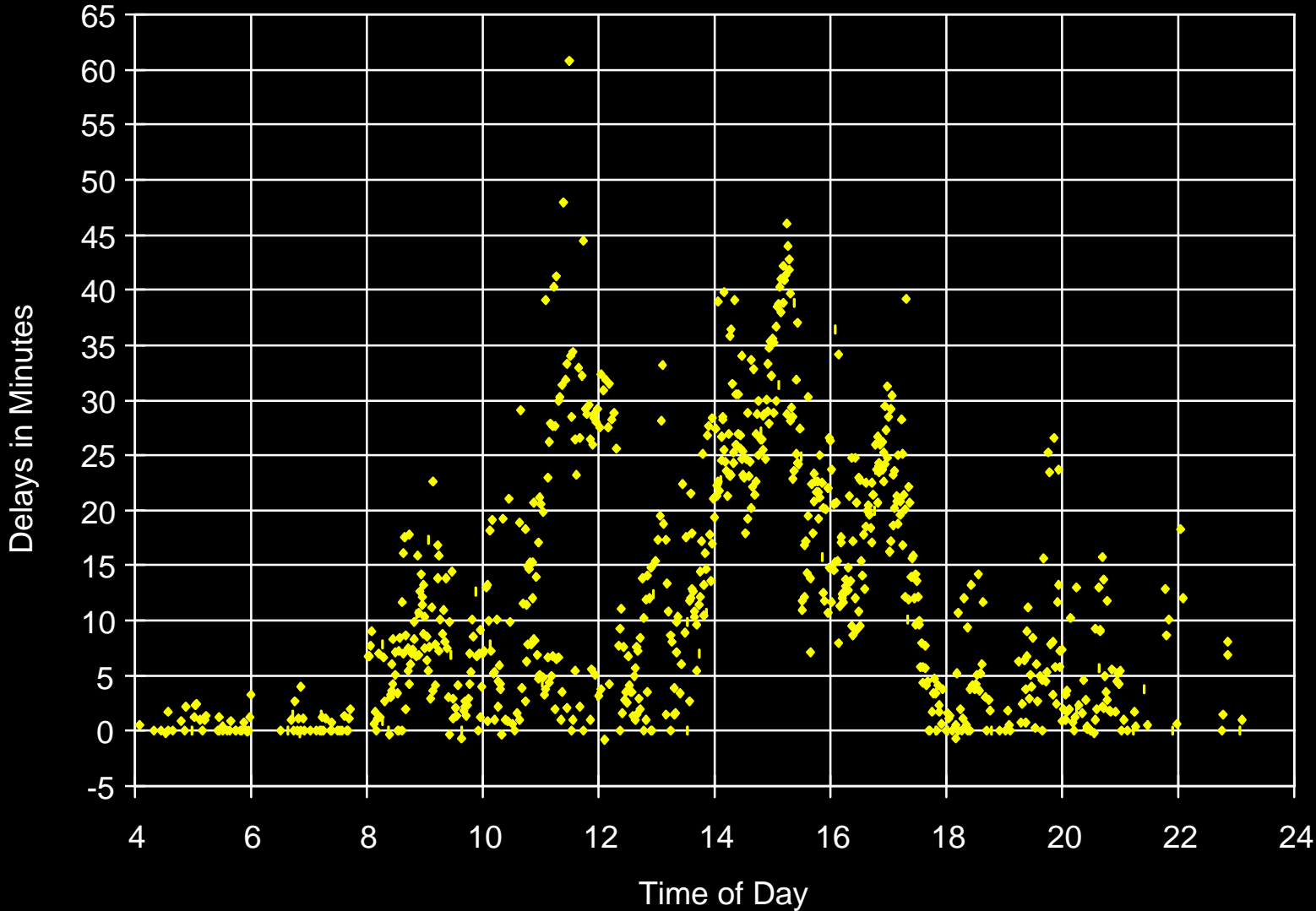
# AA NAS Study

## Arrival Dependability - 7.0 Minutes Avg Delay



# AA NAS Study

## Arrival Dependability - 13 Minutes Avg Delay



# C/AFT's Purpose

*Facilitate CNS/ATM implementation progress by developing global airline economic consensus on problem issues.*

- 

- **Establish Problems -- Why do we need to change?**

- Airline operating problems must be framed with common airline economic metrics to quantify and baseline a problem.

- **Evaluate Solutions -- What do we need to do, and when?**

- Use common airline economic metrics to establish consensus on business and capital decisions related to proposed solutions.
- Provide airline global perspective on proposed solutions to regional problems.

- **Develop Consensus -- How do we move industry forward?**

- Provide airline consensus to facilitate decisions by government agencies and service providers.

