INTEGRATION OF COST ESTIMATING IN PROGRAM MANAGEMENT AT NAVAIR

PRESENTATION TO

NAVY-MARINE CORPS COST ANALYSIS SYMPOSIUM

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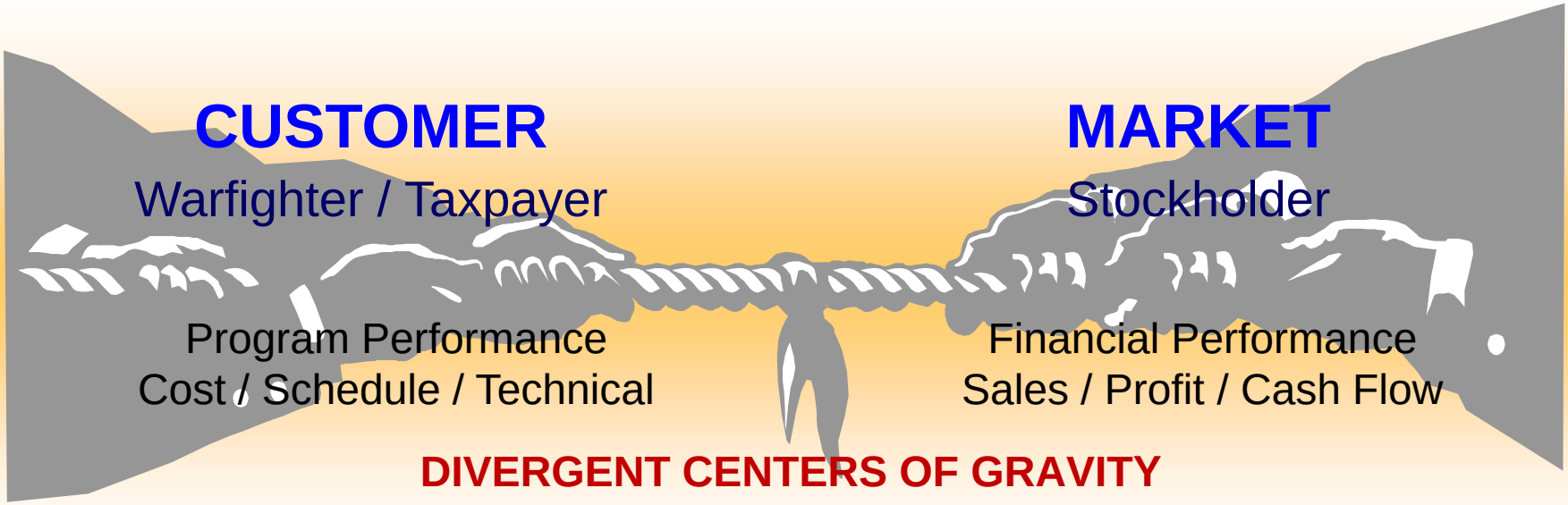
WEAPONS SYSTEMS ACQUISITION IS A COMPLEX BUSINESS

TECHNICAL COMPLEXITY



CUSTOMER

Warfighter / Taxpayer

Program Performance
Cost / Schedule / Technical

MARKET

Stockholder

Financial Performance
Sales / Profit / Cash Flow

DIVERGENT CENTERS OF GRAVITY

LACK OF COMPETITIVE PRESSURES

MUST PRO-ACTIVELY MANAGE PROGRAMS

HOW PROGRAMS GET STARTED
"THE MISSIONARY MOVEMENT"

BIASED TECHNICAL & PROGRAMMATIC BASELINE INPUTS LEAD TO HIGH RISK APPROACHES AND UNREALISTIC COST ESTIMATES

PILLARS OF A GOOD PROGRAM

A well understood requirement with flow down to performance spec and temp

A genuine integrated schedule with associated Earned Value Management

An independent cost estimate (one that isn't a part of the missionary movement where folks are trying to sell a program and to force fit it within available funds)

Full and stable funding

A culture of drawing in outside competency (from the contractor, from the syscom, from academia…)

