Performance Measures in the ATO

Federal Aviation Administration

Presented to: <Audience>

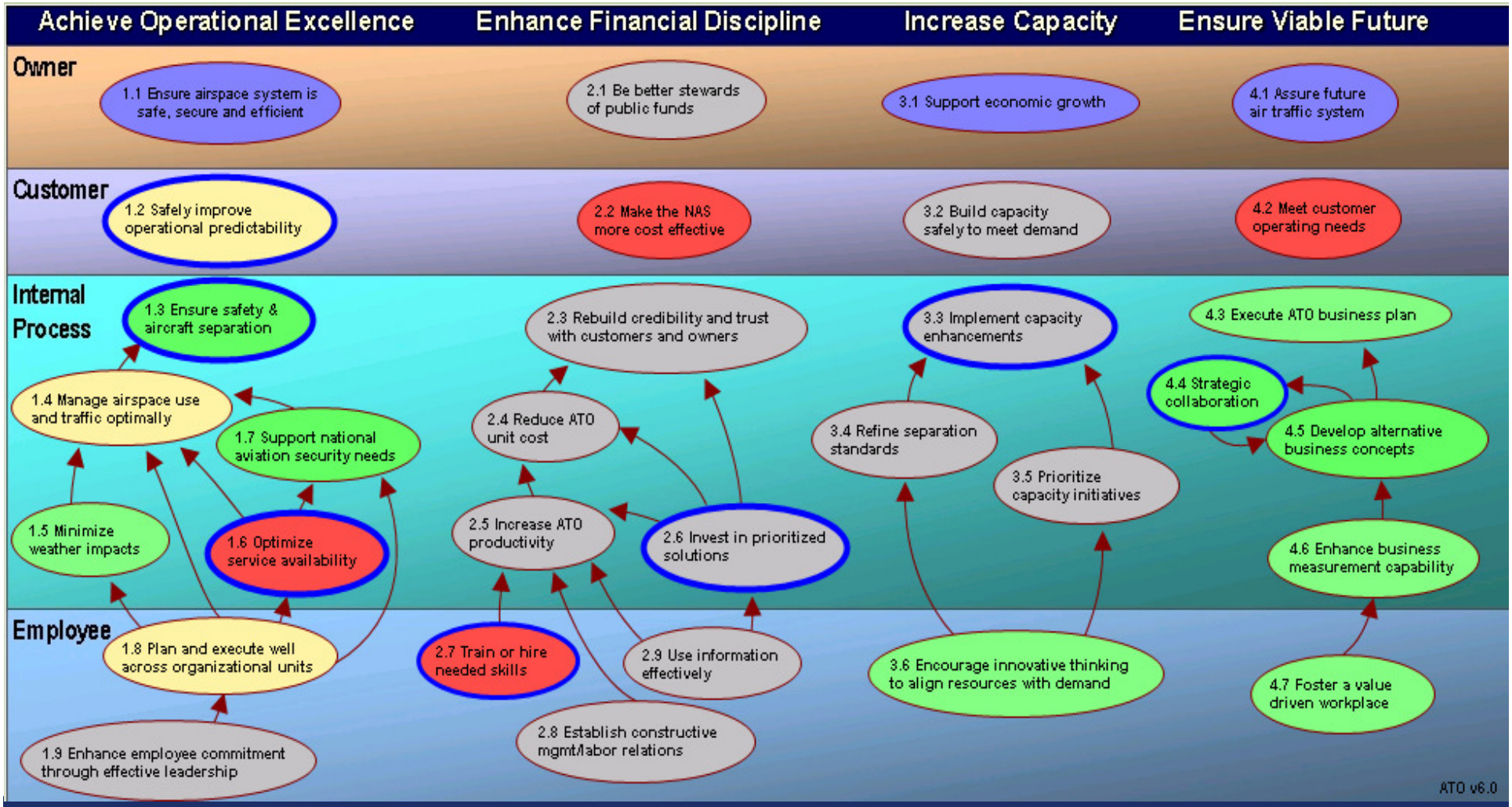
By: Dave Knorr

Date: August 2007

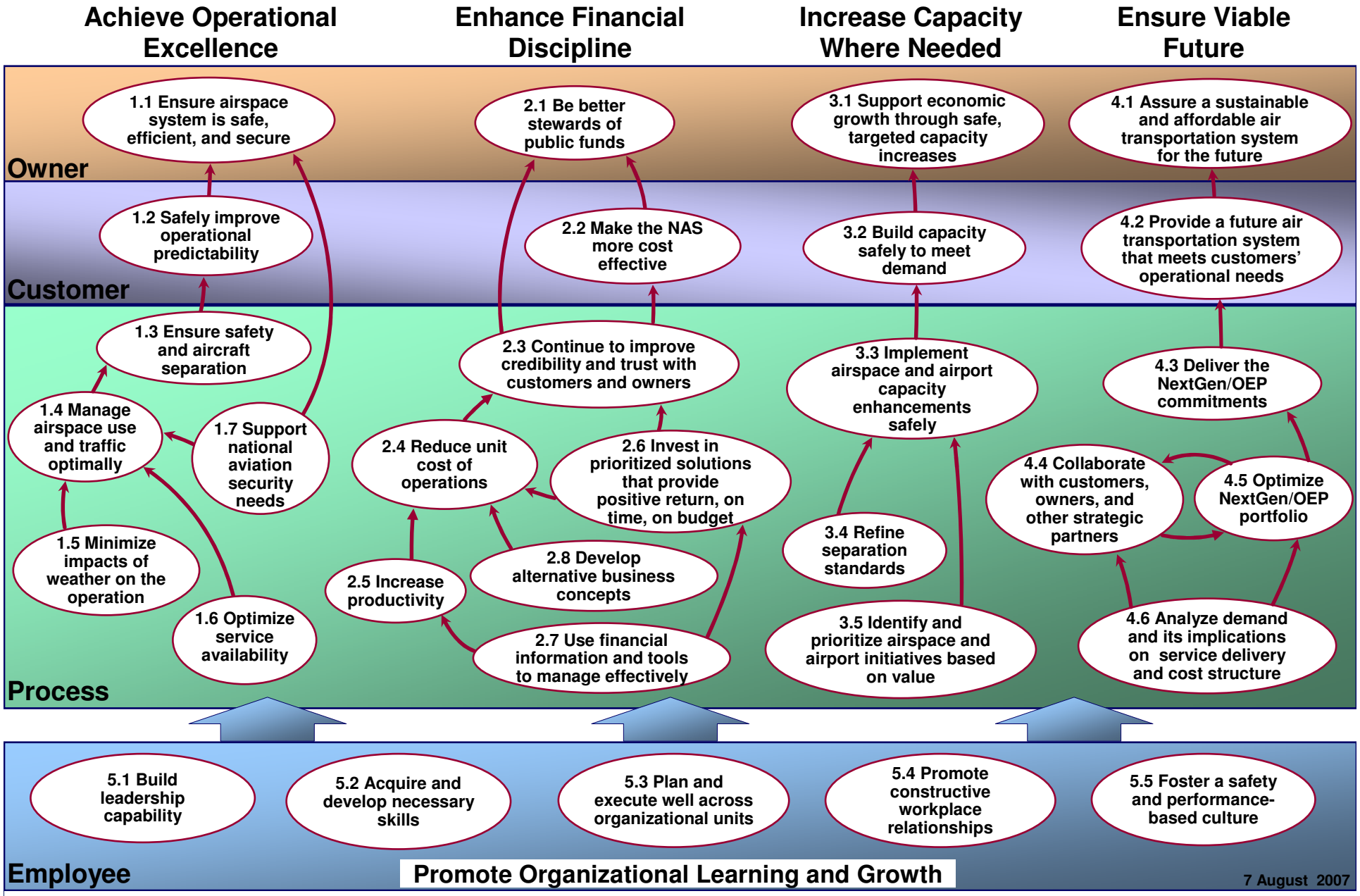
Outline

- **Strategic Management Process (SMP)**
  - Dash Board Metrics
  - NAS On-Time
- **Morning Metrics Report / Weather and Traffic Index vs. Delay**
- **Other Performance Metrics**
  - En Route Efficiency Measures
  - SAER
  - Scheduled Blocktime and Total Delay

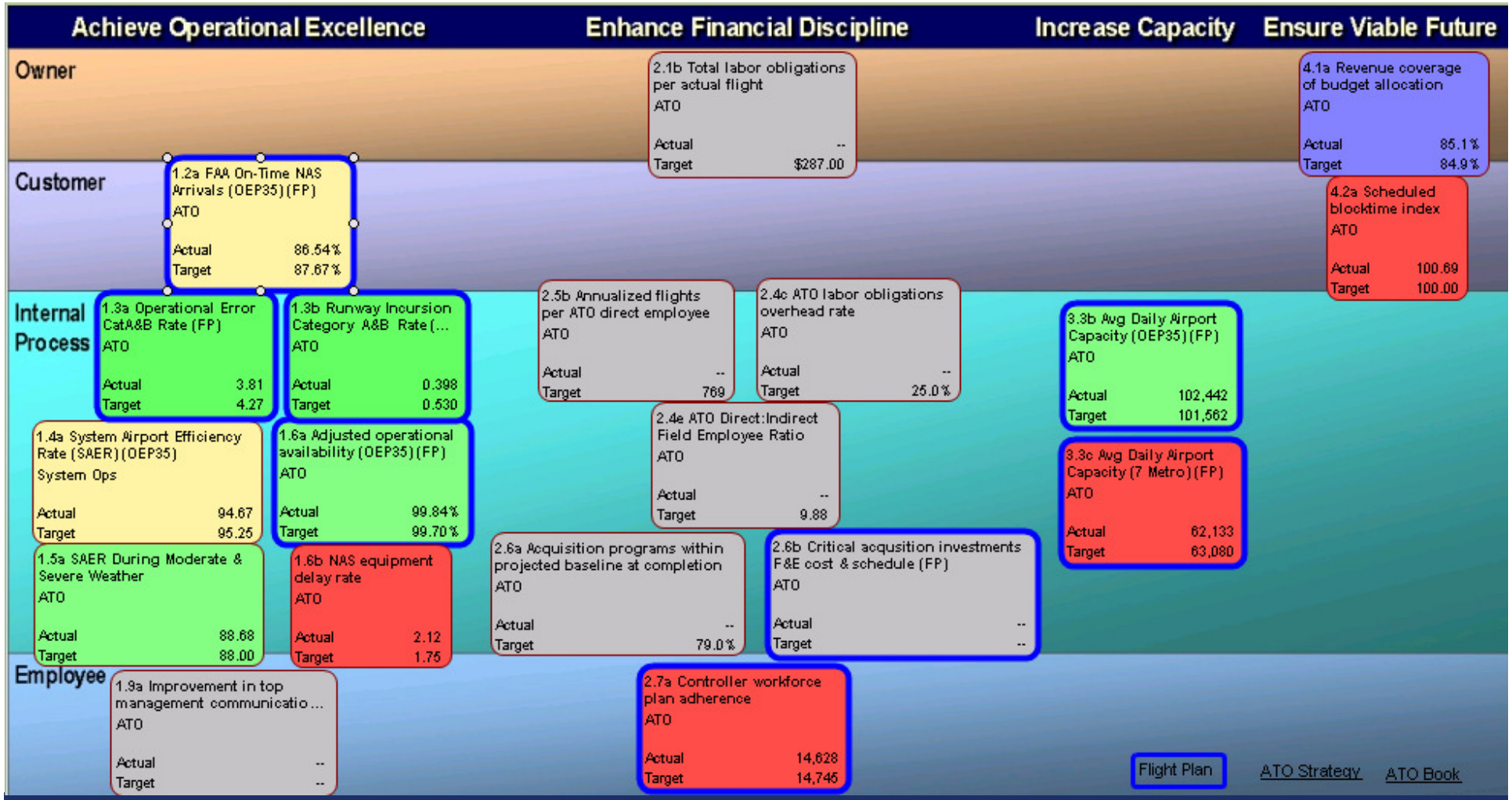
ATO SMP Map


Achieve Operational Excellence
Enhance Financial Discipline
Increase Capacity
Ensure Viable Future
Owner
1.1 Ensure airspace system is safe, secure and efficient
2.1 Be better stewards of public funds
3.1 Support economic growth
4.1 Assure future air traffic system
Customer
1.2 Safely improve operational predictability
2.2 Make the NAS more cost effective
3.2 Build capacity safely to meet demand
4.2 Meet customer operating needs
Internal Process
1.3 Ensure safety & aircraft separation
1.4 Manage airspace use and traffic optimally
1.5 Minimize weather impacts
1.6 Optimize service availability
1.7 Support national aviation security needs
2.3 Rebuild credibility and trust with customers and owners
2.4 Reduce ATO unit cost
2.5 Increase ATO productivity
2.6 Invest in prioritized solutions
3.3 Implement capacity enhancements
3.4 Refine separation standards
3.5 Prioritize capacity initiatives
4.3 Execute ATO business plan
4.4 Strategic collaboration
4.5 Develop alternative business concepts
4.6 Enhance business measurement capability
Employee
1.8 Plan and execute well across organizational units
1.9 Enhance employee commitment through effective leadership
2.7 Train or hire needed skills
2.8 Establish constructive mgmt/labor relations
2.9 Use information effectively
3.6 Encourage innovative thinking to align resources with demand
4.7 Foster a value driven workplace
ATO v6.0