# C/AFT's Structure

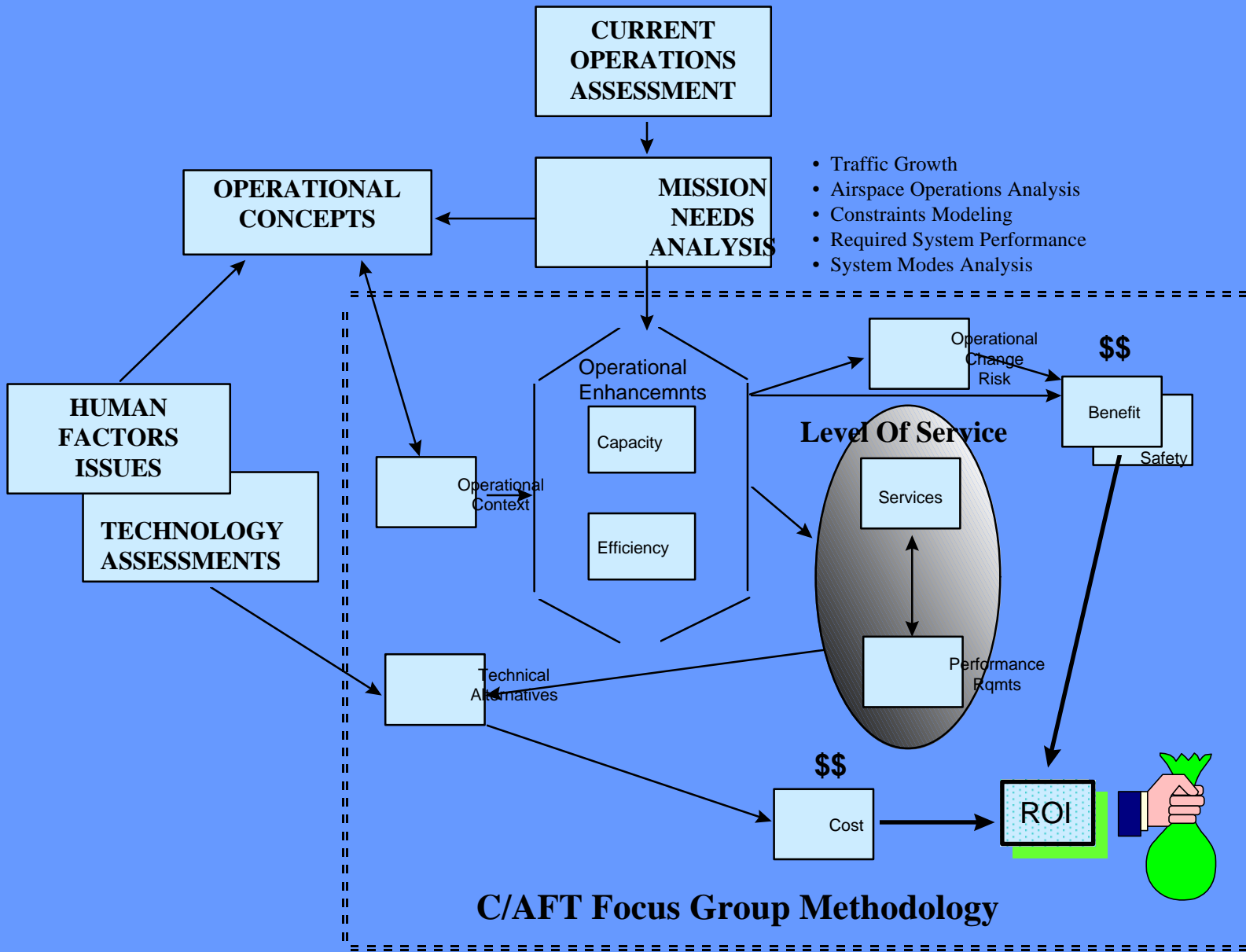
- **Airline Leader -- Captain Russell Chew, AAL**
- **Members**
  - All Airlines (Core = United, American, Air Canada, Lufthansa, Qantas, British, Ansett)
  - Airline Trade Associations (Core = ATA, IATA)
  - Service Providers (Core = FAA, Eurocontrol)
  - OEMs (Core = Boeing, Airbus)
  - Others by Invitation (Core = MITRE/CAASD, LMI)
- **Focus Groups**
  - ATS Performance Focus Group (Russ Chew, AAL)
  - ATS Data Link Focus Group (Russ Chew, AAL; Dave Jones, UAL)
  - Surveillance Focus Group (Claudia Gerstle, UAL)
  - Advanced Navigation Focus Group (Brian Harkness, Air Canada)
- **All Airlines can participate**

