

Air Force Materiel Command



Aircraft Availability-- Does it Matter?

Mr. Roger Moulder
HQ AFMC/A9
14 Jun 2016

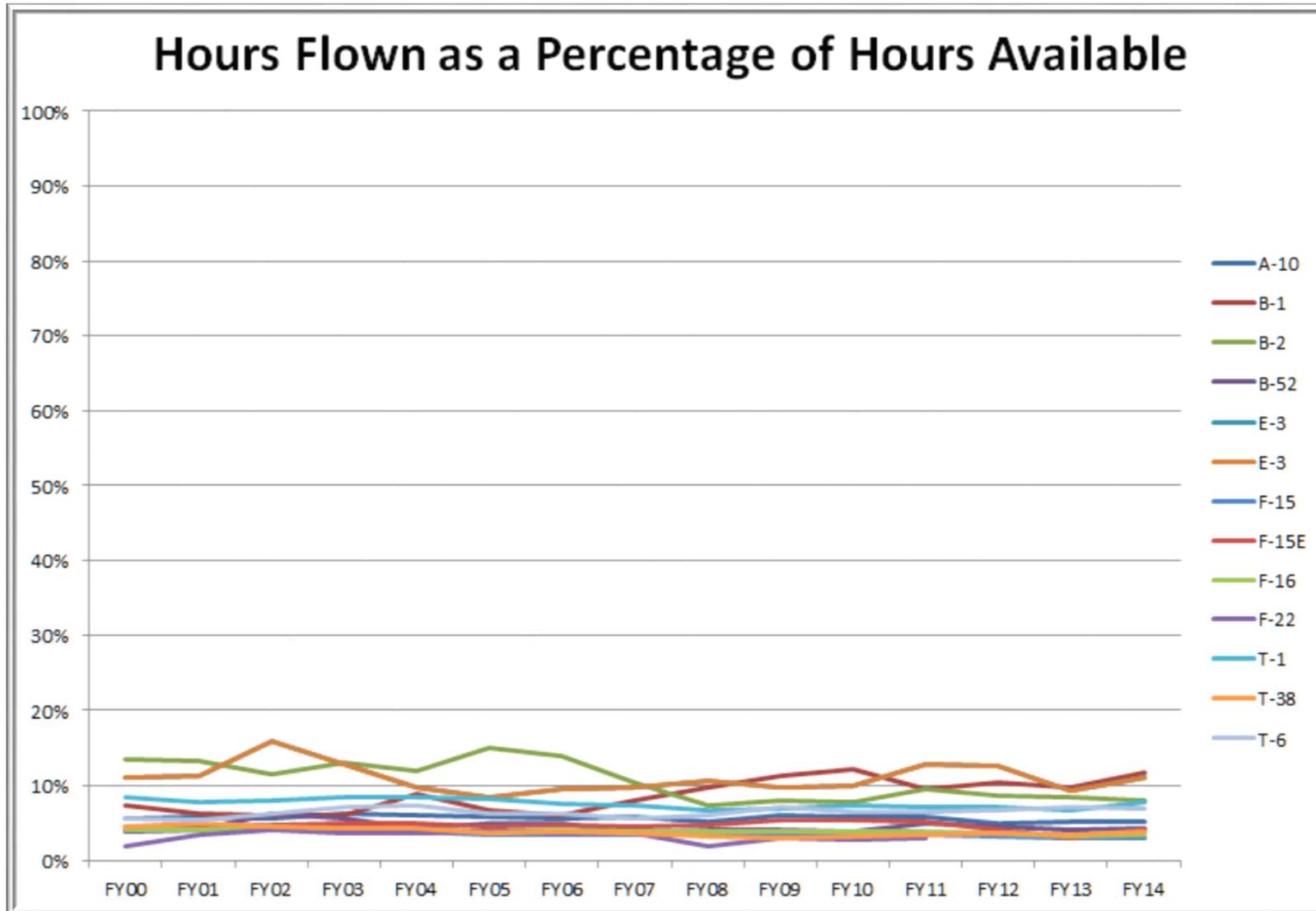


Overview

- **Motivation and Background**
- **Aircraft Utilization**
- **Why Do We Care?**
- **Conclusions/Recommendations**