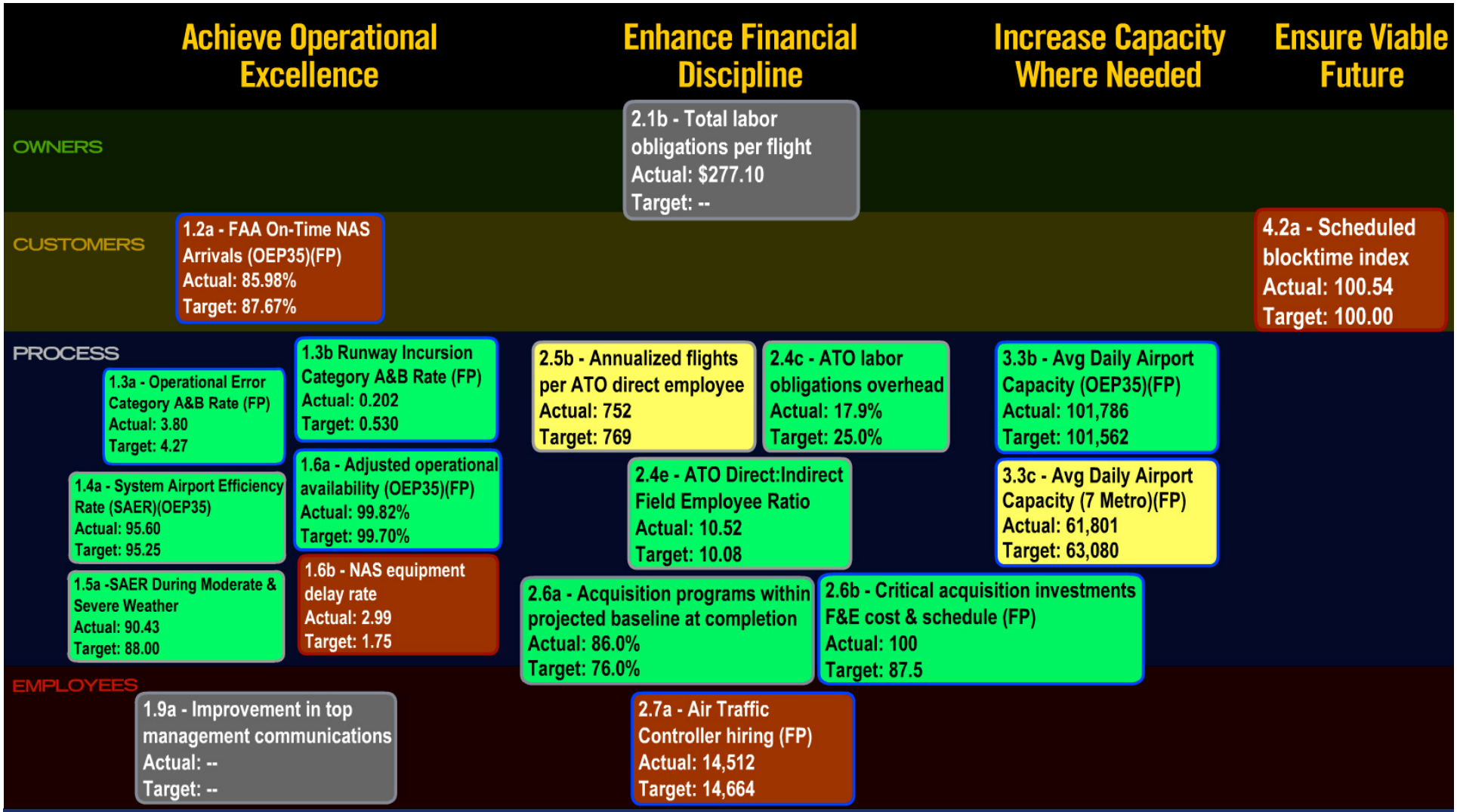
FY08 ATO Strategy Map



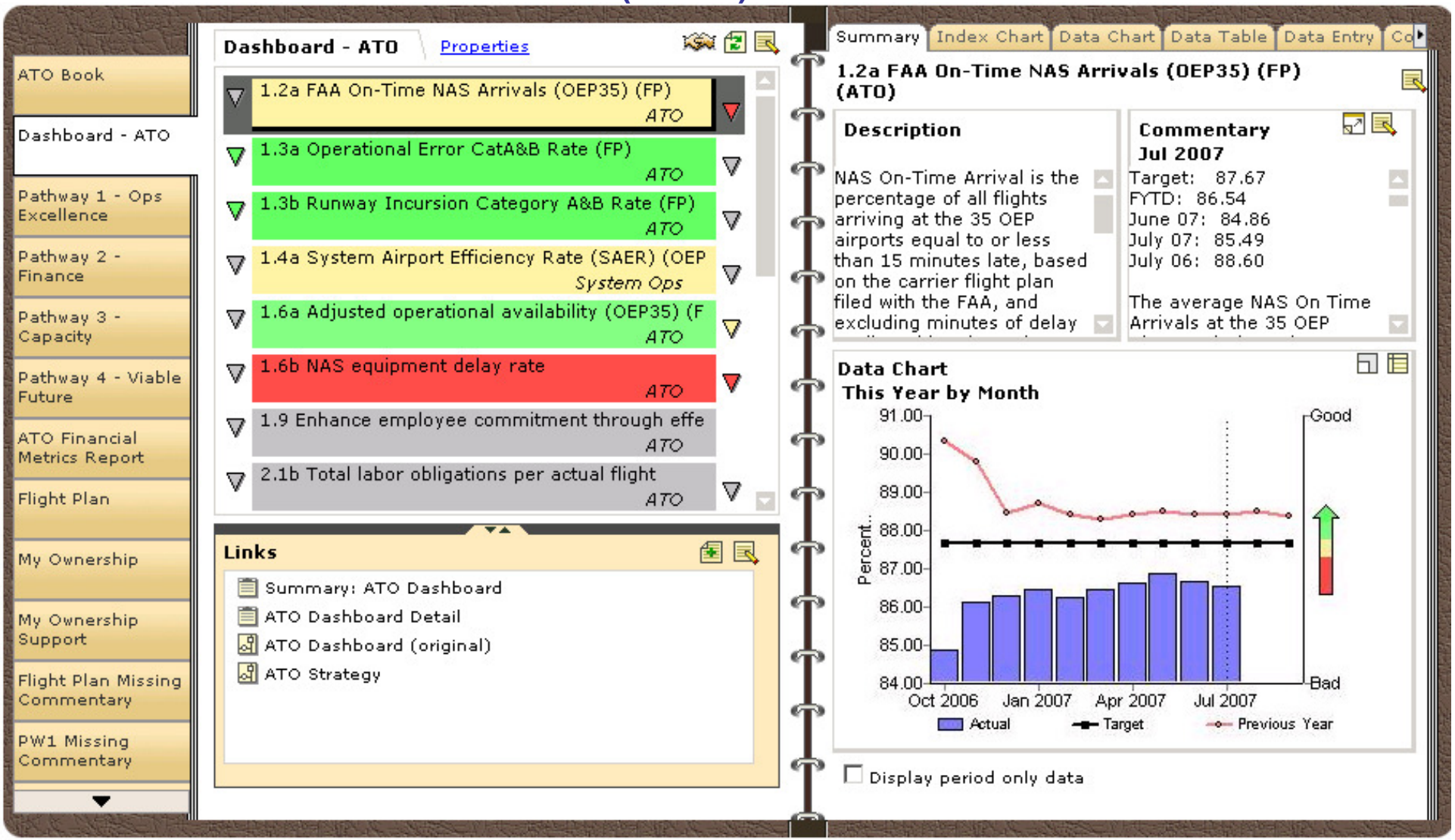
Dash Board – July 2007

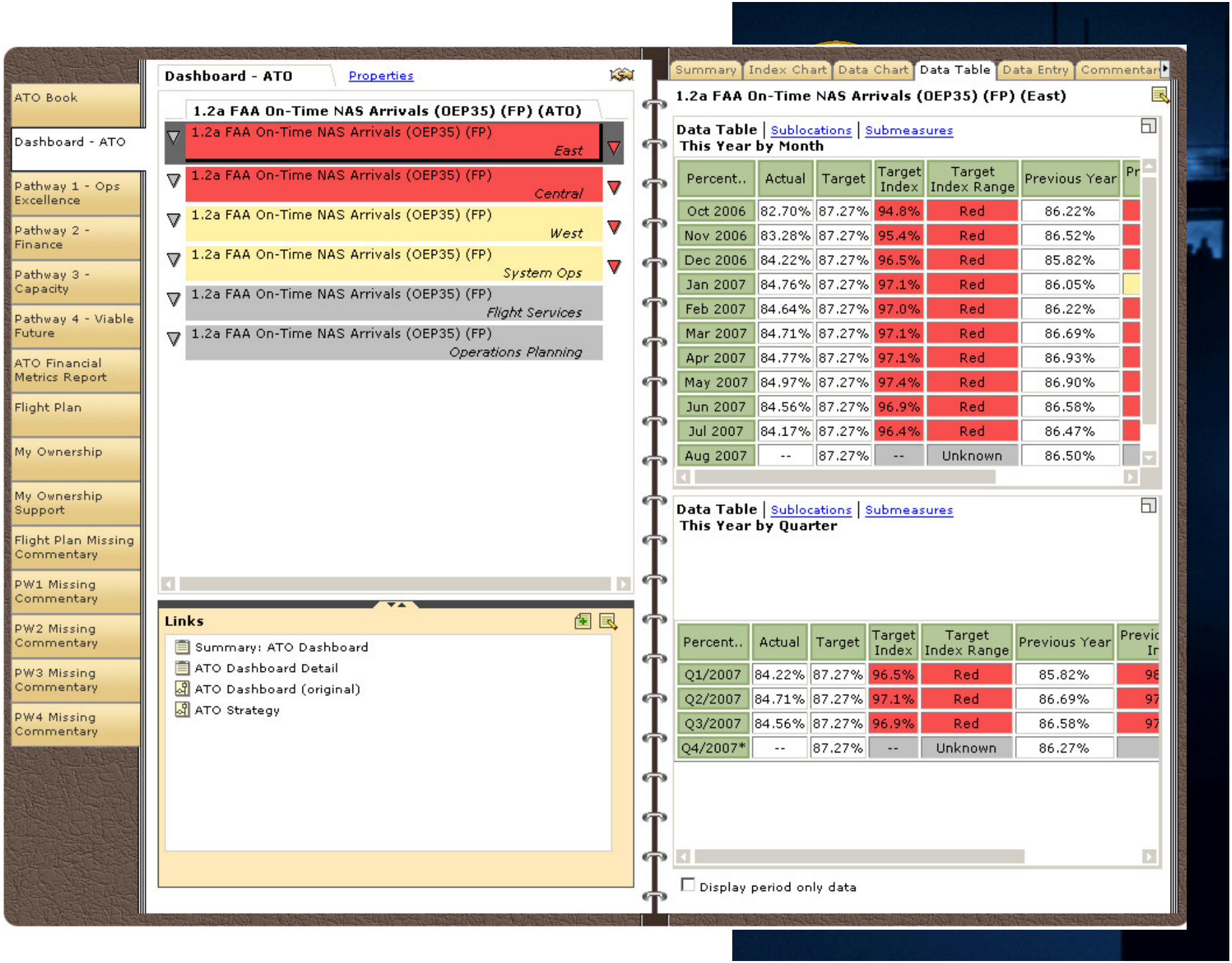


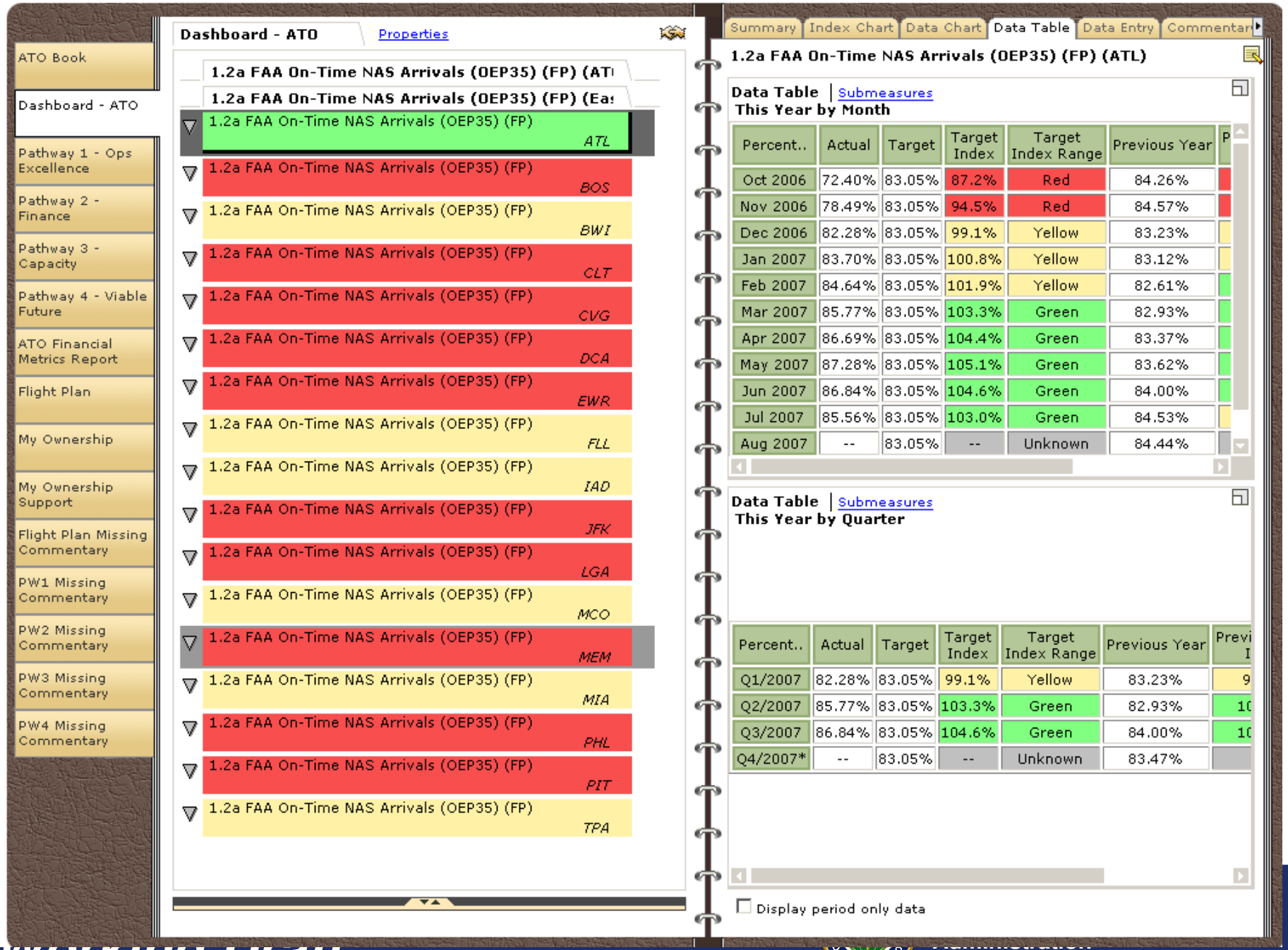
ATO Dash Board



ATO Dashboard (online)




ATO Book
Dashboard - ATO
Pathway 1 - Ops Excellence
Pathway 2 - Finance
Pathway 3 - Capacity
Pathway 4 - Viable Future
ATO Financial Metrics Report
Flight Plan
My Ownership
My Ownership Support
Flight Plan Missing Commentary
PW1 Missing Commentary
PW2 Missing Commentary
PW3 Missing Commentary
PW4 Missing Commentary
Dashboard - ATO
Properties
1.2a FAA On-Time NAS Arrivals (OEP35) (FP) (ATO)
1.2a FAA On-Time NAS Arrivals (OEP35) (FP) East
1.2a FAA On-Time NAS Arrivals (OEP35) (FP) Central
1.2a FAA On-Time NAS Arrivals (OEP35) (FP) West
1.2a FAA On-Time NAS Arrivals (OEP35) (FP) System Ops
1.2a FAA On-Time NAS Arrivals (OEP35) (FP) Flight Services
1.2a FAA On-Time NAS Arrivals (OEP35) (FP) Operations Planning
Links
Summary: ATO Dashboard
ATO Dashboard Detail
ATO Dashboard (original)
ATO Strategy
Summary
Index Chart
Data Chart
Data Table
Data Entry
Commentar
1.2a FAA On-Time NAS Arrivals (OEP35) (FP) (East)
Data Table | Sublocations | Submeasures
This Year by Month
Percent.. | Actual | Target | Target Index | Target Index Range | Previous Year | Pr
Oct 2006 | 82.70% | 87.27% | 94.8% | Red | 86.22%
Nov 2006 | 83.28% | 87.27% | 95.4% | Red | 86.52%
Dec 2006 | 84.22% | 87.27% | 96.5% | Red | 85.82%
Jan 2007 | 84.76% | 87.27% | 97.1% | Red | 86.05%
Feb 2007 | 84.64% | 87.27% | 97.0% | Red | 86.22%
Mar 2007 | 84.71% | 87.27% | 97.1% | Red | 86.69%
Apr 2007 | 84.77% | 87.27% | 97.1% | Red | 86.93%
May 2007 | 84.97% | 87.27% | 97.4% | Red | 86.90%
Jun 2007 | 84.56% | 87.27% | 96.9% | Red | 86.58%
Jul 2007 | 84.17% | 87.27% | 96.4% | Red | 86.47%
Aug 2007 | -- | 87.27% | -- | Unknown | 86.50%
Data Table | Sublocations | Submeasures
This Year by Quarter
Percent.. | Actual | Target | Target Index | Target Index Range | Previous Year | Previc Ir
Q1/2007 | 84.22% | 87.27% | 96.5% | Red | 85.82% | 98
Q2/2007 | 84.71% | 87.27% | 97.1% | Red | 86.69% | 97
Q3/2007 | 84.56% | 87.27% | 96.9% | Red | 86.58% | 97
Q4/2007* | -- | 87.27% | -- | Unknown | 86.27%
Display period only data



Percent..	Actual	Target	Target Index	Target Index Range	Previous Year
Oct 2006	72.40%	83.05%	87.2%	Red	84.26%
Nov 2006	78.49%	83.05%	94.5%	Red	84.57%
Dec 2006	82.28%	83.05%	99.1%	Yellow	83.23%
Jan 2007	83.70%	83.05%	100.8%	Yellow	83.12%
Feb 2007	84.64%	83.05%	101.9%	Yellow	82.61%
Mar 2007	85.77%	83.05%	103.3%	Green	82.93%
Apr 2007	86.69%	83.05%	104.4%	Green	83.37%
May 2007	87.28%	83.05%	105.1%	Green	83.62%
Jun 2007	86.84%	83.05%	104.6%	Green	84.00%
Jul 2007	85.56%	83.05%	103.0%	Green	84.53%
Aug 2007	--	83.05%	--	Unknown	84.44%

Percent..	Actual	Target	Target Index	Target Index Range	Previous Year
Q1/2007	82.28%	83.05%	99.1%	Yellow	83.23%
Q2/2007	85.77%	83.05%	103.3%	Green	82.93%
Q3/2007	86.84%	83.05%	104.6%	Green	84.00%
Q4/2007*	--	83.05%	--	Unknown	83.47%

NAS On-time

- **How does it work?**

•Source:
ASPM (Aviation System Performance Metrics)

•Methodology:
NAS On-Time Arrival is the percentage of all flights arriving at the 35 OEP airports equal to or less than 15 minutes late, based on the carrier flight plan filed with the FAA, and excluding minutes of delay attributed by air carriers to weather, carrier action, security delay, and prorated minutes for late arriving flights at the departure airport.

•Outcome: Increase **the percentage of flights that arrive on-time**

ASQP Causal Delay Factors

- Extreme Weather
- Carrier Cause
- NAS Cause
- Security
- Late Arrivals

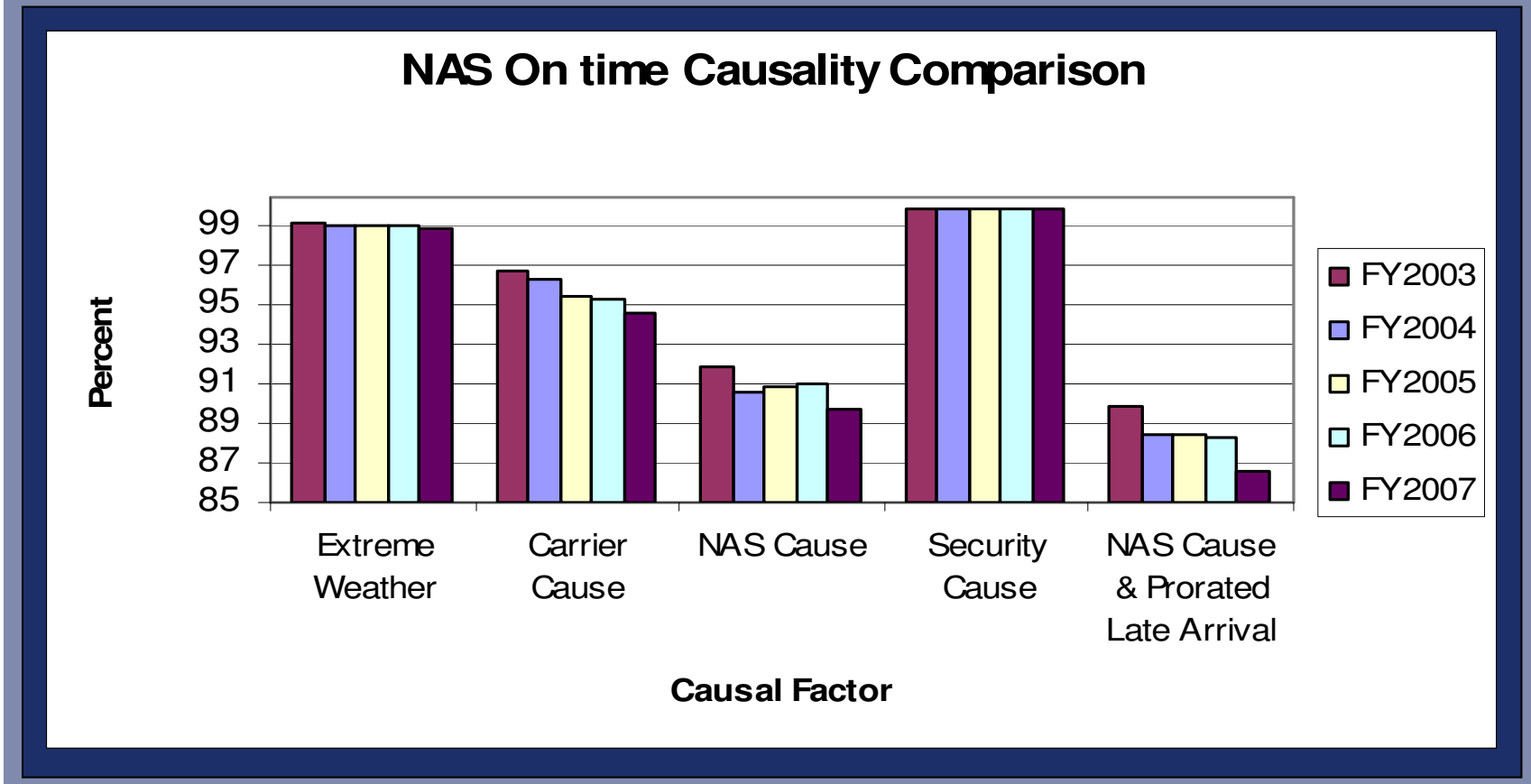
NAS Causal Categories: NAS Causes

- Airport conditions
- Airport construction
- Air Traffic Control (ATC)
- Awaiting ATC clearance while still at gate
- Air Traffic Quota Flow Program—ATC
- Closed Runways
- Computer failure--air carrier equipment
- Equipment Outage--ATC
- Gate hold--ATC
- Ground delay program--ATC
- Flow control program--FAA
- Other disabled aircraft blocking runway
- Ramp congestion--blocked by aircraft not under carrier's control
- Ramp Traffic--Air Traffic Control
- Restricted aircraft movement on runways
- Volume Delays

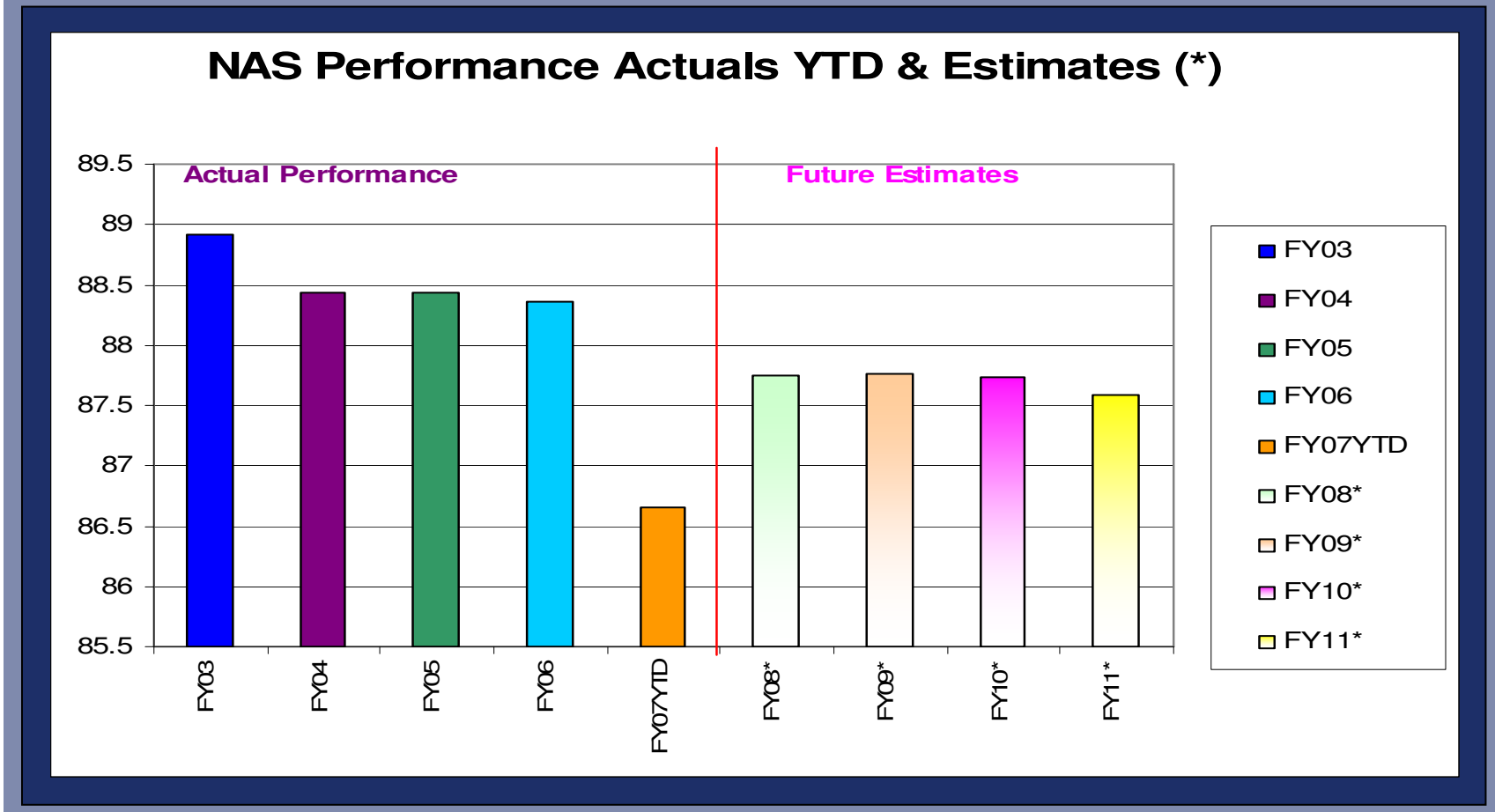
NAS Causal Categories: Carrier Cause

Aircraft cleaning
Aircraft damage (except bird strikes, lightning/hail damage)
Airport curfew
Awaiting the arrival of connecting passengers or crew
Awaiting alcohol test
Awaiting gate space
Baggage loading
Cabin servicing
Cargo loading
Catering
Computer outage--carrier equipment
Crew legality (pilot or attendant rest)
Damage by hazardous goods
Engineering Inspection
Flight paperwork
Fueling
Gate congestion
Government forms not properly completed--INS, FAA, Agriculture, Public Health, etc.
Ground equipment out of service
Hot brakes restriction
Last minute passenger
Late mail from Post Office
Late crew
Lavatory servicing
Maintenance
Medical emergency
Out of service aircraft
Oversales
Positive passenger baggage match
Passenger services
Potable water servicing
Pre-flight check
Ramp congestion--blocked by another aircraft under carrier's control
Ramp service
Removal of unruly passenger
Revised weight sheet
Shortage of ramp equipment
Slow boarding or seating
Snow removal (when it is a carrier ramp service function)
Stowing carry-on baggage
Weight and balance delays

NAS On Time Causal Comparison Analysis



NAS On Time Performance & Projections



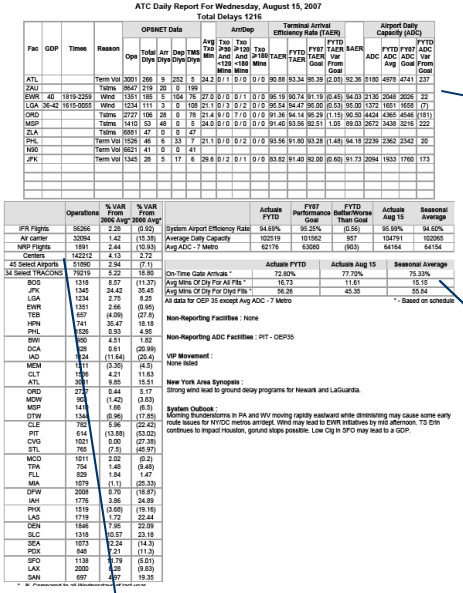
ATO Dash Board

- **Key measures and targets *but not the only* measures and targets.**
- **Over 100 metrics being continuously monitored as part of SMP**
  - Over 5000 tracked at the facility level
- **Other Delay Indices also regularly studies (WITI, DFTI, NAS Delay Model, etc)**

Outline

- **Strategic Management Process (SMP)**
  - NAS On-Time
- **Morning Metrics Report / Weather Index and Delay**
- **Other Performance Metrics**
  - En Route Efficiency Measures
  - SAER
  - Scheduled Blocktime and Total Delay

ATC Daily Report



ATC Daily Report For Wednesday, August 15, 2007
Total Delays 1216

Fac	GDP	Times	Reason	OPSNET Data					Avg Txo Min	Arr/Dep			Terminal Arrival Efficiency Rate (TAER)				SAER	Airport Daily Capacity (ADC)			
				Ops	Total Dlys	Arr Dlys	Dep Dlys	TMS Dlys		Txo ⩾90 And <120 Mins	Txo ⩾120 And <180 Mins	Txo ⩾180 Mins	TAER	FYTD TAER	FY07 TAER Goal	FYTD TAER Var From Goal		ADC	FYTD ADC Avg	FY07 ADC Goal	FYTD ADC Var From Goal
ATL			Term Vol	3001	266	9	252	5	24.2	0 / 1	0 / 0	0 / 0	90.88	93.34	95.39	(2.05)	92.36	5180	4978	4741	237
ZAU			Tstms	8647	219	20	0	199													
EWR	40	1819-2259	Wind	1351	185	5	104	76	27.0	0 / 0	0 / 1	0 / 0	95.19	90.74	91.19	(0.45)	94.03	2130	2048	2026	22
LGA	36-42	1615-0055	Wind	1234	111	3	0	108	21.1	0 / 3	0 / 2	0 / 0	95.54	94.47	95.00	(0.53)	95.00	1372	1651	1658	(7)
ORD			Tstms	2727	106	28	0	78	21.4	9 / 0	7 / 0	0 / 0	91.36	94.14	95.29	(1.15)	90.50	4424	4365	4546	(181)
MSP			Tstms	1410	53	48	0	5	24.0	0 / 0	0 / 0	0 / 0	91.40	93.56	92.51	1.05	89.03	2672	3438	3216	222
ZLA			Tstms	6881	47	0	0	47													
PHL			Term Vol	1526	46	6	33	7	21.1	0 / 0	0 / 2	0 / 0	93.56	91.80	93.28	(1.48)	94.18	2239	2362	2342	20
N90			Term Vol	6621	41	0	0	41													
JFK			Term Vol	1345	28	5	17	6	29.6	0 / 2	0 / 1	0 / 0	83.82	91.40	92.00	(0.60)	91.73	2094	1933	1760	173

	Actuals FYTD	FY07 Performance Goal	FYTD Better/Worse Than Goal	Actuals Aug 15	Seasonal Average
System Airport Efficiency Rate	94.69%	95.25%	(0.56)	95.99%	94.60%
Average Daily Capacity	102519	101562	957	104791	102065
Avg ADC - 7 Metro	62176	63080	(903)	64164	64154

	Operations	% VAR From 2006 Avg*	% VAR From 2000 Avg*
IFR Flights	56266	2.28	(0.92)
Air carrier	32094	1.42	(15.38)
NRP Flights	1891	2.44	(10.93)
Centers	142212	4.13	2.72
45 Select Airports	51890	2.94	(7.1)
34 Select TRACONS	79219	5.22	18.80

	Actuals FYTD	Actuals Aug 15	Seasonal Average
On-Time Gate Arrivals *	72.80%	77.70%	75.33%
Avg Mins Of Dly For All Flts *	16.73	11.61	15.15
Avg Mins Of Dly For Dlyd Flts *	56.26	45.35	55.84

