LEADERSHIP AT WORK

RNAV Development

Getting it Right

ALPA Advancing Next Gen

The Plan for Today

- Discuss RNAV Development
  … Challenges & Benefits
- What do we need to do to meet those challenges and gain the maximum benefit

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Our Distinguished Guests

- Captain Brian Townsend
- Don Porter, *Naverus*
- James Arrighi, *FAA*
- Grady Boyce, *Delta Air Lines*

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In the past, technology was less

Original Boeing 737 Flight Deck

And, well, things were different

But what a difference time makes

Now, it's all about technology

Slightly Newer Boeing 737 Flight Deck

Where the NAS Wants to Go

- RNAV / RNP from takeoff to touchdown
  - More capacity
  - More access
  - Less delays
- More efficient procedures mean...
  - Less fuel
  - Less time in the air
  - Less emissions
  - Less noise

Where the NAS Wants to Go

- RNAV / RNP Departure & Arrival
  - Better use of airspace
  - Shorter, more efficient tracks
  - Idle path descents & less restrictive climbs
- RNAV / RNP Approach
  - More capacity
  - Flexible Lateral and Vertical guidance to the runway

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What's the Payoff ?

- Save $$$
- Reduce Flight Time
- Save Gas
- Reduce Noise
- Reduce Emissions

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What's the Payoff ?

- Save $$$ (Happy Shareholders)
- Reduce Flight Time (Happy Passengers)
- Save Gas (Happy CFO)
- Reduce Noise (Happy Neighbors)
- Reduce Emissions (Happy Environment)

Economy & Environment Force Innovation

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How Do We Get That Payoff?

We have to walk (RNAV) …

… Before we can run (RNP)

We're talking the talk ...

But are we walking the walk?

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RNAV – How Do We Get It ~~W~~right?

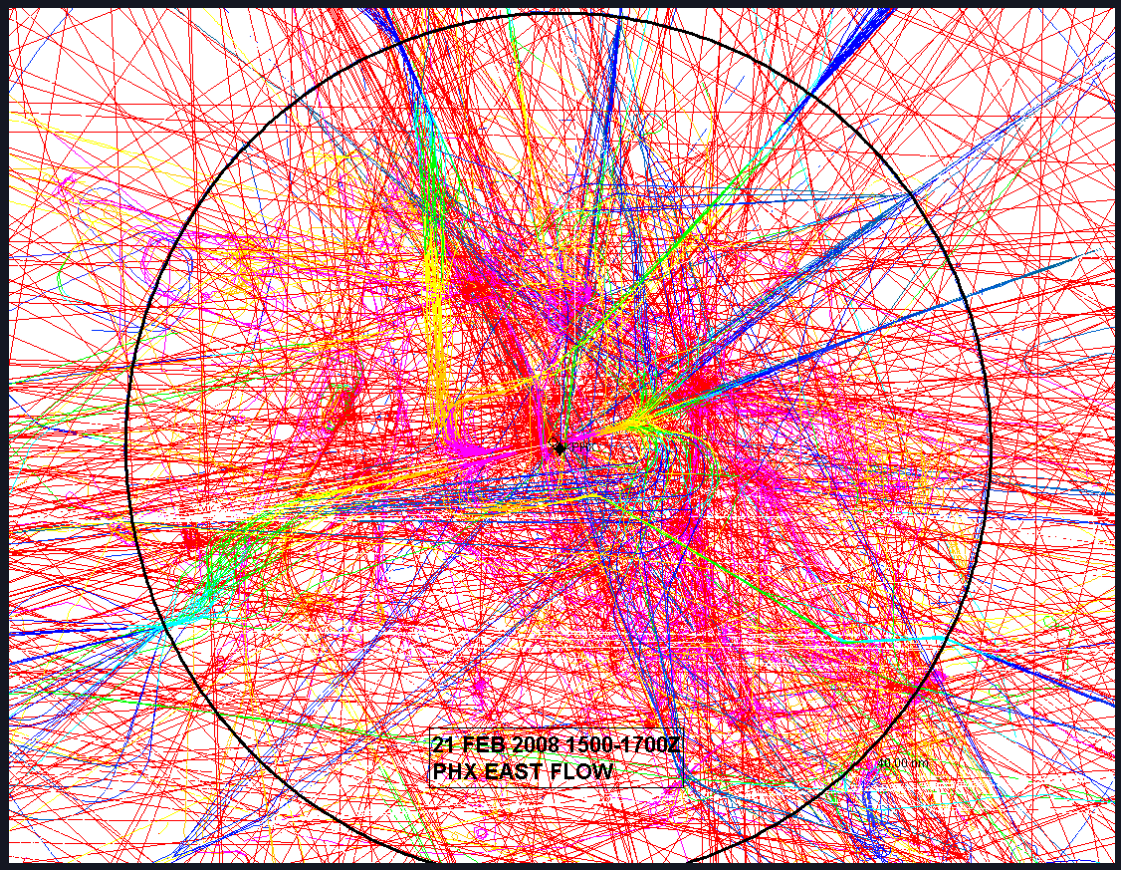
Captain Brian Townsend

ALPA Air Safety Week

August 14, 2008

Crowded Skies

- Much of today's air traffic is handled by voice communications
- Traffic growth results in overloaded communication frequencies
- Crowded skies means less efficiency



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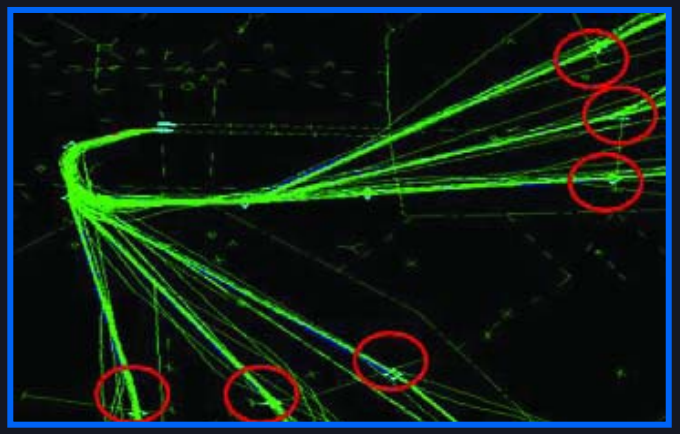
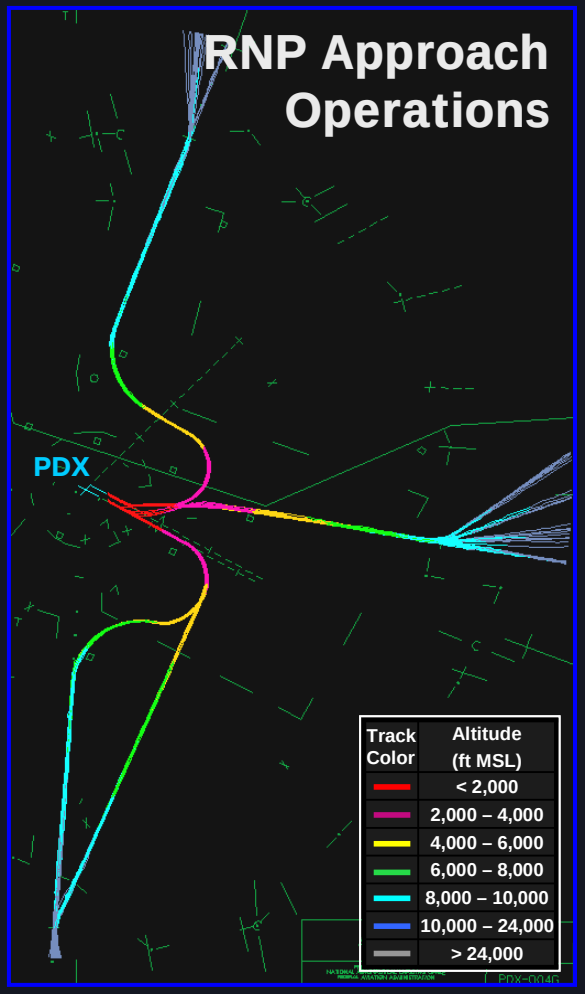
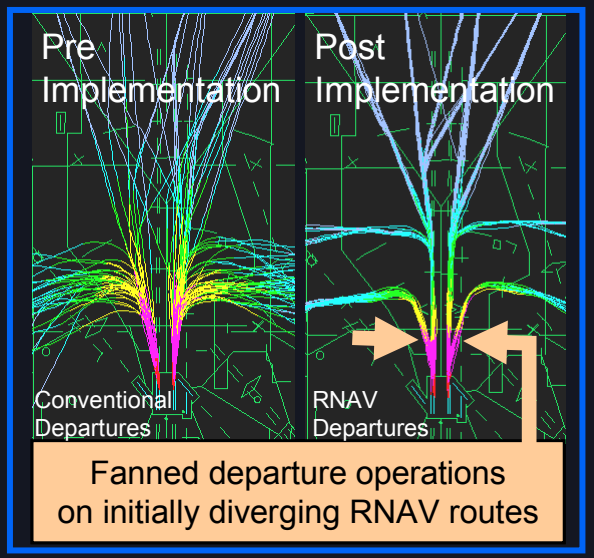
Proven Benefits







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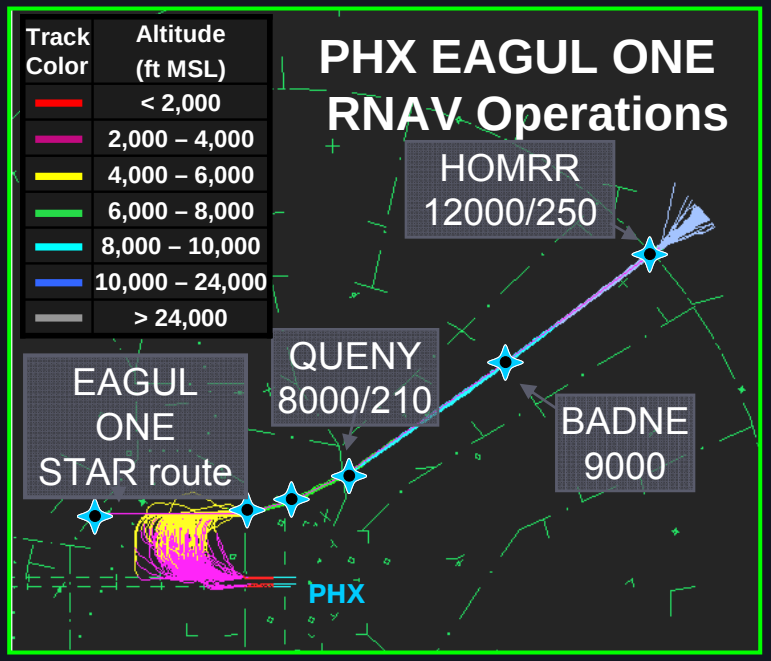
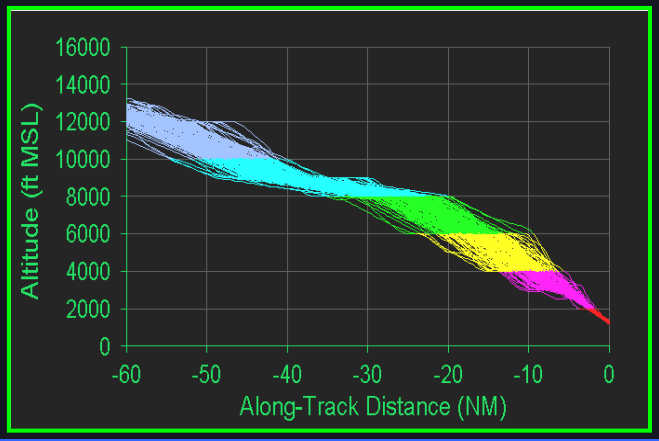
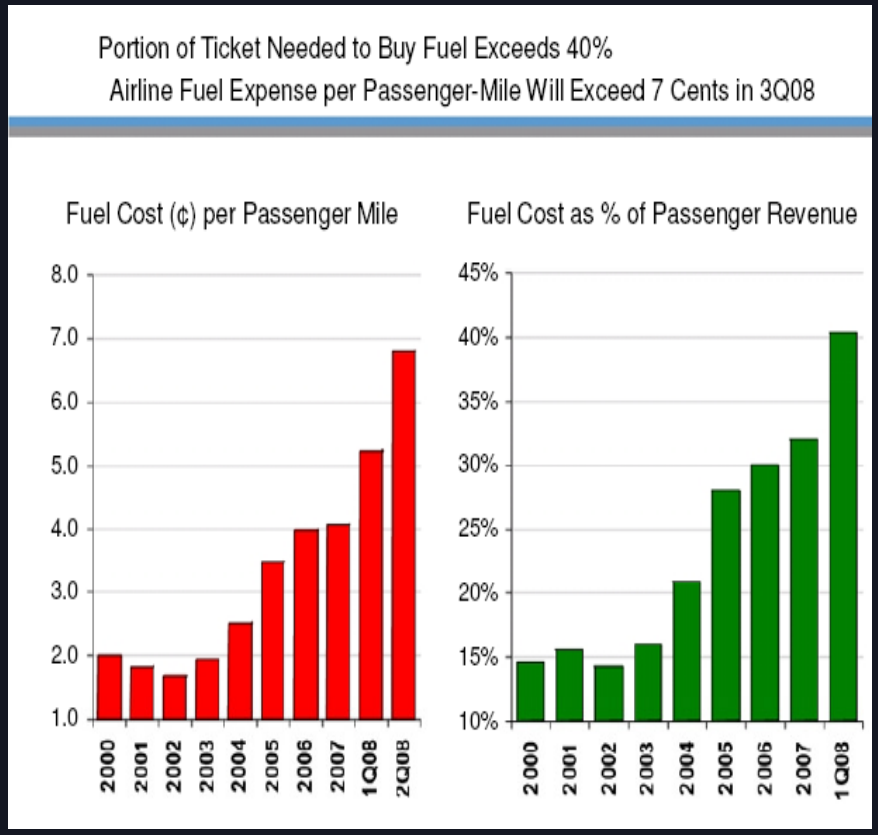
Optimized Profile Descents