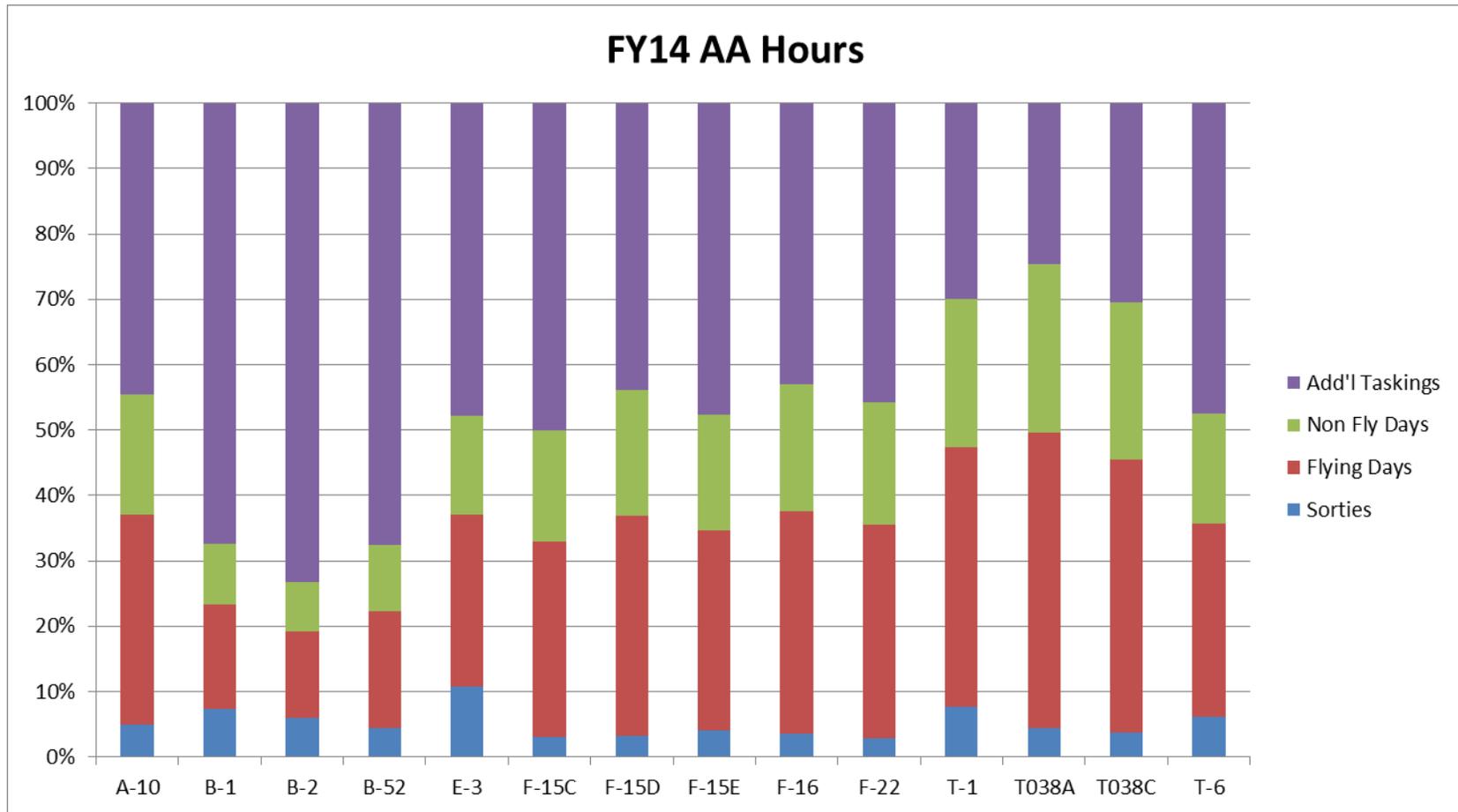


Motivation: Available Hours vs Flying Hours





How are A/C Utilized during AA Hours?



Data source: LIMS-EV

Assumption: AA Hours allocated based on AA Standards formula:

$$\left[\frac{(S_0)}{F_{days}} \right] + \left[\frac{(S_t)}{F_{days} \times T_u \times (1 - \alpha)} \right] + G + S + A + R$$

G – Ground Schedule S – Spare
 A – Alert R – ARC



Definitions

- **Operational Availability (A_o)**
 - # MC Aircraft / Primary Aircraft Inventory (PAI)
 - **Mission Capable (MC) Rate**
 - # MC Aircraft / Primary Aircraft Inventory (PAI)
- Identical
- **Materiel Availability (A_m)**
 - # MC Aircraft / Total Aircraft Inventory (TAI)
 - **Aircraft Availability (AA)**
 - # MC Aircraft* / Total Aircraft Inventory (TAI)
- Identical

* # MC Aircraft required determined by AA Standard Formula (Slide 6)



AA Standard Formula

$$\left[\frac{(S_o)}{F_{\text{days}}} \right] + \left[\frac{(S_t)}{F_{\text{days}} \times T_u \times (1-a)} \right] + G + S + A + R = OR$$

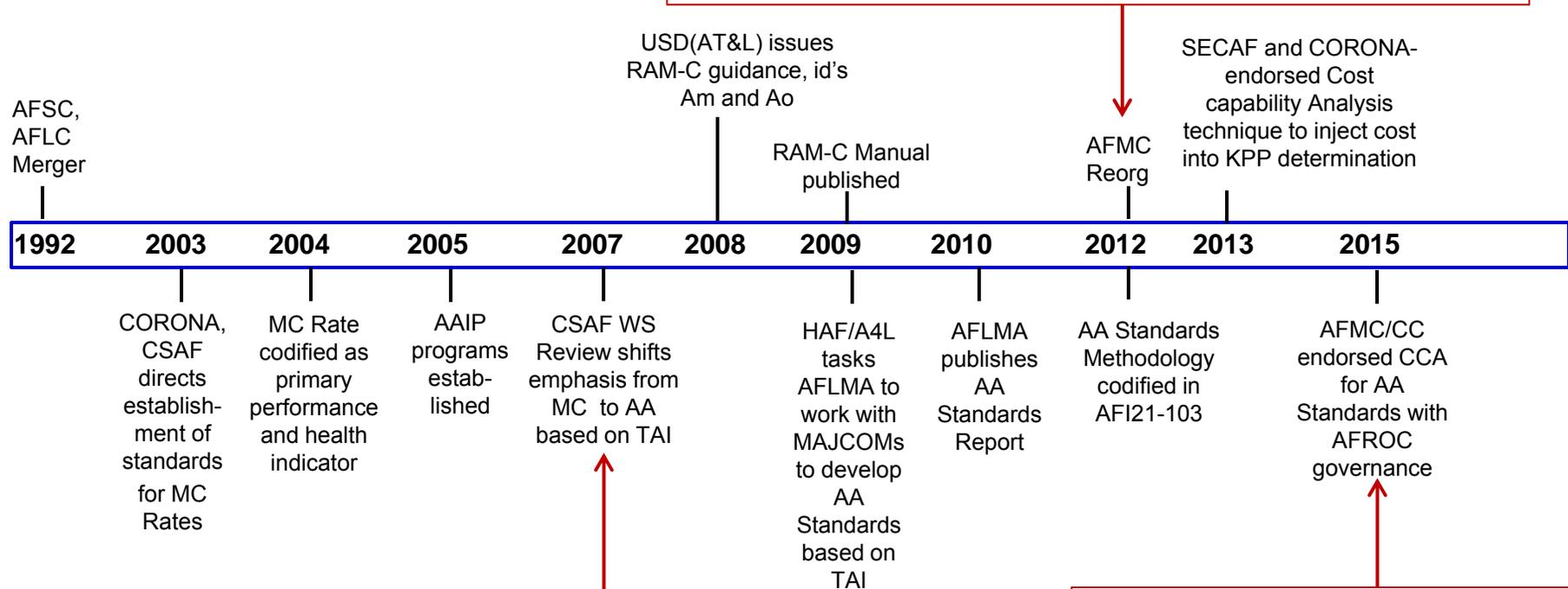
- FH_o, FH_t - Flying Hours (contingency and training)
- S_o, S_t - Sorties/Missions required by Ops (contingency and training)
- F_{days} - Days Available to Fly (operational/contingency and training)
- T_u - Turn rate
- a - Attrition rate
- Ground Schedule requirement – G
- Spare requirement – S
- Alert requirement – A
- ARC requirement – R

$$\rightarrow AA \text{ Standard} = OR / TAI$$



How Did We Get Here?