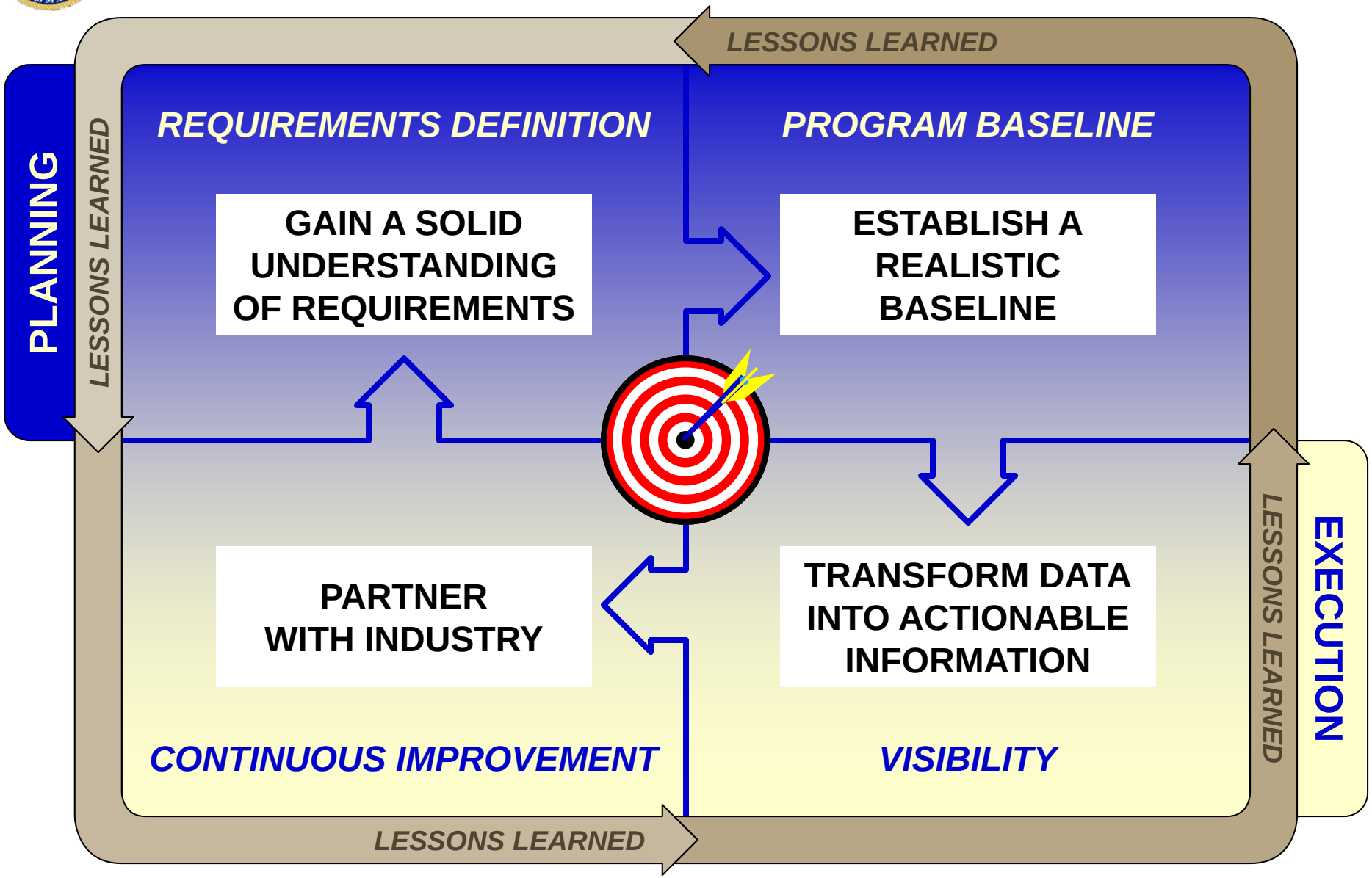
A willingness to ask the hard questions, and the courage and energy to not quit until you gain understanding

A recognition that it takes requirements, resources, and acquisition, all working together, to get the dog to hunt

"Program success is made difficult by missing any one of these, missing two does not lead to a good place…"