- PHX RNAV procedures with vertical guidance and descend via
  - Reduce low-altitude level flight segments
  - Enable more time in reduced or idle-power descent
- Fuel burn savings to operators
  - Observed savings of 5 gallons per flight
  - Savings of up to 9 gallons per flight possible with full equipage and participation
- Lower aircraft emissions
  - Observed savings of 2500 Metrics tons of Carbon Dioxide (CO2) per year
  - Savings of up to 4500 metric tons per year possible

Fuel Pressure



- Airlines are squeezing every drop
- Pilots play a role
- Performance-based procedures are increasingly vital

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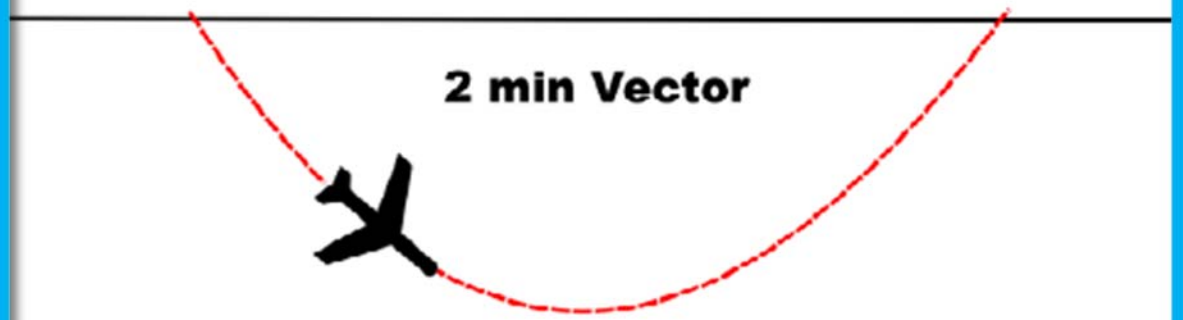
Turn & Burn

Added Fuel Cost / min for vector

5600 lbs/hr÷60 = 93.3 X 2 = 186.6 lbs/2 mins
186.6÷6.7 =27.85 Gals burned



27.85 X 3.00= $ 83.55
27.85 X 4.00= $111.40
27.85 X 5.00= $139.25
27.85 X 6.00= $167.10

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Flight Deck of Yesterday & Today

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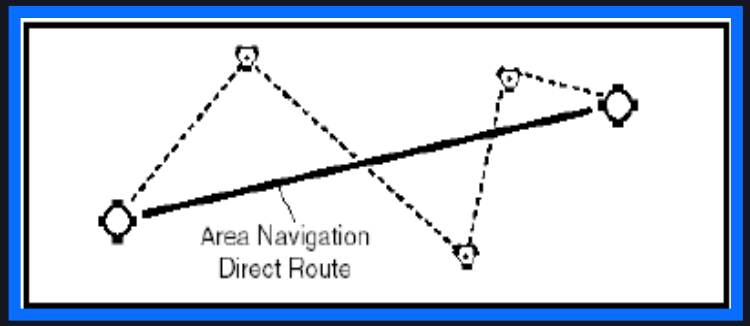
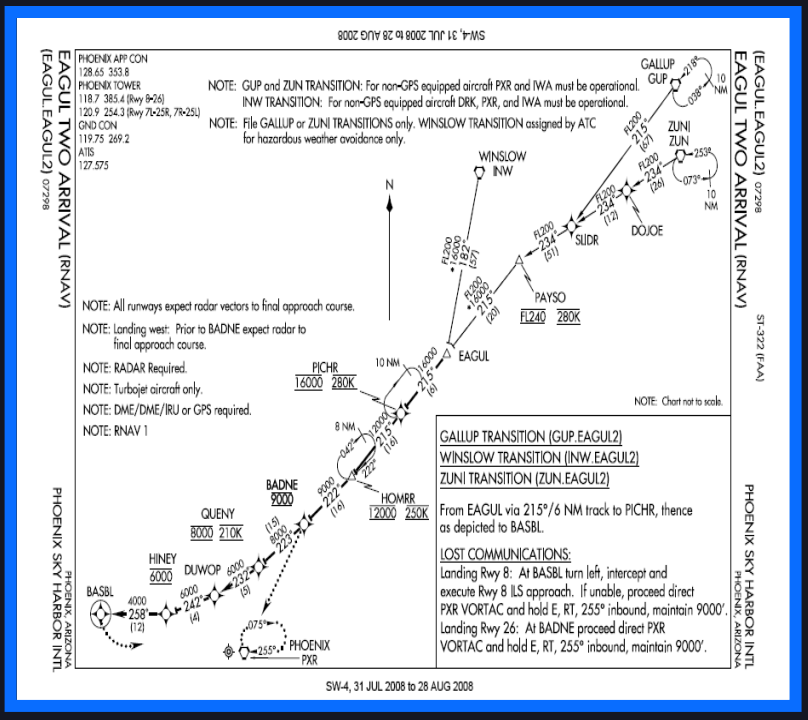
Old, But New

Point-to-point RNAV has existed for years



RNAV for departures and arrivals is not the "Modus Operandi" everywhere



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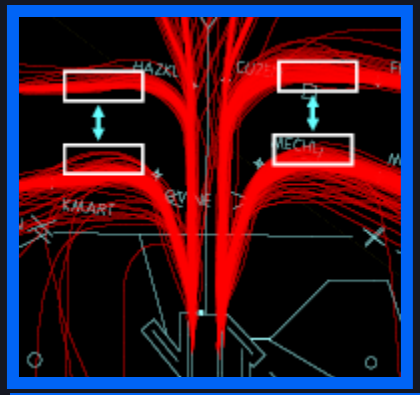
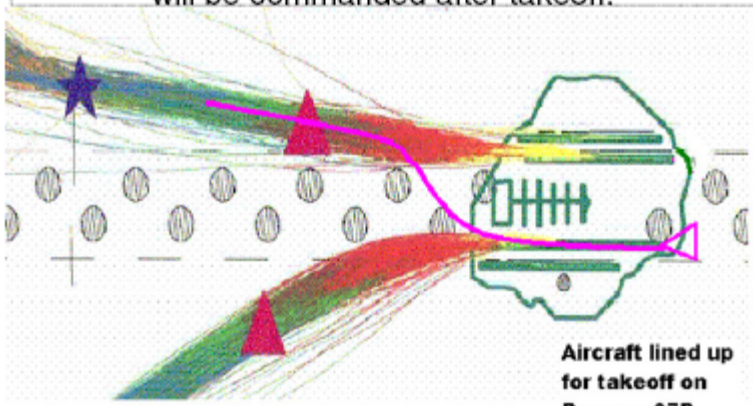
Precision of RNAV Requires Precise Pilots



Track compliance

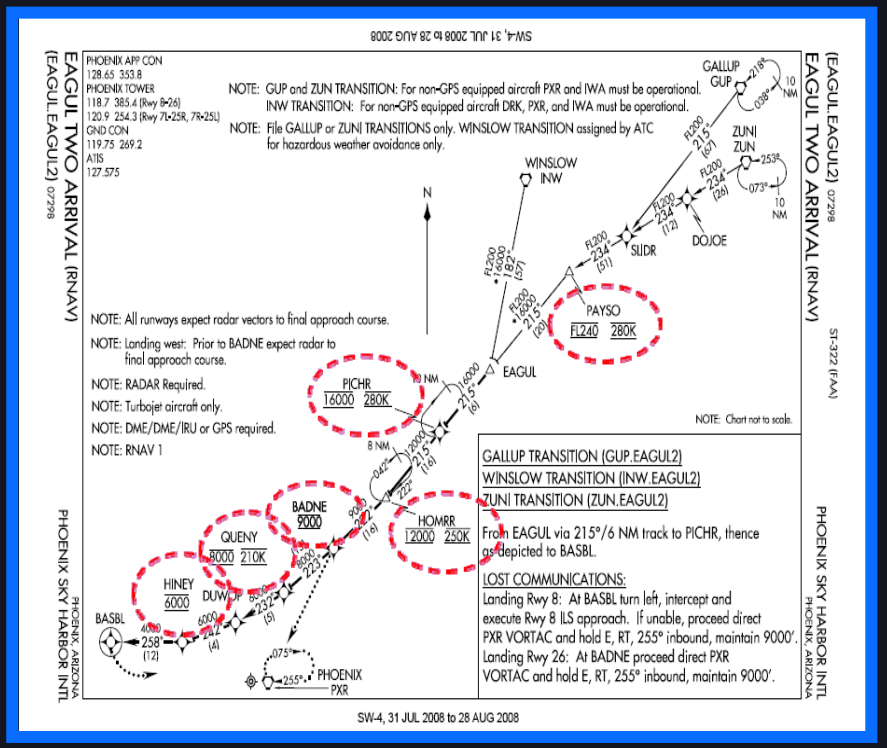
Close adherence to altitudes and airspeeds is essential

If the pilot loads runway 26L in the FMS, *BUT takes off of runway 27R,* the following LNAV path will be commanded after takeoff.



Aircraft lined up for takeoff on Runway 27R

NOT A GOOD WAY TO LEAVE ATLANTA !!!!!!



Flight Management Systems & Training

- Human Factors
  - Human-Automation Interface
  - Cumbersome Programming
- Unreliable Path Predictions
  - Crossing Restrictions
- Unintended Speed Reversions

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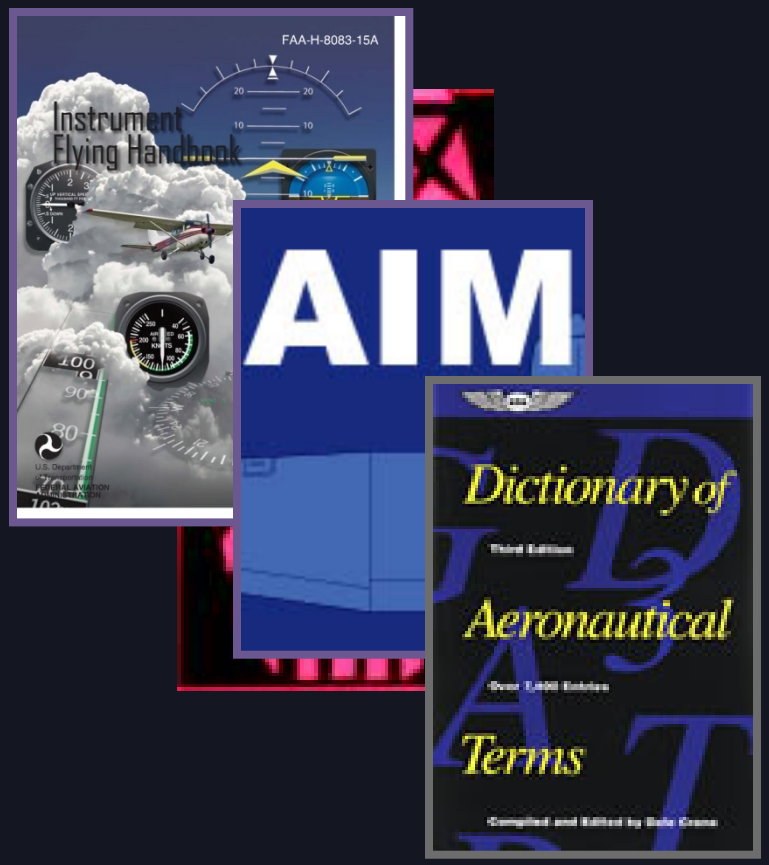
Tribal Knowledge

- Tribal knowledge is any unwritten information that is known within a tribe but unknown outside of it.
- RNAV information is not
  - Centralized
  - Integrated
- Bits & Pieces of Information



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Training … Or Not

- Operators who put forth the effort, produce better compliance with procedures
- The *few* that don't, inhibit progress
- In today's world we can't afford backward steps

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Focus On Training

- National Focus
  - Inconsistent training among individual operators
  - Pilots need structured training to fly “right”
- Human Element
  - Layers of protection needed to assure consistent compliance
  - Assure understanding of charting instructions
  - Human-friendly technology a key component (not something you can change today)

Transition

- We’re transitioning from a voice communicated ATC system to a procedural ATC system
- Consistent Products = Consistent Results
- RNAV training must become a part of “routine” training

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RNAV
We must get it right, together

Captain Brian Townsend

ALPA Air Safety Week

August 14, 2008

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RNAV Lesson Learned and Issues
"Bridging the Knowledge Gap"

Donald Porter

ALPA Air Safety Week

August 14, 2008

Overview

- A Little About RNP, NextGen
- 2002 - 2003
  - Strategic Pause
  - FAA RNAV Action Team (RAT)
- NATCA 2003
- 2008
  - What Happened at KSLC?
- Is There a Knowledge Gap?
- Efforts Underway

2002 - 2003

- Strategic Pause - Procedure Design and Development
  - CLT, LAS, PHX and others
  - December 23, 2002
- FAA RNAV Action Team (RAT)
  - “Issues Buckets”
  - Lessons Learned and Issues
  - Phased start-up
  - AC 90-100 RNAV