True Weapon System Life Cycle Management Enabled



Shift from MC to Am

Enables lifecycle focus on Sustainment KPP



Issue

- **AF has disconnected processes for determining and vetting Aircraft Availability requirements across the lifecycle**

	“acquisition”	“sustainment”
Terminology	Materiel Availability	Aircraft Availability
Who computes?	MAJCOM/A5/8	MAJCOM/A4
Who approves?	AFROC	n/a
How computed?	Various methods, analogies, CCA	Standard formula
Is cost a factor?	Yes	No



Why Do We Care? “Cost Conscience”

Annual Costs to Make Aircraft Available for “Additional Taskings”¹

MD	2011	2012	2013	2014
B1	\$171,724,815	\$146,730,152	\$142,691,944	\$146,435,857
B2	\$190,779,245	\$166,149,088	\$156,057,839	\$154,048,777
B52	\$275,798,233	\$276,158,561	\$283,865,903	\$303,214,710
A10	\$265,426,500	\$250,476,795	\$254,611,543	\$231,484,096
F15C	\$240,787,809	\$192,137,334	\$190,973,550	\$192,653,762
F15D	\$30,123,172	\$26,711,099	\$29,670,337	\$34,238,598
F15E	\$246,809,736	\$218,159,158	\$236,566,253	\$212,818,158
F16	\$615,260,835	\$522,355,823	\$549,596,481	\$500,325,991
F22	\$461,743,939	\$268,449,837	\$278,697,969	\$255,612,766
E3	\$161,218,891	\$155,150,165	\$157,523,077	\$153,448,875
T1	\$9,749,087	\$14,934,166	\$23,556,262	\$16,397,131
T38A	\$1,390,590	\$1,602,147	\$5,233,115	\$3,874,100
T38C	\$26,065,479	\$28,200,456	\$24,483,437	\$31,488,765
T6	\$23,057,537	\$27,300,574	\$30,828,100	\$28,422,968
TOTALS	\$2,719,937,879	\$2,294,517,367	\$2,364,357,824	\$2,264,466,570

¹ AFTOC Variable Costs per TAI x AA for Add'l Taskings



Why Do We Care? Is the AA Standard Meaningful?

United States General Accounting Office

GAO Report to the Chairman, Subcommittee on Readiness, Committee on Armed Services, House of Representatives

April 2003

MILITARY READINESS

DOD Needs a Clear and Defined Process for Setting Aircraft Availability Goals in the New Security Environment

 G A O
Accountability * Integrity * Reliability

GAO-03-300

- “... uncertainty and lack of documentation of the basis for the existing goals”
- “Absence of information on the readiness and cost implications”
- “GAO recommends that DOD review the current goals to ensure that they have a valid basis and are appropriate to the new defense strategy, and revise its instructions to ensure that such measures are based on a clearly defined and documented process and objective methodology.”



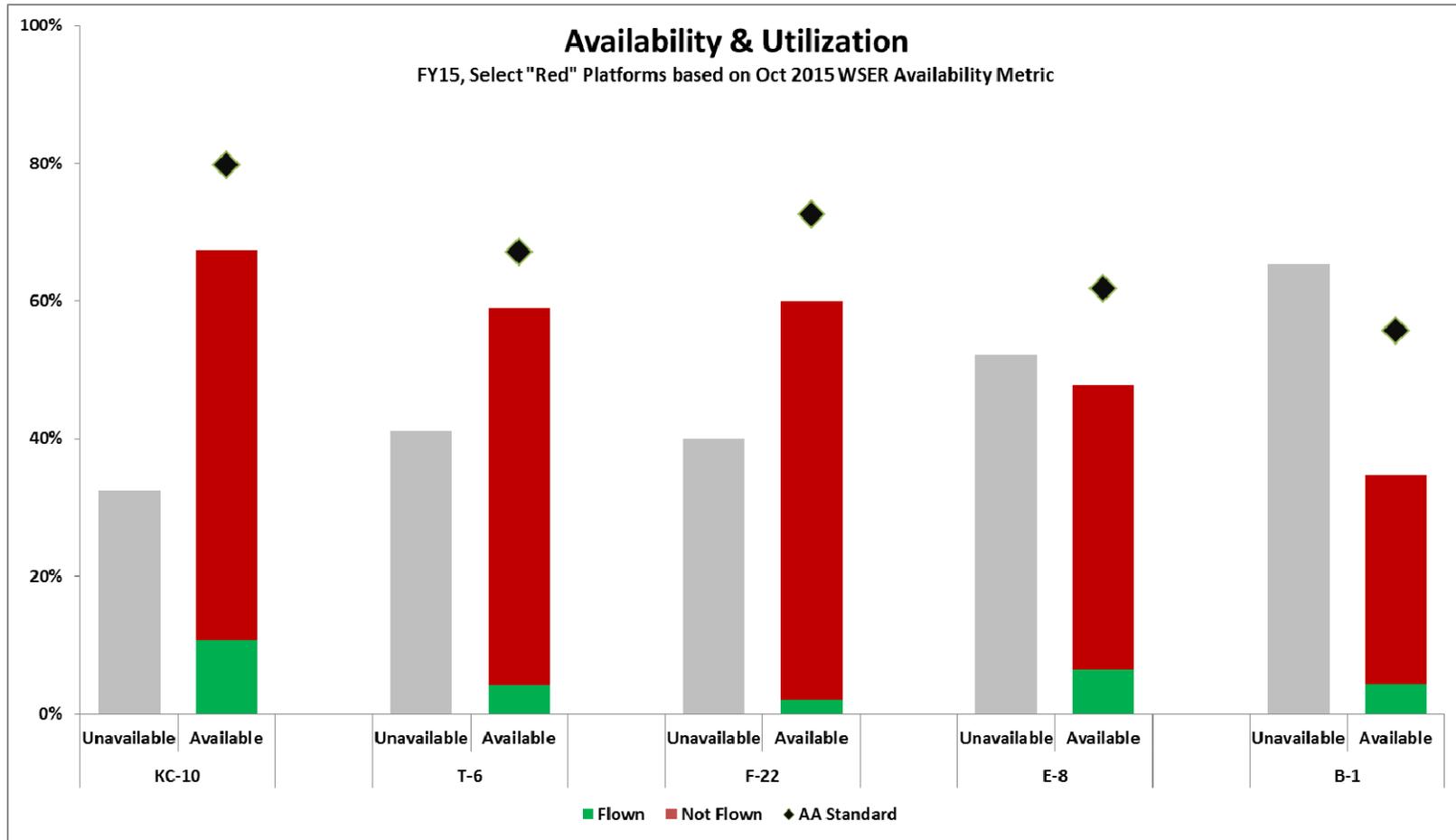
Why Do We Care? Is the AA Standard Meaningful?

- **April 2011 Congressional Budget Office (CBO) study found:**
 - “DoD ... has not been able to clearly identify the relationship between the department’s O&M spending and the readiness of military units”
 - “Nor has the Congressional Budget Office’s (CBO’s) analysis ... yielded a well-defined linkage.”
 - “Those efforts were not fruitful, largely because the information needed to determine that linkage ... is not readily available or may not, in fact, exist.”
 - “The military’s current measures of readiness are not readily applicable to such analyses...”



Why Do We Care?

Why Increase AA for A/C Not at Standard?