All data for OEP 35 except Avg ADC - 7 Metro

* - Based on schedule

Non-Reporting Facilities : None

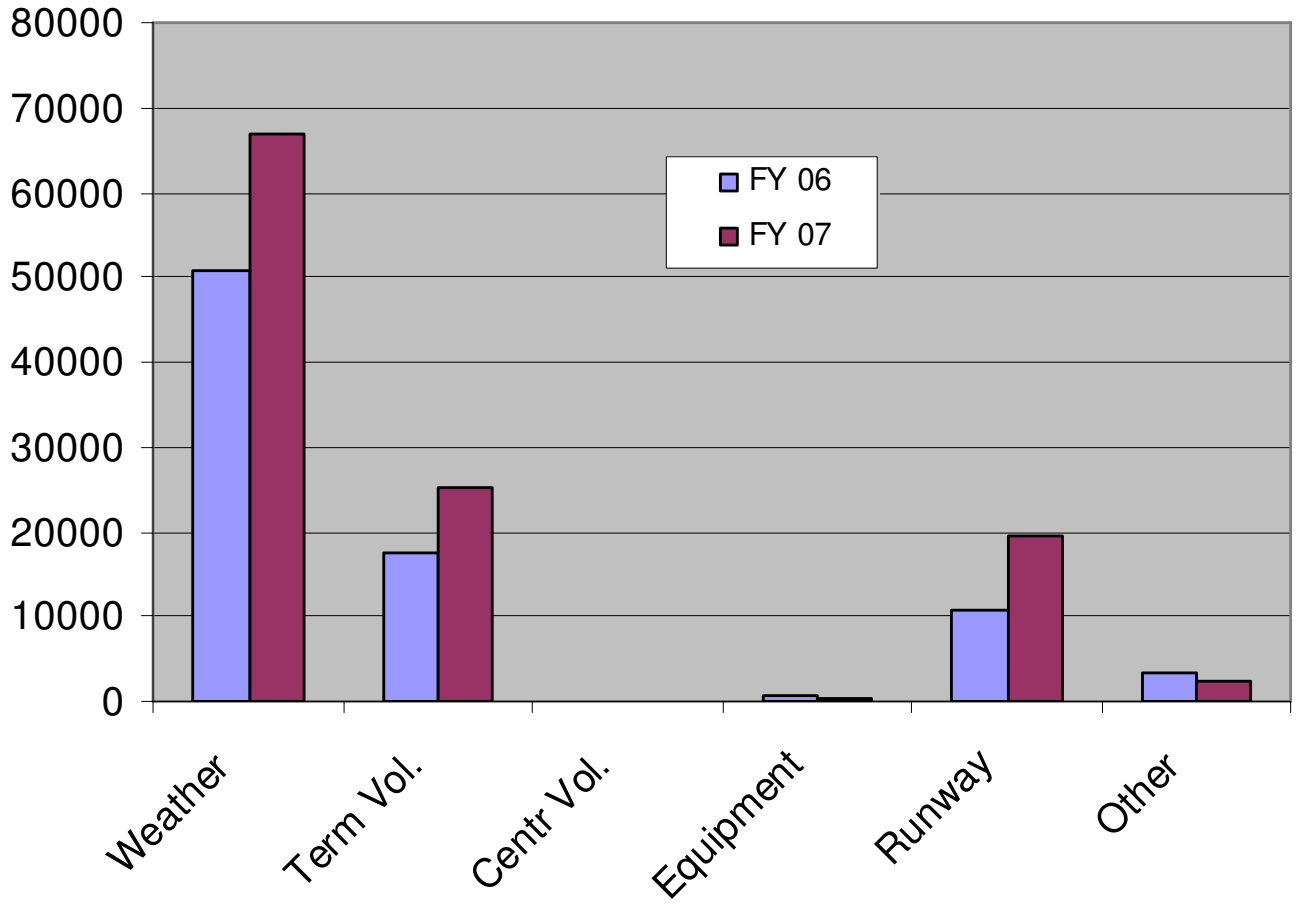
Non-Reporting ADC Facilities : PIT - OEP35

VIP Movement :
None listed

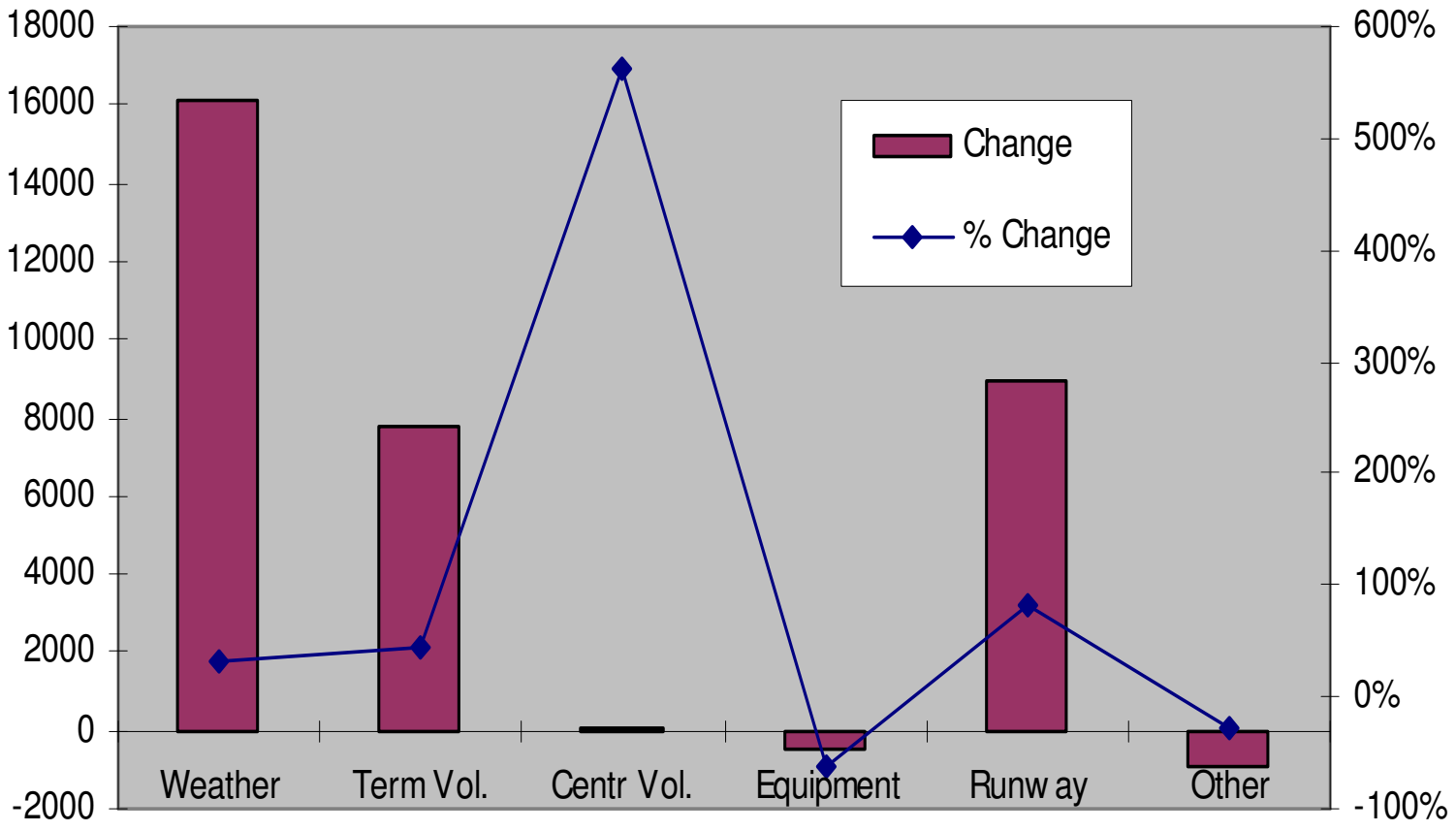
New York Area Synopsis :
Strong wind lead to ground delay programs for Newark and LaGuardia.

System Outlook :
Morning thunderstorms in PA and WV moving rapidly eastward while diminishing may cause some early route issues for NY/DC metros am/dept. Wind may lead to EWR initiatives by mid afternoon. TS Erin continues to impact Houston, ground stops possible. Low Cig in SFO may lead to a GDP.

OPSNET Delays by Cause FY06-FY07



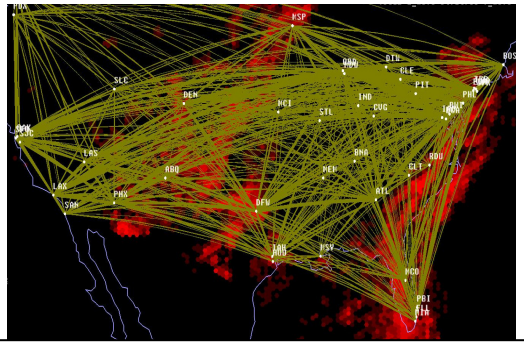
OPSNET Change in Delays By Cause FY06-FY07



Weather / Traffic Index

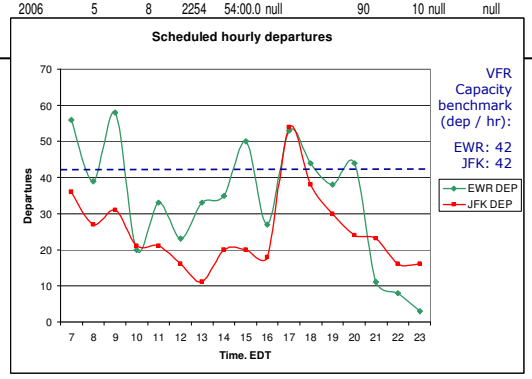
Weighted sum of 3 components:

- **<u>En-route Weather Index</u>** reflecting impact of convective weather on 39 major airports
  - Linear impact (more Wx, more traffic = proportionally higher impact)
- **<u>Terminal Index</u>** for same airports: local Wx impact
  - Linear impact
- **<u>Queuing Index</u>** for same airports reflecting excess traffic demand vs. capacity
  - May be exacerbated by reduced capacity due to local Wx and en-route Wx
  - <u>Non-linear</u> (exponential) impact

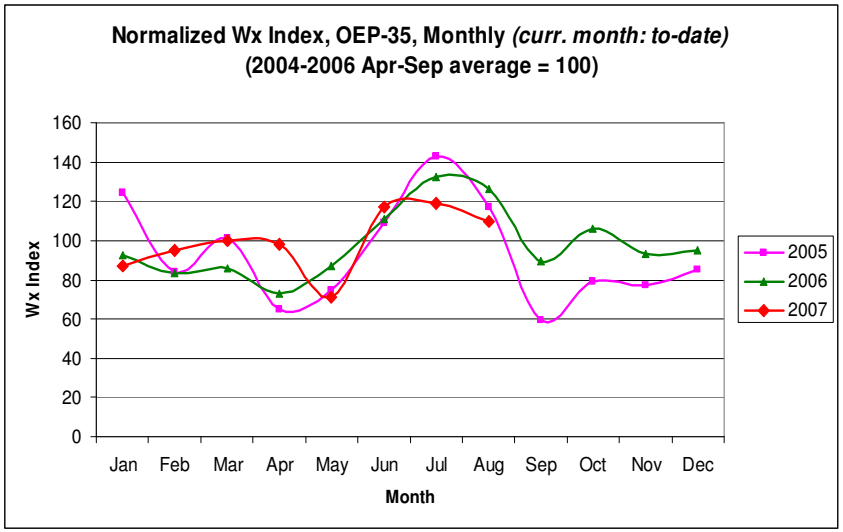


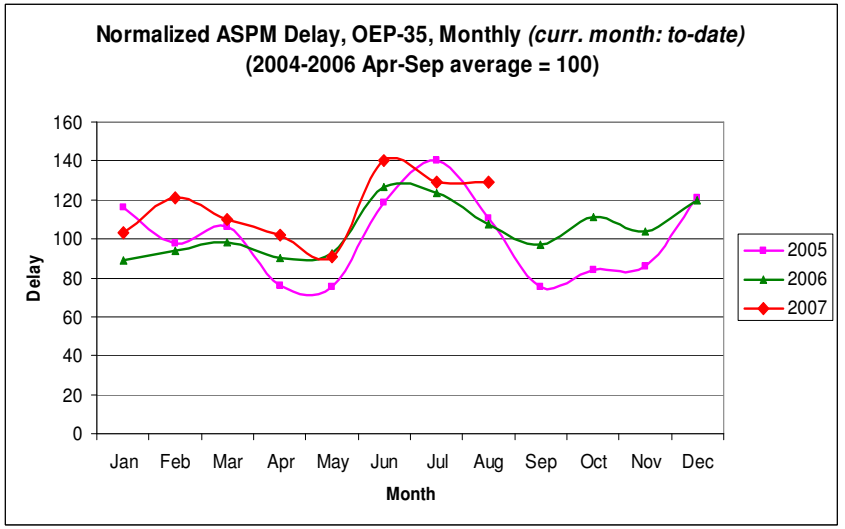
KPHL	2006	5	8	1654	54:00.0	null	75	10	null	null	10	17	1	null	8	14	34	70	15
KPHL	2006	5	8	1754	54:00.0	null	100	10	null	null	10	17	1	null	8	14	34	80	14
KPHL	2006	5	8	1754	54:00.0	null	100	10	null	null	10	17	1	null	8	14	34	80	14
KPHL	2006	5	8	1854	54:00.0	null	80	10	null	null	10	17	1	null	8	14	34	80	13
KPHL	2006	5	8	1954	54:00.0	null	80	10	null	null	10	16	1	null	7	13	36	60	10
KPHL	2006	5	8	2054	54:00.0	null	85	10	null	null	10	16	-1	null	7	13	31	60	10
KPHL	2006	5	8	2054	54:00.0	null	85	10	null	null	10	16	-1	null	7	13	31	60	10
KPHL	2006	5	8	2154	54:00.0	null	85	10	null	null	10	16	-2	null	7	13	29	60	10
KPHL	2006	5	8	2254	54:00.0	null	90	10	null	null	10	14	-3	9	5	12	31	70	9
KPHL											10	14	-3	9	5	12	31	70	9
KPHL											10	14	-3	8	5	12	31	80	11

METAR

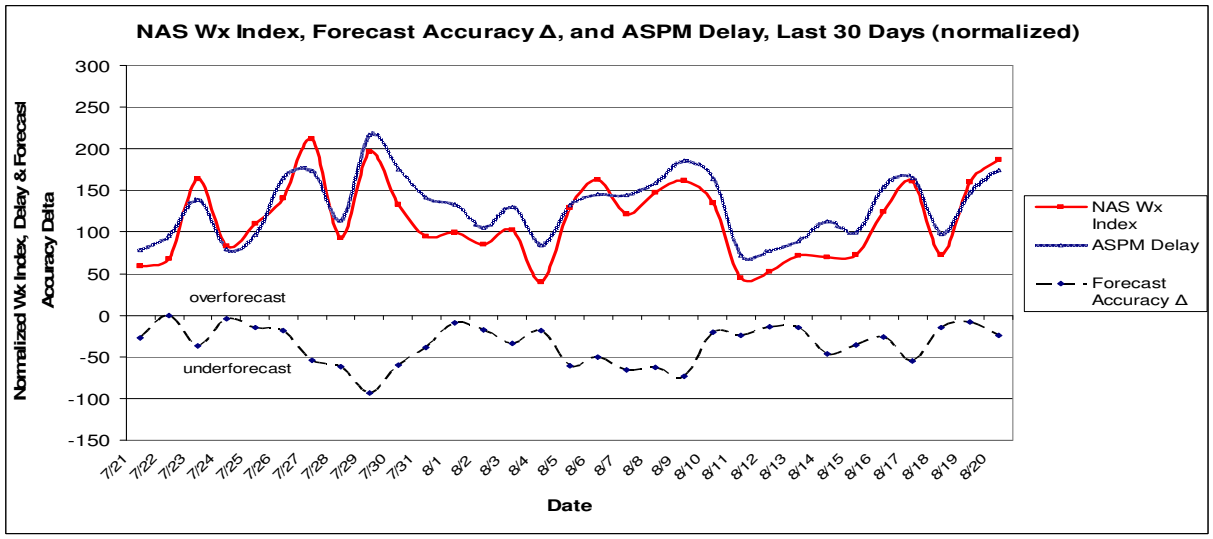


Weekly NAS WX Index and Delay Comparison
Period Ending 08/20/2007

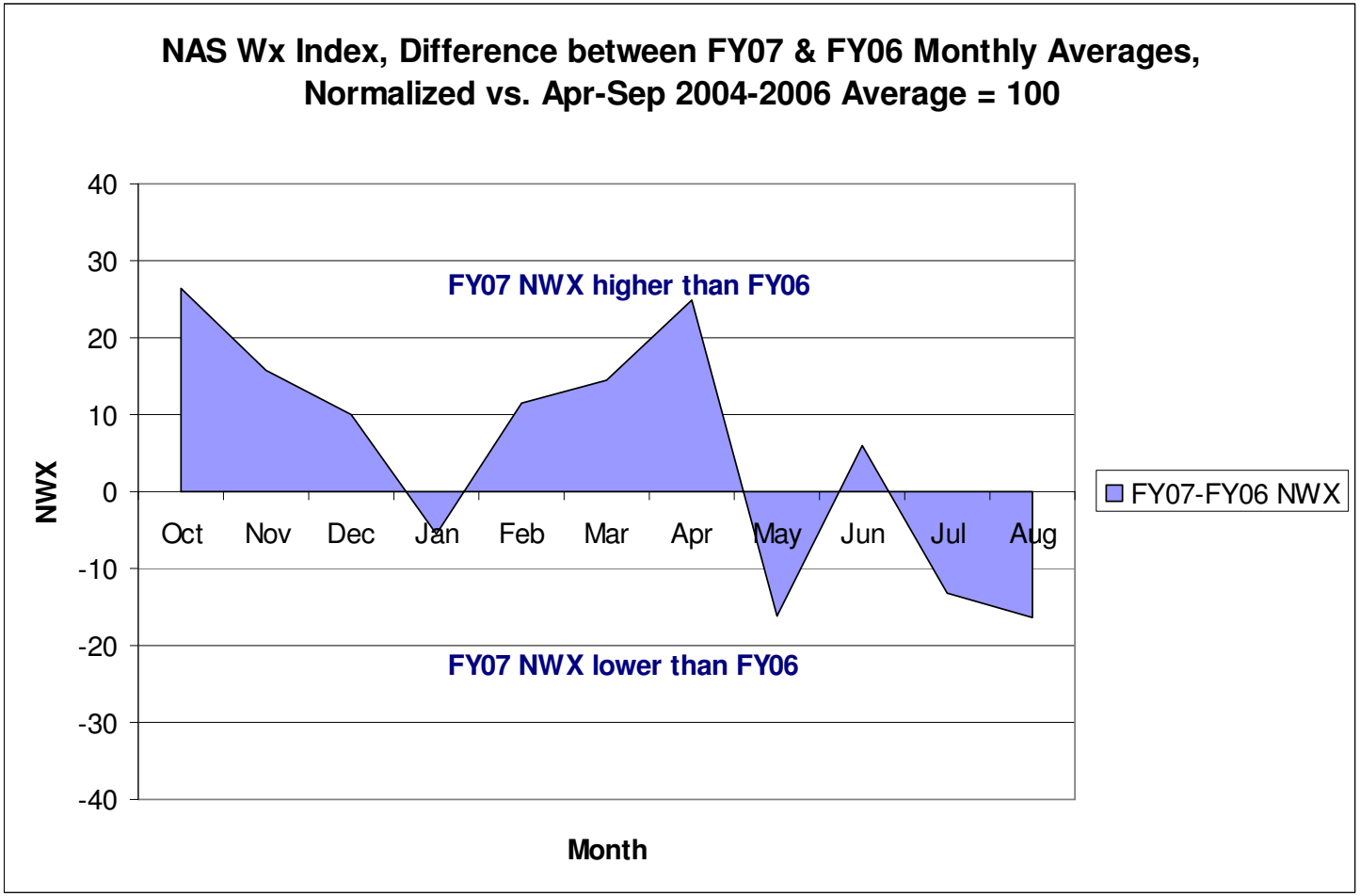




August 2007 is month-to-date as at 08/20



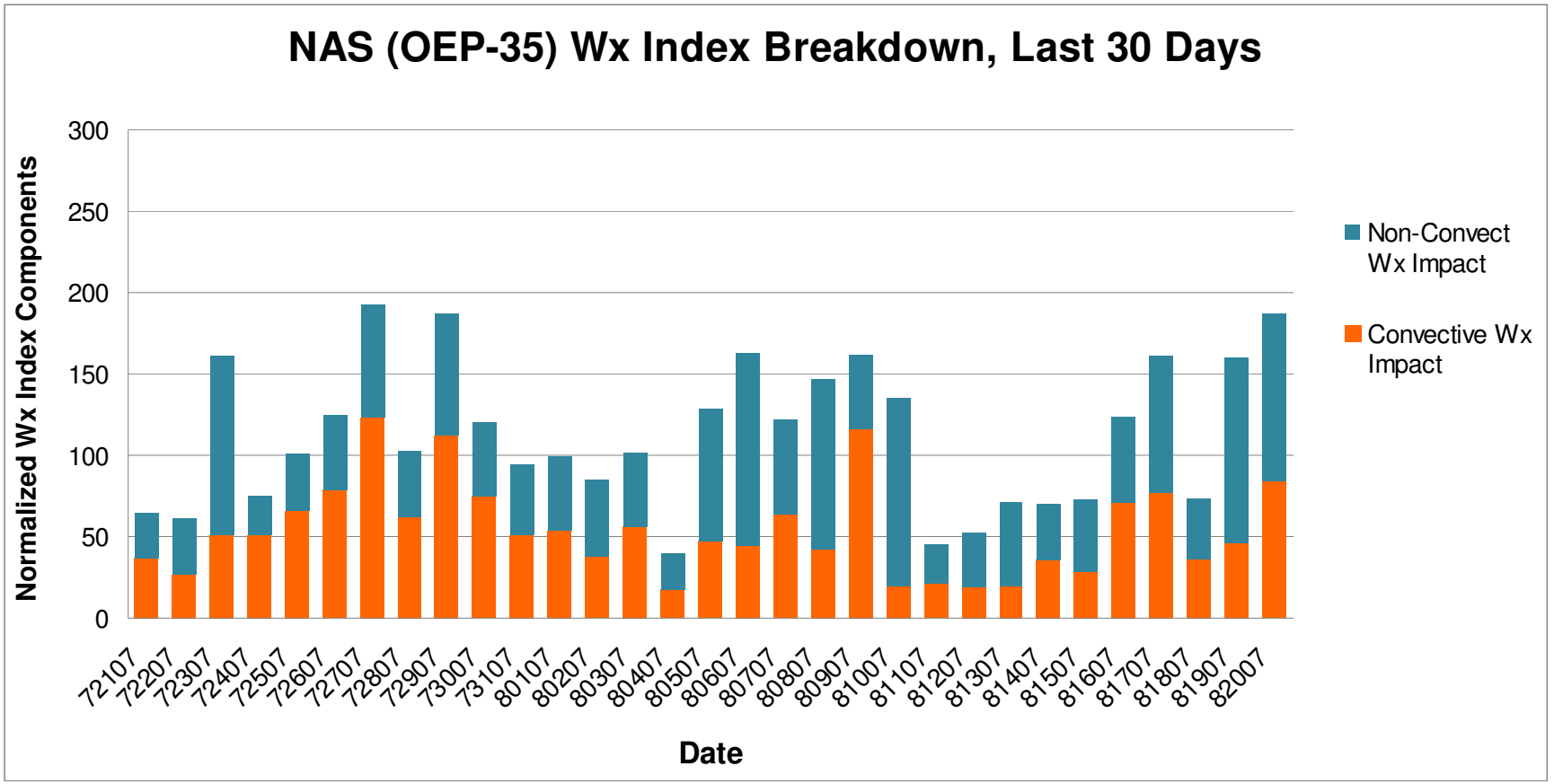
[FY07 – FY06] NWX Difference



August 2007 is month-to-date as at 08/20

NAS Wx Index Breakdown by Component (Experimental)

Period Ending 08/20/2007



NAS Wx Index Breakdown by Cause
Explanation to Slides 3 and 4

NAS Wx Index software can distinguish the following factors:

Marked as "Convective"

- En-route convective weather. This shows convective weather impact on an airport's inbound/outbound flows within approx. 500-NM range. This component does *not* affect queuing delay at the airport.
- Local convective weather. This reflects how convective weather in the vicinity (<= 100 NM) or directly over the airport reduces airport's capacity. It may affect queuing delay.
- Wind. Any time there is a wind greater than 20 Kt, or there is precipitation *and* wind greater than 15 Kt, the corresponding impact is recorded. Airport capacity may decrease, i.e. queuing delays may increase.
- Snow, freezing rain, ice etc. The corresponding impact is recorded. Airport capacity may decrease, i.e. queuing delays may increase.
- IMC. Ceiling or visibility below airport specific minima; fog; and heavy rain. The corresponding FAA capacity benchmarks for IMC are used. Queuing delays may increase.