Vice Admiral (Ret.) Dyer, September 29, 2002

IMPROVING PROGRAM PERFORMANCE

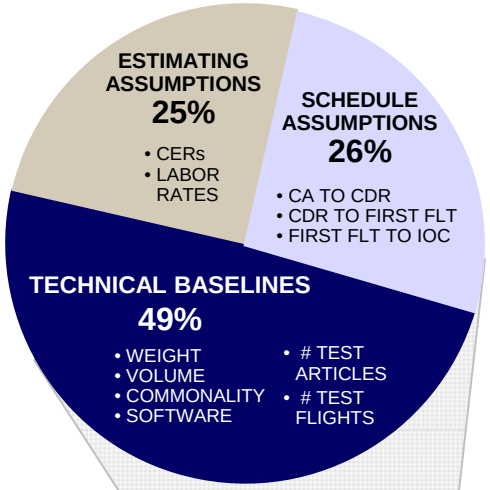


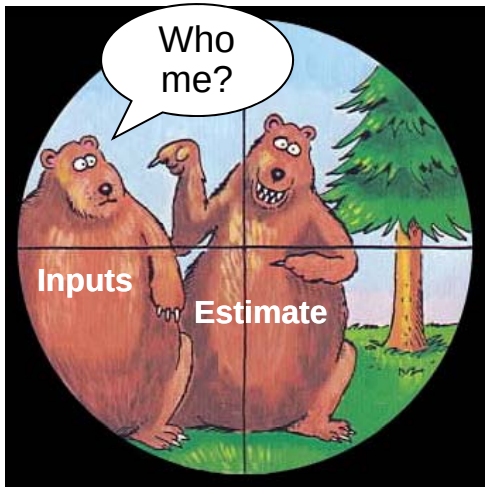
UNCERTAINTY OVER TIME

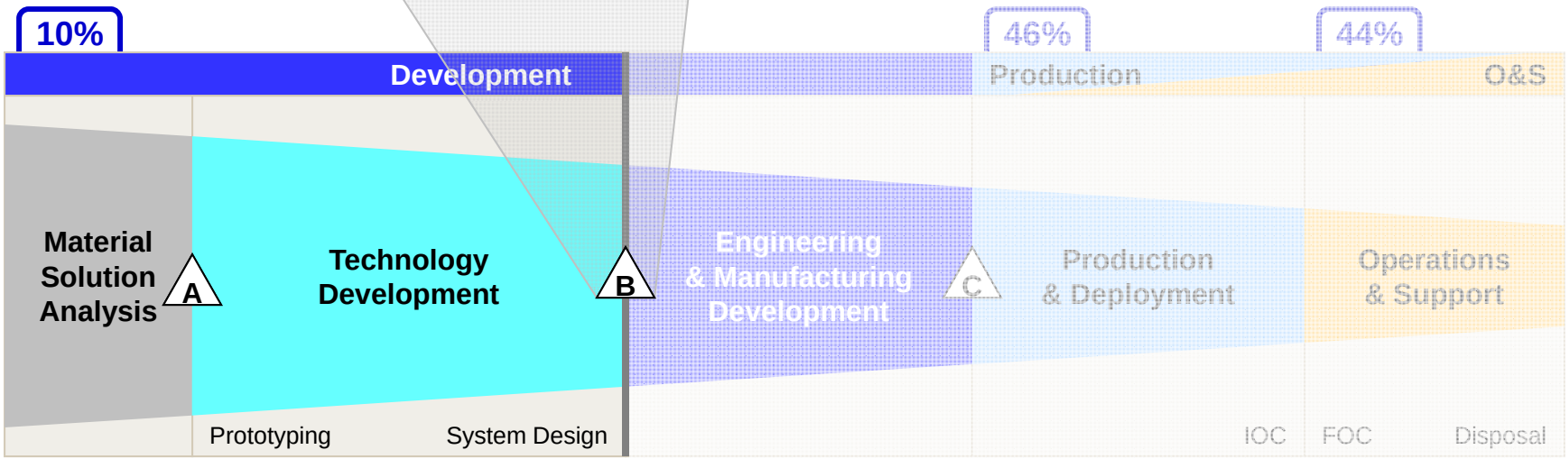
AVG RDT&E COST GROWTH FROM APB*
(ACROSS ALL PROGRAMS)