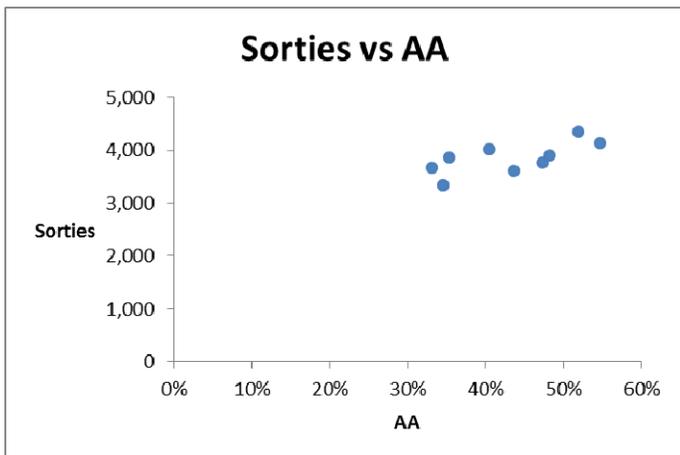
Would Expending Resources to Increase Availability Add to the Red or the Green?



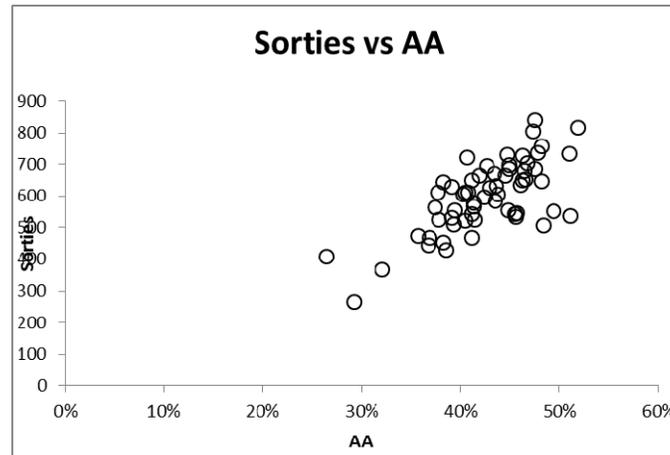
Why Do We Care? Is AA a Meaningful Metric?

B-1

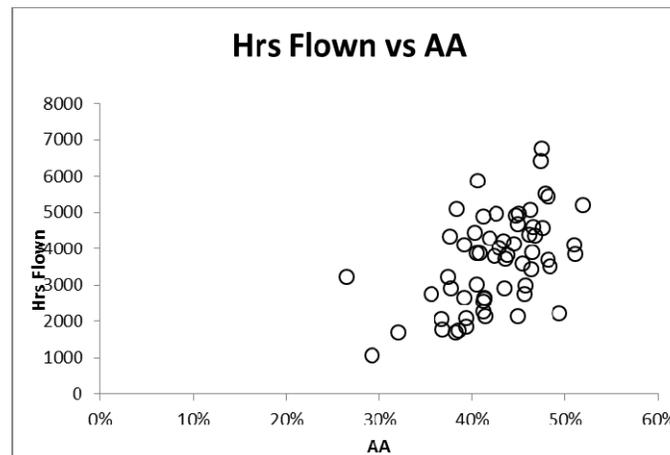
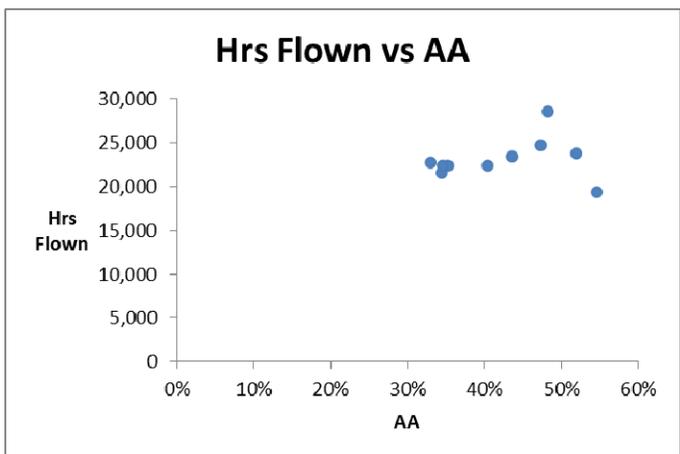
Fleet



Tail



- **Sorties: Some relationship, AA not a strong factor for fleet**
- **Flying Hours: No relationship**



All Tails, Single FY (FY06-15)

Single Tail, All FYs (FY06-15)

(Only tails that were in inventory for the entire period)



Why Do We Care? Is AA a Meaningful Metric?

Summary -- AA Relationship to Sorties and Flying Hours

	KC-10	B-1	E-8	T-6	F-22
Sorties-Fleet	None	Some	None	None	None
Sorties-Tail	None	Strong	Strong	Some	Some
FH-Fleet	None	None	None	None	None
FH-Tail	None	None	Some	Some	Some

Only 2 of 20 Relationships are strong – 12 of 20 Non-existent
--AA Not Related to Fleet Mission Metrics
--AA Only Modestly Related to Tail Mission Metrics



Why Do We Care?

Increased AA Standards Means Increased WSS Requirements and Increased AA Achieved ... or Does it?

FY10-15 Summary for 21 Program Sample

	Trend in Agreement	Trend Unclear	Trend in Disagreement
Increase AA Standard -> Increase AA Achieved	19%	43%	38%
Increase AA Standard -> Increase WSS Rqmt	19%	29%	52%
Increase Wss Funding -> Increase AA Achieved	14%	24%	62%

AA Standards Unrelated to AA Achieved
AA Standards Unrelated to WSS Requirements
WSS Costs Unrelated to AA Achieved



Why Do We Care?

Increased AA Achieved Means Increased WSS Costs ... or Does it?

	No Lag	1 Yr Lag	2 Yr Lag
A-10 Thunderbolt II	0.779	0.037	0.179
B-1 - Lancer	-0.494	0.655	0.883
B-2 - Spirit	0.481	-0.345	-0.224
B-52 - Stratofortress	0.001	-0.505	0.603
C017 GLOBEMASTER III	-0.527	0.806	0.509
C-130 - Hercules	-0.469	0.839	0.387
C-130J - Super Hercules	0.627	-0.022	-0.286
C-5 - Galaxy/Super Galaxy	0.670	0.597	0.824
CV-22 - Osprey	-0.437	0.163	-0.358
E-3 AIRBORNE WARNING & CONTROL SYSTEM	-0.269	0.082	0.974
E-4	-0.365	-0.682	-0.034
E-8 JOINT STARS AIRCRAFT	-0.715	0.246	-0.006
EC-130-H - Compass Call	-0.202	-0.373	0.923
F-15-C/D - Eagle	-0.026	0.563	0.290
F-15-E - Strike Eagle	-0.046	0.266	-0.403
F-16 - Fighting Falcon	0.179	-0.075	-0.717
F-22 - Raptor	0.712	-0.084	-0.527
HC-130 - King	-0.327	-0.820	0.315
HH-60	-0.468	0.772	-0.102
KC-10 - Extender	0.770	0.815	-0.442
KC-135 - Stratotanker	-0.457	0.246	0.659
MC-12	-0.205	-0.461	-0.900
MQ-1 - Predator	-0.126	-0.131	-0.675
MQ-9 - Reaper	0.165	0.204	0.798
RC-135 - Manned Reconnaissance System	-0.668	-0.232	0.794
RQ-4 - Global Hawk	-0.261	-0.578	-0.545
T-1 - Jayhawk	-0.346	-0.083	0.728
T-38 - Talon	-0.914	-0.644	-0.841
T-6 - Texan II	0.341	0.481	0.441
TH-1H	-0.143	0.829	0.541
U2 SYSTEMS	0.007	-0.693	-0.877
UH-1N	-0.303	0.264	0.147
Total	-0.718	-0.328	0.559