NATCA - 2003

- Must Do / Haves To Continue
  - Human Factors
  - RNAV Procedure Implementation
  - Pilot and Controller Training
  - Safety

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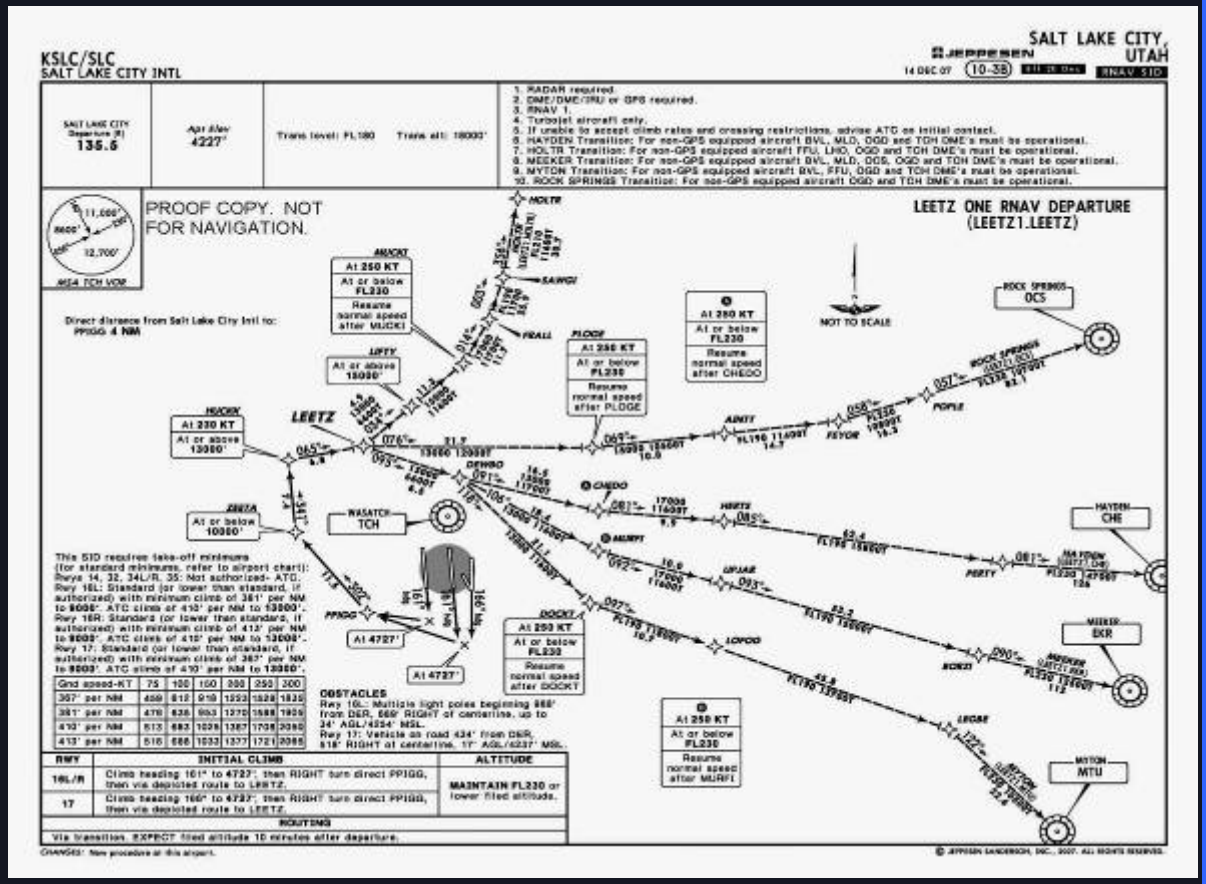
2008 KSLC – What Happened??

- Compliance with Vertical
  - Cleared LEETZ 1 as filed
  - Altitude Box – Maintain FL230
  - Training and Education
  - Charting
  - Human Factors



Is There a Knowledge Gap??

- Some Assumptions
  - Understand (SID) clearances
    - As filed – lateral and vertical
    - Confusion with Descend Via
  - Use of standard phraseology
  - Compliance with speeds
    - On the path
    - ATC assigned
    - Termination - Resume normal speed
    - Descend via
    - InFO

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Lessons Learned and Issues - Efforts Underway

- Air Traffic Control Procedures and Phraseology (ATCPP)
  - Runway clarification
  - Resume published speed
  - Climb via
- Pilot Controller Procedures System Integration (PCPSI)
  - Catalog and publish “lessons learned”
  - Frequently asked questions – “RNAV for Dummies”
- RNAV Action Team II

Thank you!

Donald Porter

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(202)641-1899

18 Steps to Safety

The Process for RNAV Procedures Development

Federal Aviation Administration

Presentation to: ALPA Air Safety and Security Forum

Name: Jim Arrighi,
FAA System Operations, RNAV /RNP Group

Date: August 14, 2008

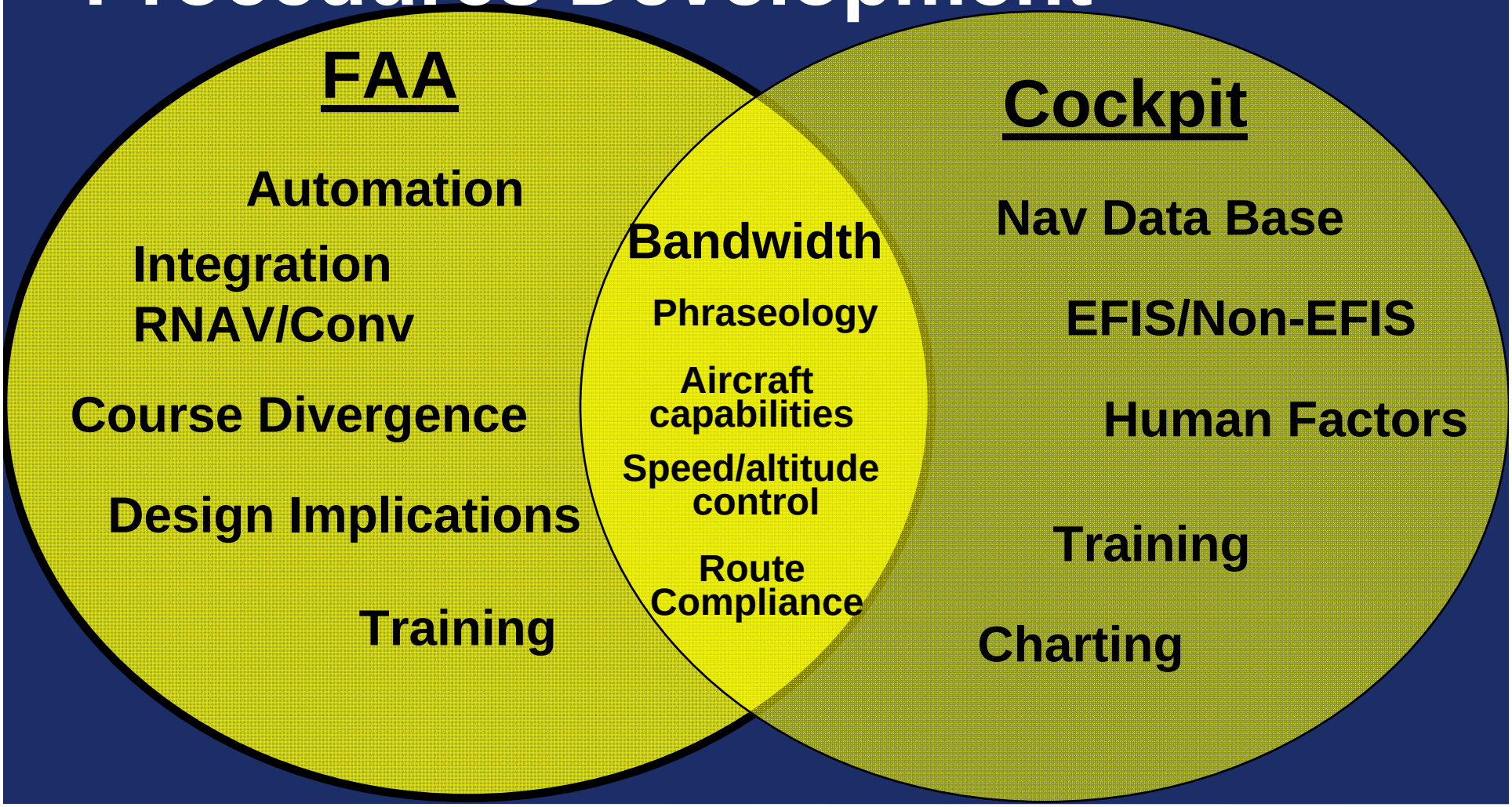
RNAV Procedure Development

- 2002 Strategic Pause in Procedures Development
- RNAV Action Team
- Development Guidance
- The Process for RNAV Procedures Development
- The Instrument Flight Procedures Production Pipeline
- ICAO PBN Process 3

2002 Strategic Pause in Procedures Development

- FAA and Industry began development and implementation of RNAV procedures in 1999
  - JFK, CLT, IAD, PHL, LAS, LAX, PHX, CVG
- Problems reported through:
  - Quality assurance reports, RNAV TF, pilot feedback, HF studies, others
  - Issues addressed at local level (band aid)
- Strategic Pause in RNAV procedures development prior to Atlanta STAR Implementation December 2002. Key issues identified

2002 Strategic Pause in Procedures Development



RNAV Action Team

- Delayed RNAV procedures design and publication
- Provided a period to identify and resolve issues
- Reach collaborative consensus with industry
- Goal to resume design / implementation:
  - STARs July 2003
  - SIDs September 2003

RNAV Action Team

- FAA/Industry Team: Flight Standards, Aviation Systems Standards, Aircraft Certification, Air Traffic, PARC
- Developed Four Buckets for SID and STAR Challenges:
  - Training, Procedures Development, Navigation, Automation
    - Three Priorities, focus on Priority-1 and Priority-2
  - 65 items identified
- Ensure issues and lesson learned are identified and addressed

RNAV Development Guidance

- FAA Order 7100.9D provides guidance and standardization for procedures development and management of RNAV arrivals
- FAA Order 8260.46C policy guidance for RNAV departures
- FAA Order 8260.43A Regional Airspace Procedures Team (RAPT) guidance for initiating and processing requests for RNAV procedures
- Advisory Circular 90-100(A) - U.S. Terminal and En Route RNAV
- 18-Step Process: Now being vetted through Safety Management System process to validate it as the safety process to be used for procedure development/implementation

Guidelines for RNAV Procedure Implementation

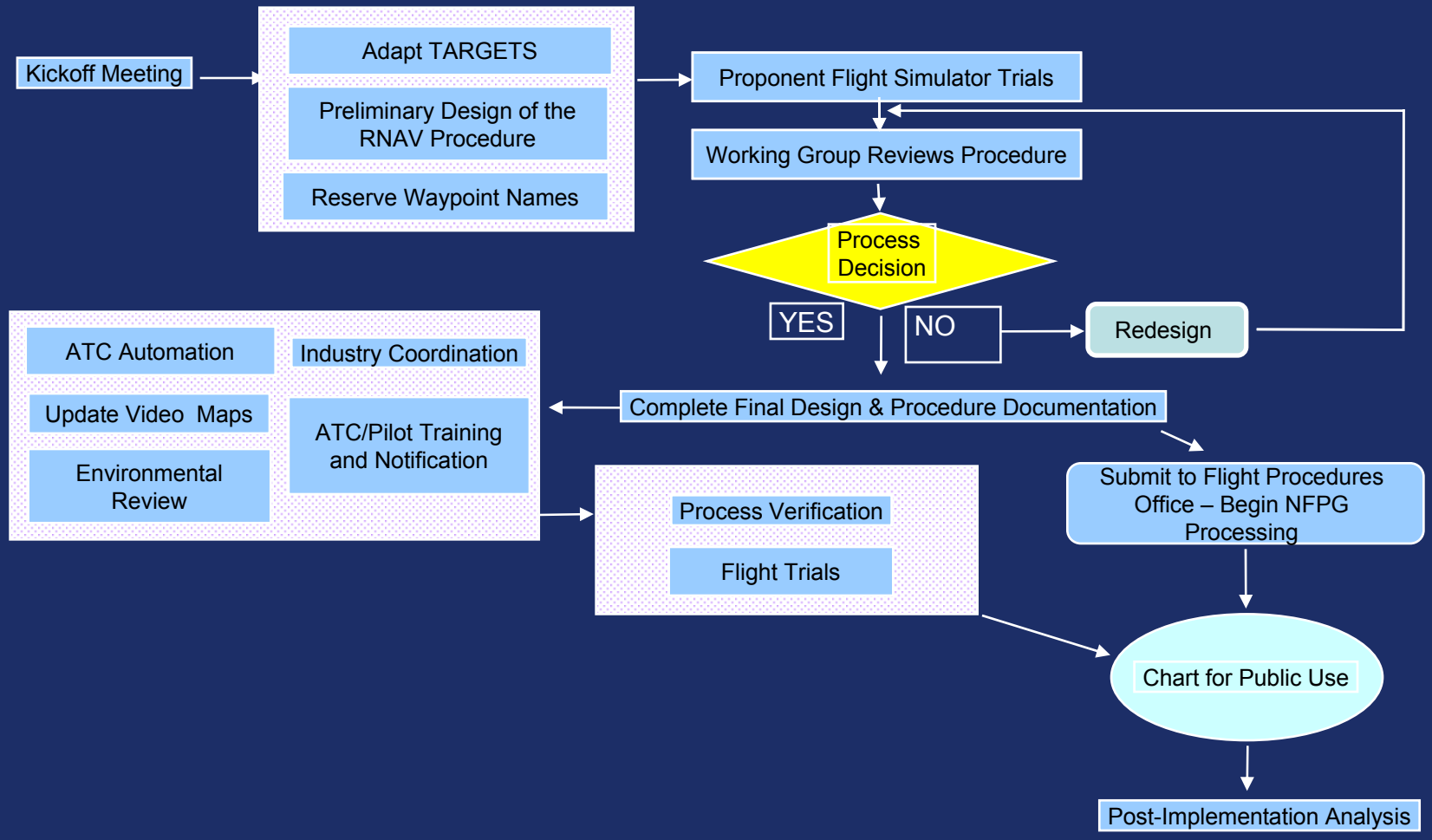
Developed and validated a repeatable implementation process