44%

* MEASURED FROM INITIAL SAR SUBMISSION~MS-B

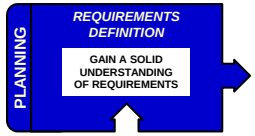


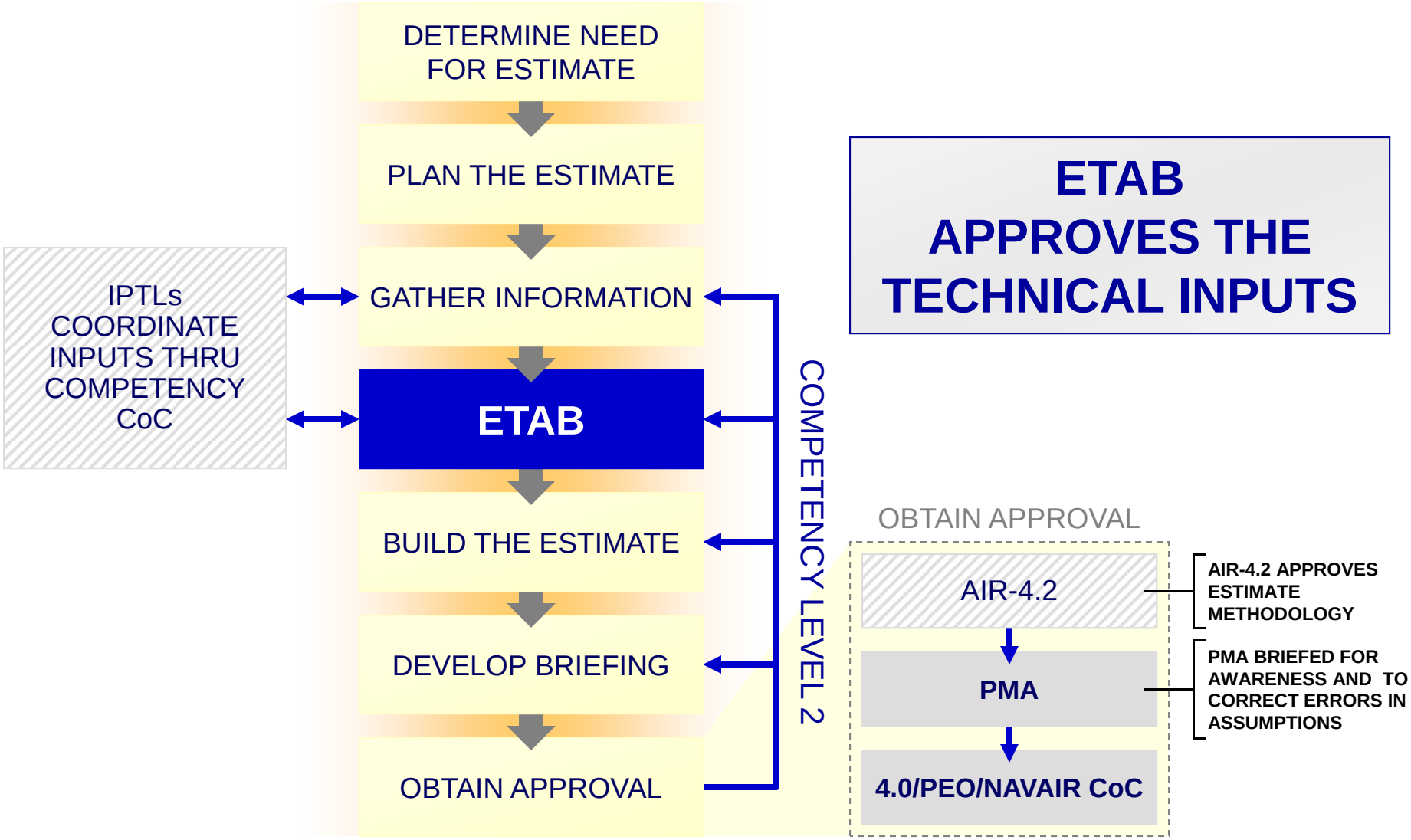




UNDERSTAND THE TECHNICAL REQUIREMENTS

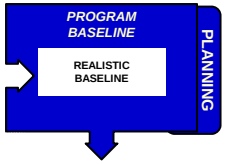
ESTIMATING TECHNICAL ASSURANCE BOARD (ETAB) PROCESS