- Negative Correlation (<0)
- Weak Positive Correlation (0 to 0.5)
- Medium Positive Correlation (0.5 to 0.8)
- Strong Positive Correlation (>0.8)

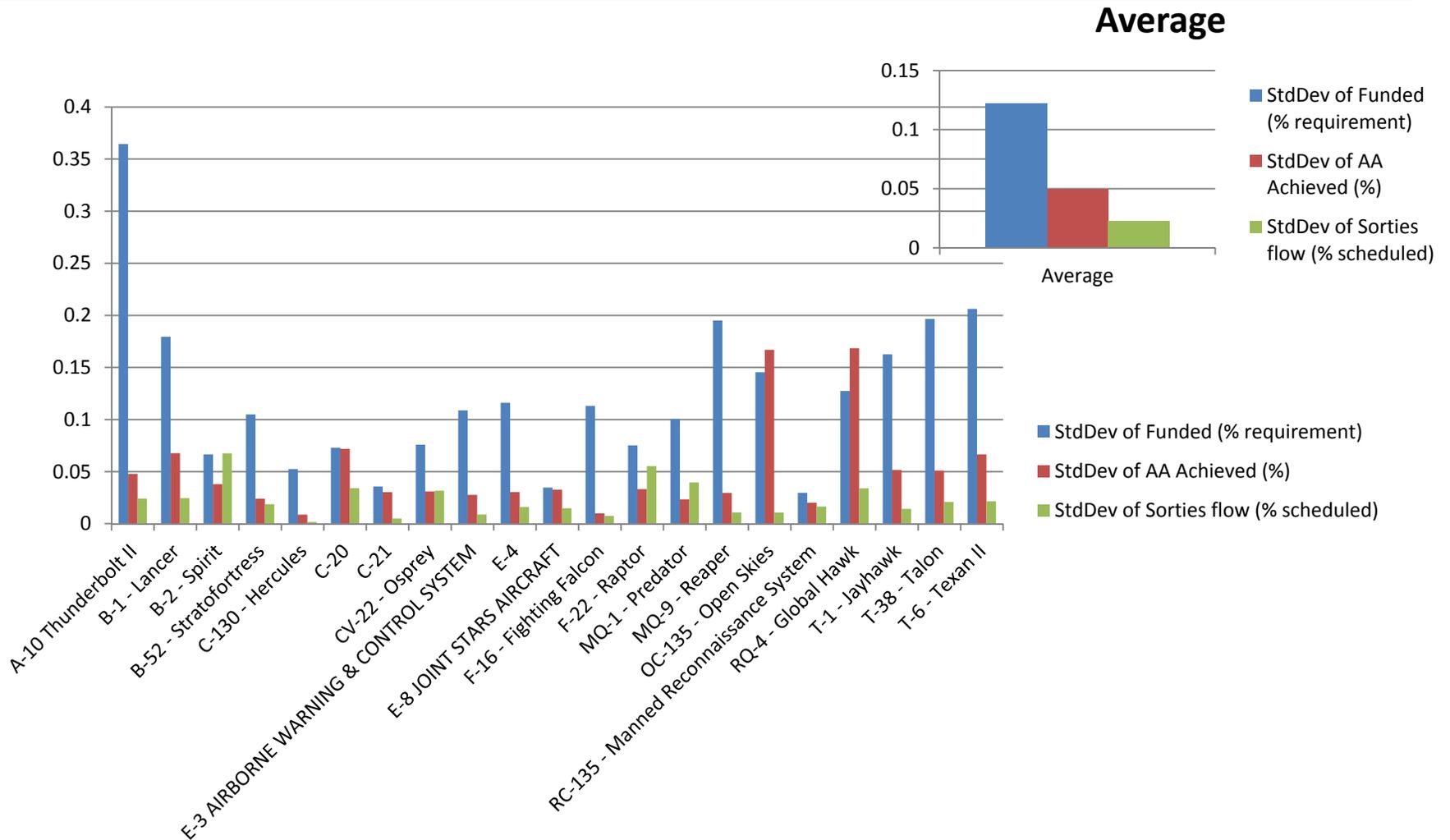
Weapon System Count			
	No Lag	1 Yr Lag	2 Yr Lag
■	21	15	15
■	6	9	6
■	5	4	7
■	0	4	4

**No obvious correlation between WSS Funding and AA Achieved
-- Consistent with Prior A9, AFIT and FVB Findings**



Why Do We Care?

Standard Dev in WSS Funding vs AA Achieved/Sorties Flown



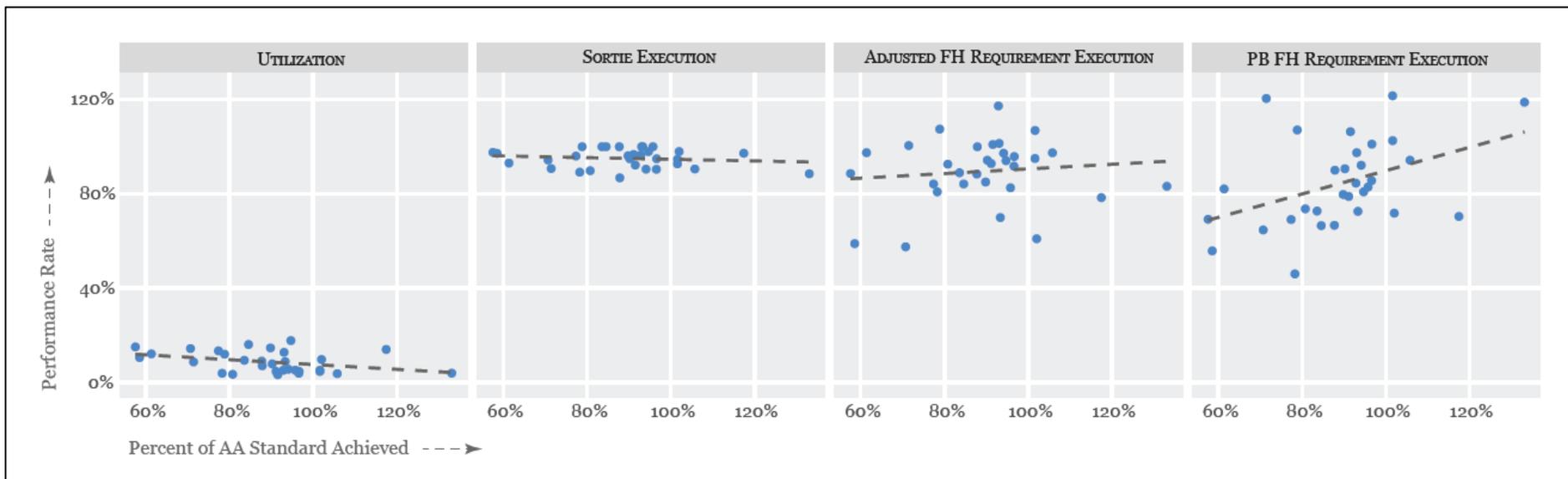
Variations in WSS Funding %'s >> Variations in Performance



Why Do We Care?