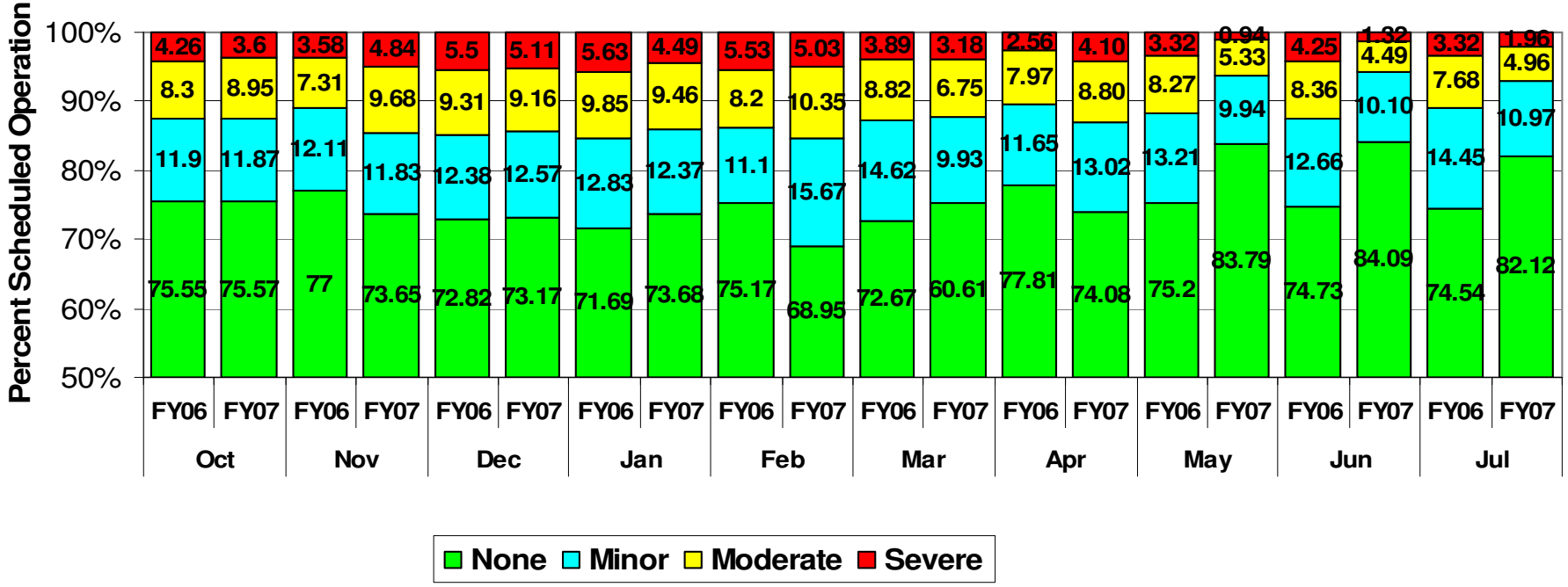
Marked as "Non-Convective"

- Queuing Delay (No Weather) plus Ripple Effects. No particular weather factor recorded locally for the given airport / given hour but WITI software computed that there would be queuing delays. This can be simply due to high traffic demand or in an aftermath of a major weather event when queuing delays linger on (even as the weather has moved out).

  Additionally, Ripple Effects are recorded in this component. For example, if ORD experiences departure queuing delays, its corresponding destination airports will get some additional arrival queuing delay.

- Unfavorable Runway Configuration, usually due to light-to-moderate winds (15-20 Kt or even 10 Kt) that prevent optimum-capacity runway configurations from being used. Airports like ORD or LGA are susceptible to this factor. As airport capacity decreases, queuing delays may increase.

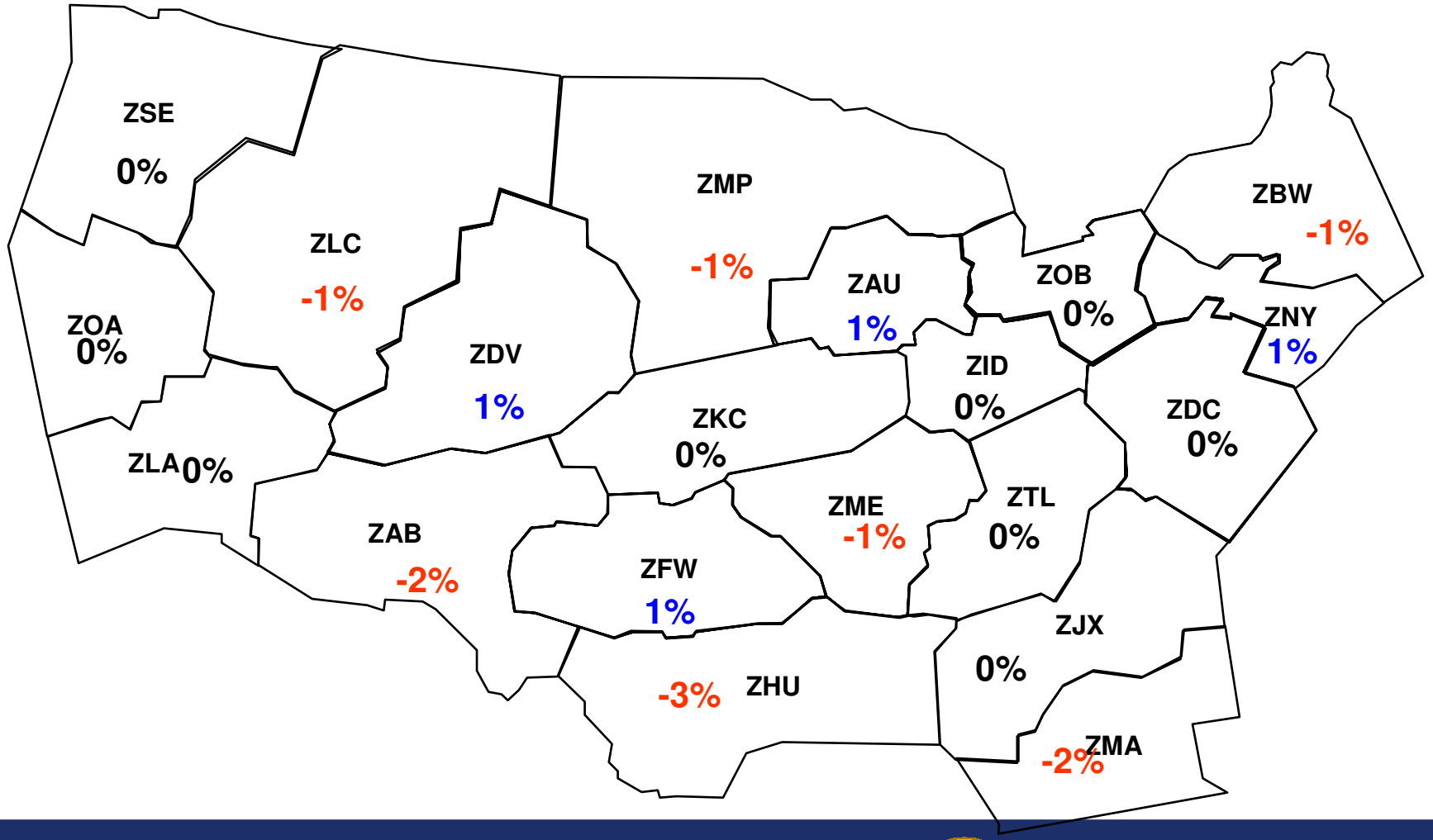
Airport Weather by Category (OEP 35)
Comparison FY06 and FY07 JULY YTD



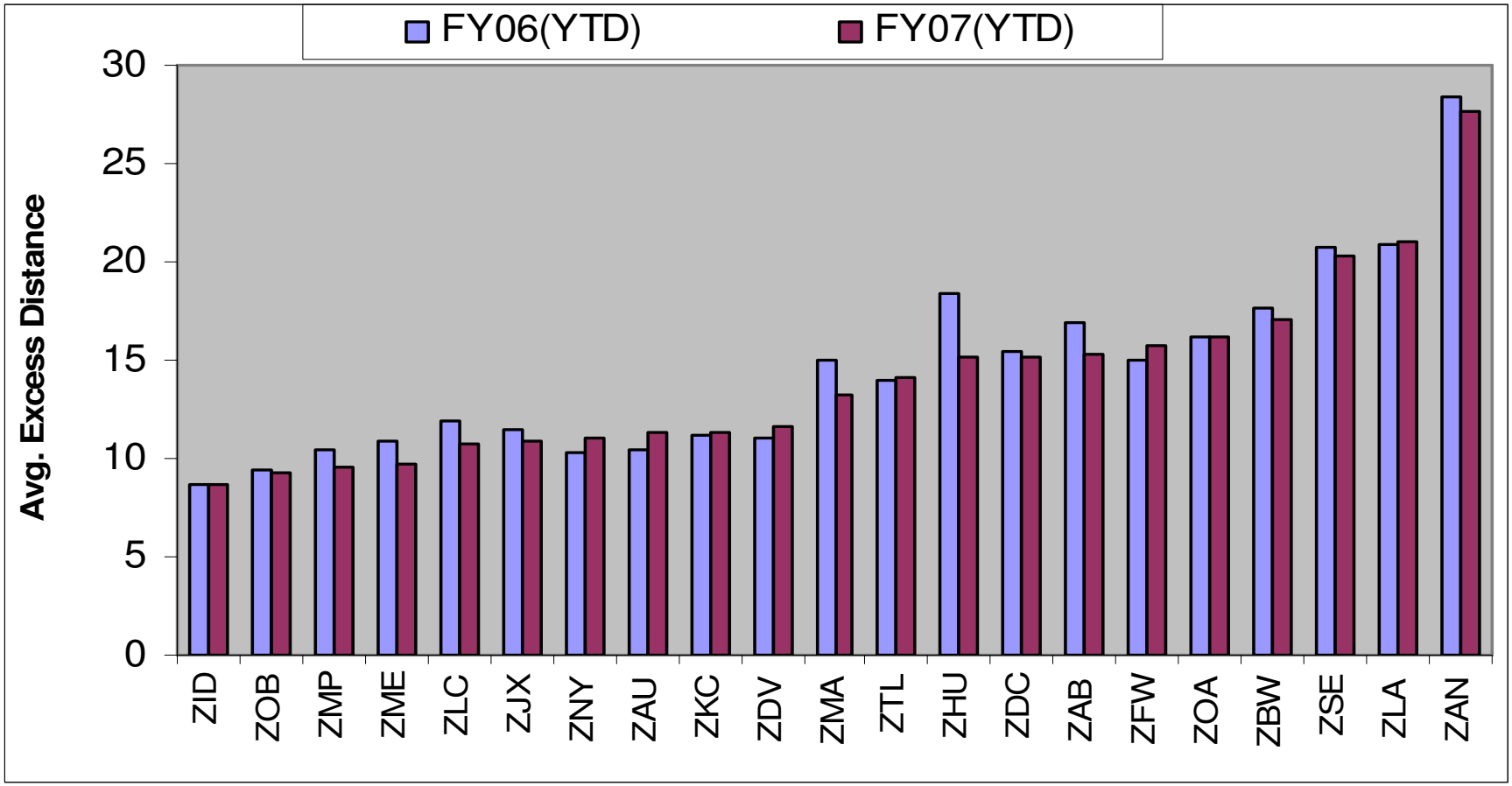
Other KEY Performance Measures

- En Route Efficiency
- SAER and Terminal Capacity
- Schedule Block Time & Total Delay

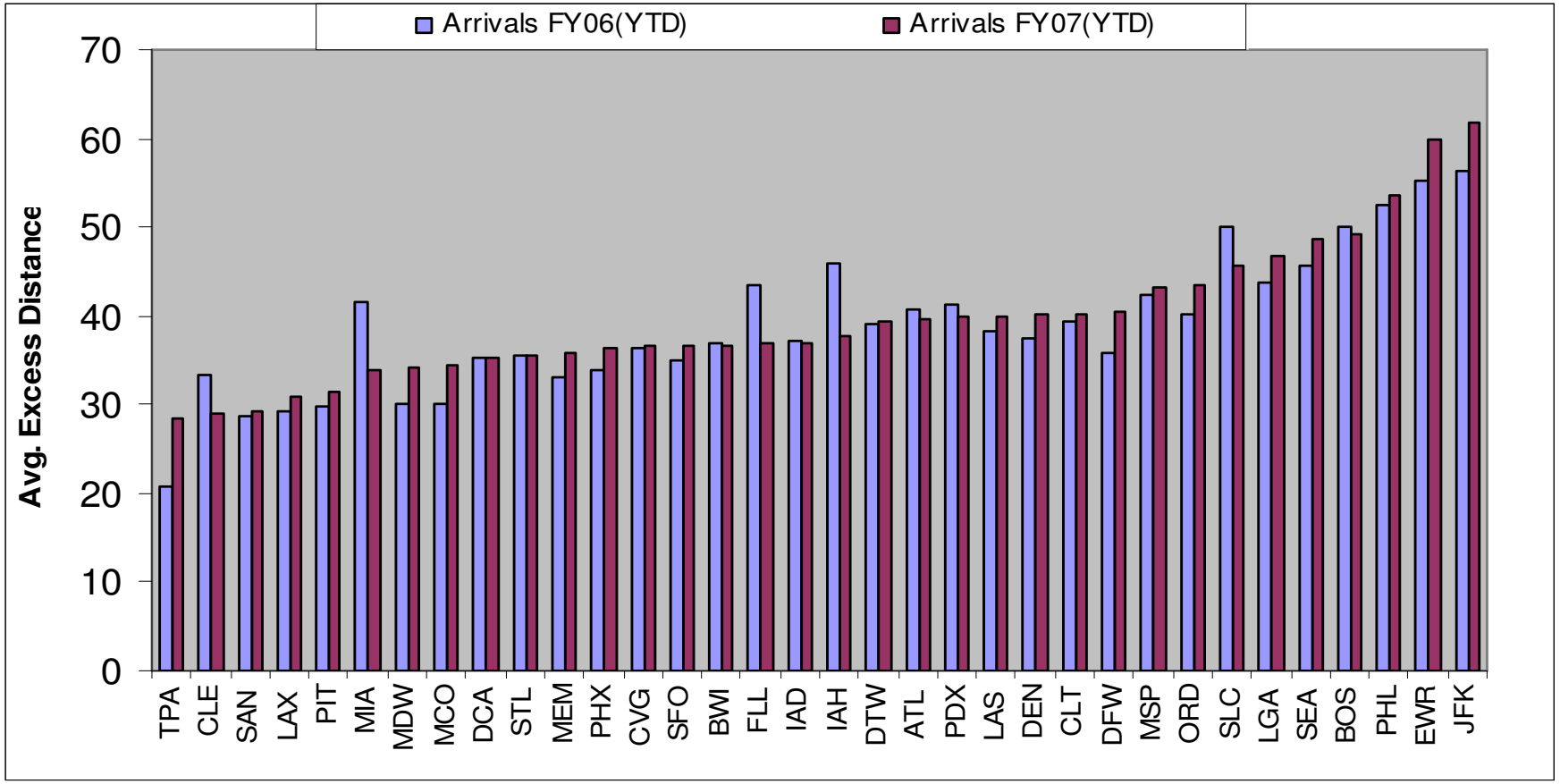
ARTCC ETMS Traffic Changes
FY-06(Thru July) vs. FY-07(Thru July)



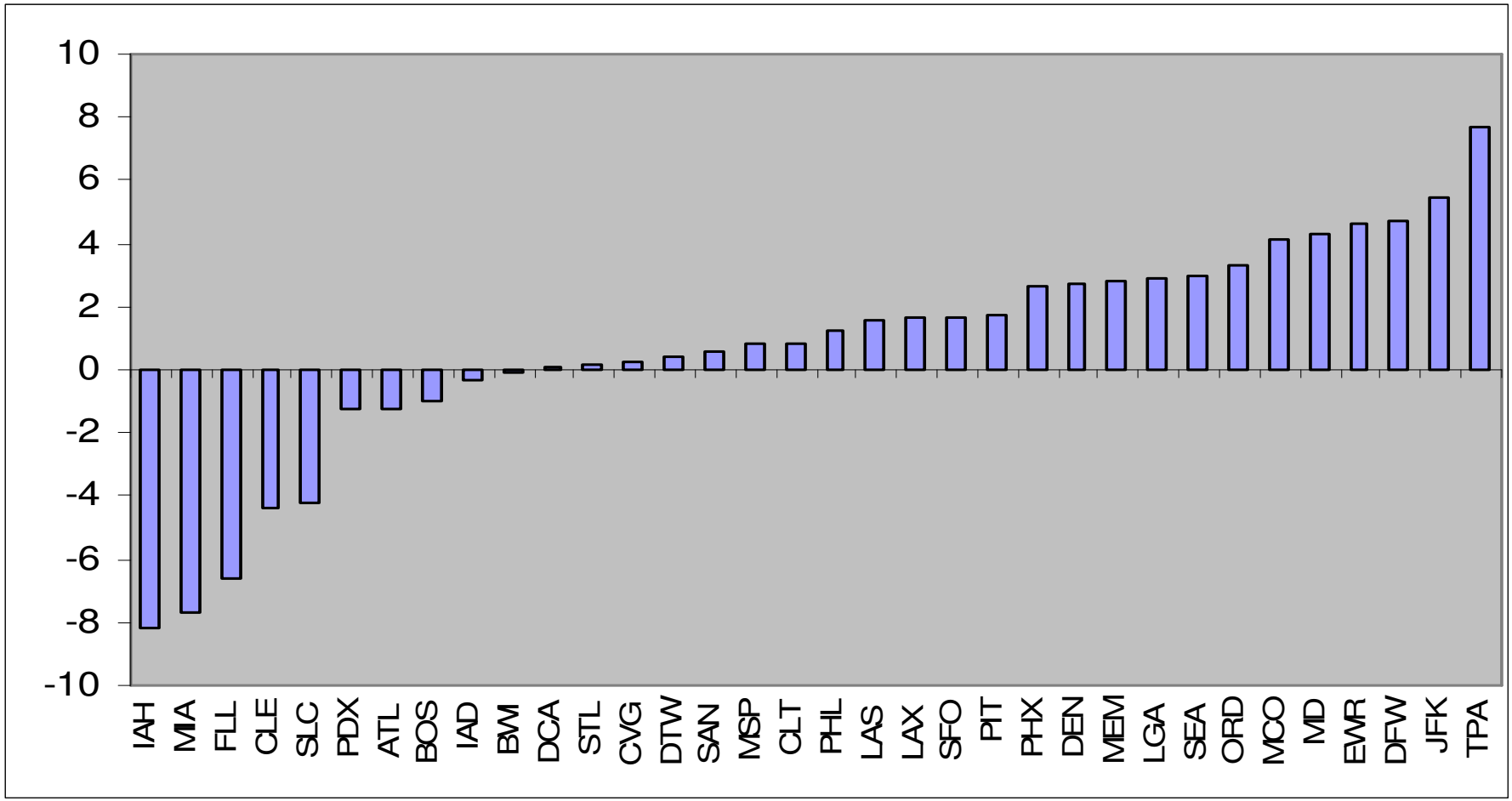
Avg. Excess Distance By ARTCC



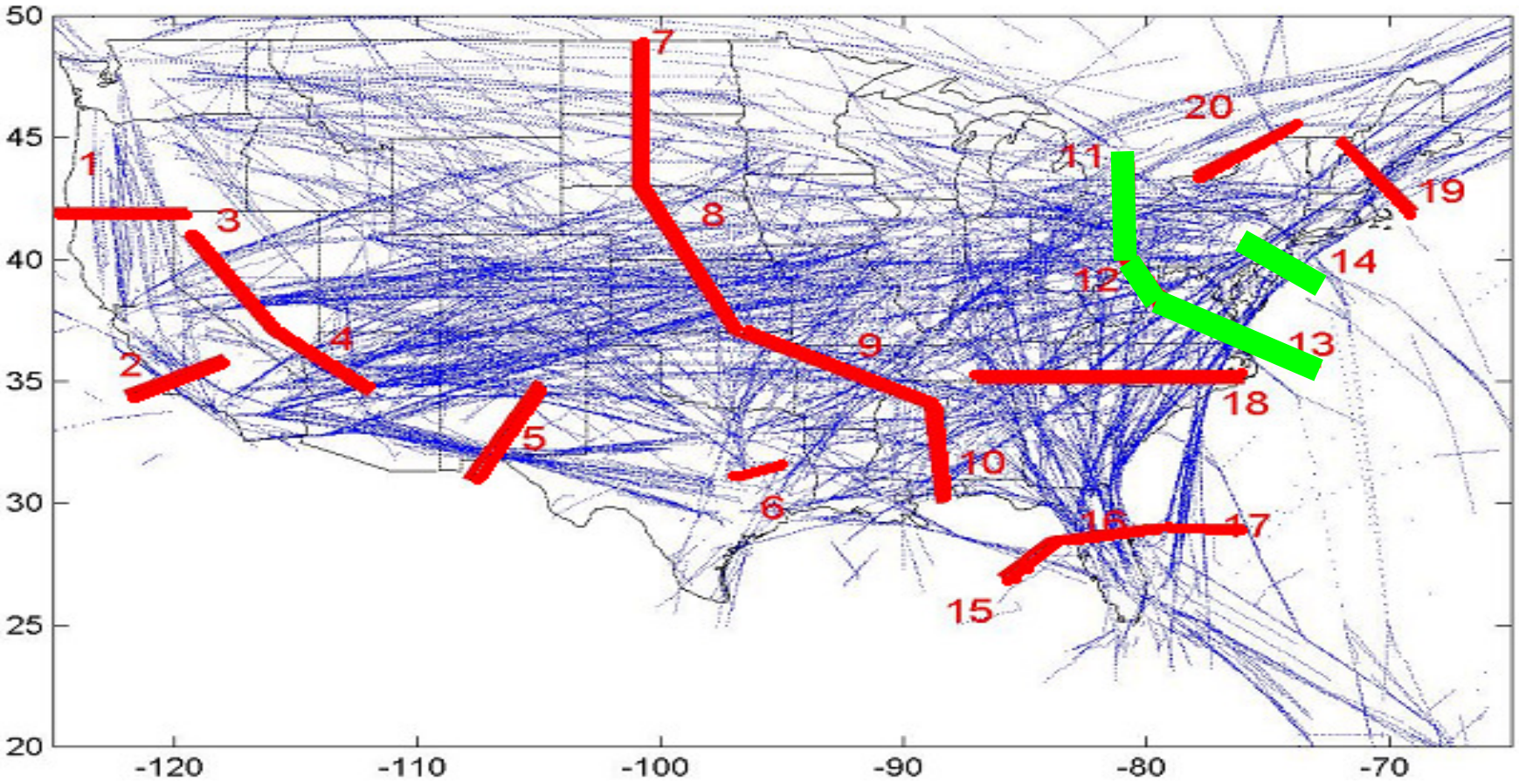
Avg. Excess Distance Arriving @ OEP35 *(Less HNL)*