- 18-step process developed and coordinated starting in 1999
- Validated at 7 US sites (PHL, EWR, CLT, JFK, IAD, DTW, IAH) Feb 99 - Aug 01
- Collaborative team - FAA, NATCA, Airlines, and industry

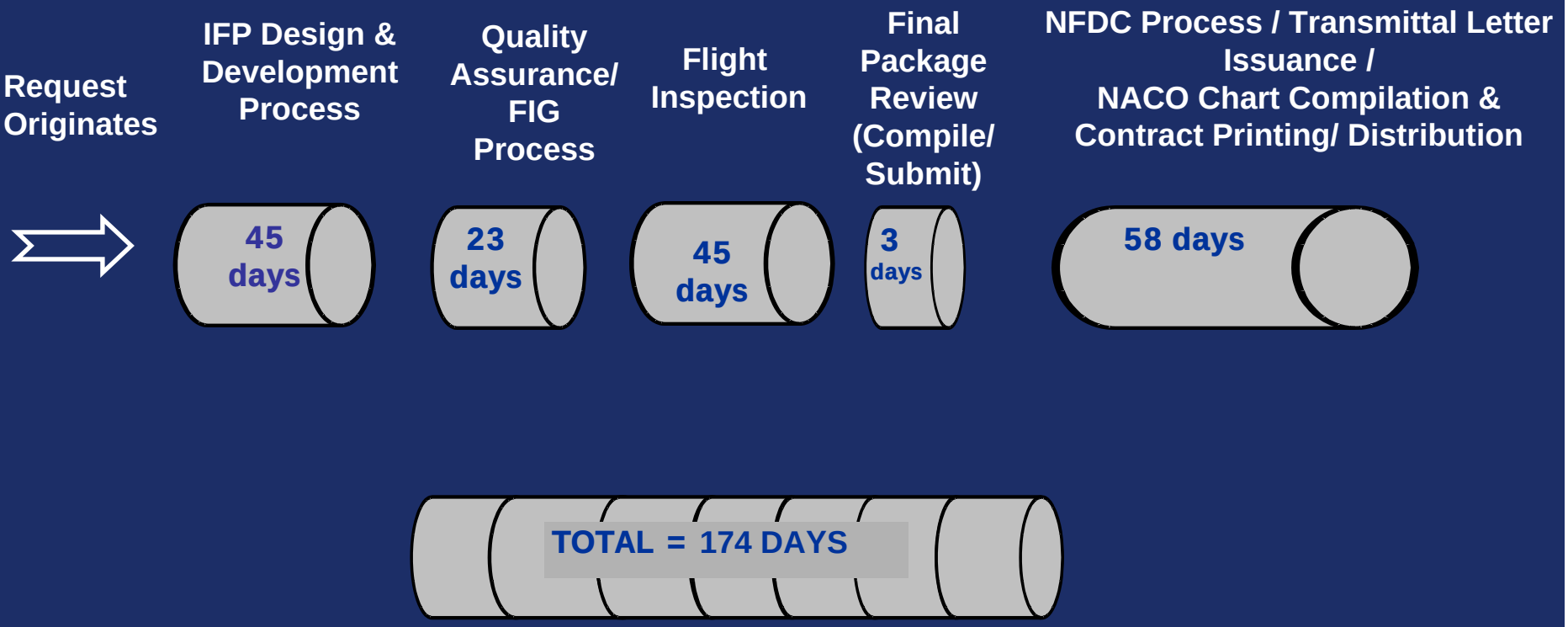
Fielded TARGETS tool to support and expedite process

- Software application with simple point-and-click user interface to design terminal RNAV procedures
  - Terminal Area Route Generation, Evaluation, and Traffic Simulation
  - Capabilities: route design, real-time flyability assessments, and simulation
  - Data export capabilities that expedite the distribution of data.
- Technology Transition of TARGETS to FAA August 2001

Guidelines for RNAV Procedure Implementation



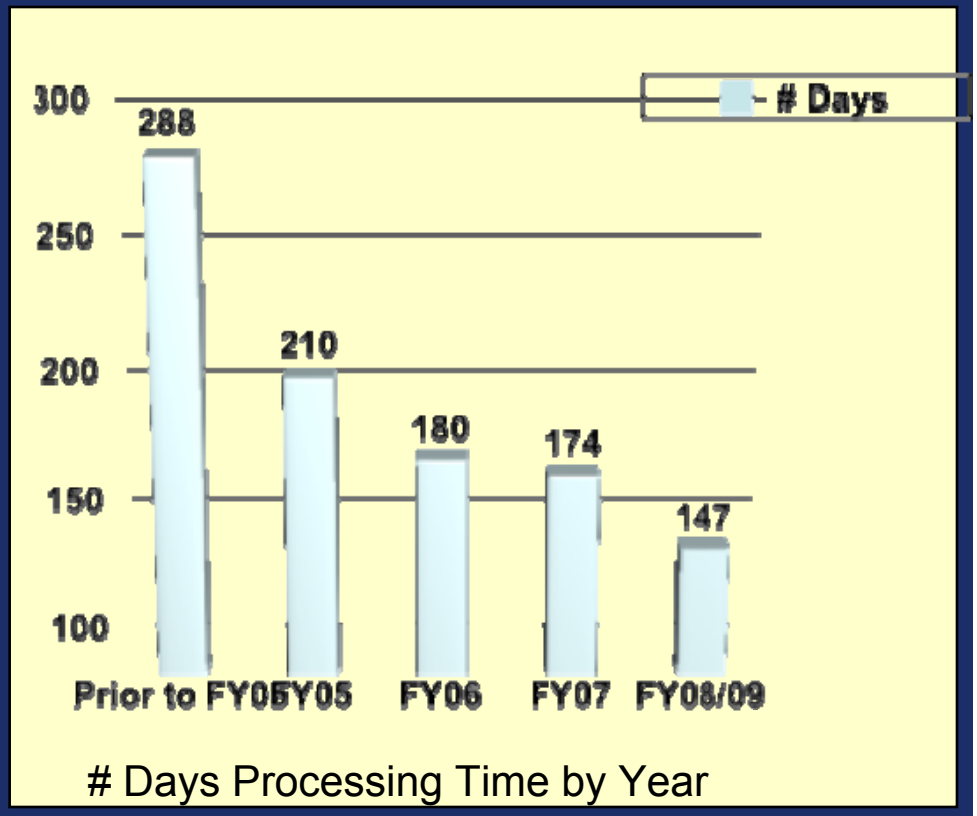
The Instrument Flight Procedure Timeline Pipeline



Revision date: 06/02/05

Flight Procedure Processing Timeline

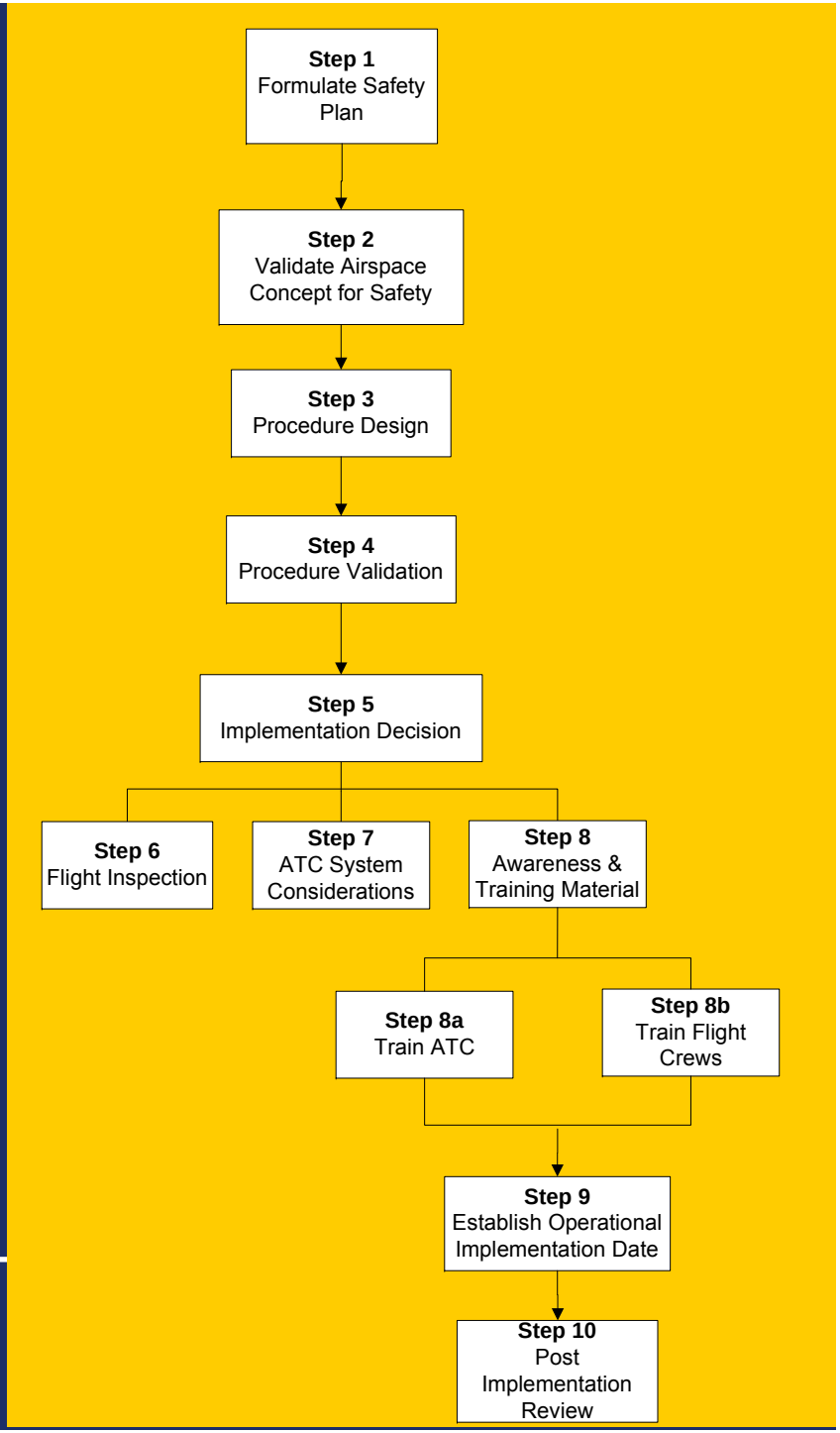
- Process re-engineering and IT investment has reduced the Instrument Flight Procedures processing timeline
  - Prior to FY05 processing time averaged 288 days
  - End of FY05 – reduced to 210 days
  - FY06 – reduced to 180 days
  - FY07/08 – reduced to 174 days
  - FY08/09 – planned reduction to 147days
  - Does not include 45-working days for standards waivers