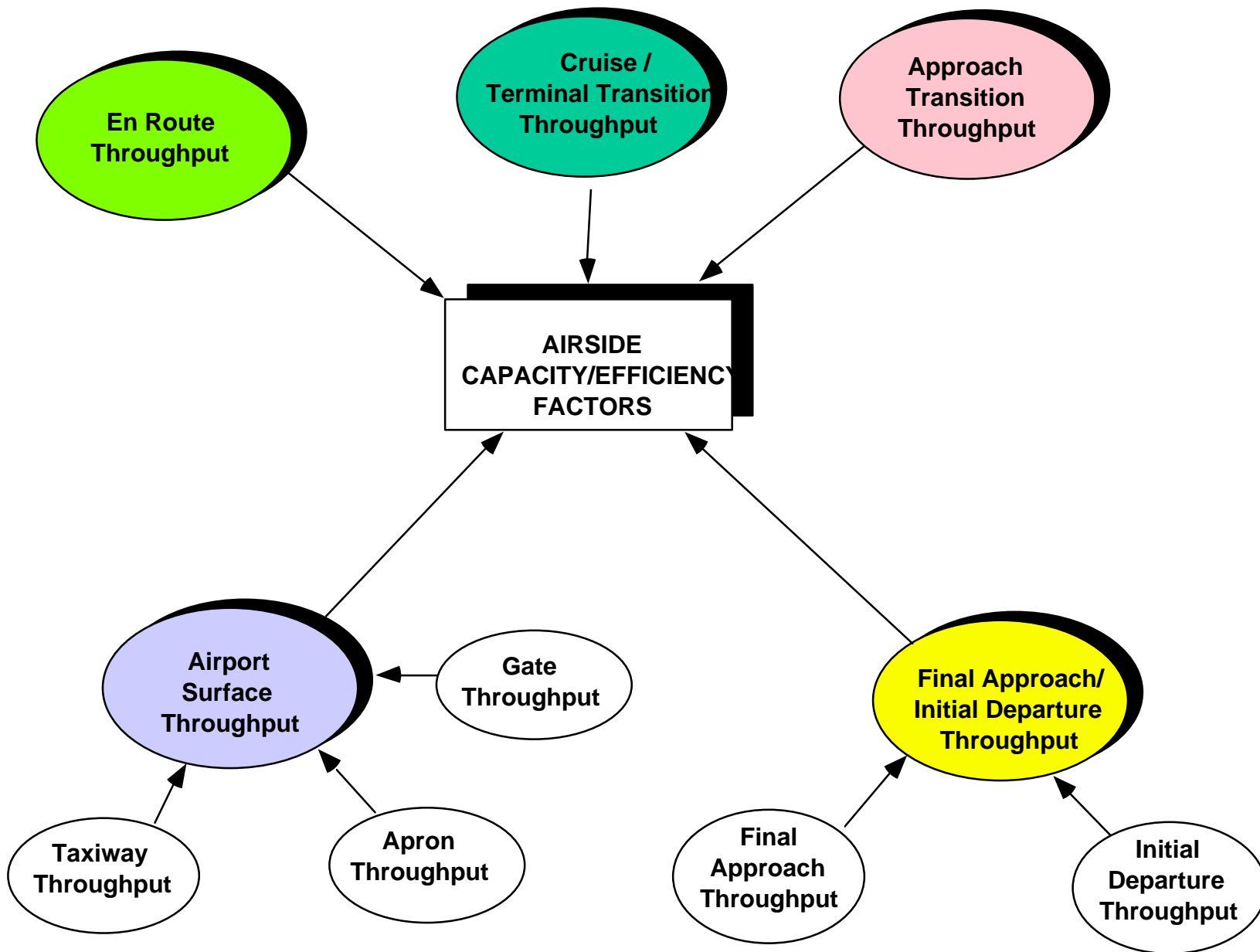
# C/AFT History

- Started in April 1996
- 4 all-airline meetings
  - March 1997, hosted by Boeing (Seattle)
  - October 1997, hosted by AAL (Dallas/Ft. Worth)
  - April 1998, hosted by EUROCONTROL (Paris)
  - November 1998, hosted by UAL (San Francisco)
- Developed analysis methodology & processes
- Completed Performance Metrics Recommendations & Report
- Performed detailed cost/benefit analysis on U.S. datalink
- Performed benefits analysis on surveillance and navigation
- Next all-airline meeting probably October 21 1999 hosted by Airbus in Toulouse, France