Change In Excess Distance @ OEP35
FY06(YTD)-FY07(YTD) *(Less HNL)*



Hoses


50
45
40
35
30
25
20
-120
-110
-100
-90
-80
-70
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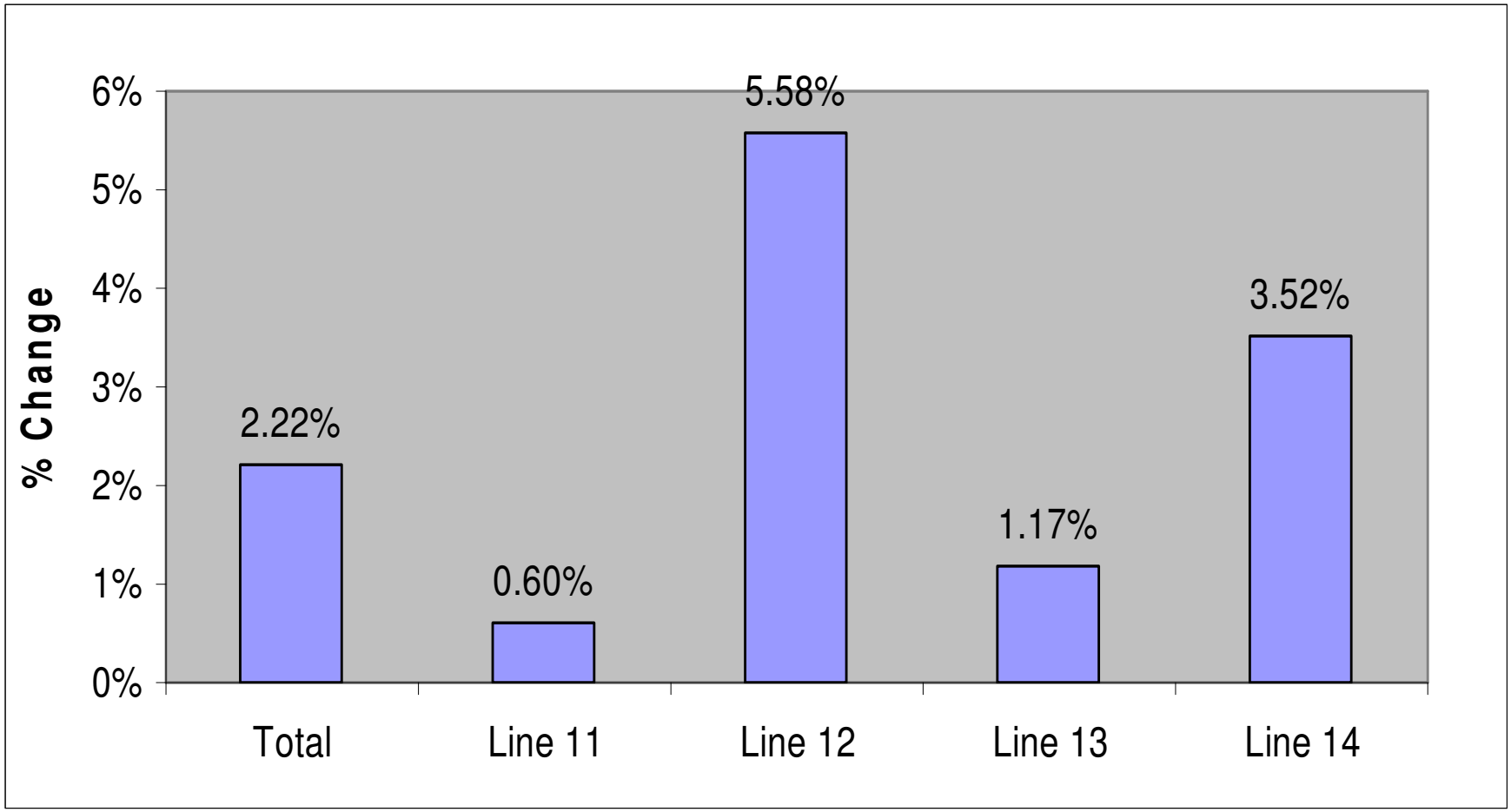
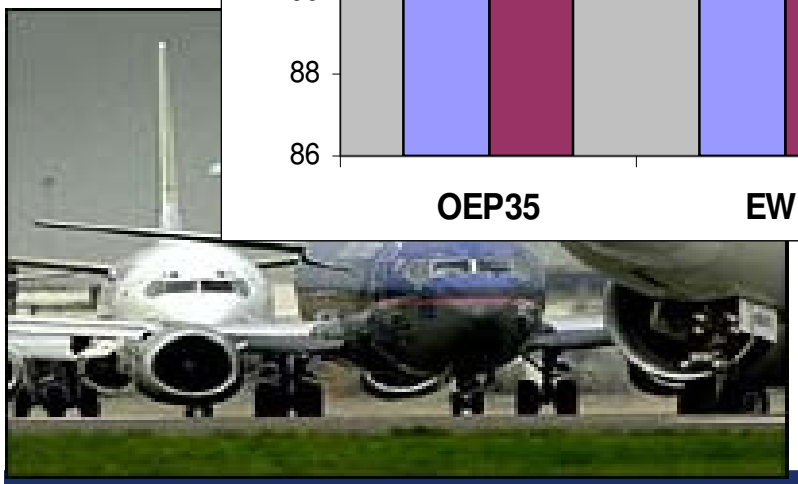
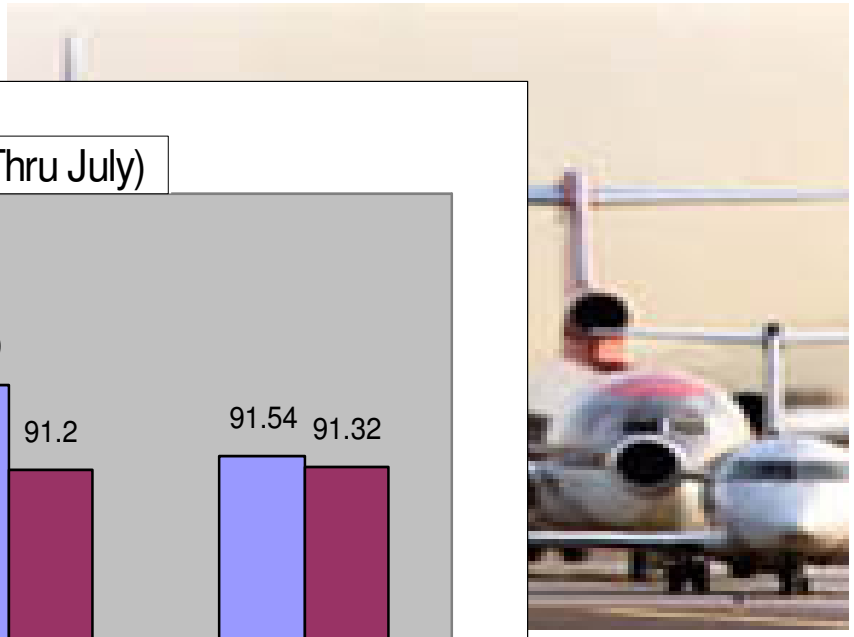
North East Corridor Hoses (Lines 11-14) FY06(YTD)-FY07 (YTD)



System Airport Efficiency Rating



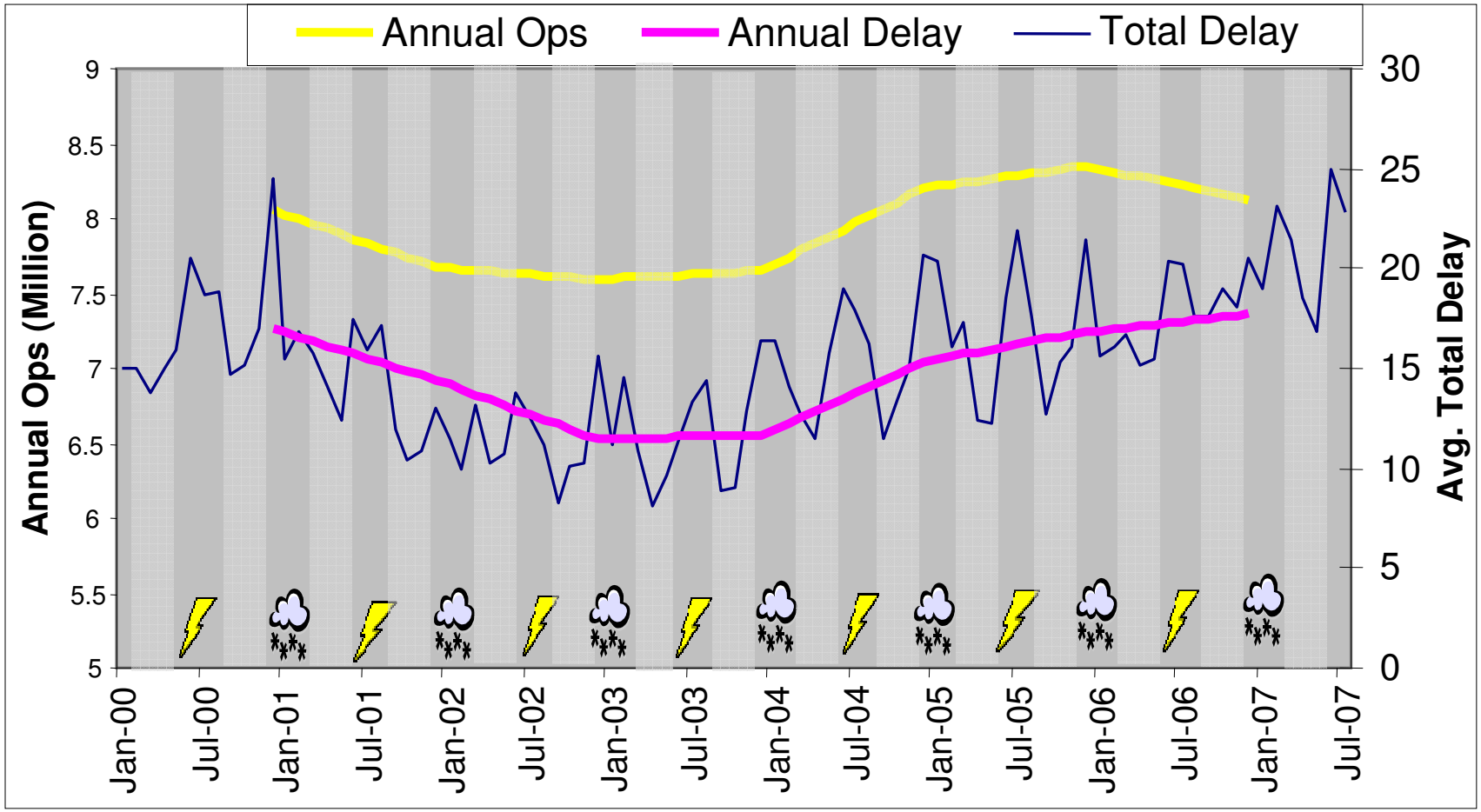


Total Delay Measure

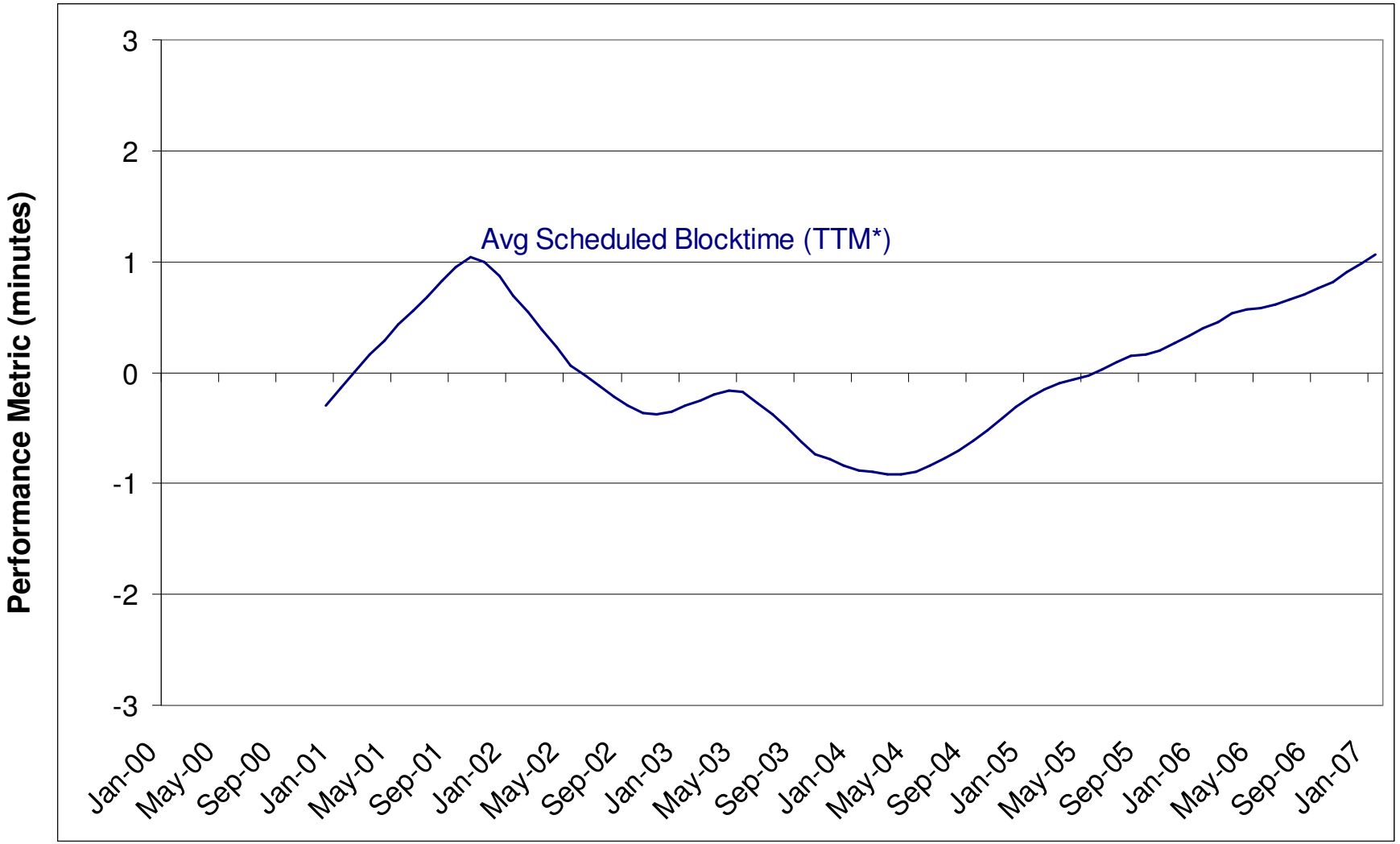
- **Schedule Delay**
  - Airlines compensate for routine system delays.
- **Modeling – Total System Delay**
  - Allows us to know full range of delays and where they occur.

Total Delay = Gate Delay + Taxi-out Delay + Airborne Delay + Taxi-in Delay

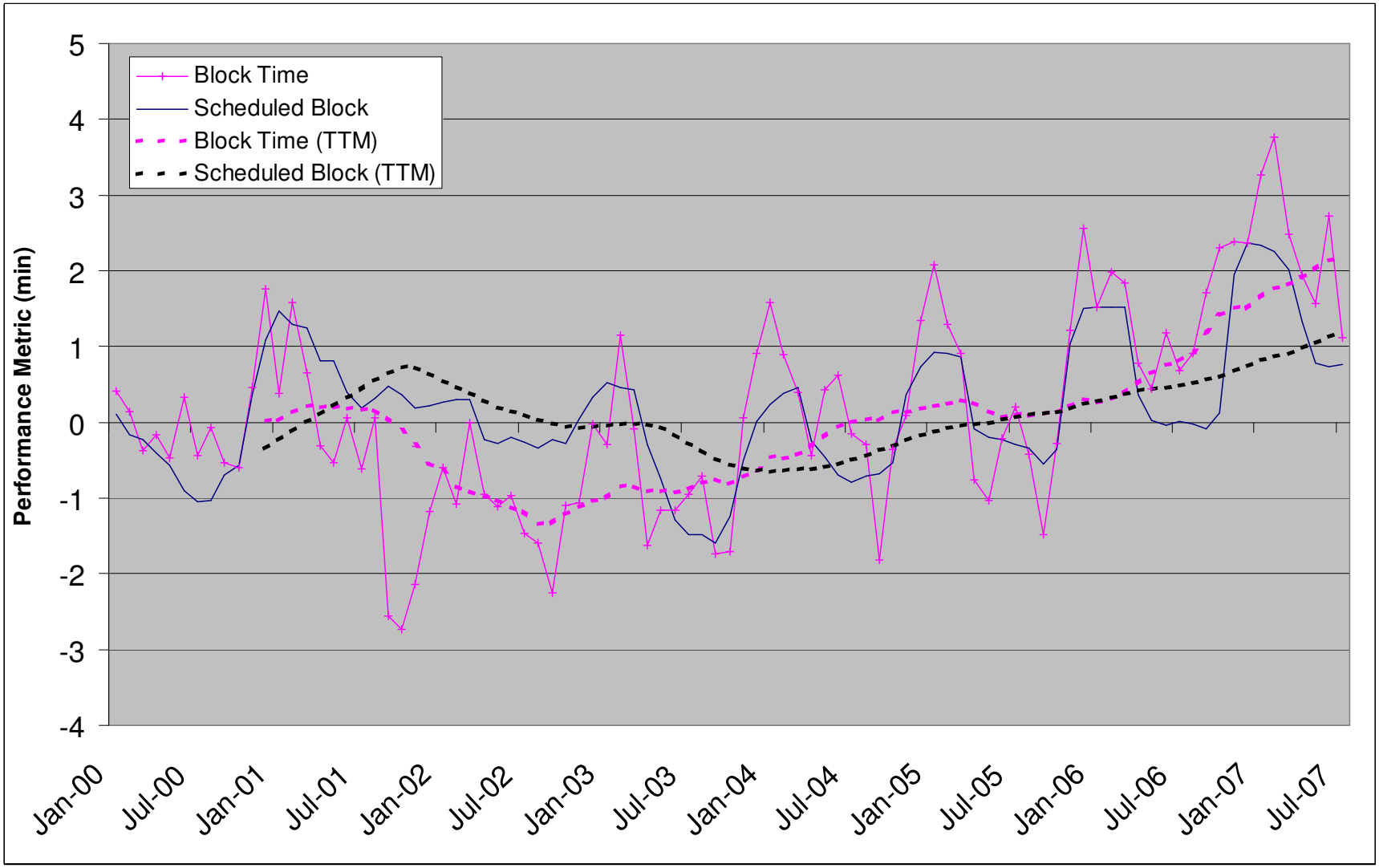
OEP 35 Demand vs. Delay



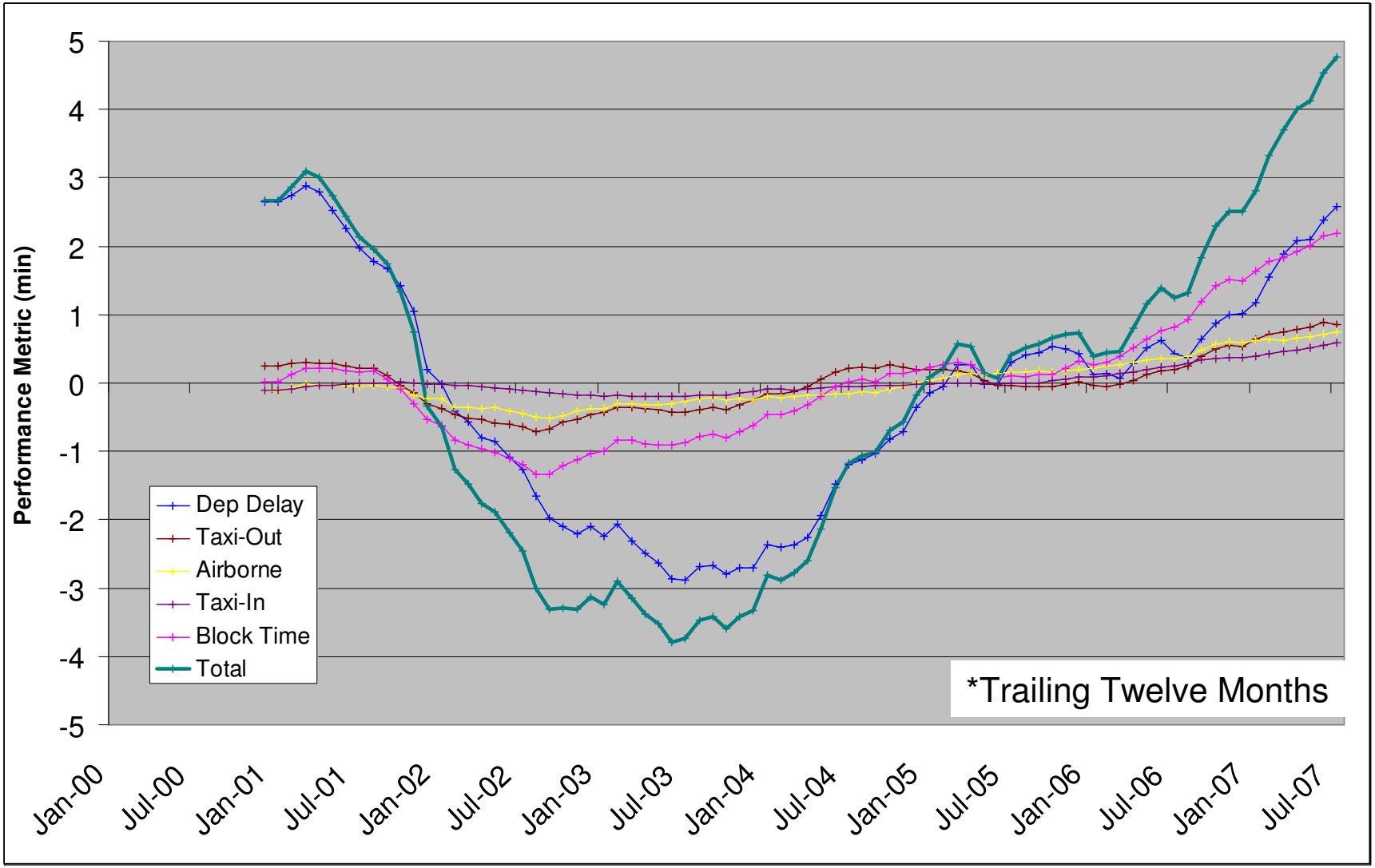
Scheduled Block Time



Performance Metric Block Time



Performance Metric (TTM*)