Days Processing Time by Year

ICAO PBN Manual

Volume 1
Part B, Chapter 4:
A Snapshot of Process #3



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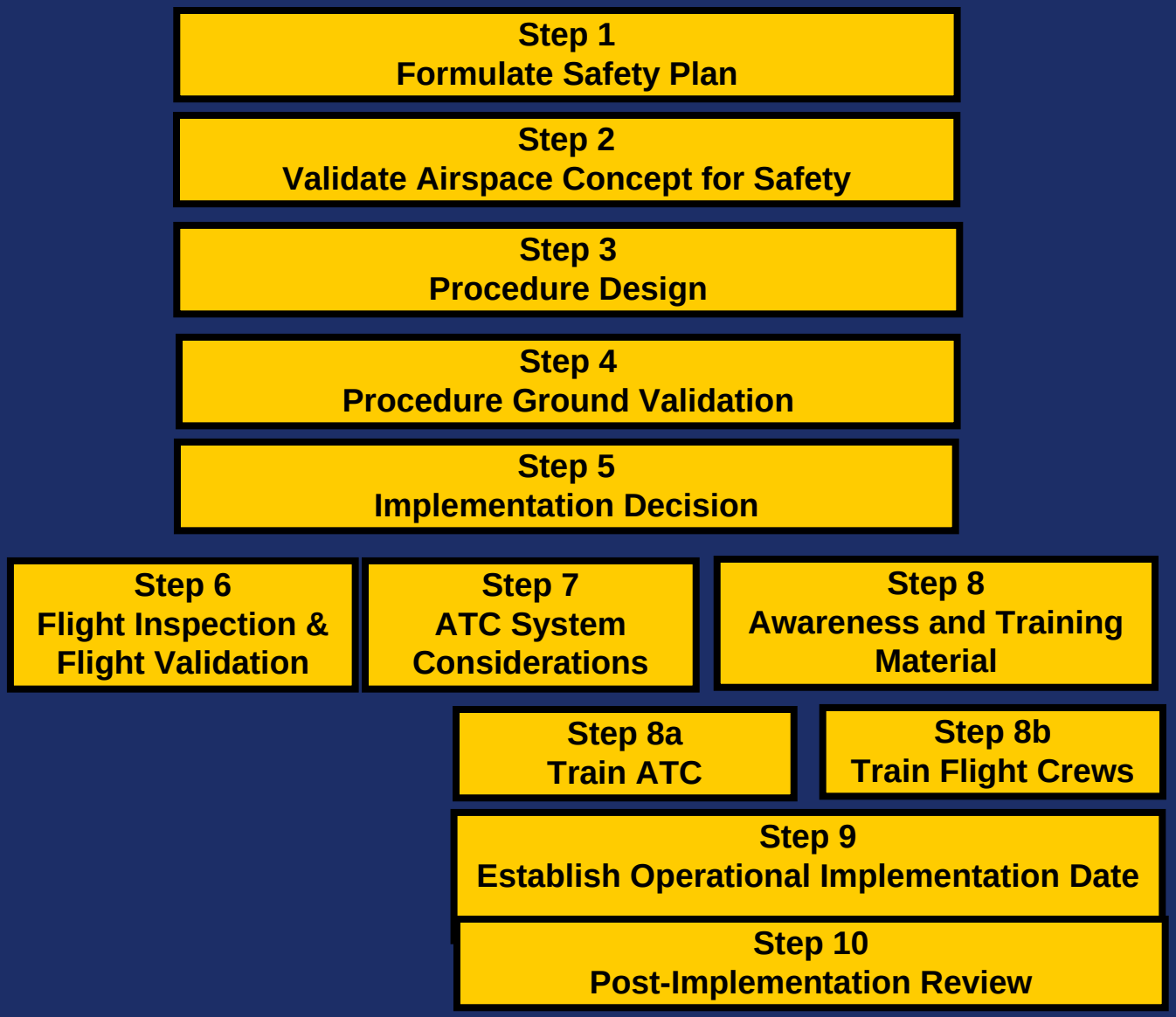

Step 1
Formulate Safety Plan
Step 2
Validate Airspace Concept for Safety
Step 3
Procedure Design
Step 4
Procedure Ground Validation
Step 5
Implementation Decision
Step 6
Flight Inspection &
Flight Validation
Step 7
ATC System
Considerations
Step 8
Awareness and Training
Material
Step 8a
Train ATC
Step 8b
Train Flight Crews
Step 9
Establish Operational Implementation Date
Step 10
Post-Implementation Review

18-Steps to Safety

The Process for RNAV Procedures Development

An Ongoing Journey

RNAV Development

An Operator's Experience

Grady Boyce, Technical Pilot

DELTA

Overview

Airlines play a significant role in procedure development. The level of involvement by the “Lead Carrier” will have a significant impact on the final product.

This presentation will discuss the importance of the “Lead Operator/Carrier” in development of RNAV Procedures through:

- How procedures are developed
- What is a “Lead Carrier”
- Delta’s Experiences as lead carrier – SLC Evolution
- Post Procedure Development Involvement

7110.9D & The 18-Step Process – The Basics

The 18-Step Process

What is it?

7110.9D is a STAR Order that defines a standardized process for all stakeholders involved in STAR development.
This process is also used for SIDs and is known as the "18-Step Process."

Roles and Responsibilities for the following:

1. ATD – Air Traffic Division
2. TARGETS Operator
3. ATC
4. FPO – Field Procedures Office
5. AWO – All Weather Office
6. Lead Operator
7. And more …

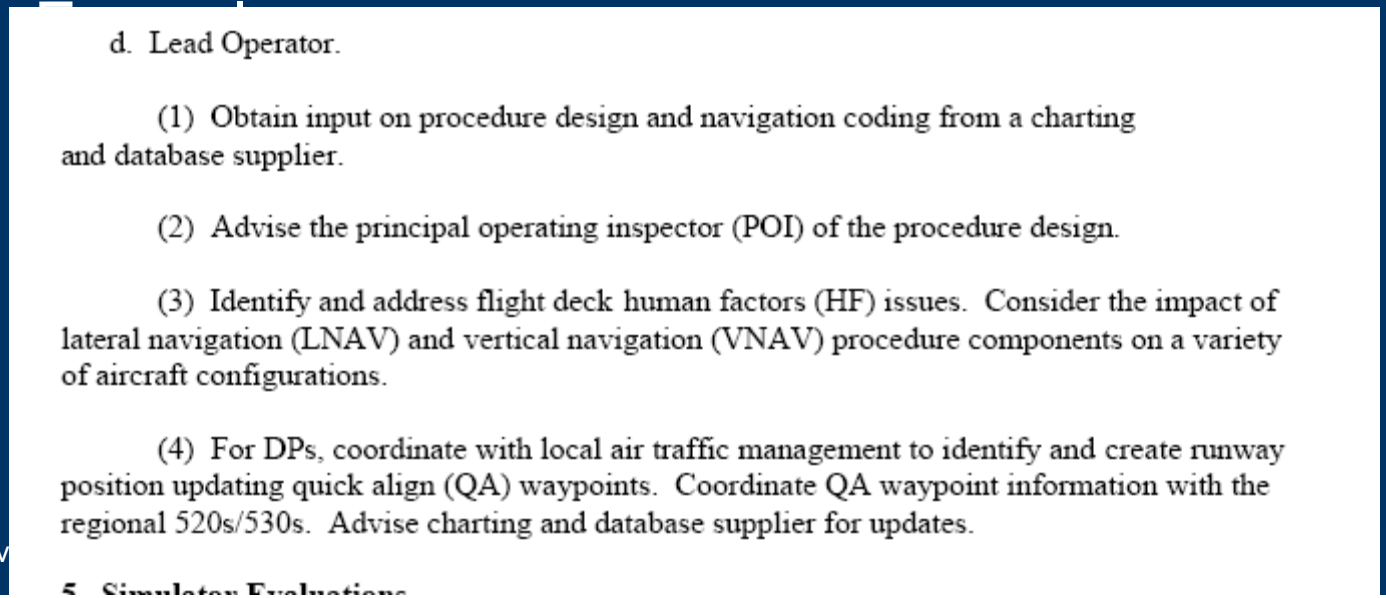
While the roles and responsibilities are defined, ***how*** the tasks are implemented is also critical to the development process

The Lead Operator

Lead Operator is defined as:

"An operator that has agreed to serve as the focal point for the development of STARs at a specific airport. The lead operator agrees to help develop the STAR and ensure fly-ability by all aircraft expected to use the STAR."

Beyond the basic definition, the 18-Step Process details recommended actions throughout the process.



d. Lead Operator.

(1) Obtain input on procedure design and navigation coding from a charting and database supplier.

(2) Advise the principal operating inspector (POI) of the procedure design.

(3) Identify and address flight deck human factors (HF) issues. Consider the impact of lateral navigation (LNAV) and vertical navigation (VNAV) procedure components on a variety of aircraft configurations.

(4) For DPs, coordinate with local air traffic management to identify and create runway position updating quick align (QA) waypoints. Coordinate QA waypoint information with the regional 520s/530s. Advise charting and database supplier for updates.

5. Simulator Evaluations

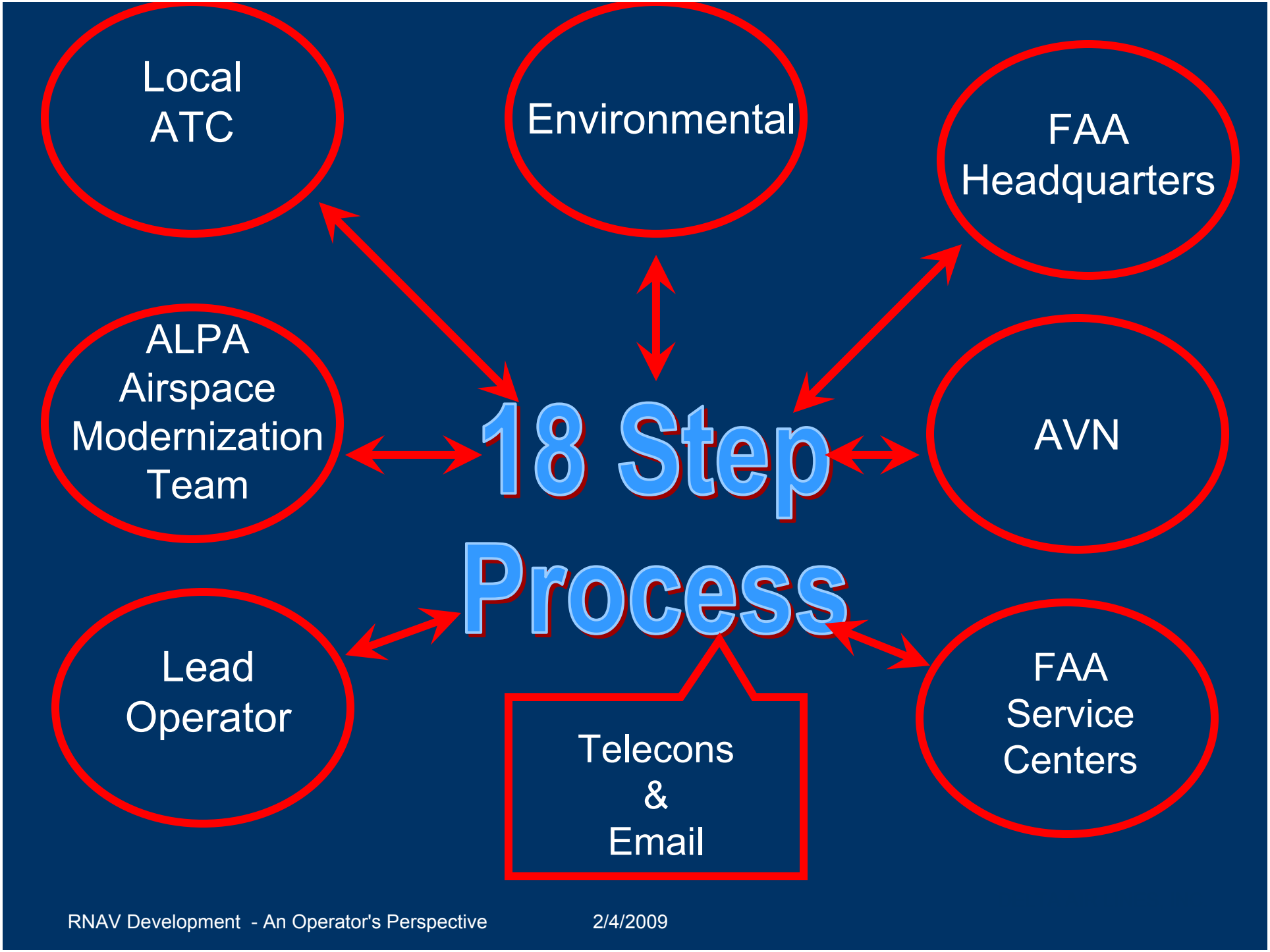
Example of Delta's Evolutionary role as Lead Operator

Delta lead carrier activities:

- ATL
- SLC
- MCO
- JFK/LGA

The following slides will discuss our evolution during the SLC development process and how, as lead carrier, we employed a new twist on the collaborative process

This is one carriers perspective …


Local ATC
Environmental
FAA Headquarters
ALPA Airspace Modernization Team
18 Step Process
AVN
Lead Operator
Telecons & Email
FAA Service Centers

The SLC STAR Development Process...

Kickoff Meeting for new SLC RNAV Procedures 12/15/06:

- Introduced 11 procedures (STARs and SIDs) – multiple transitions
- Approximately 45 days to sim test
- Paper work was scheduled to be submitted in late Jan.

Issues facing Delta for successful simulator runs:

- Christmas and New Years
- Nav DB coding lead time 30-45 days (can do without, but not optimum)
- Simulator scheduling 30-45 days lead time due to logistics
- Large number of procedures to be tested
- Feb 1, 2007 deadline

Example of Silos, and how one does not always understand how the other works (Ex. Paper Design to Sim Testing)

The STAR Process…

During 18-Step Telecons, Delta extended an offer for other parties to join us during Sim testing. Some ATC personnel accepted the offer.