# C/AFT Tools and Resources

- Economic Insight
  - Constraints Analysis
    - Provides perspective on system performance dependencies
    - Provides insight into technical performance requirements
  - Transition Analysis
    - Identifies tangible path of incremental progress
    - Provides insight into operating concept enablers
- Economic Analysis
  - Quantifies probability of financial success of proposed solutions
  - Identifies key economic drivers of risk and value



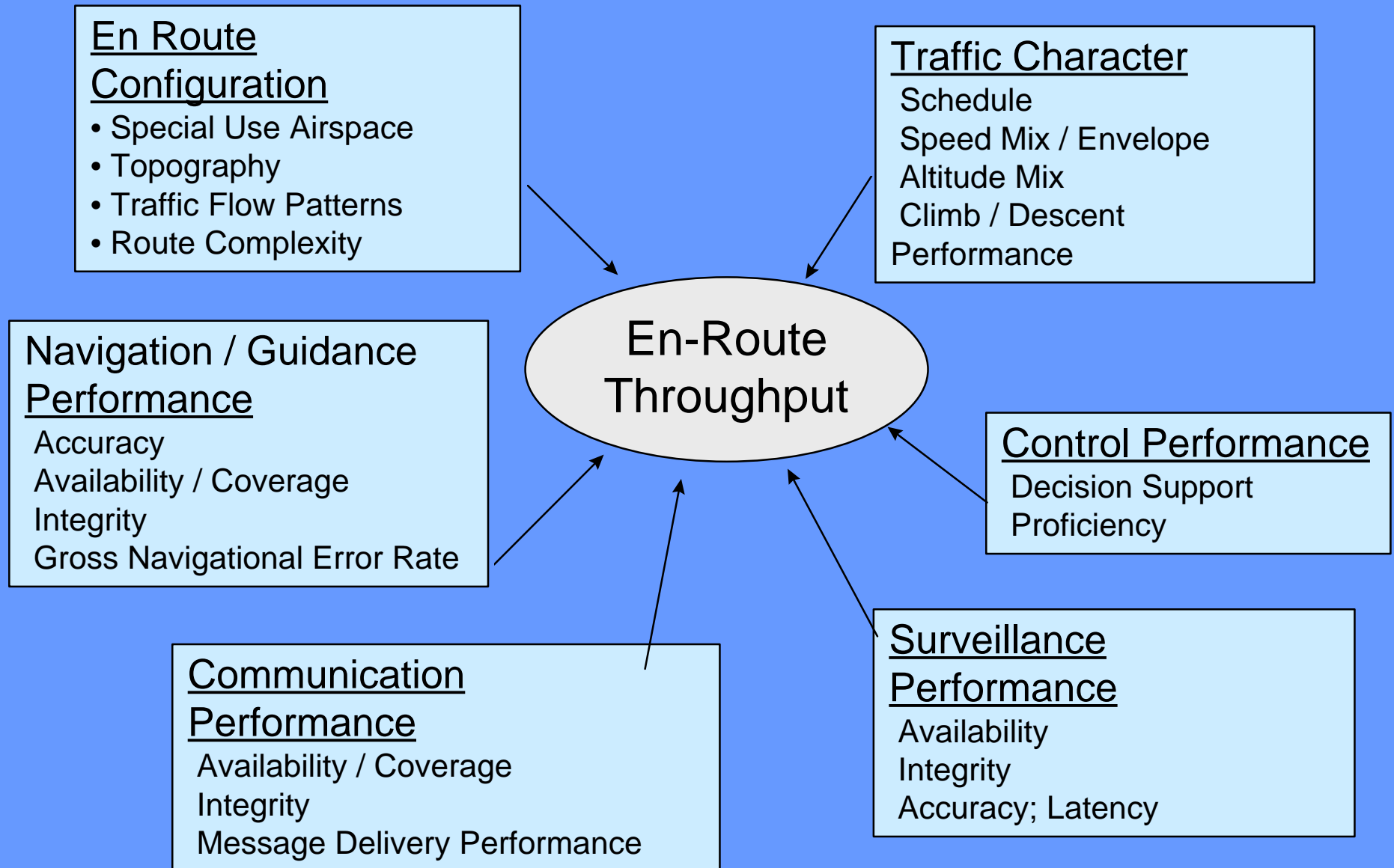


**CONDITION:** \_\_\_\_\_

**LOCATION:** \_\_\_\_\_

CNS/ATM Focused Team

# Factors Affecting En Route Throughput



**CONDITION:** \_\_\_\_\_

**LOCATION:** \_\_\_\_\_

CNS/ATM Focused Team

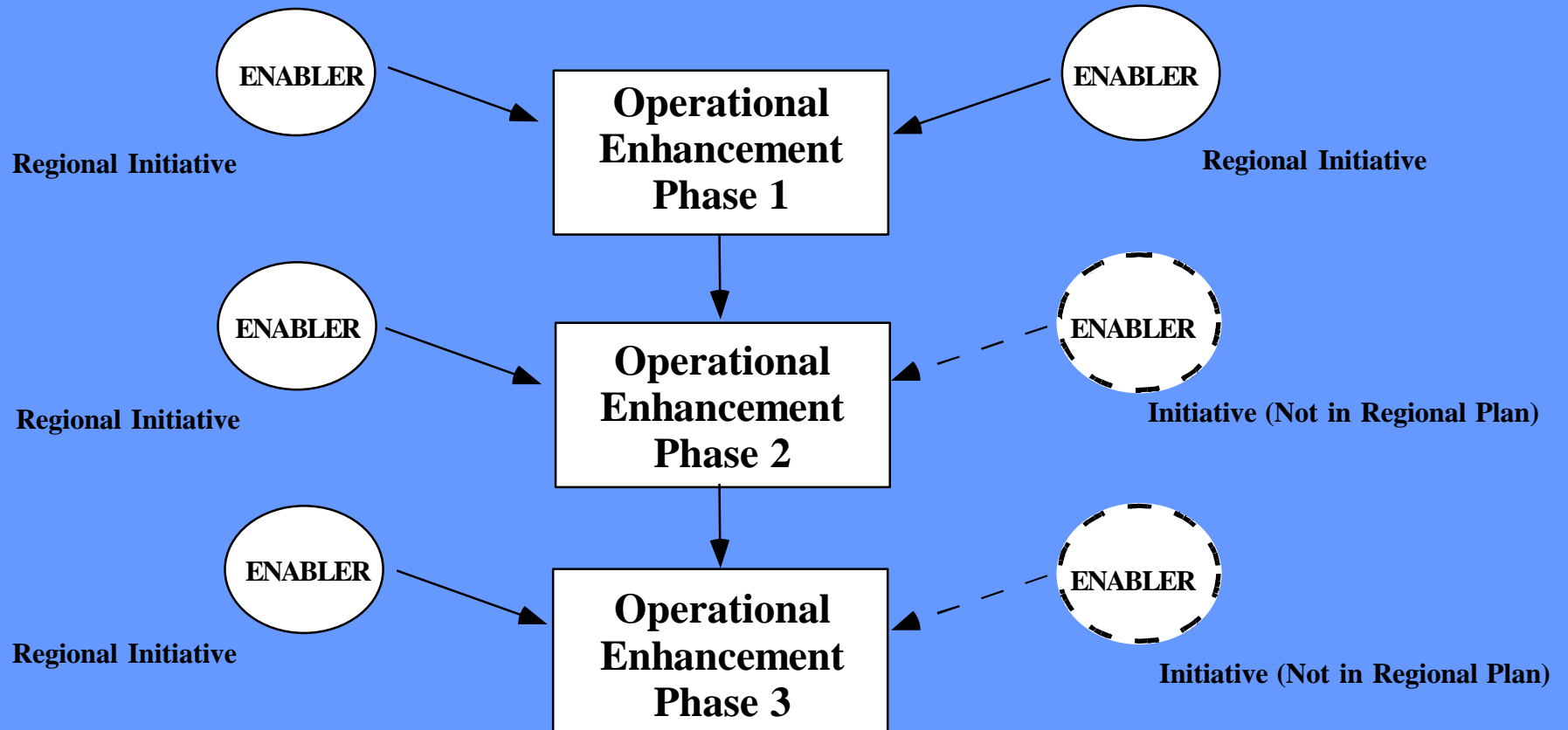
# CNS/ATM Transition Logic Diagram

# REGIONAL PLAN

**Operational