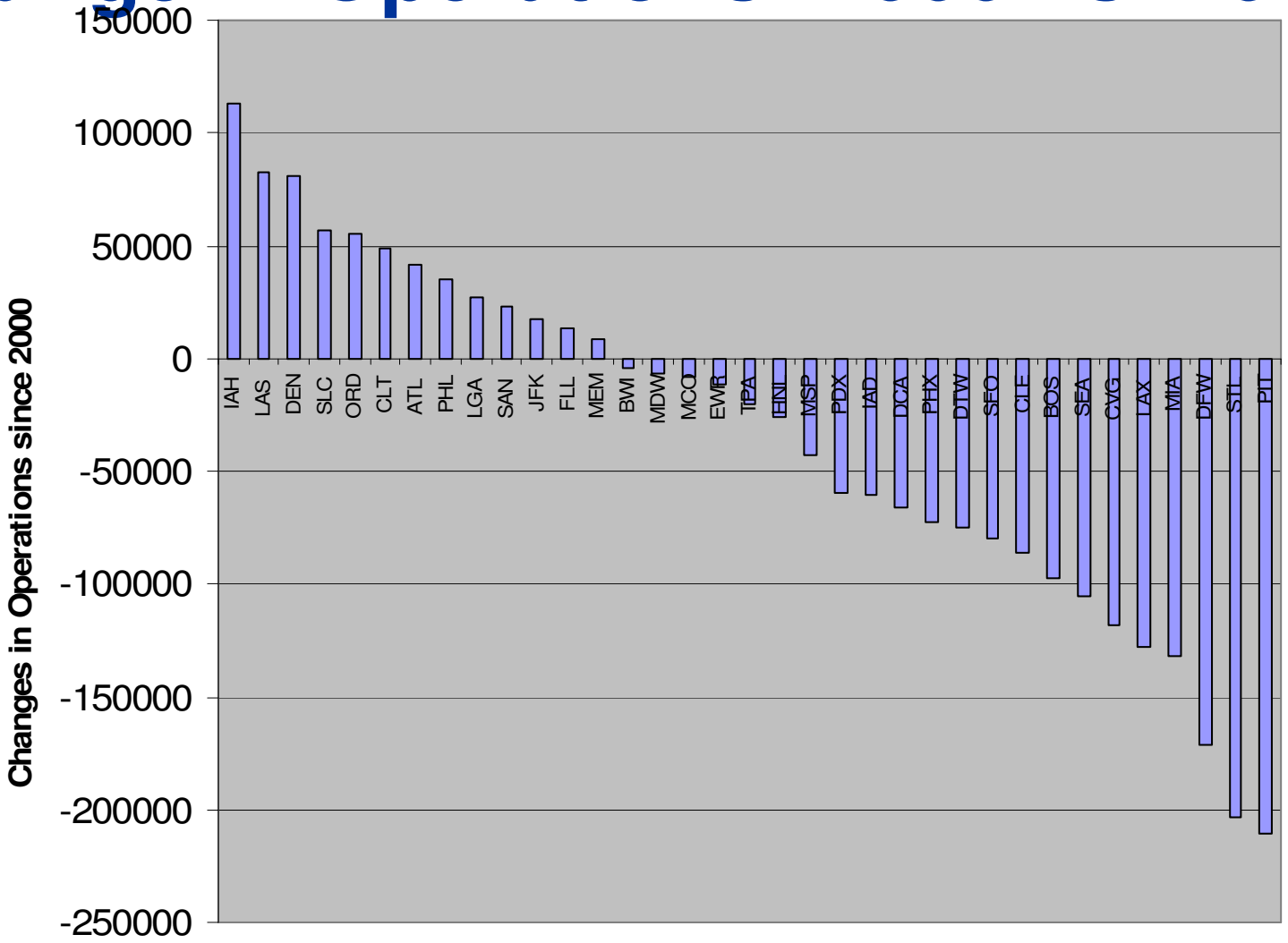


OEP Performance Metrics

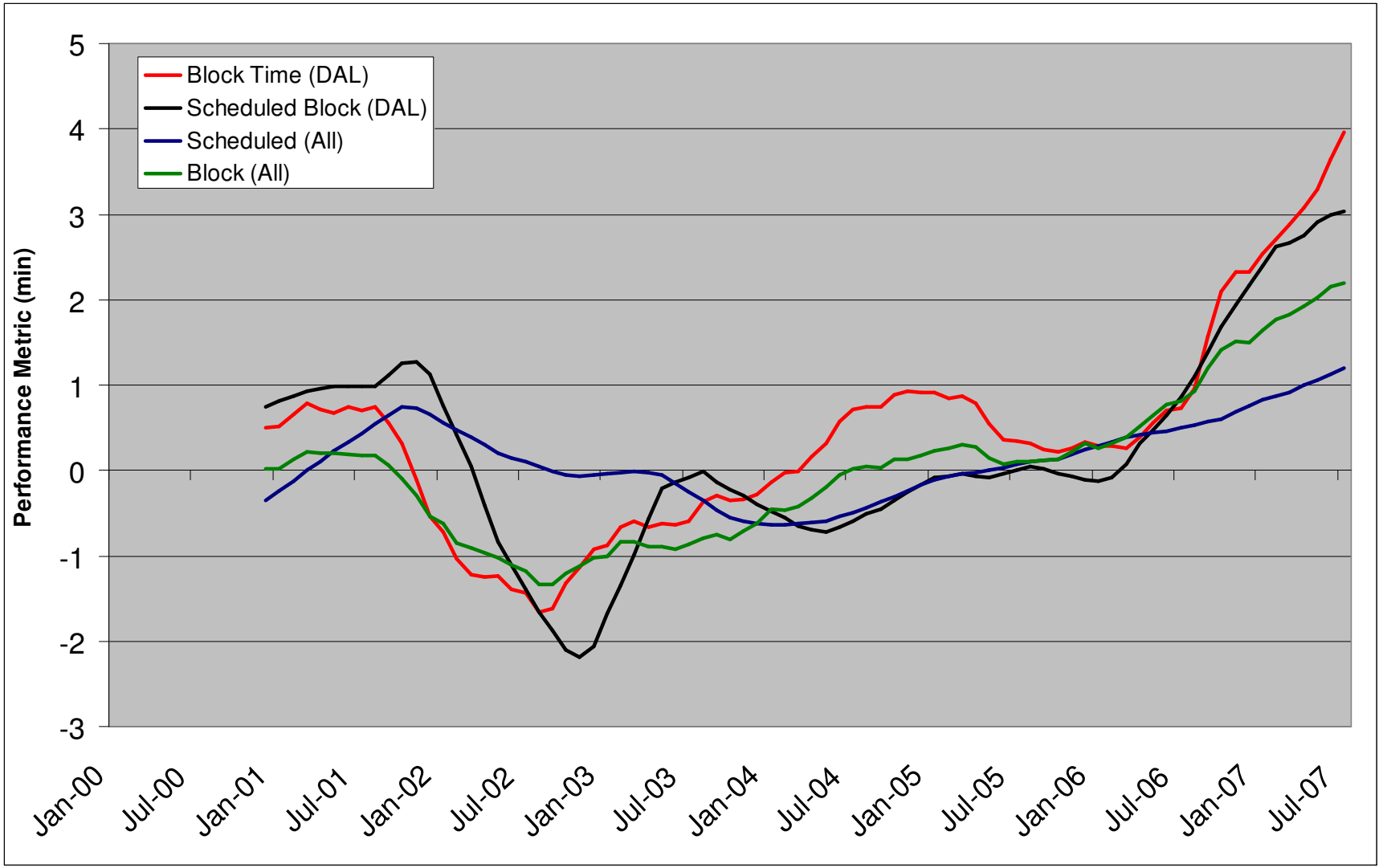
Everything should be made as simple as possible, but not any simpler.

-Albert Einstein (paraphrase)

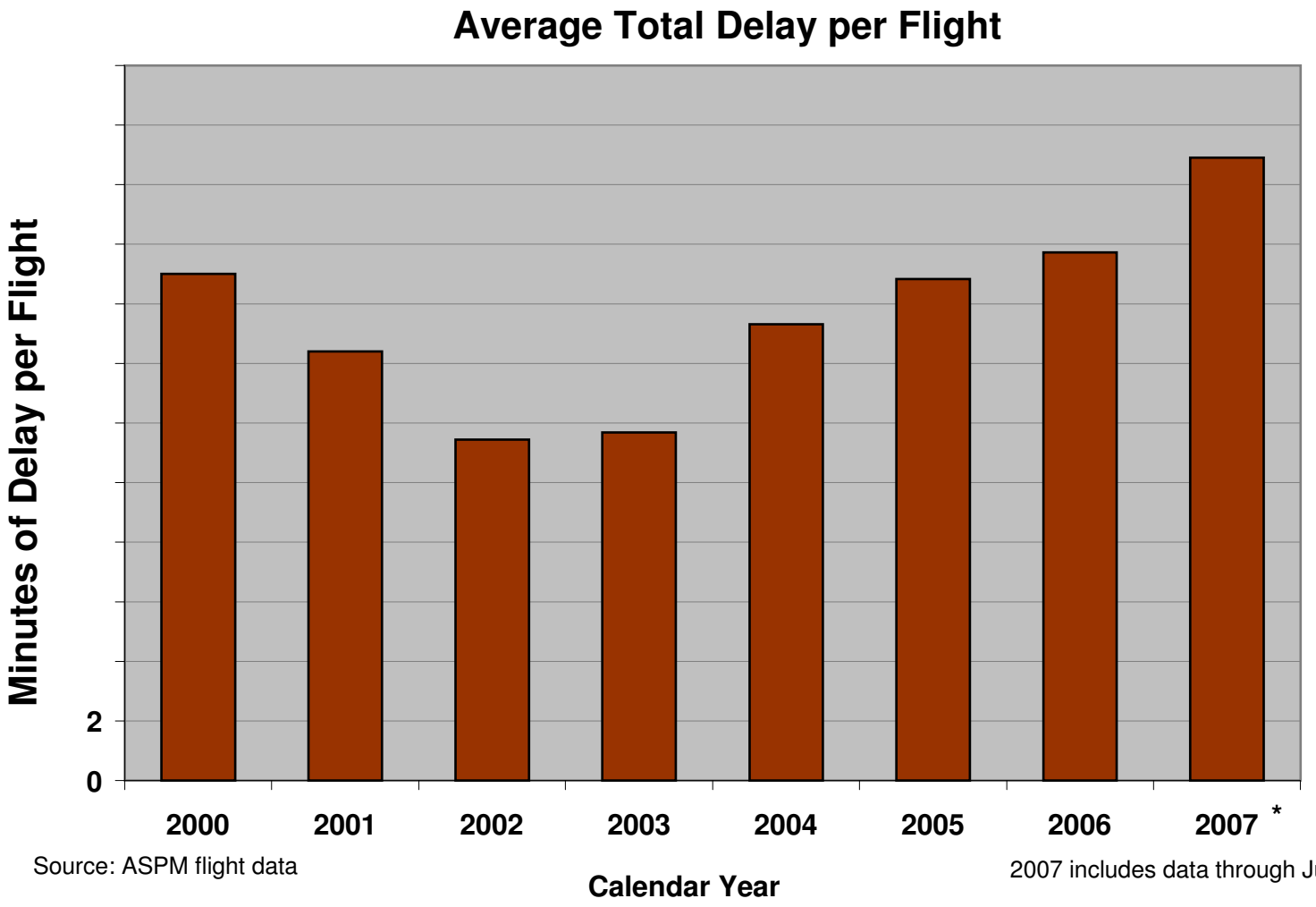
Change in Operations: 2000 vs. 2006



Performance Metric Delta Airline



Delays - Already Worse than 2000

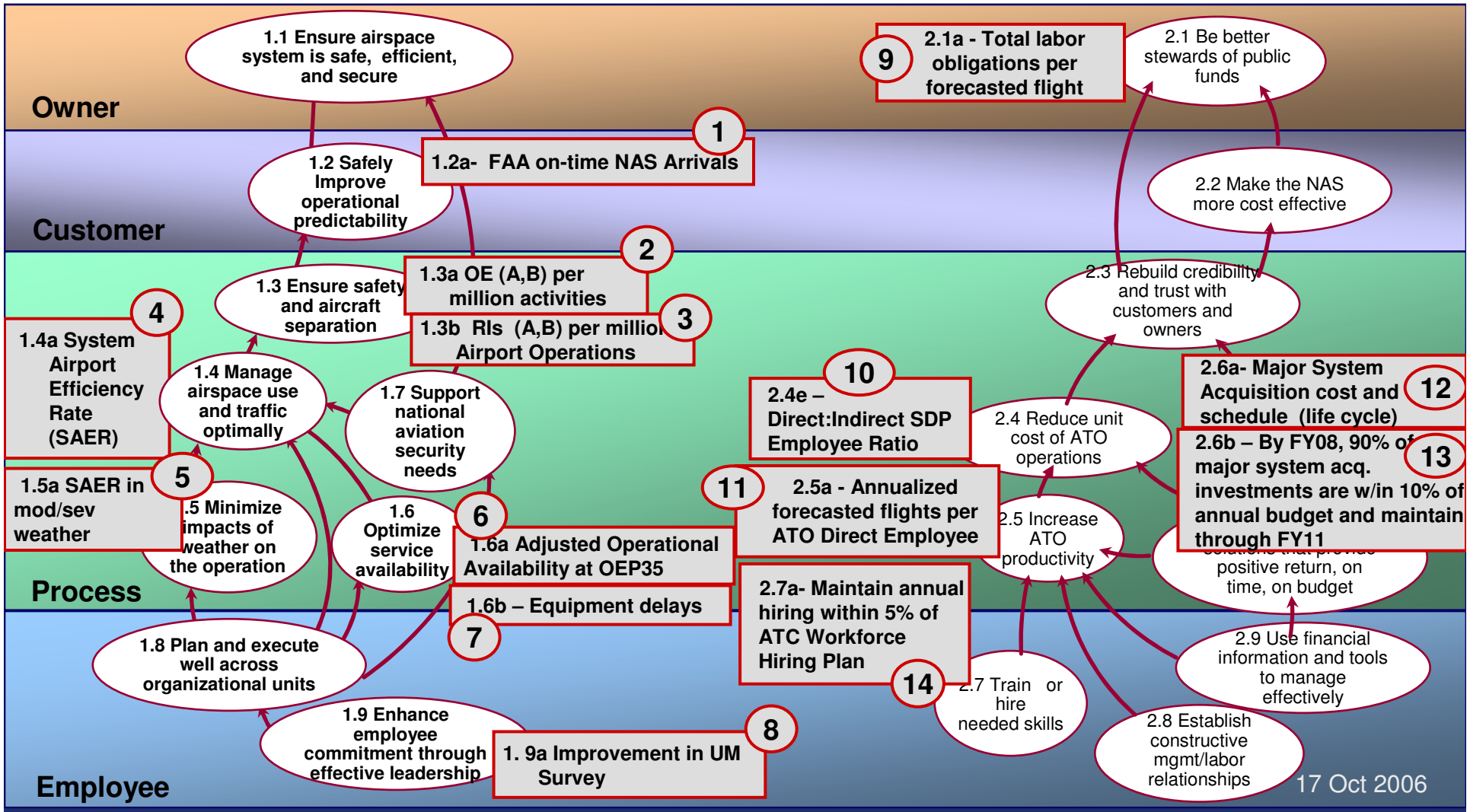


Source: ASPM flight data

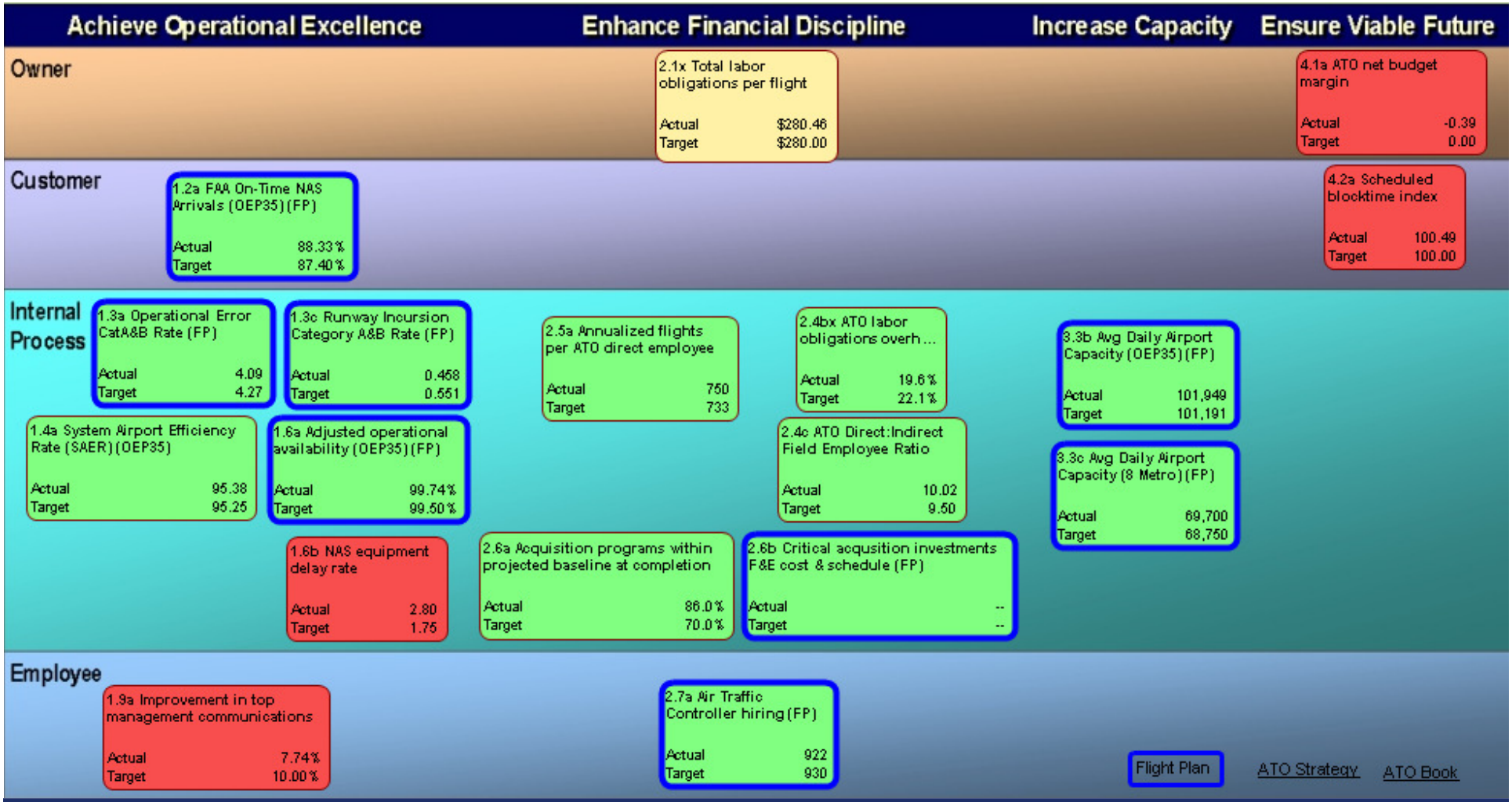
2007 includes data through July

Measures gauge our success in achieving the Strategic Outcomes… COO Metrics Dashboard

(These 18 measures are the ones Mr. Chew will regularly review to monitor ATO performance)



Dash Board – September 2006

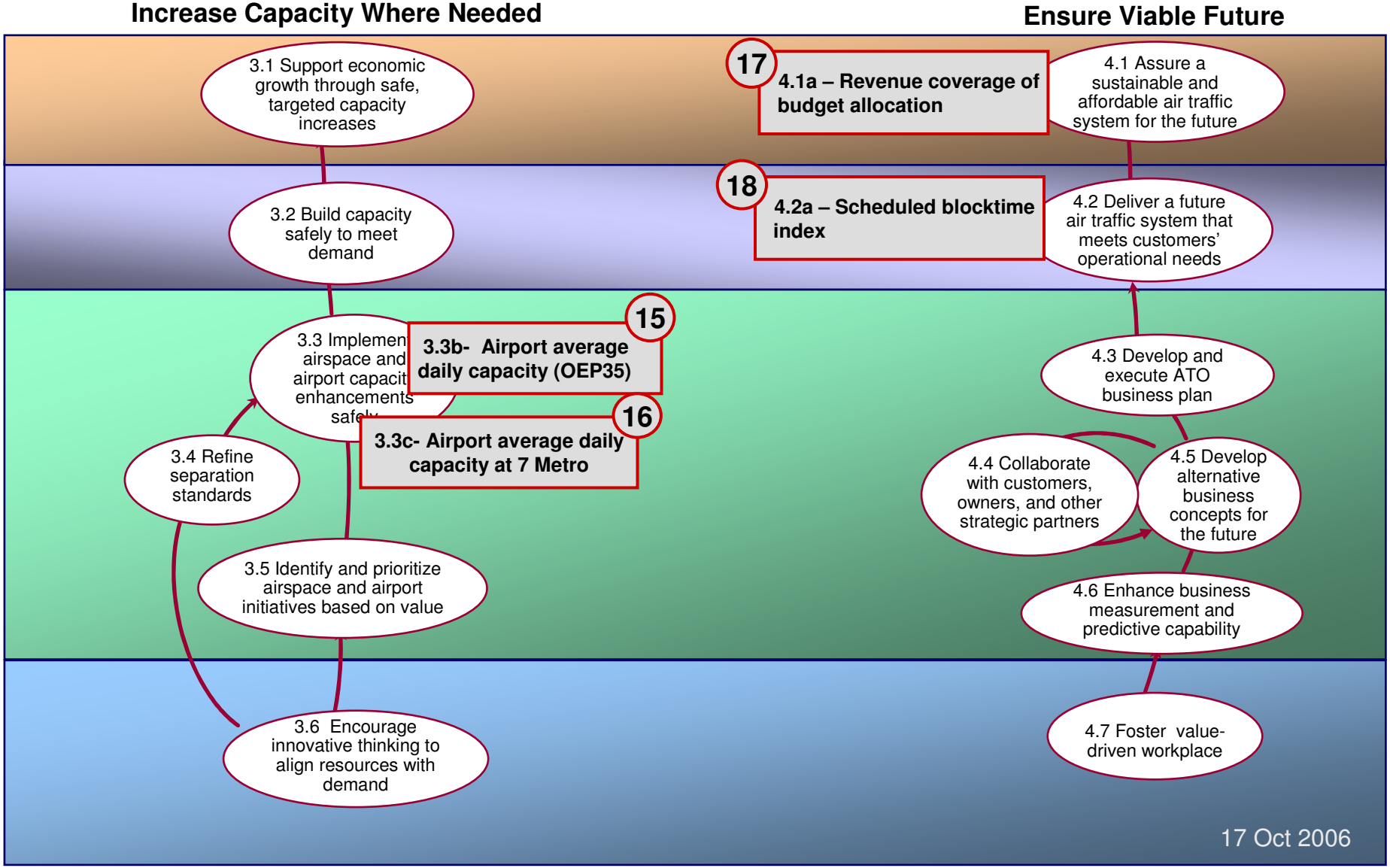


Working Draft

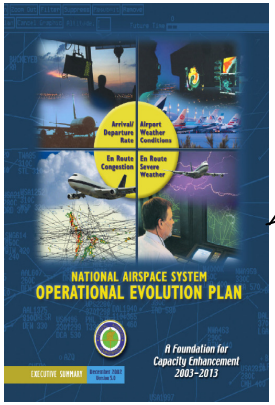
Federal Aviation Administration

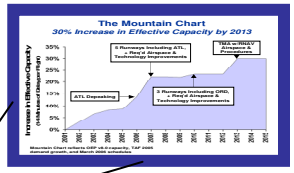
COO Metrics Dashboard

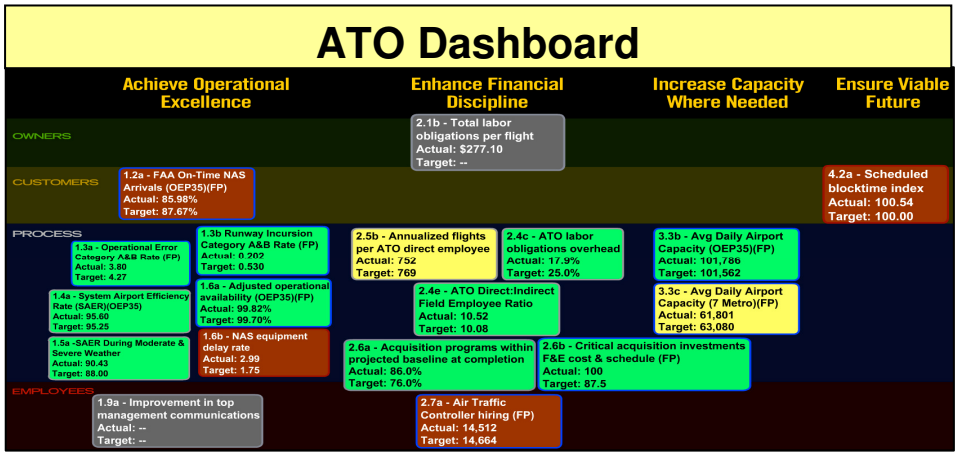
(These 18 measures are the ones Mr. Chew will regularly review to monitor ATO performance)