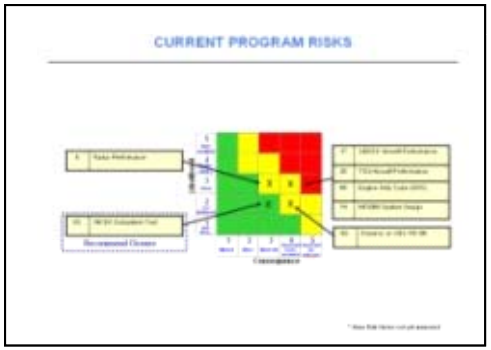


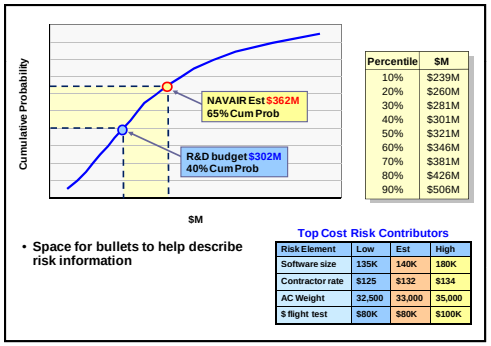


ASSURE QUALITY INPUTS

ASSESSING RISK

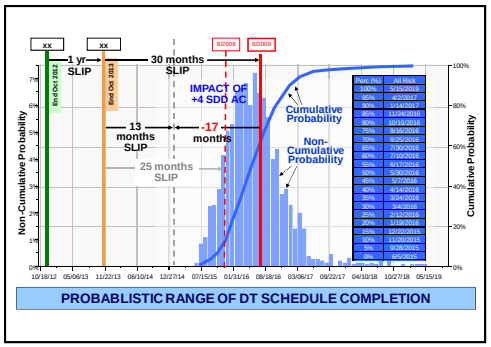






Percentile	$M
10%	$239M
20%	$260M
30%	$281M
40%	$301M
50%	$321M
60%	$346M
70%	$381M
80%	$426M
90%	$506M

Risk Element	Low	Est	High
Software size	135K	140K	180K
Contractor rate	$125	$132	$134
AC Weight	32,500	33,000	35,000
$ flight test	$80K	$80K	$100K



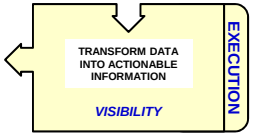
TECHNICAL

COST

SCHEDULE

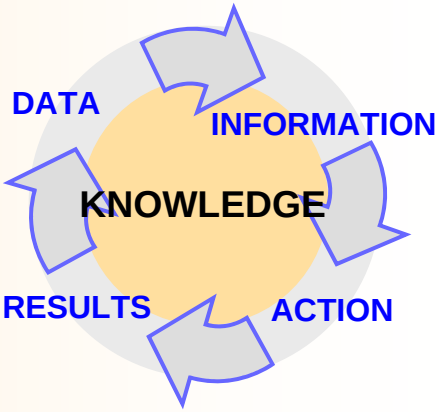
ESTABLISH A REALISTIC BASELINE

FUNDAMENTALS TO RADICALLY IMPROVE PROGRAM PERFORMANCE



- **TRANSFORM DATA** INTO
- **ACTIONABLE INFORMATION** CREATING
- **PROFOUND KNOWLEDGE** WITH WHICH MANAGERS
- **PRIORITIZE** ISSUES/**ACTIONS**, FOLLOW THROUGH
- **TAKE ACTION**, ACHIEVING
- **RESULTS**, RADICALLY IMPROVED PROGRAM PERFORMANCE

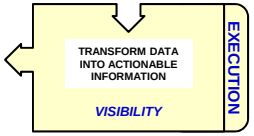
"NOTIONAL MODEL"



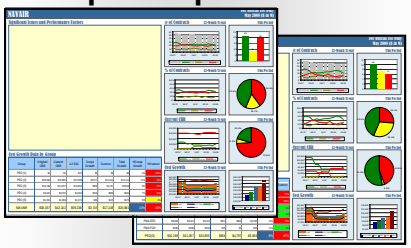
- **INNOVATION – LOOK OUTSIDE THE COMFORT ZONE**
- ***RAPID* INSIGHT – PM PROBLEM SOLVERS/ AVOIDERS**
- **LIFE CYCLE COST OVERSIGHT – TOC VISIBILITY**