Percent of AA Standard Achieved affects Utilization/Sortie Execution/Flying Hour Execution... or Does It?

- Relationships between AA and near-term mission performance attributes are weak
- Utilization, sortie execution, and adjusted flying hour requirement execution rate are not influenced by the weapon system's percent of AA standard achieved
- The only statistically significant relationship observed is the relationship between AA and the President's Budget flying hour requirement execution. This relationship is weak with less than 15% of the variance in executing the PB flying hour requirement explained by a weapon systems ability to achieve it's AA standard





Wartime Requirements

Assuming an 'available' aircraft is a 'ready' aircraft (in other words, when unit readiness is not considered), many MDS AA standards are above what is required for wartime



AA Conclusions

- **AA may NOT be a meaningful mission metric**
 - Just about all AF aircraft have low utilization
 - Low utilization is planned → 50% of AA not intended for sorties & conservative sortie planning factors
 - High variable cost to sustain aircraft (savings?)
 - Do RED WSER A/C need more AA?
 - Not linked very well to sorties or flying hours
- **What is effect of AA Standards?**
 - Do NOT drive increased AA
 - Do NOT increase WSS reqmts
 - Do NOT affect sortie and flying hour execution
- **What is effect of WSS costs?**
 - WSS costs unrelated to AA achieved

How to Rationalize WSS Requirements? ...



Recommendations

- **Develop an approach for considering cost when setting AA standards**
 - Methodology should provide decision makers the cost of reaching AA goals and the risk of not meeting those objectives
- **Institute a governance process for AA standards**
 - Currently exists for acquisition requirements

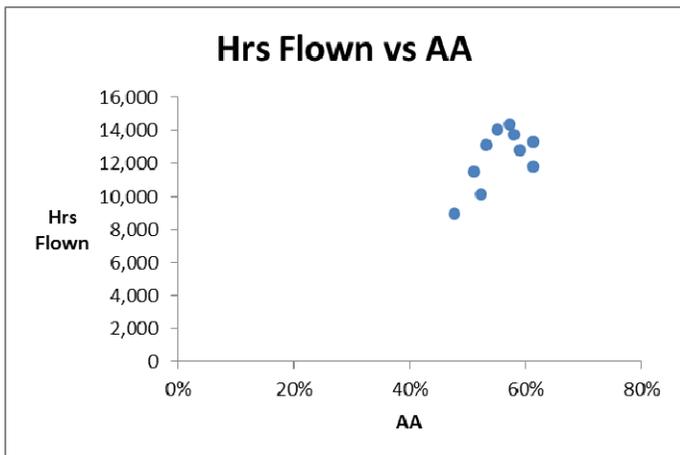
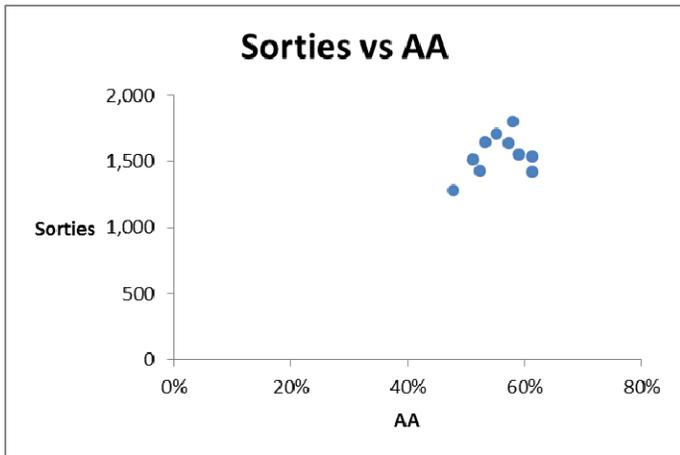




Why Do We Care? Is AA a Meaningful Metric?

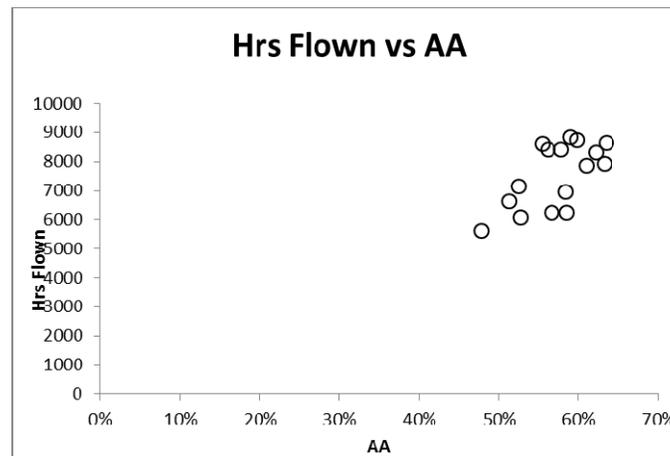
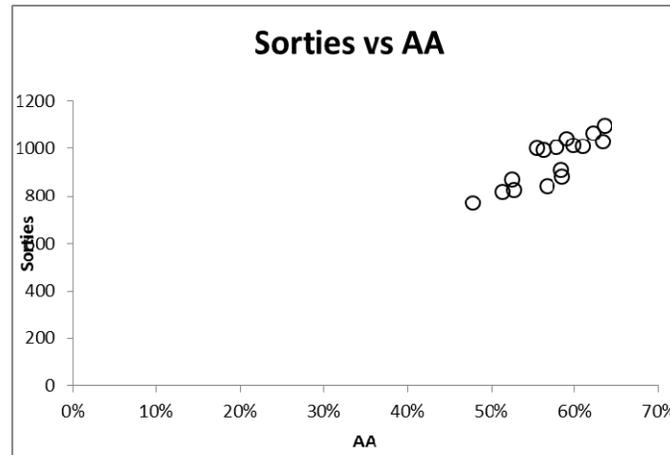
E-8

Fleet



All Tails, Single FY (FY06-15)

Tail



Single Tail, All FYs (FY06-15)