Demonstrated Metrics Experience







ATO Pathways Measures

PW-1 Achieve Operational Excellence

1.2 Safely improve operational predictability
1.3 Ensure safety & aircraft separation
1.3a Operational Error CatA&B Rate (FP)
1.3b Runway Incursion Category A&B Rate (FP)
1.4 Manage airspace use and traffic optimally
1.5 Minimize weather impacts
1.6 Optimize service availability
1.7 Support national aviation security needs
1.8 Plan and execute well across organizational units
1.9 Enhance employee commitment through effective leadership

ATO Pathway Measures

PW-3 Increase Capacity Where Needed

3.2 Build capacity safely to meet demand

3.2a - Monitor Alert Parameter (MAP) analysis

3.3 Implement capacity enhancements

3.3a Safety Risk Management (FP)

3.3b Avg Daily Airport Capacity (OEP35) (FP)

3.3c Avg Daily Airport Capacity (7 Metro) (FP)

3.4 Refine separation standards

3.5 Prioritize capacity initiatives

3.6 Encourage innovative thinking to align resources with demand

ATO Pathway Measures

PW-4 Ensure Viable Future

4.1 Assure future air traffic system

4.2 Meet customer operating needs – Schedule Block Time

4.3 Execute ATO business plan

4.3a Percent of critical NGATS Transition Decision milestones achieved as planned

4.3c Percent ATO Operating Plan development milestones achieved as planned

4.4 Strategic collaboration

4.4a GPS technologies (FP)

4.4b Reduce US filed ICAO SARP differences (FP)

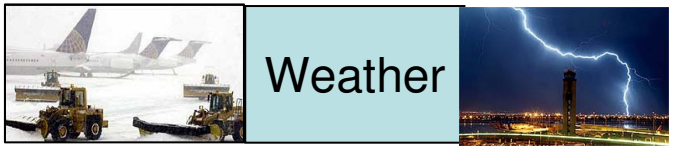
4.5 Develop alternative business concepts

4.6 Enhance business measurement capability

4.7 Foster a value driven workplace

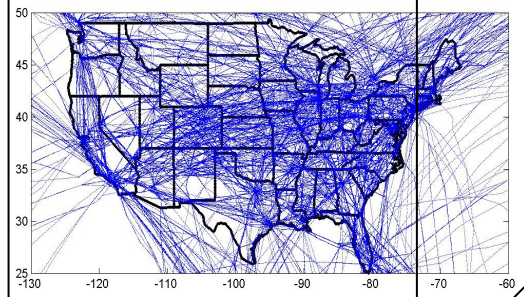
Serious Business

Performance Metrics Models



Weather

NAS Model



Demand

Trajectories by City pair, time of day, and aircraft type

Outcome

- **Delays**
- **Cancellations**
- **Scheduled Blocktime Changes**
- **Constrained Demand**

Efficiency & Capacity

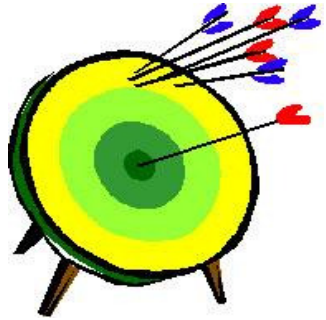
Terminal

En Route

OEP Solution Sets

Establishing Realistic Targets

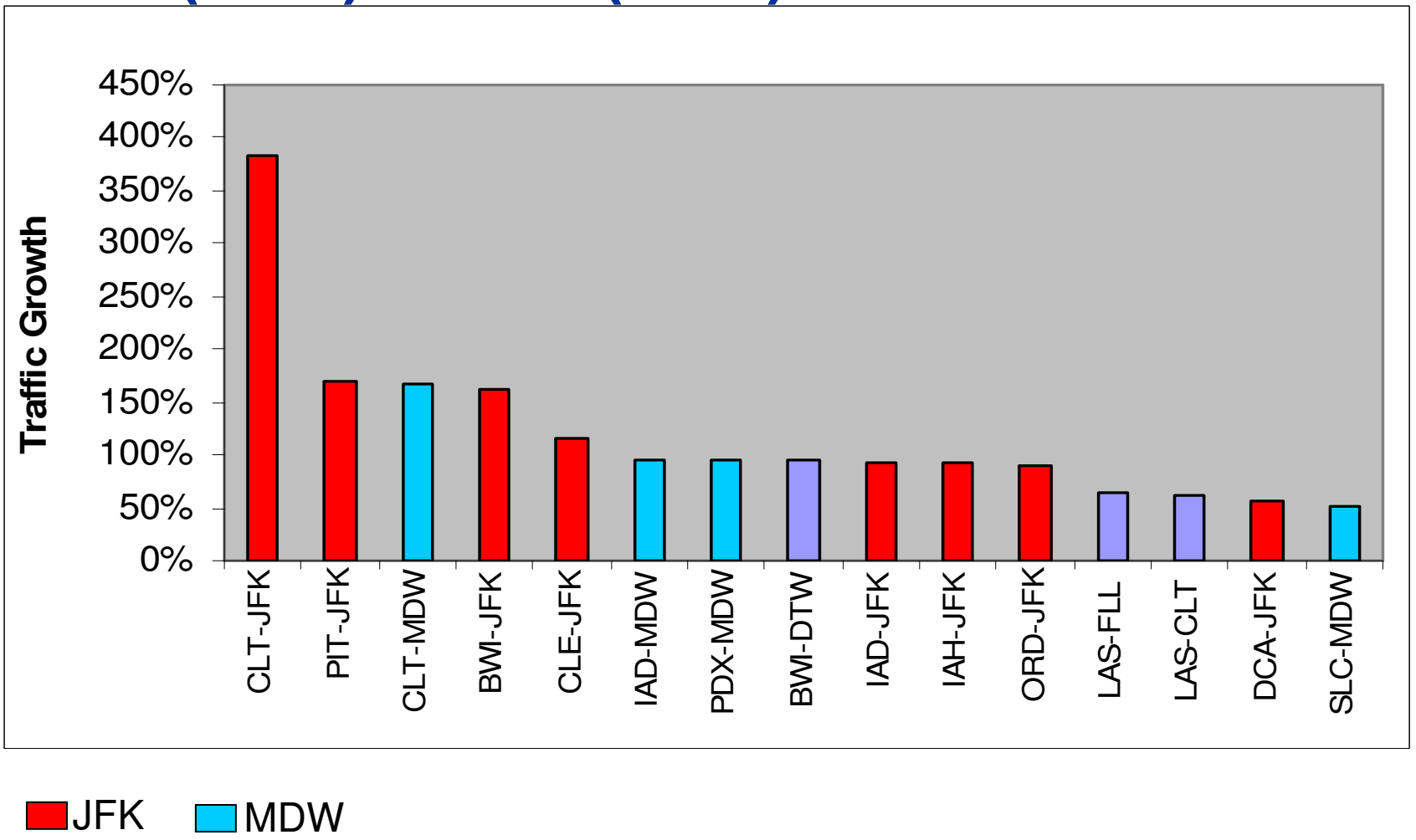
- **Customer perspective is essential for successful implementation of Balanced Scorecard. Both the ATO and Customers must see the value in meeting the targets.**
- **Partnership: ATO and Customers must partner in target setting.**
  - Targets must be validated by Customer input
  - Targets are jointly achieved



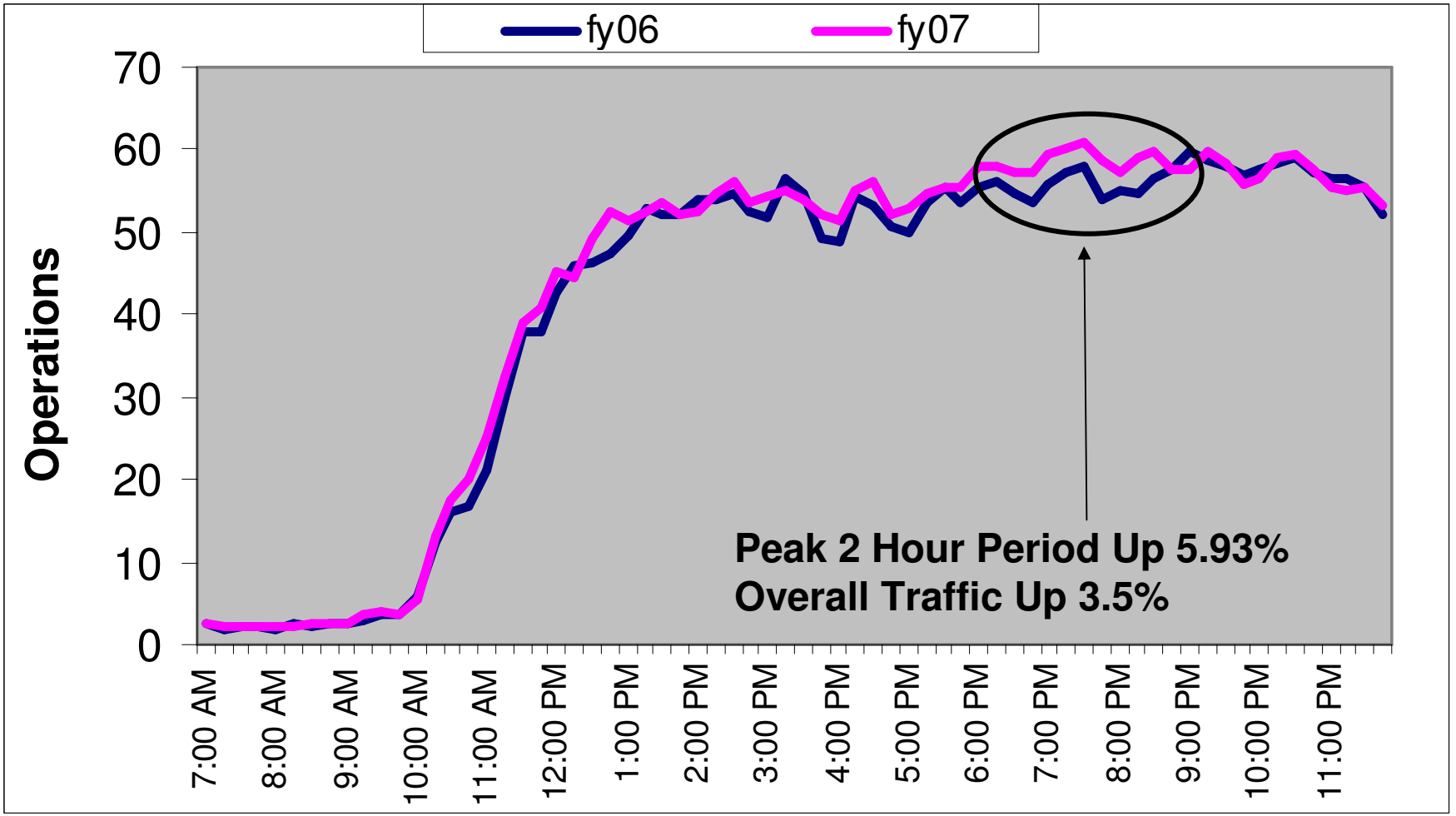
Outline

- **Strategic Management Process (SMP)**
  - NAS On-Time
- **Morning Metrics Report / Weather Index and Delay**
- **Other Performance Metrics**
- **Projecting Performance in the Future**
  - Total Delay

Top 15 Growing City Pairs
FY06(YTD) -FY07 (YTD)

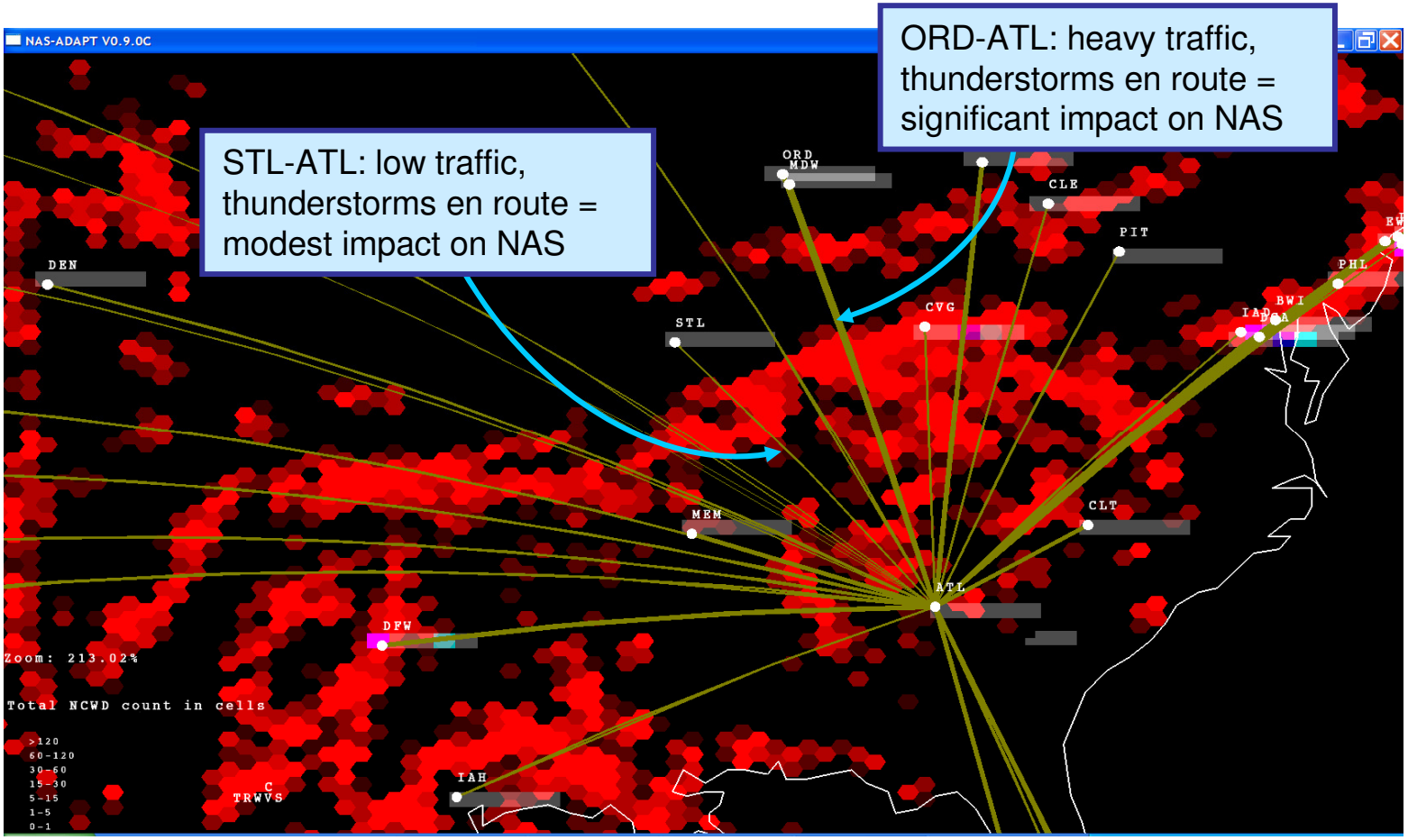


15 Minute Operation Counts @ Line 14
FY06(YTD) -FY07 (YTD)

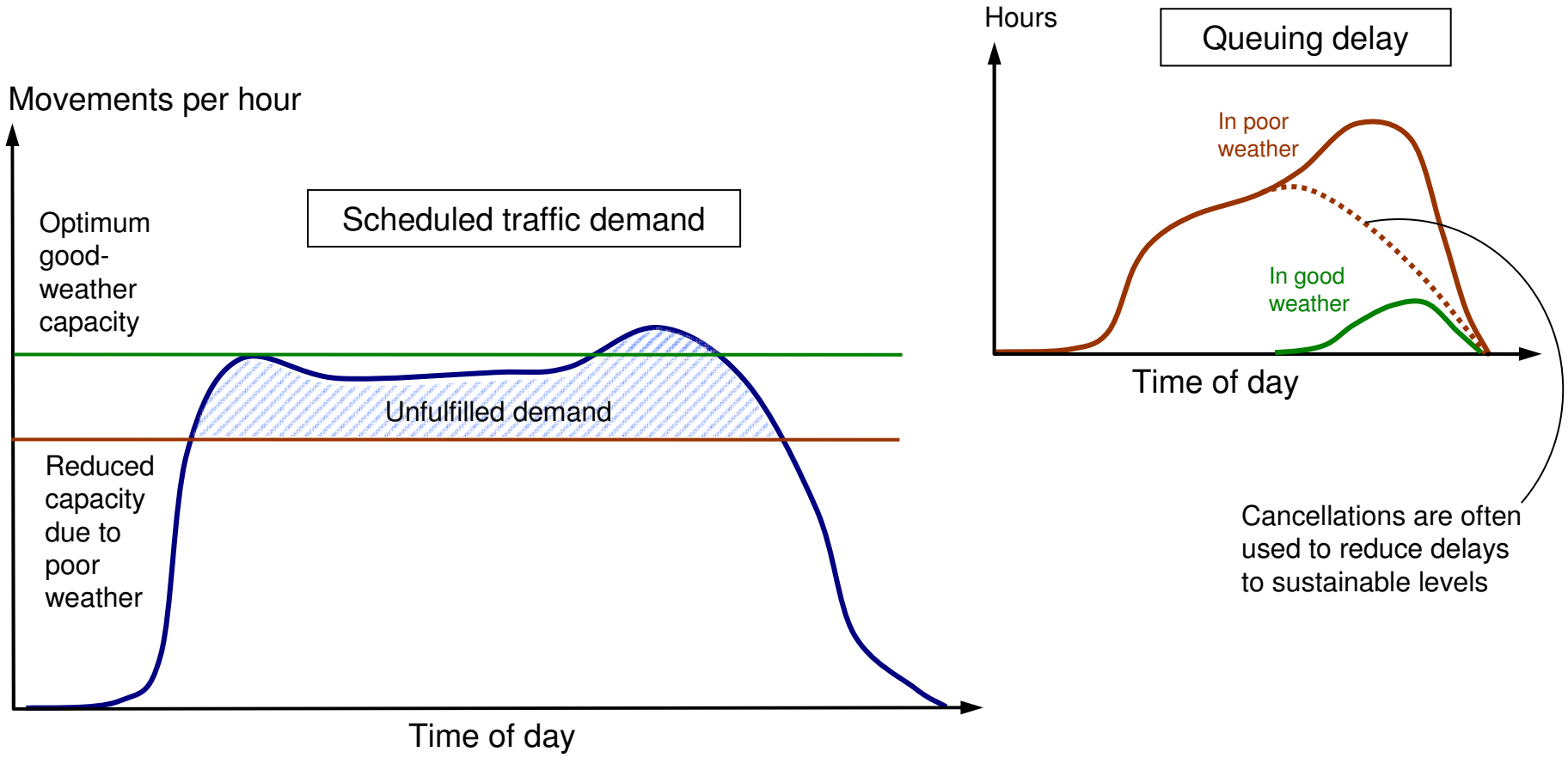


Traffic Component & En-Route Weather

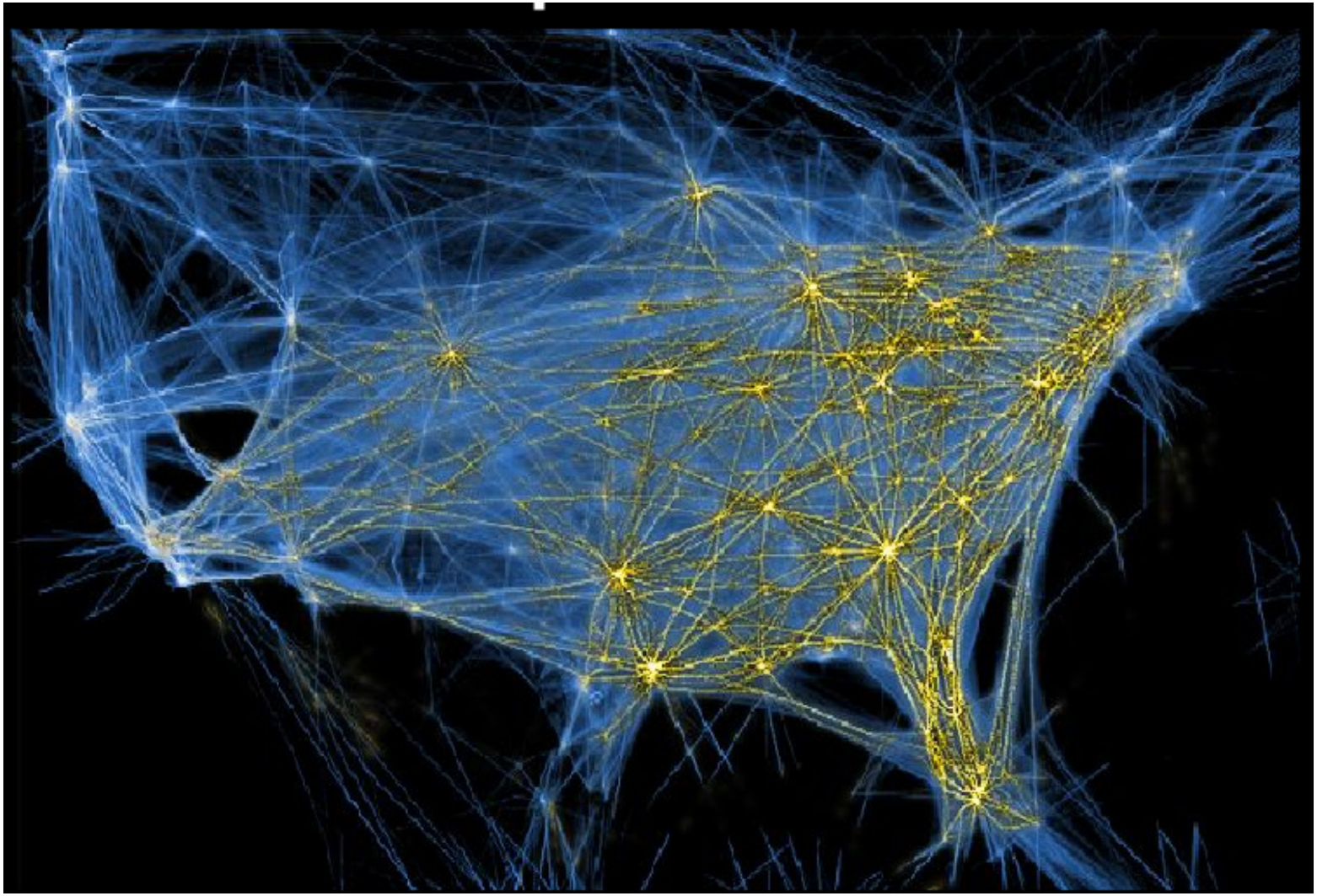
Intended traffic frequency on major routes **x** amount of convective weather