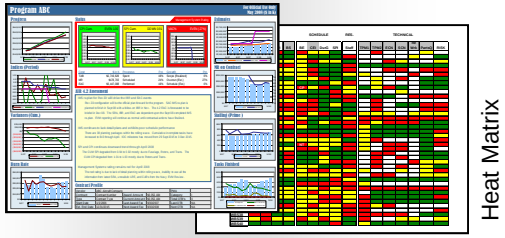
DEMANDS DATA TRANSPARENCY & INTEGRATION

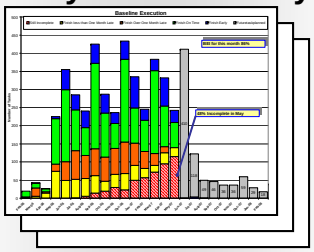
TRANSFORM DATA INTO ACTIONABLE INFORMATION



PRODUCT	"DATA TRANSPARENCY" AT ALL LEVELS		CONSUMER & ACTIONS
Group Cockpit Chart (NAVAIR Trends, PEO Trends)	STRATEGIC PORTFOLIO VIEW	AIR-00 & PEOs	*Oversight* *Milestone Decision* *Authorization to Proceed*
Project Cockpit Chart (Project Trends, Heat Matrix)	OPERATIONAL CONTRACT VIEW	PEOs & PMAs	*Eliminate "Red' Rating* *Assess Progress* *Milestone Decisions* *Cost Reduction Initiatives* *Program Restructure*
Monthly Detailed Analysis (Project Details)	TACTICAL DETAIL VIEW	PMAs & IPTs	*Identify Risks* *Initiate Risk Mitigation* *Cost Reduction Actions* *Tradeoff Analysis*