The results were:

- For ATC,
  - Better understanding how ATC designed RNAV paths affect pilots
  - How capabilities of an aircraft compare to standard “assumptions”
  - Increased understanding of the operators/pilots environment
- For Pilots,
  - Better understanding of ATC’s perspective
  - Answers to questions regarding procedure design
  - Chance to provide our ideas how we could perform better in the system together
- For both,
  - Collaborative understanding to make the product beneficial to all
  - Desire to continue future RNAV development in the same collaborative fashion
  - Bring realistic input together from both perspectives for the first time

The STAR Process…

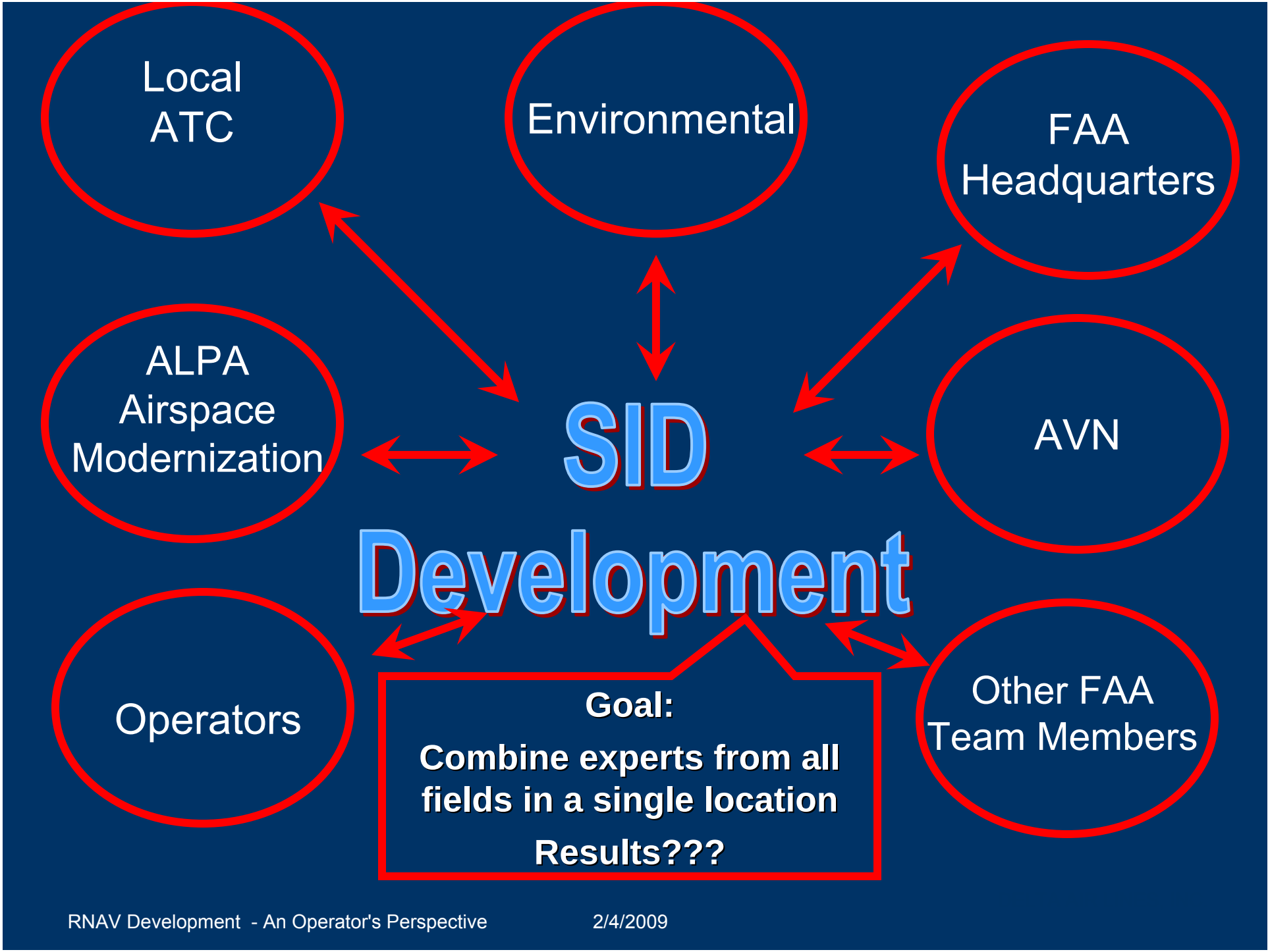
The next phase and the breakdown that occurred:

737NG testing (the next step):

- Necessary to test the performance of the 737 and Smiths FMS
- What was missing during these tests?
  - ATC, Environmental and TARGETS experts perspective
- Results?

Results:

- Many hours spent on a single procedure:
  - Effort to create a more efficient descent profile that eliminated long level segments.
- On the next telecon:
  - Results were discussed only to have the work discarded due to violations of other traffic flows and procedures that an operator does not have awareness of
- Hours of simulator testing on these procedures were wasted
- The idea for a “New Collaborative” Approach was developed for SLC SIDs


Local ATC
Environmental
FAA Headquarters
ALPA Airspace Modernization
SID Development
AVN
Operators
Other FAA Team Members
Goal:
Combine experts from all fields in a single location
Results???

Results...

Efficient designs resulting in RNAV procedures that are generations beyond where they would have been without this process.

Simulators

Briefing Rooms

Computers

All Experts in 1 place

After Procedure Development … What Next?

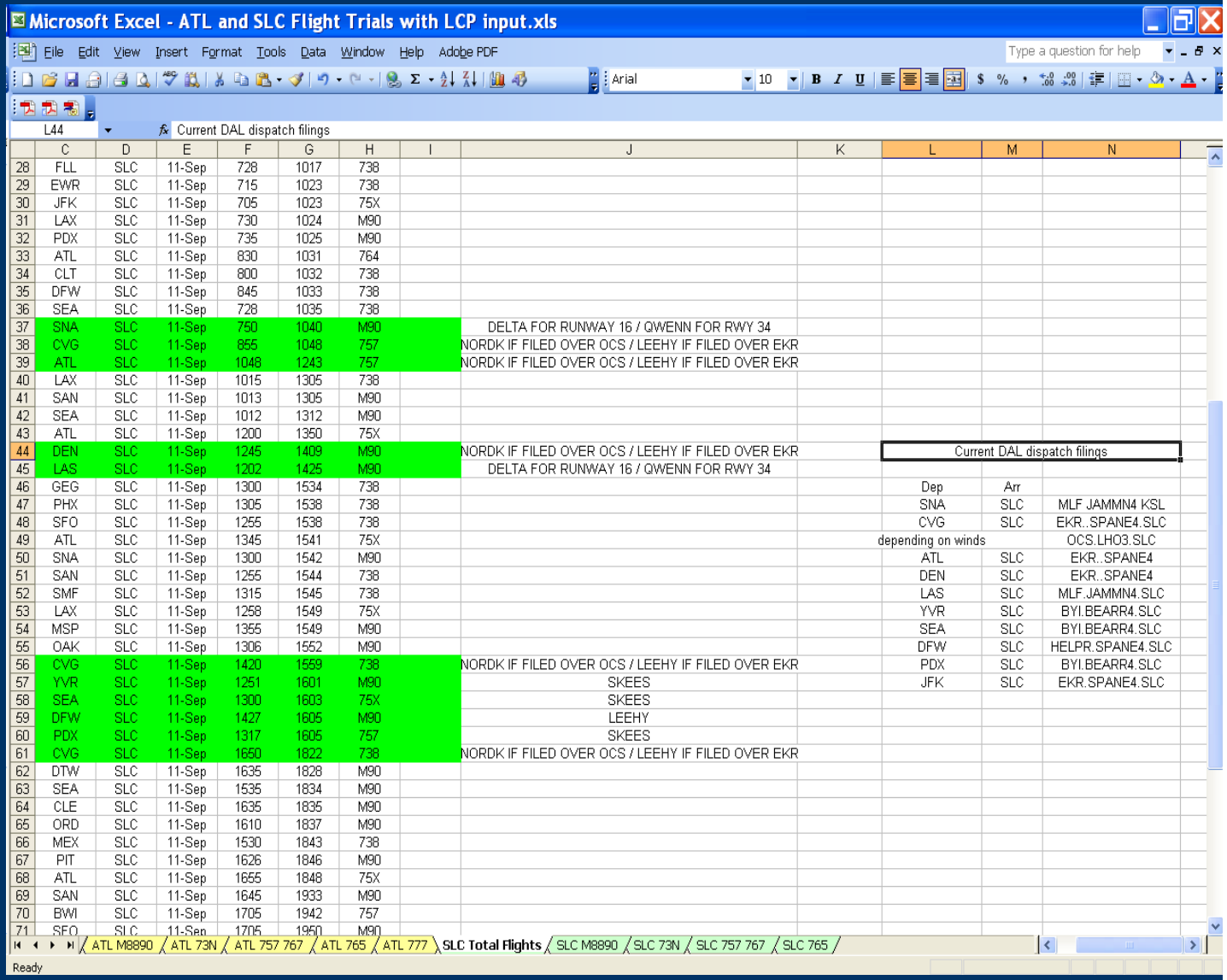
After the procedures are developed and delivered to the FAA Regional Office, a lead carrier's job is not complete.

Next Steps:

- Conducting "Live Flight Trials"
- Facilitating ATC/Operator Dialogue
- Line Pilot Communication
- Active Participation in Implementation Activities

Post Procedure Development - Live Flight Trials

- Utilize Line Check Pilot group
- Scheduled flights over a one week period
- Provide input to Company, FAA, and ALPA



	C	D	E	F	G	H	I	J	K	L	M	N
28	FLL	SLC	11-Sep	728	1017	738						
29	EWR	SLC	11-Sep	715	1023	738						
30	JFK	SLC	11-Sep	705	1023	75X						
31	LAX	SLC	11-Sep	730	1024	M90						
32	PDX	SLC	11-Sep	735	1025	M90						
33	ATL	SLC	11-Sep	830	1031	764						
34	CLT	SLC	11-Sep	800	1032	738						
35	DFW	SLC	11-Sep	845	1033	738						
36	SEA	SLC	11-Sep	728	1035	738						
37	SNA	SLC	11-Sep	750	1040	M90		DELTA FOR RUNWAY 16 / QWENN FOR RWY 34				
38	CVG	SLC	11-Sep	855	1048	757		NORDK IF FILED OVER OCS / LEEHY IF FILED OVER EKR				
39	ATL	SLC	11-Sep	1048	1243	757		NORDK IF FILED OVER OCS / LEEHY IF FILED OVER EKR				
40	LAX	SLC	11-Sep	1015	1305	738						
41	SAN	SLC	11-Sep	1013	1305	M90						
42	SEA	SLC	11-Sep	1012	1312	M90						
43	ATL	SLC	11-Sep	1200	1350	75X						
44	DEN	SLC	11-Sep	1245	1409	M90		NORDK IF FILED OVER OCS / LEEHY IF FILED OVER EKR		Current DAL dispatch filings		
45	LAS	SLC	11-Sep	1202	1425	M90		DELTA FOR RUNWAY 16 / QWENN FOR RWY 34				
46	GEG	SLC	11-Sep	1300	1534	738				Dep	Arr	
47	PHX	SLC	11-Sep	1305	1538	738				SNA	SLC	MLF.JAMMN4.KSL
48	SFO	SLC	11-Sep	1255	1538	738				CVG	SLC	EKR..SPANE4.SLC
49	ATL	SLC	11-Sep	1345	1541	75X				depending on winds		OCS.LHO3.SLC
50	SNA	SLC	11-Sep	1300	1542	M90				ATL	SLC	EKR..SPANE4
51	SAN	SLC	11-Sep	1255	1544	738				DEN	SLC	EKR..SPANE4
52	SMF	SLC	11-Sep	1315	1545	738				LAS	SLC	MLF.JAMMN4.SLC
53	LAX	SLC	11-Sep	1258	1549	75X				YVR	SLC	BYI.BEARR4.SLC
54	MSP	SLC	11-Sep	1355	1549	M90				SEA	SLC	BYI.BEARR4.SLC
55	OAK	SLC	11-Sep	1306	1552	M90				DFW	SLC	HELPR.SPANE4.SLC
56	CVG	SLC	11-Sep	1420	1559	738		NORDK IF FILED OVER OCS / LEEHY IF FILED OVER EKR		PDX	SLC	BYI.BEARR4.SLC
57	YVR	SLC	11-Sep	1251	1601	M90		SKEES		JFK	SLC	EKR.SPANE4.SLC
58	SEA	SLC	11-Sep	1300	1603	75X		SKEES				
59	DFW	SLC	11-Sep	1427	1605	M90		LEEHY				
60	PDX	SLC	11-Sep	1317	1605	757		SKEES				
61	CVG	SLC	11-Sep	1650	1822	738		NORDK IF FILED OVER OCS / LEEHY IF FILED OVER EKR				
62	DTW	SLC	11-Sep	1635	1828	M90						
63	SEA	SLC	11-Sep	1535	1834	M90						
64	CLE	SLC	11-Sep	1635	1835	M90						
65	ORD	SLC	11-Sep	1610	1837	M90						
66	MEX	SLC	11-Sep	1530	1843	738						
67	PIT	SLC	11-Sep	1626	1846	M90						
68	ATL	SLC	11-Sep	1655	1848	75X						
69	SAN	SLC	11-Sep	1645	1933	M90						
70	BWI	SLC	11-Sep	1705	1942	757						
71	SEA	SLC	11-Sep	1705	1950	M90						

Post Procedure Development – ATC/Operator Dialogue

With the removal of the FAA FAM (Cockpit Familiarization Program), the gap in understanding between the ATC Operational Environment and the Pilot Operational Environment has widened significantly.

One Solution

In order to facilitate bridging this gap, Delta has participated in week long briefings titled "RNAV – The Pilot's Perspective" to various ATC facilities.

Post Procedure Development – Line Pilot Communication

Perspectives on the impact of an RNAV Implementation can vary from "Significant" to "It's just another procedure."

Many examples throughout the NAS have illustrated that all RNAV implementations should be viewed as Independent and Significant.

Lead Carrier's role in preparation of procedure implementation:

- "Head's Up" notifications to flight crews
- Issuing publications describing the new procedures and their unique characteristics:
  - RNAV off the runway
  - Runway Transitions
  - Speeds/Altitudes, or Descend Via
- Flight Plan Remarks
- Sign in screen "Pop Ups"
- Face to Face briefings

Post Procedure Development – Active role in Implementation

As implementation dates approach, lead carrier engagement is an essential part of the procedure oversight group.