(Only tails that were in inventory for the entire period)

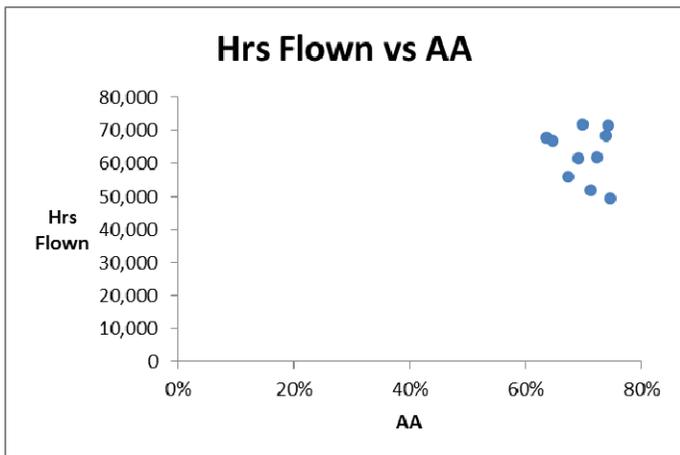
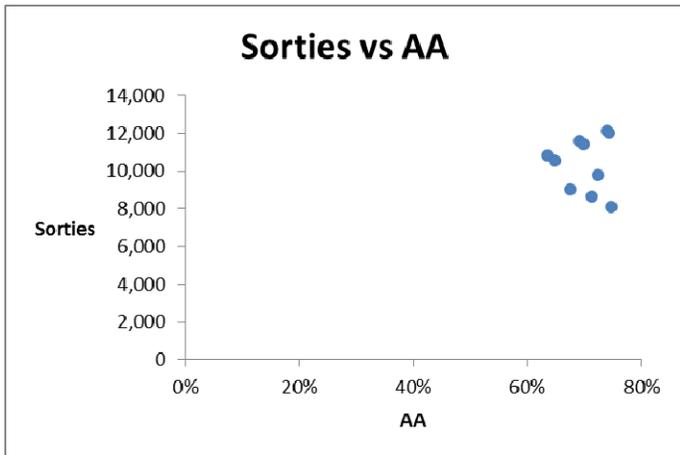
- **Sorties: No fleet relationship, strong tail relationship**
- **Flying Hours: Some fleet or tail relationship, wide variances**
- **LDHD A/C → Less Flex Capacity**



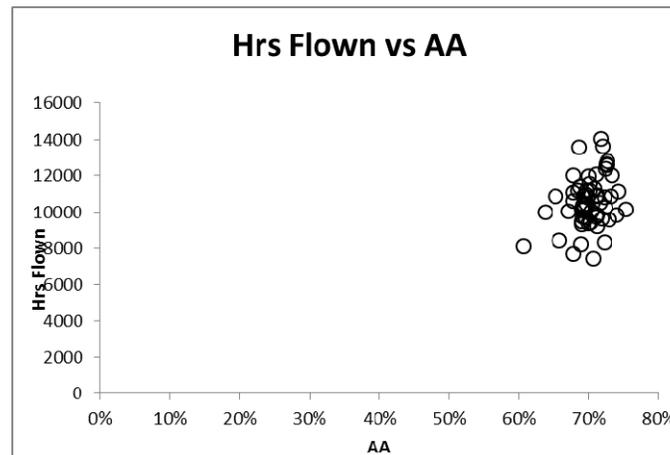
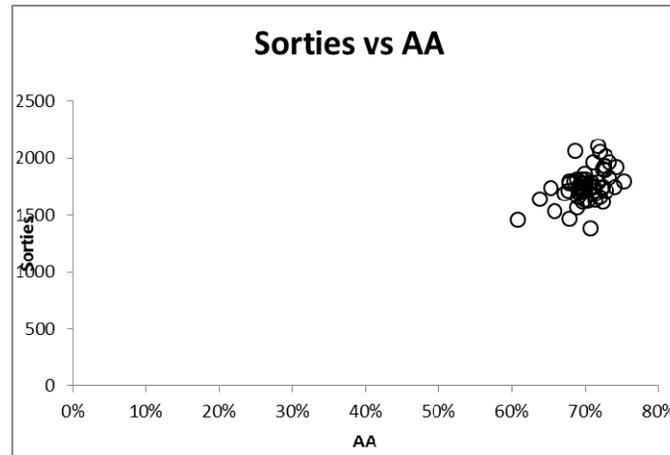
Why Do We Care? Is AA a Meaningful Metric?

KC-10

Fleet



Tail



- **Sorties: No fleet or tail relationship**
- **Flying Hours: No fleet or tail relationship**

● All Tails, Single FY (FY06-15)

○ Single Tail, All FYs (FY06-15)

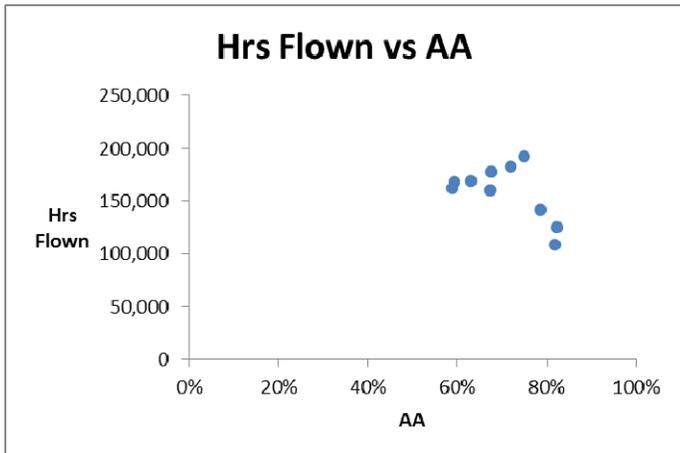
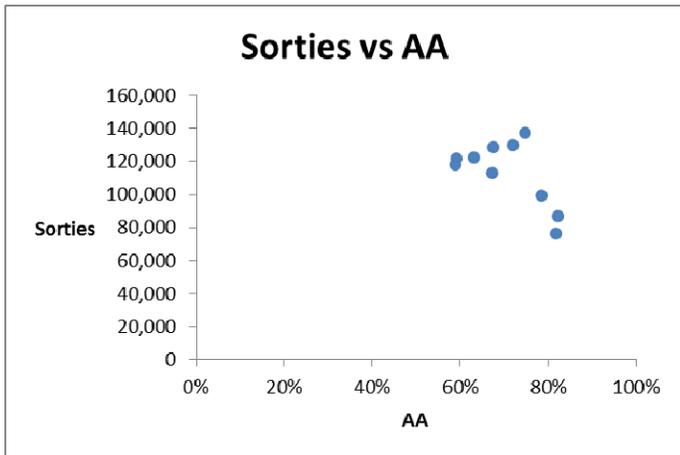
(Only tails that were in inventory for the entire period)



Why Do We Care? Is AA a Meaningful Metric?