Phase**

**Benefit Mechanism**

**Capacity (Efficiency)**



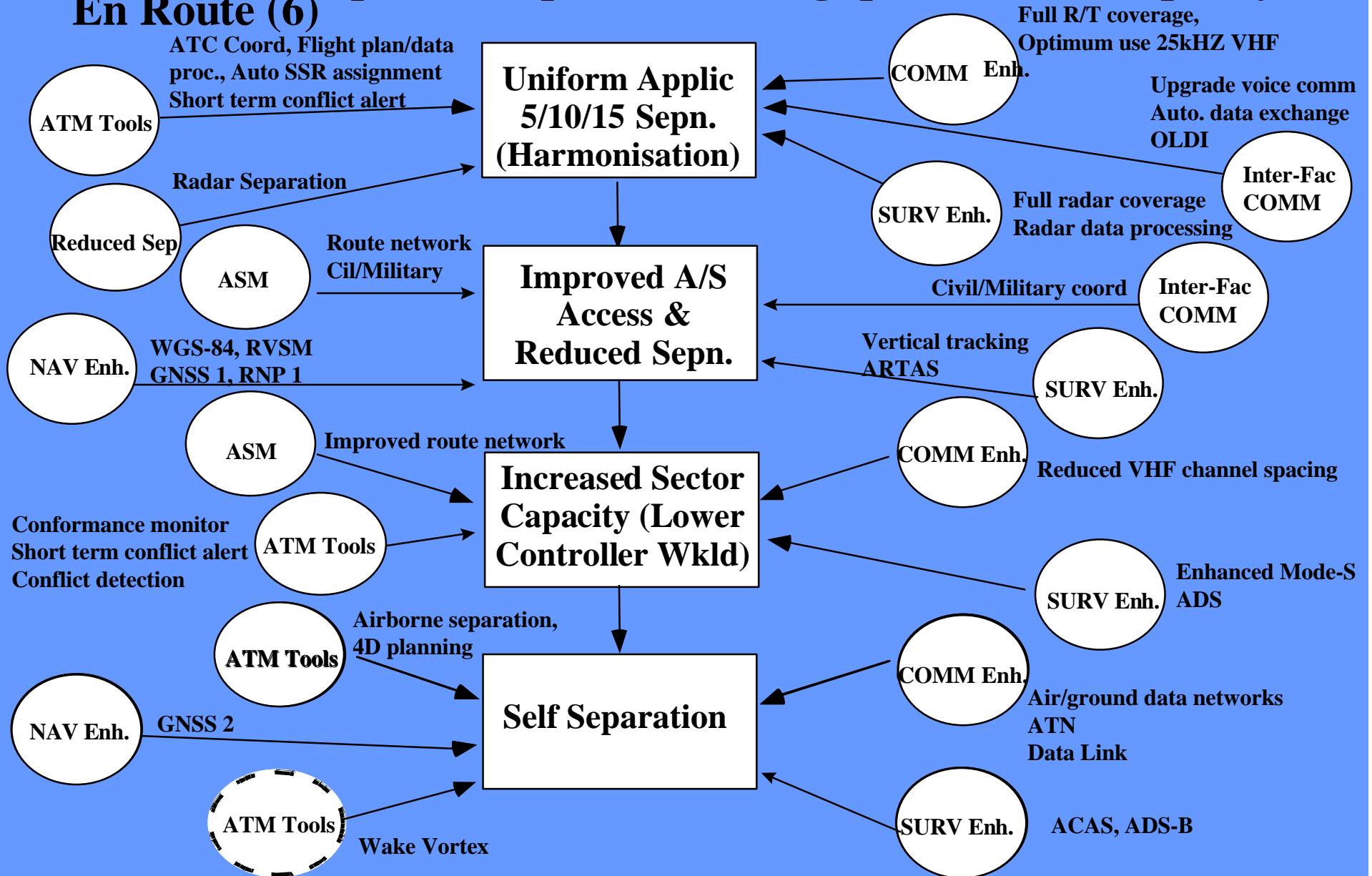
# CNS/ATM Transition Logic Diagram

# EATCHIP

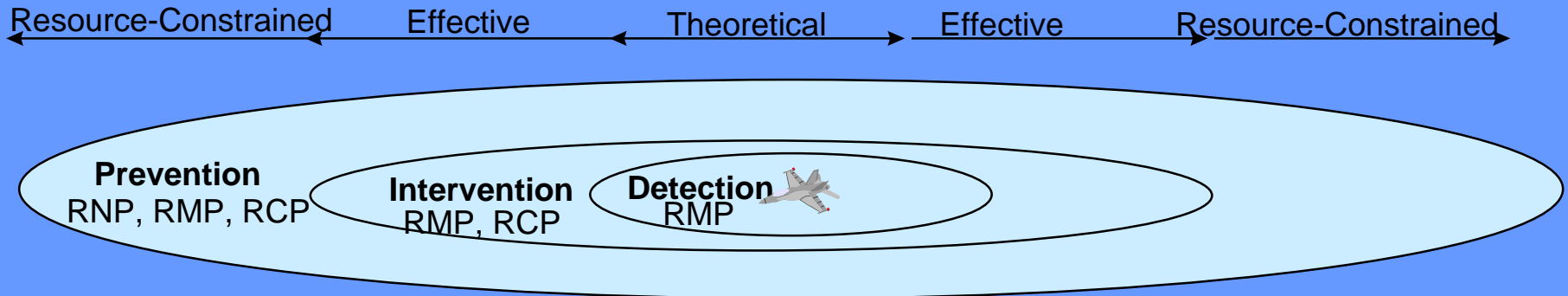
**TMA Arr / Dep (5)  
En Route (6)**

**Improved Throughput**

**Capacity**



# Separation Rings



Display  
Weather  
Medium-Term Intent  
Data Controller  
Comm: g/g  
Pilot  
Flow Rates  
Airspace Complexity