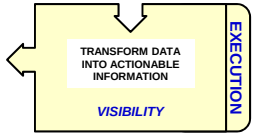


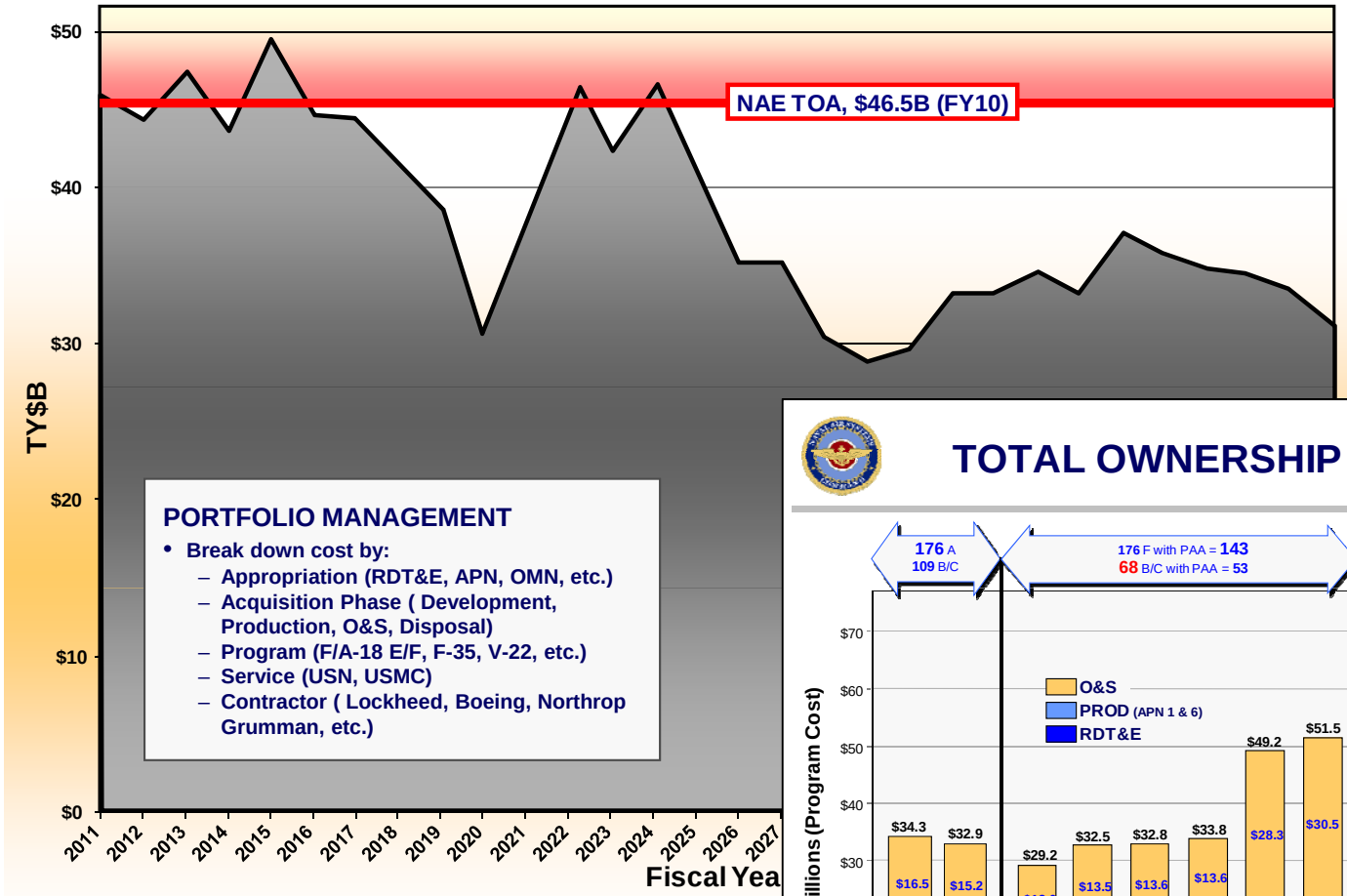




PROVIDE VISIBILITY

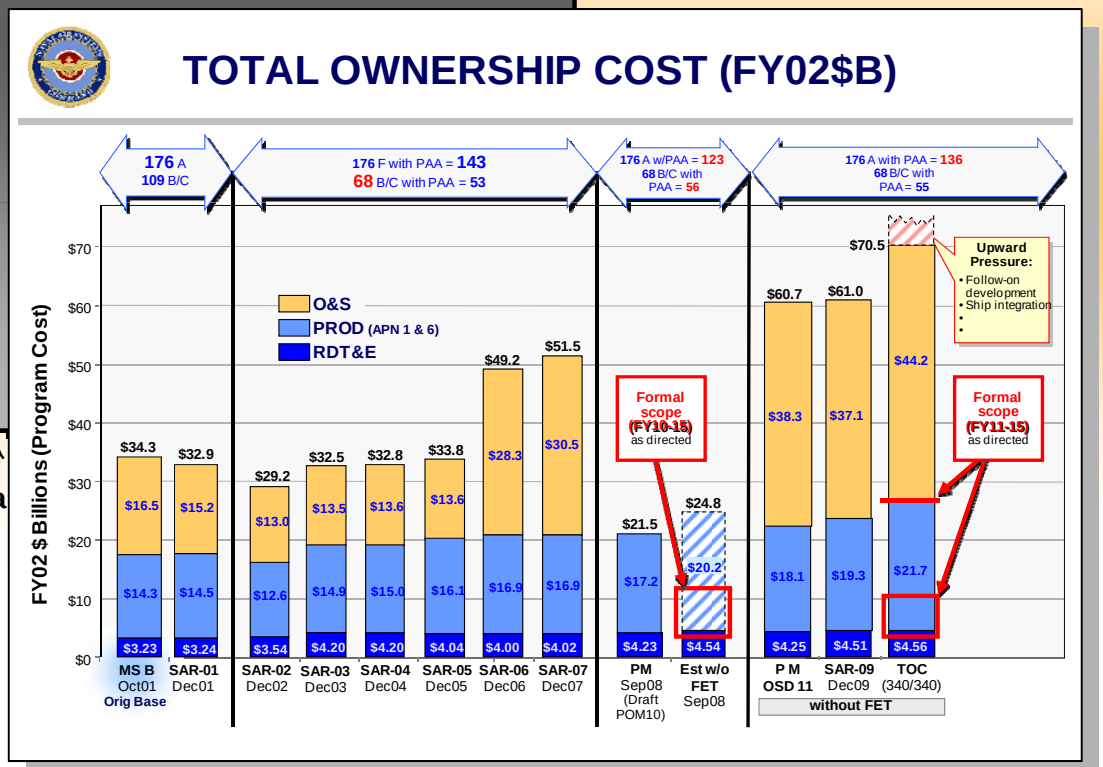