Examples of pre-implementation activities:

- Telecons
  - Report:
    - Actions taken for communication to your and other airlines
    - Readiness Status
    - Any last minute issues
- Participate in Implementation Action Team during initial days of the new procedure(s)
  - Have a POC available 24/7
  - Assist ATC with tactical issues. Presence on the ATC floor if able.
  - Provide instant feedback to carrier
- Post Implementation Follow-up

Summary…

1. RNAV procedures are necessary and benefit all: FAA, the users, and the environment
2. RNAV development consumes many resources. How these resources are utilized is key and will have a significant impact on the end result.
3. The lead carrier plays a major role in development
4. Recommendations:
   - Consult experienced parties with a wealth of “Lessons Learned”
   - Keep an active involvement in all parts of the 18-Step Process
   - Utilize a collaborative onsite design meeting where simulators can be utilized
   - Facilitate collaboration with ATC through ATC/Pilot Dialogues

RNAV

How do we get it right?

Marc Henegar

Director, RNAV / RNP Initiatives

How We Get It Right

- Collaborative Procedure Development
- Successful Implementation
- Training & Education of aviation community
- Transfer success from each site to the next

LEADERSHIP AT WORK

Successful Procedure Development

- Collaborative Design is the way
  - We're greater than the sum of our parts
- Industry Participation
- Strong Lead Carrier
  - Led by Delta, Alaska & now US Airways

ALPA fully supports this concept

Why is it Important?

- Resulting Procedures are Long Term
- We may develop them in 6 months, but we have to live with them for decades
  - Tracks and airspace are not easily changed

Implementation - ALPA On Site

- Develop training materials for Pilots & ATC
- ALPA on site during Procedure Turn ons
  - Resource for Controllers & Pilots
    - Pilot & Aircraft performance
    - RNAV Knowledge
- Feedback from ATC and Crews
  - EDUCATE not VIOLATE

Why is Implementation Important?

- Flawed implementation can reduce benefits
- Prevent High Profile Procedure Shutdowns
  - Catch situations before they become major issues
- Bad implementations destroy “street cred”
  - ATC, Pilots, Airports, Noise Community, Environment

Makes it that much harder the next time

LEADERSHIP AT WORK

Training

- Resources widely scattered & poorly disseminated
  - No universally applied training concept


Training
PULL
Pilot
RNAV
SCHOOL FOR
THE GIFTED

Current Training

- Resources widely scattered & poorly disseminated
  - No universally applied training concept
- Inconsistent Charting and Phraseology

LEADERSHIP AT WORK

Better Training

- Need National Focus on RNAV Training
- Universal Training Concept
  - Take out inconsistencies (Phraseology, Ops, etc.)
  - Consider Human Factors
- Common Knowledge Base
- Move from user hostile to human friendly technology

LEADERSHIP AT WORK

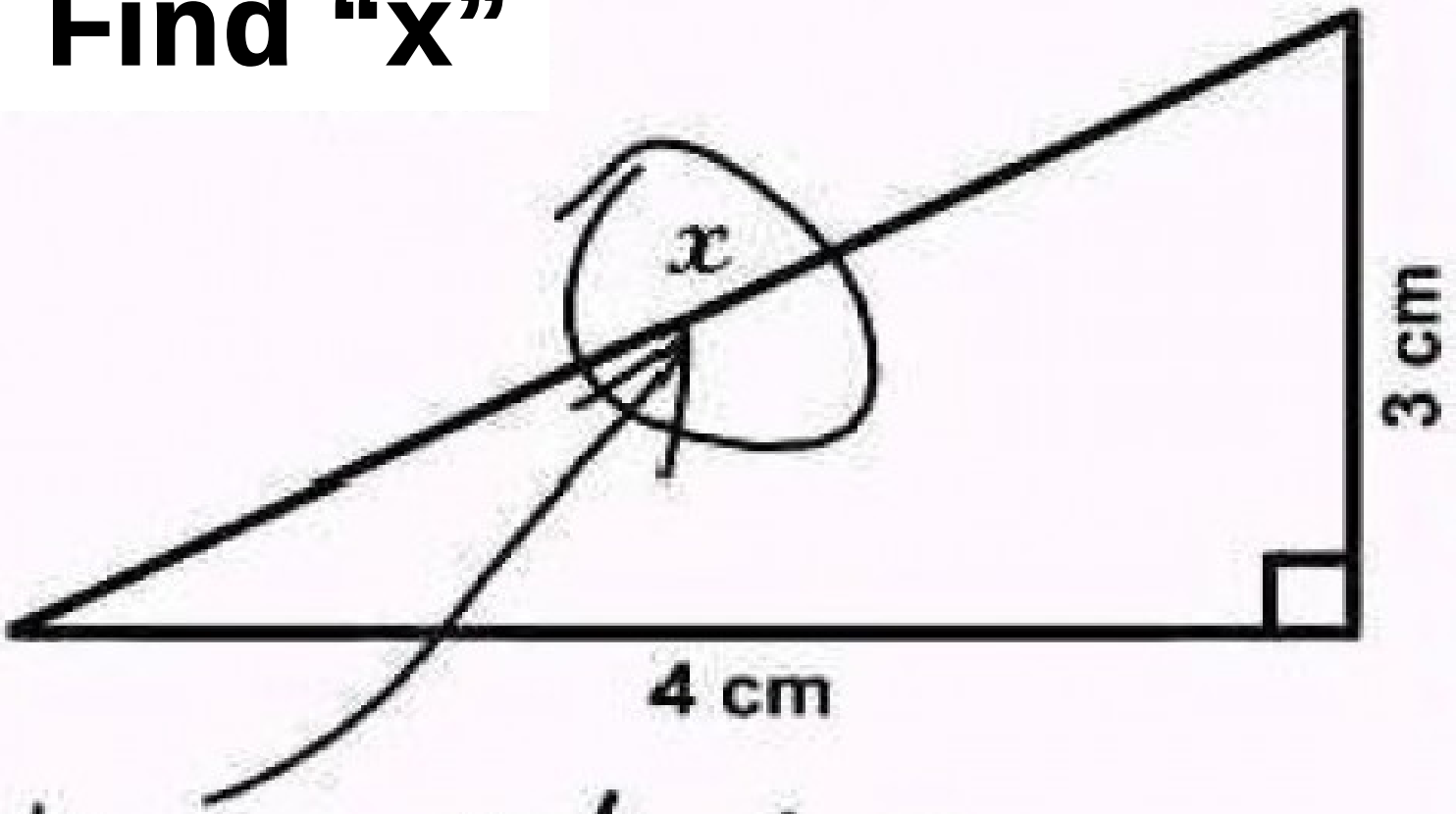
Why is Good Training Important ?

- Poorer knowledge level presents problems
- Better knowledge level prevents problems
- Allows us to get full benefit from RNAV capabilities and advancements they bring
- Need to keep training concise, simple

LEADERSHIP AT WORK

Keeping it Simple

1. Find "x"



Here it is

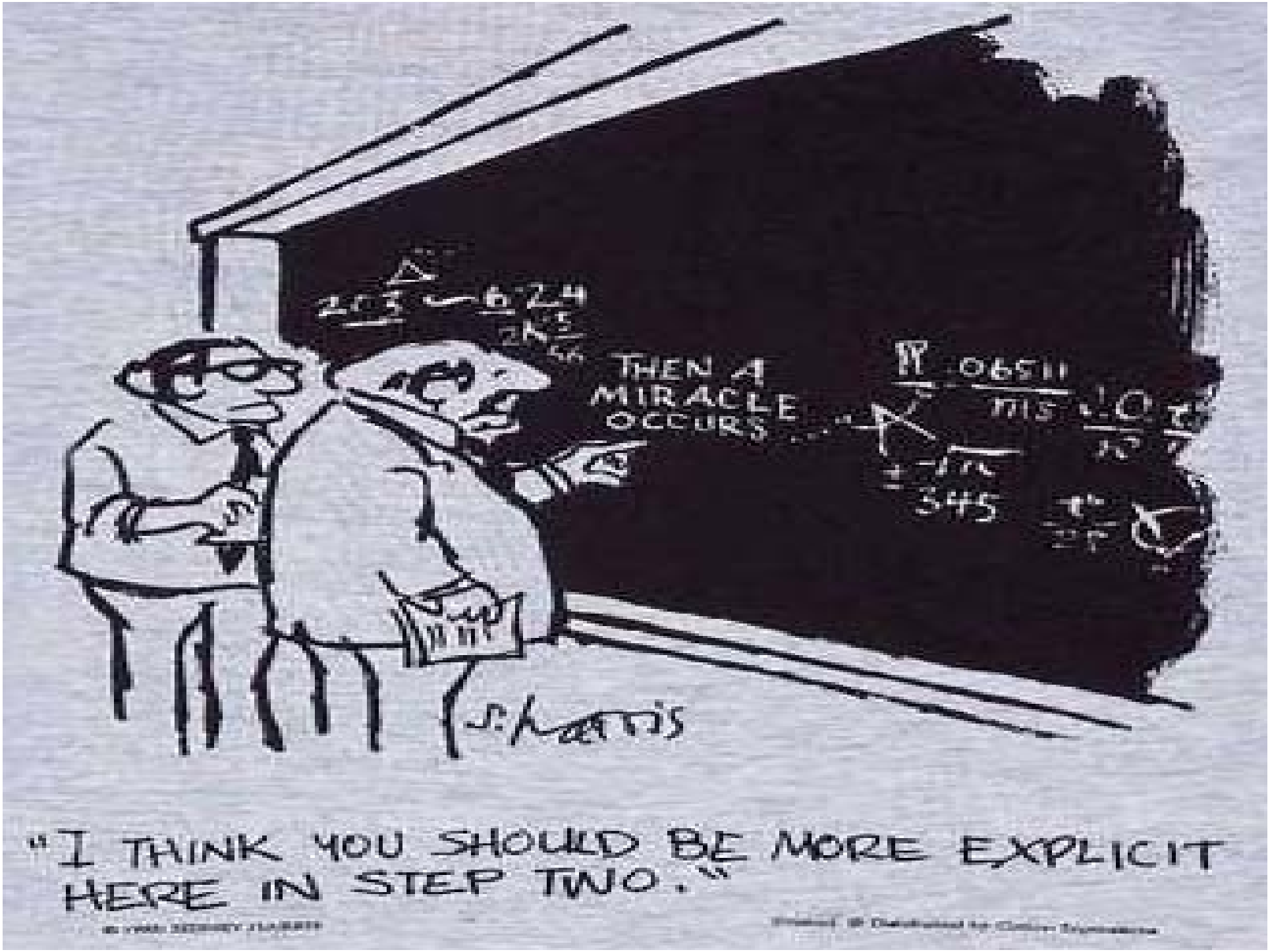
LEADERSHIP AT WORK

How Do We Succeed?

Success Breeding Success

- Dedicated “Team” of professionals to coordinate design & implementation at major sites
  - FAA RNAV Specialists
  - Industry Reps (Airline, NBAA, AOPA)
  - ALPA
- Import knowledge and success from other sites

LEADERSHIP AT WORK



"I THINK YOU SHOULD BE MORE EXPLICIT HERE IN STEP TWO."

Success Breeding Success

- Dedicated “Team” of professionals to coordinate design & implementation at major sites
  - FAA RNAV Specialists
  - Industry Reps (Airline, NBAA, AOPA)
  - ALPA
- Import knowledge and success from other sites

Success Breeding Success

- "Team" works with local stakeholders at each site to meet their needs
  - Local ATC Tower/TRACON
  - Overlying En Route Center
  - FAA Regional Reps
  - Major Airlines, NBAA, AOPA, interested parties
  - ALPA ALR (Airport Liaison Representative)

Why is Success Important?

We have to walk (RNAV) …

… Before we can run (RNP)

RNAV and RNP together gets us the big payoff

LEADERSHIP AT WORK

What's the Payoff?

- Save $$$
- Reduce Flight Time
- Save Gas
- Reduce Noise
- Reduce Emissions

LEADERSHIP AT WORK

What's the Payoff?

- Save $$$ (Happy Shareholders)
- Reduce Flight Time (Happy Passengers)
- Save Gas (Happy CFO)
- Reduce Noise (Happy Neighbors)
- Reduce Emissions (Happy Environment)

We want to be successful …

… we don't want to be

LEADERSHIP AT WORK

IDIOTS

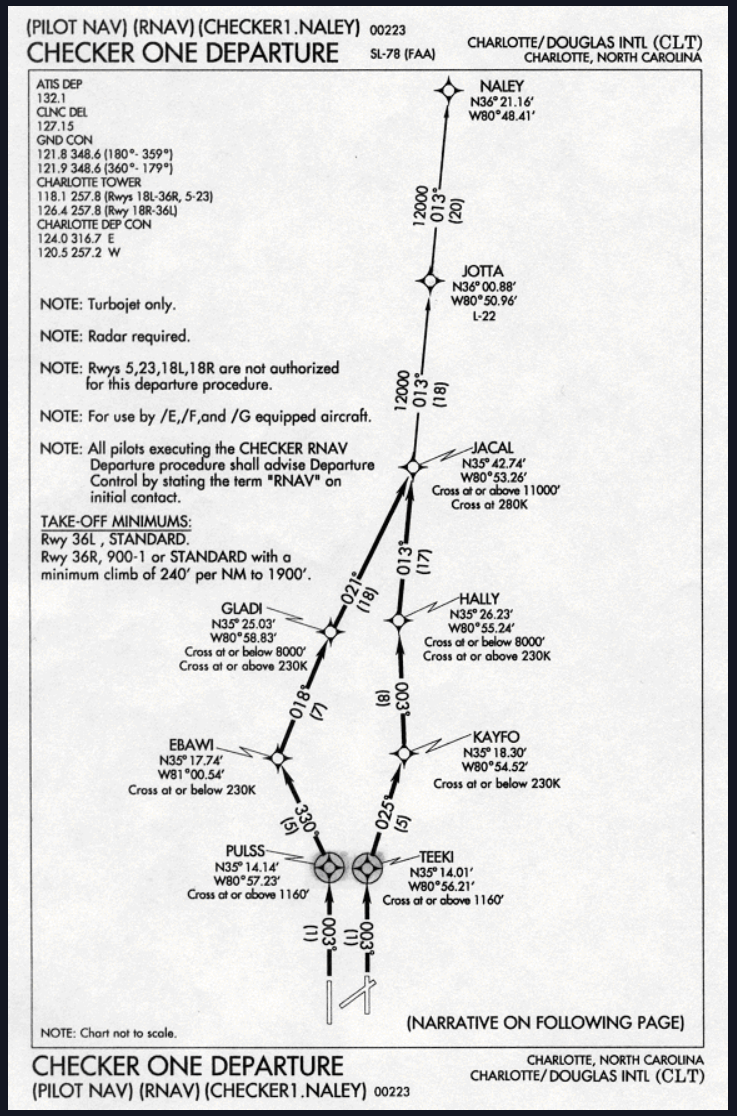
We all know one

Questions?