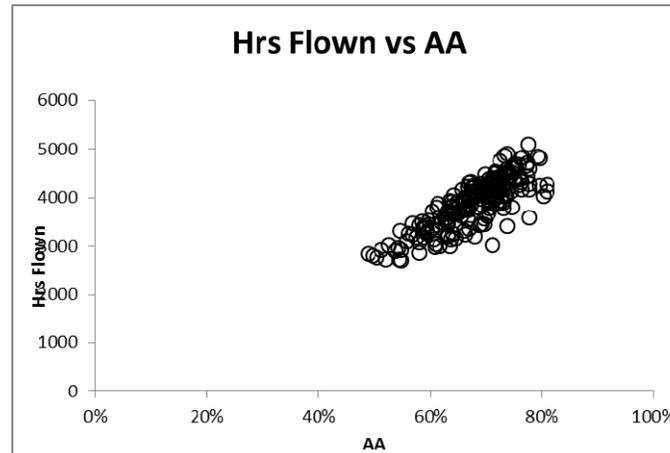
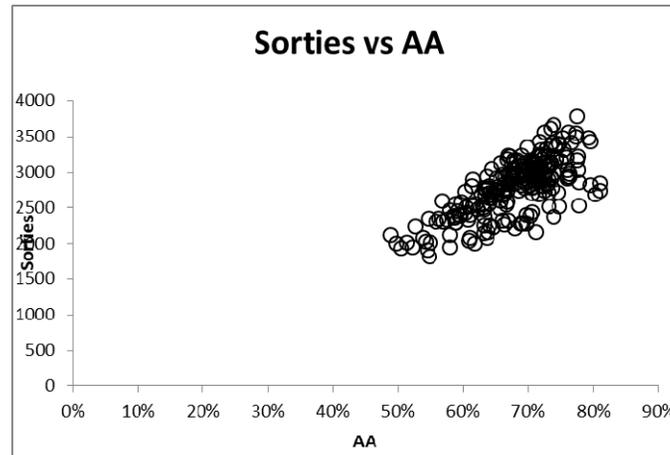
T-6

Fleet



All Tails, Single FY (FY06-15)

Tail



Single Tail, All FYs (FY06-15)

(Only tails that were in inventory for the entire period)

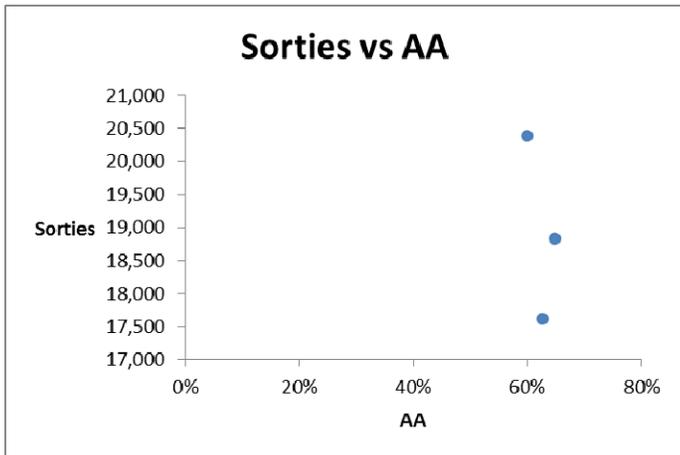
- **Sorties: No fleet relationship, some tail relationship but wide variances**
- **Flying Hours: No fleet relationship, some tail relationship but wide variances**



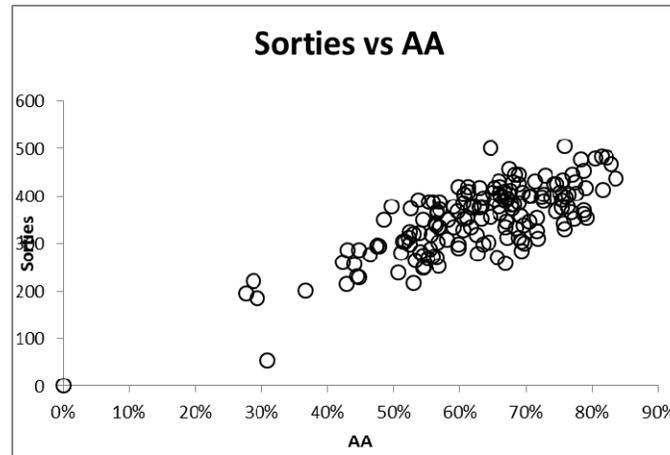
Why Do We Care? Is AA a Meaningful Metric?

F-22

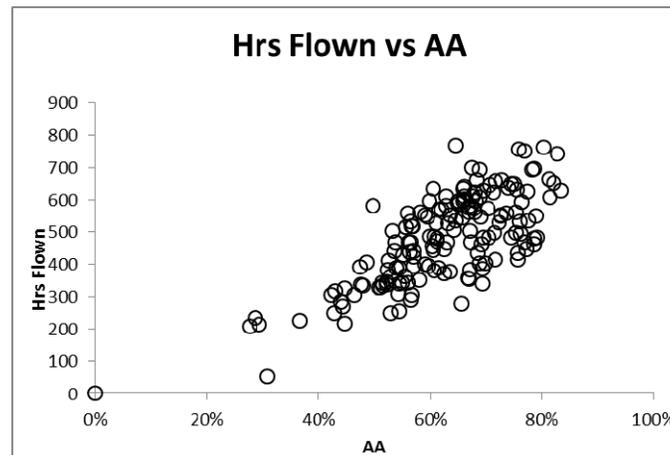
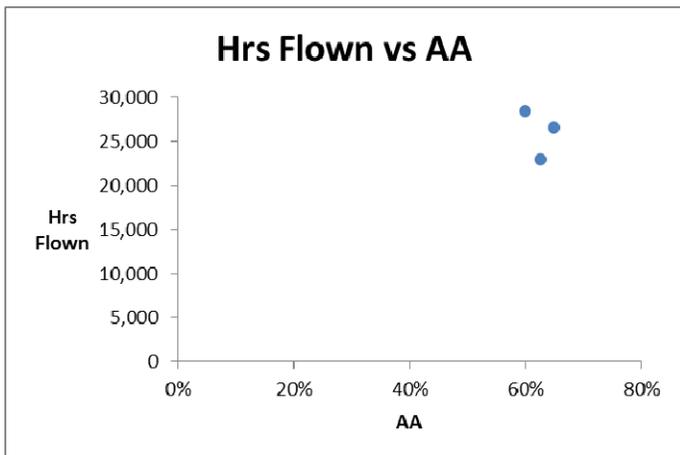
Fleet



Tail



• Only three years of data



All Tails, Single FY (FY06-15)

Single Tail, All FYs (FY06-15)

(Only tails that were in inventory for the entire period)