Sensor  
Display  
Short-Term Intent  
Controller  
Comm: a/g  
Pilot  
Closure Rate

Sensor  
Display  
Controller  
Pilot

## Required Element Performance

$RxP = f(\text{sensors, decision support, human})$

## Required System Performance sets Separation Standard

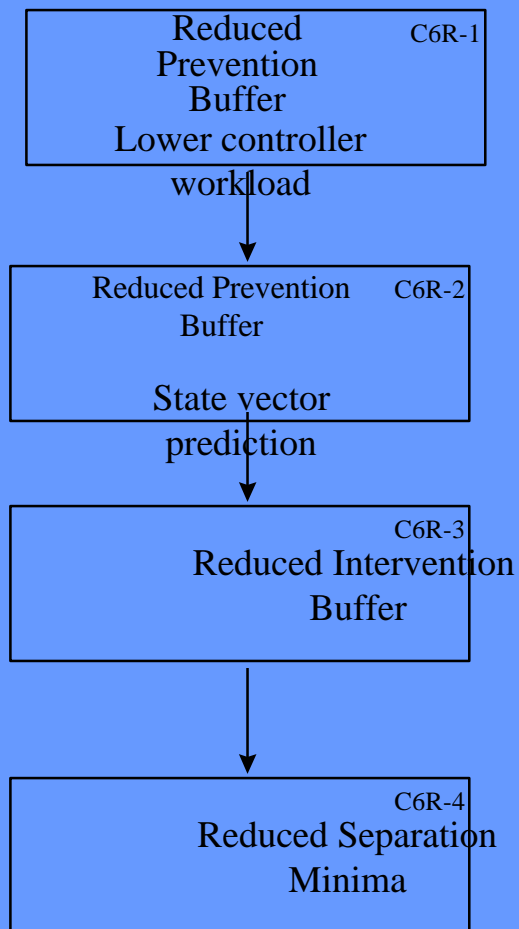
$RSP = g(RCP, RMP, RNP)$

# Transition Logic Diagram

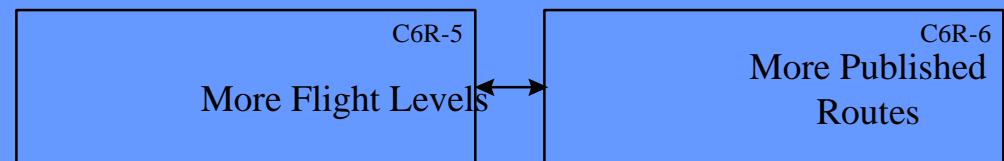
## Phased Operational Enhancements

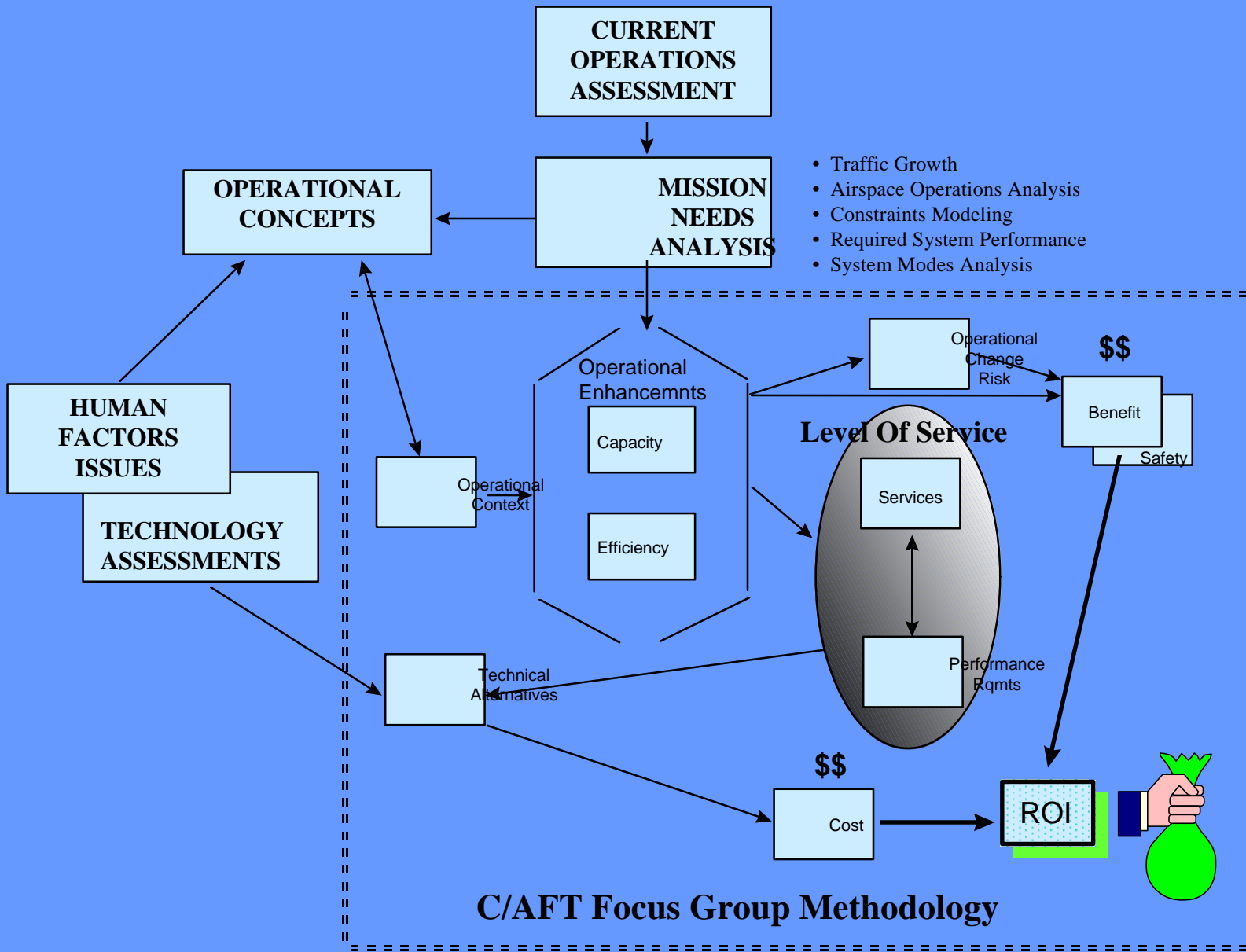
### 6. En-Route Capacity Transitions (Radar Separations)

#### Airplane-Level Capacity Effects



#### System-Level Capacity Effects





# ATS Datalink Focus Group

- Goal of the group is “to provide a high level economic analysis of the value of equipping with an Advanced ATS Data Link”.
- Detailed economic analysis for U.S. NAS has been performed and results presented at last all-airline meeting.
- Results indicate that VDL Mode 2 datalink provides a reasonable return on investment for Airline Operational Control (AOC) and ATC applications.
- The C/AFT datalink analysis is responsible for U.S. airlines reaching a consensus on VDL Mode 2 implementation.
- C/AFT analysis has influenced the FAA CPDLC program.
- IATA and Eurocontrol have requested C/AFT assistance in economic modeling for LINK 2000+ program.