DIPLOMACY

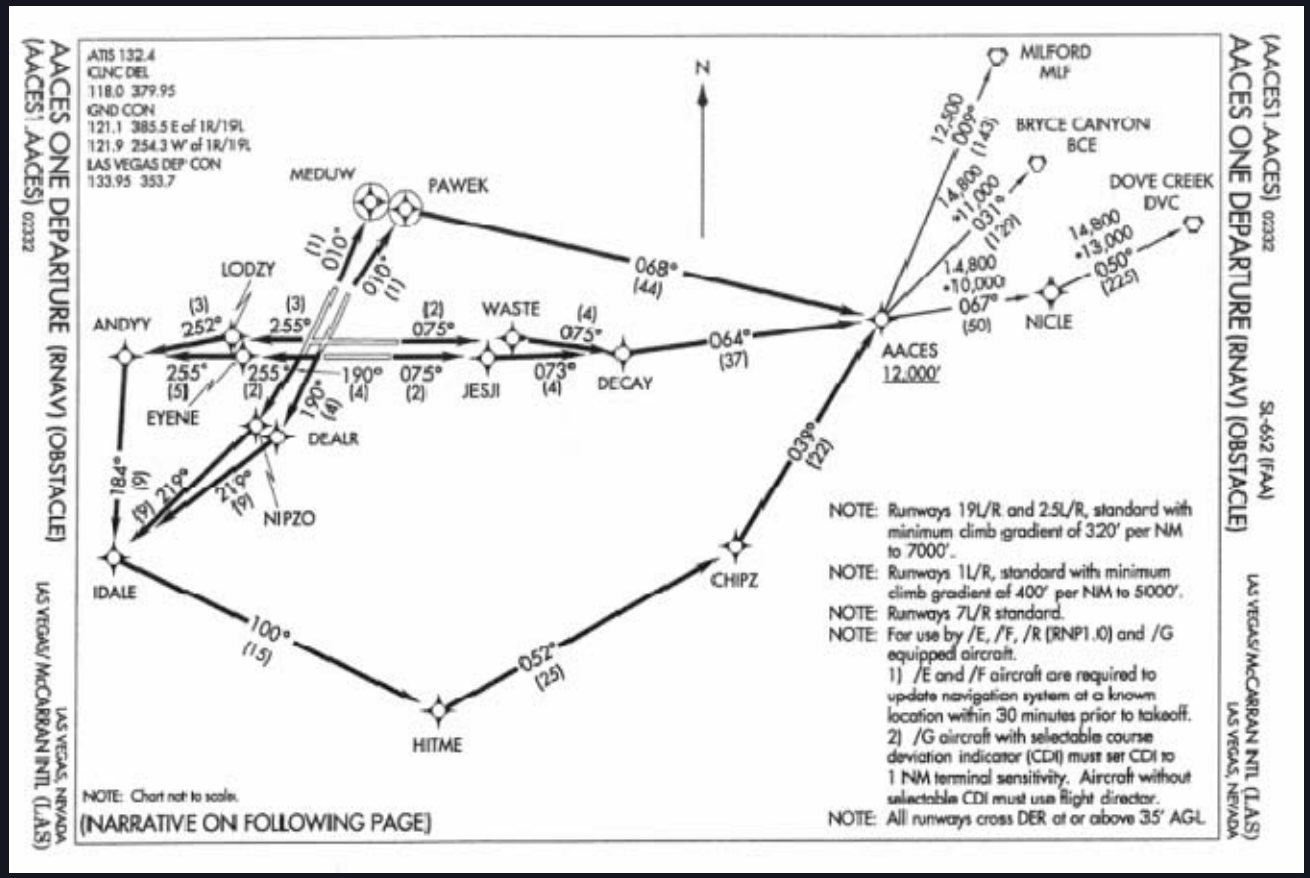
WORDS DON'T ALWAYS SOLVE PROBLEMS.
SOMETIMES YOU JUST HAVE TO PUNCH AN ALIEN IN THE FACE.

AACES ONE Departure - KCLT

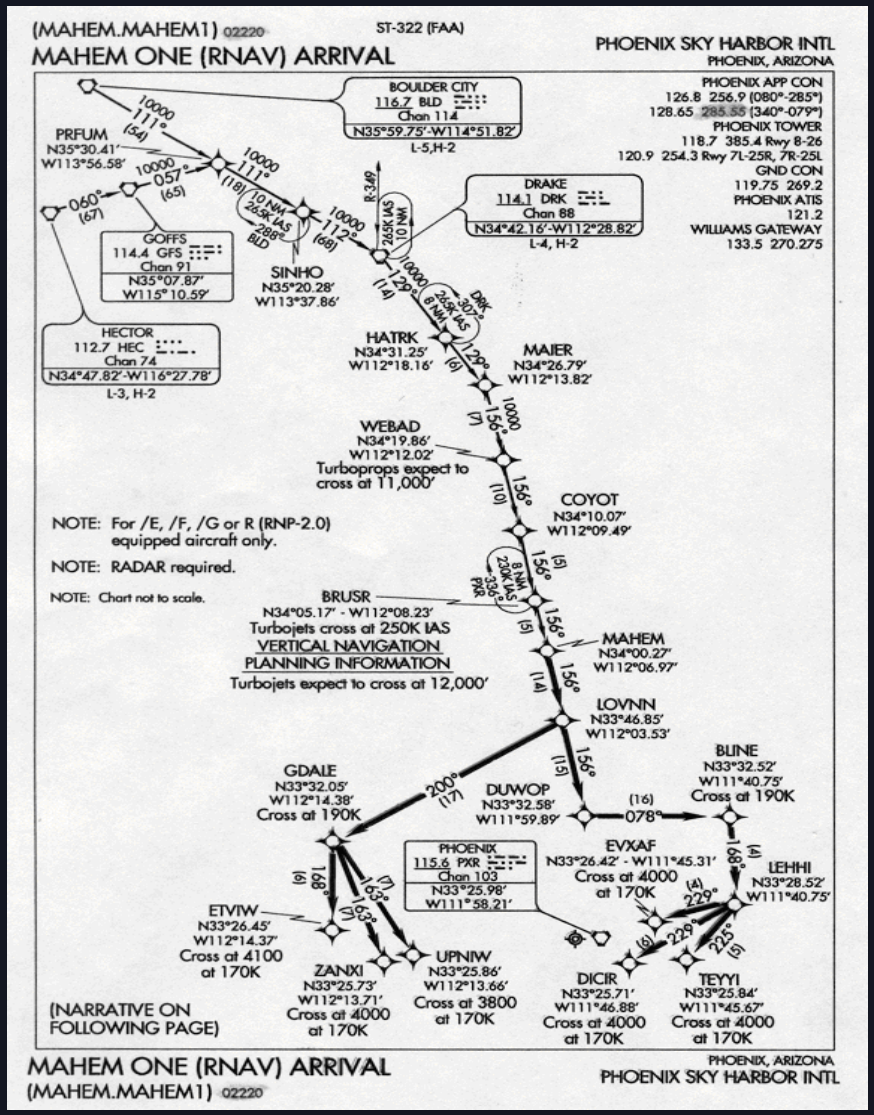


LEADERSHIP AT WORK

AACES ONE Departure - KLAS



MAHEM ONE Arrival - KPHX



LEADERSHIP AT WORK

Pilot Knowledge Requirements and Training

c. Procedure characteristics as determined from chart depiction and textual description.

(1) Depiction of waypoint types (fly-over and fly-by) and path terminators (provided in paragraph 6c(16) and any other types used by the operator) as well as associated aircraft flight paths.

(2) Required navigation equipment for operation on RNAV routes, SIDs, and STARs (for example, DME/DME, DME/DME/IRU, GNSS).

d. RNAV system-specific information:

(1) Levels of automation, mode annunciations, changes, alerts, interactions, reversions, and degradation.

(2) Functional integration with other aircraft systems.

(3) The meaning and appropriateness of route discontinuities as well as related flight crew procedures.

(4) Monitoring procedures for each phase of flight (for example, monitor PROG or LEGS page).

(5) Types of navigation sensors (for example, DME, IRU, GNSS) utilized by the RNAV system and associated system prioritization/weighting/logic.

(6) Turn anticipation with consideration to speed and altitude effects.

(7) Interpretation of electronic displays and symbols.

e. RNAV equipment operating procedures, as applicable, including how to perform the following actions:

(1) Verify currency of aircraft navigation data.

(2) Verify successful completion of RNAV system self-tests.

(3) Initialize RNAV system position.

(4) Retrieve and fly a SID or STAR with appropriate transition.

(5) Adhere to speed and/or altitude constraints associated with a SID or STAR.

(6) Make a runway change associated with a SID or STAR.

(7) Verify waypoints and flight plan programming.

(8) Perform a manual or automatic runway update (with takeoff point shift, if applicable).

(9) Fly direct to a waypoint.

(10) Fly a course/track to a waypoint.

(11) Intercept a course/track.

(12) Be vectored off and rejoin a procedure.

(13) Determine cross-track error/deviation.

(14) Insert and delete route discontinuity.

(15) Remove and reselect navigation sensor input.

(16) When required, confirm exclusion of a specific navigation aid or navigation aid type.

(17) Insert and delete lateral offset.

(18) Change arrival airport and alternate airport.

f. Operator-recommended levels of automation for phase of flight and workload, including methods to minimize cross-track error to maintain procedure centerline.

/s/ John M. Allen for
James J. Ballough
Director, Flight Standards Service

LEADERSHIP AT WORK

Information for Operators

U.S. Department of Transportation
Federal Aviation Administration

InFO
Information for Operators

InFO 07011
DATE: 5/17/2007

Flight Standards Service
Washington, DC

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info

An InFO contains valuable information for operators that should help them meet certain administrative, regulatory, or operational requirements with relatively low urgency or impact on safety.

Subject: Altitude and Speed Constraints in Area Navigation (RNAV) Procedures.

Purpose: This InFO emphasizes that separation and sequencing of airplanes by air traffic control (ATC) depends on uniform performance by pilots with respect to published altitude and speed constraints, especially when conducting RNAV procedures.

Background: Adherence to published altitude and speed constraints is essential in conducting conventional (non-RNAV) procedures. But adherence has taken on additional importance with the widespread implementation of RNAV procedures, which generally involve more constraints. Published constraints are shown on charts and may be amended by Notices to Airmen (NOTAMs).

Discussion: ATC clears pilots to fly departure, arrival, and approach procedures using phraseology such as "join", "resume", "proceed via", "descend via", and "climb via." Pending more explicit language to be included in an upcoming revision to the Aeronautical Information Manual (AIM) pilots should understand the following key points regarding published altitude and speed constraints in order to fully comply with the intent of ATC clearances.

1. **Cancellation of Constraints.**
   - **Altitude Constraints.** Cancellation of one or more altitude restrictions will normally include the use of "maintain" and/or "except" phraseology, which *does not* cancel published speed constraints associated with the procedure.
   - **Speed Constraints.** Cancellation of published speed constraints will be indicated by the use of "speed your discretion" or "cancel speed restriction(s)/constraint(s)" phraseology. The use of "except" phraseology may also be used, for example, "except cross MAVVS at 250 knots."
2. **Resume Normal Speed.** The phraseology "resume normal speed" *does not* cancel published speed constraints; rather, per Air Traffic Order 7110.65, Air Traffic Control, it cancels speed constraints previously issued by ATC and returns the aircraft to the published speed for the procedure.

Approved by: AFS-200

3. **Speeds between Waypoints with Published Speed Constraints.**
   - **Departure and Missed Approach Procedures.** Pilots should not exceed published speed associated with a waypoint until passing that waypoint.
   - **Arrival and Instrument Approach Procedures (Excluding Missed Approach Procedures).** Pilots should plan to cross waypoints with a published speed restriction in accordance with the published speed and should not exceed this speed after passing the associated waypoint unless authorized by ATC or published note to do so.

For more information regarding the content of this InFO contact Mark Steinbicker, Aviation Safety Inspector, Flight Technologies and Procedures Division, AFS-400, 202-385-4613

Recommended Action: Directors of safety, directors of operations, fractional ownership program managers, and pilots should cooperate in ensuring that the practices described in this InFO are clearly understood and uniformly applied in flight operations.

Approved by: AFS-200

LEADERSHIP AT WORK