Queuing Delay Buildup Example



Weather Index Concept



Outline

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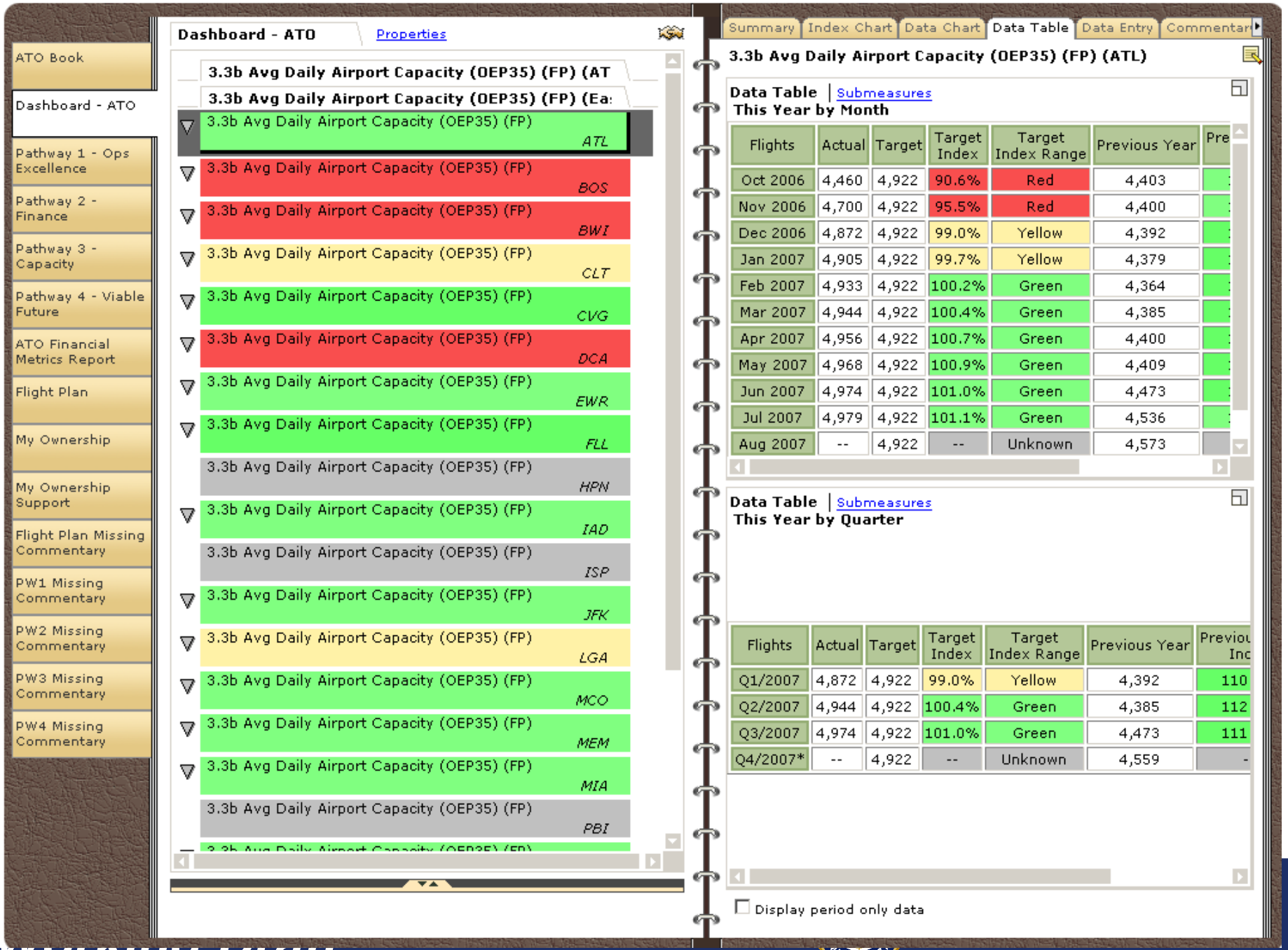
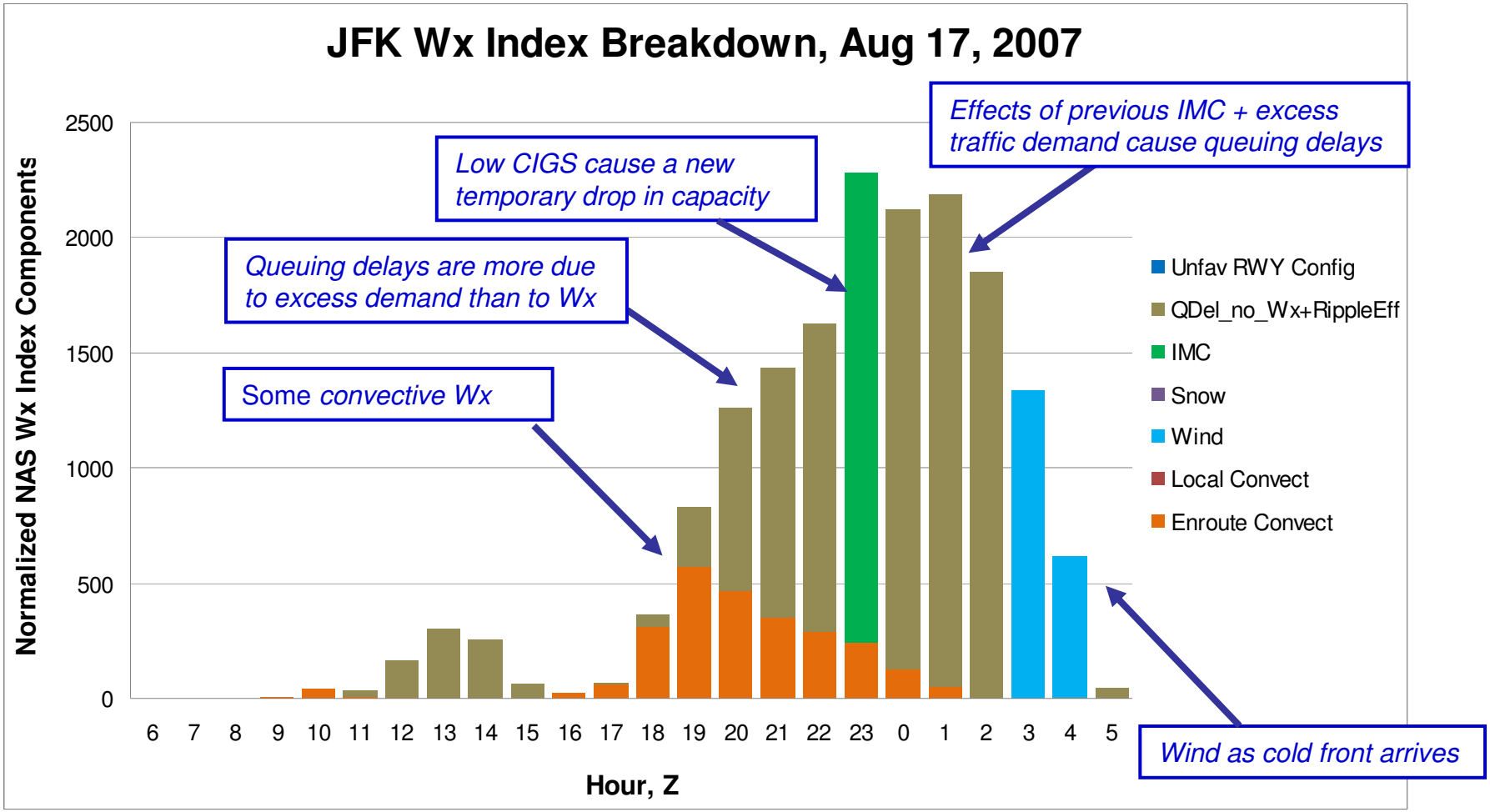
NAS On-time Comparison

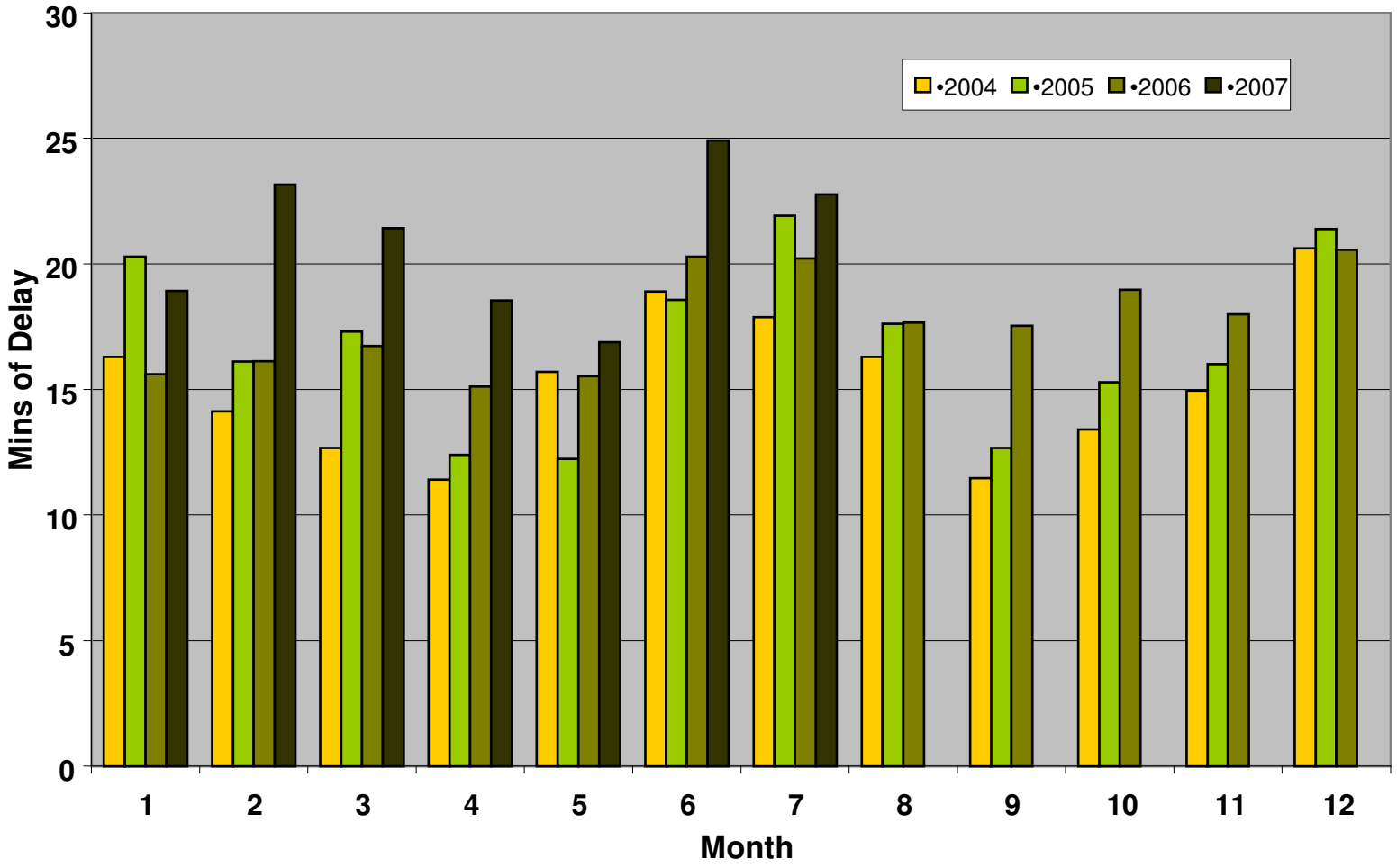
Time Period October-July	FY05	FY06	FY07YTD
With NY Metro Included ALL OEP 35	88.18	88.42	86.29
Without NY Metro (LGA, JFK, EWR)	88.90	89.51	87.68



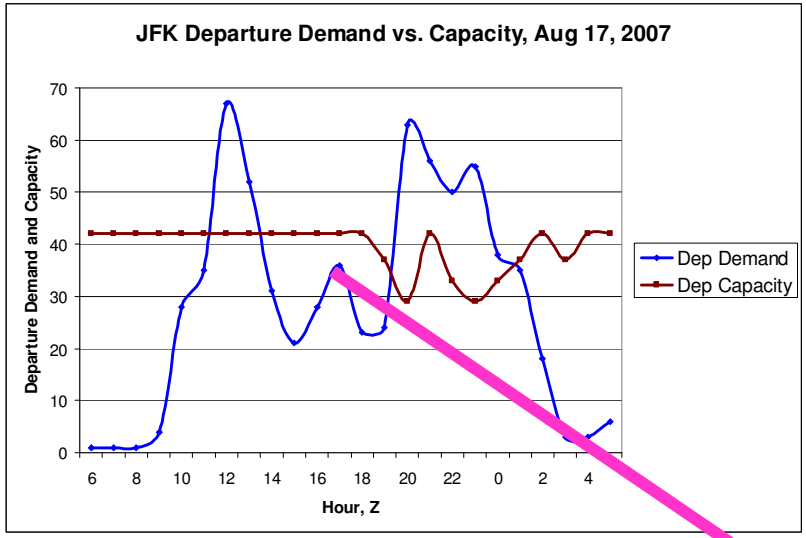
Airport Wx Index Breakdown by Hour and by Component: JFK, Aug 17, 2008

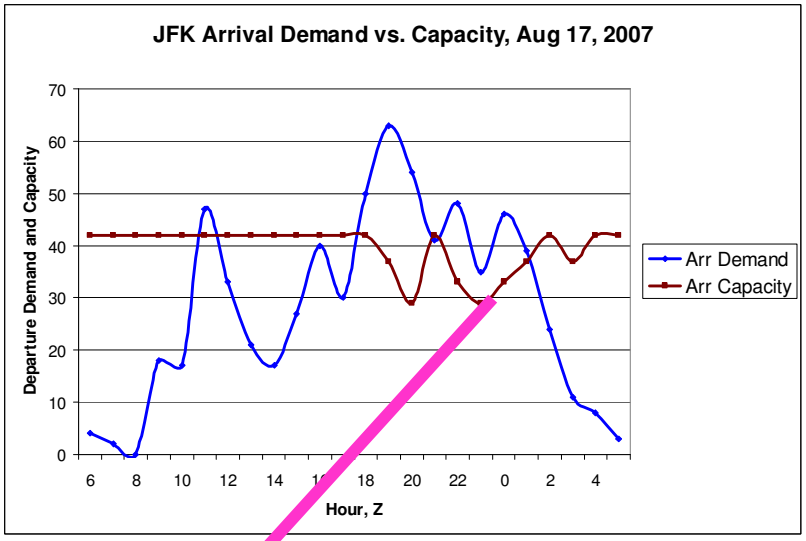


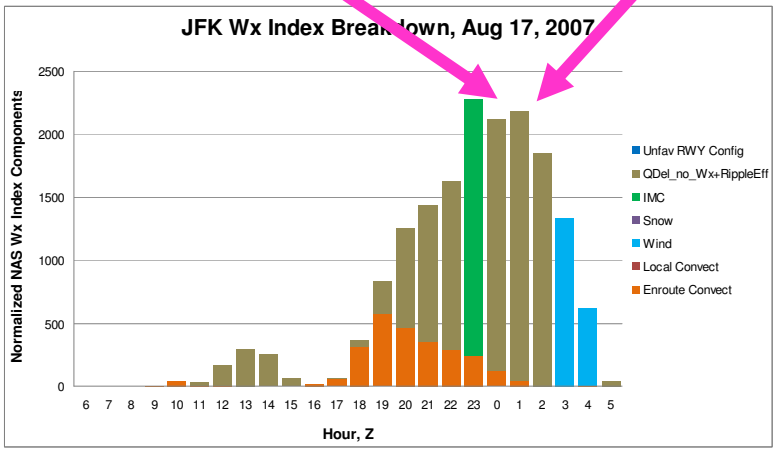
Delay Comparison (2004 thru 2007)



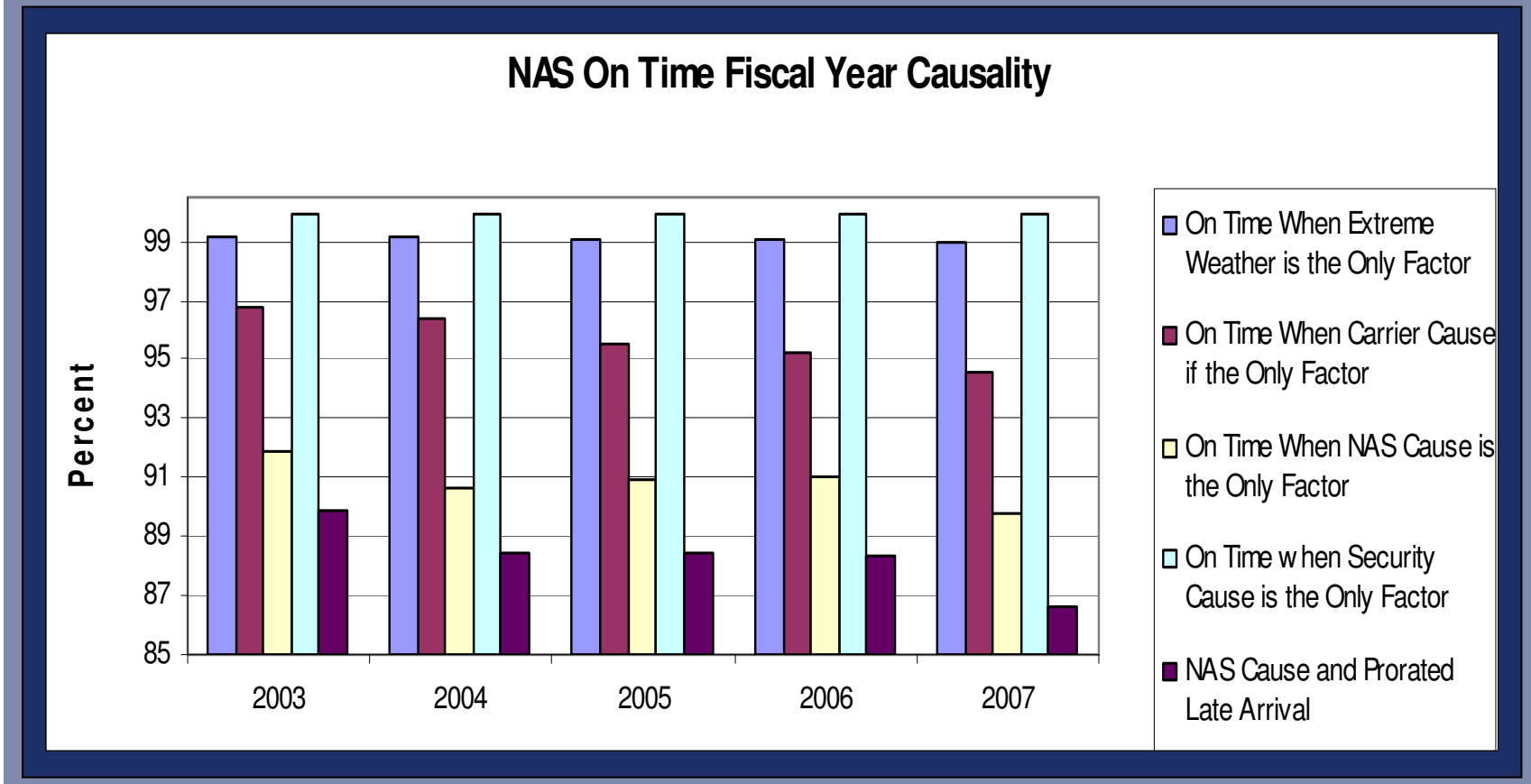
JFK Traffic Demand vs. Capacity



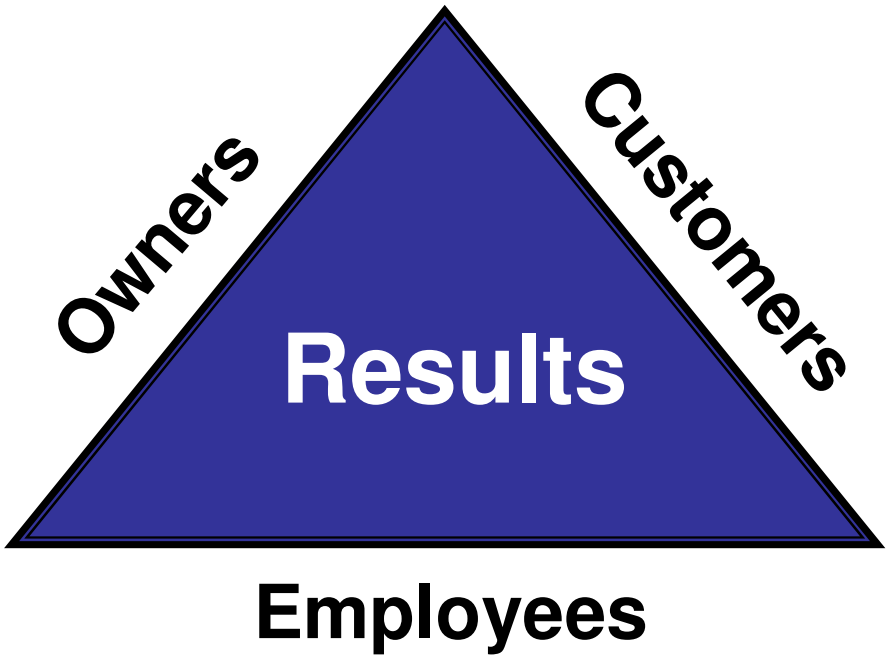




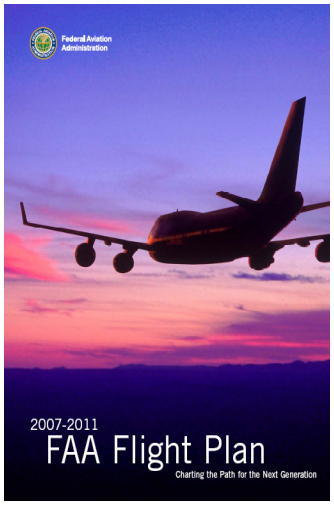
NAS On Time Fiscal Year Causal Analysis



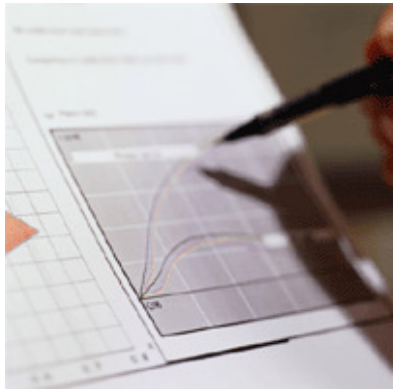
Responsive to Stakeholders



Importance of Measures and Targets



- **SMP sets specific goals that are tied to the strategic aims of the organization mapping into the FAA Flight Plan.**
- **Measures are in place <u>down to the Service Delivery Point (SDP) level</u>.**
- **Teams meet with VP's Monthly to discuss**



You can't improve what you can't measure!