# Datalink Analysis

- ACARS demand is growing, spectrum availability is limited.
- ACARS represents significant economic benefit to airlines.
- C/AFT business case demonstrated that VDL Mode 2 is a good investment for AOC-only applications
  - Resulted in airline agreement on datalink implementation (meeting our goal of managing change)
  - Resulted in datalink industry-wide agreement for quick implementation of AOC over VDL Mode 2, which is an incremental step to future ATC applications.
  - Reduces scope of VDL-2 Planning Directive by allowing phased approach, AOC before ATC applications

# ROI's for Datalink Scenarios

<b>Scenario</b>	<b>End Equippage %</b>	<b>NPV</b>	<b>Expected Productivity <u>Net Expected Benefit</u> <u>Net Expected Inv.</u></b>	<b>IRR</b>	<b>Breakeven Year (Cum Discounted Cash Flow)</b>
Full Datalink	72%	\$2004M	5.0	45%	2007
AOC Only	47%	\$869M	5.0	46%	2006
Full Datalink for FF	35%	\$793M	6.7	61%	2006
Full Datalink for RF	37%	\$716M	3.0	31%	2009
AOC Only for FF	24%	\$567M	10.0	72%	2006
AOC Only for RF	22%	\$302M	2.8	28%	2009

# To Participate

## [www.boeing.com/caft](http://www.boeing.com/caft)

- See Boeing Website
- Let me know that you're interested
  - [kathleen.pirotte@boeing.com](mailto:kathleen.pirotte@boeing.com)