PORTFOLIO MANAGEMENT
VISIBILITY



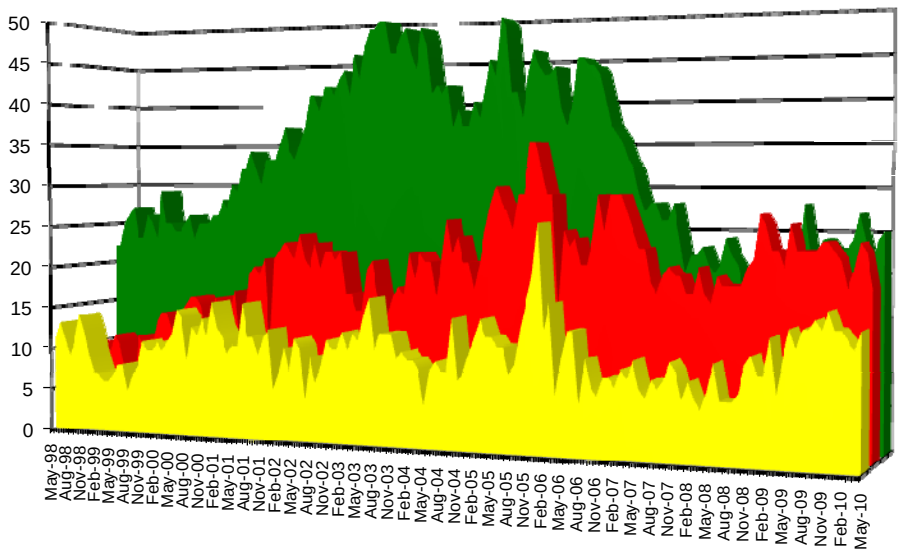


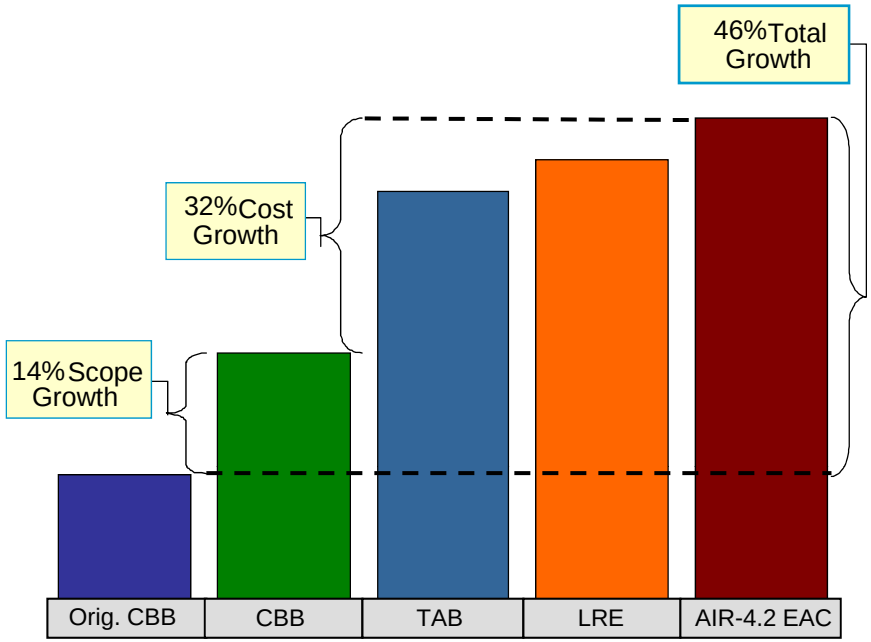
PORTFOLIO MANAGEMENT

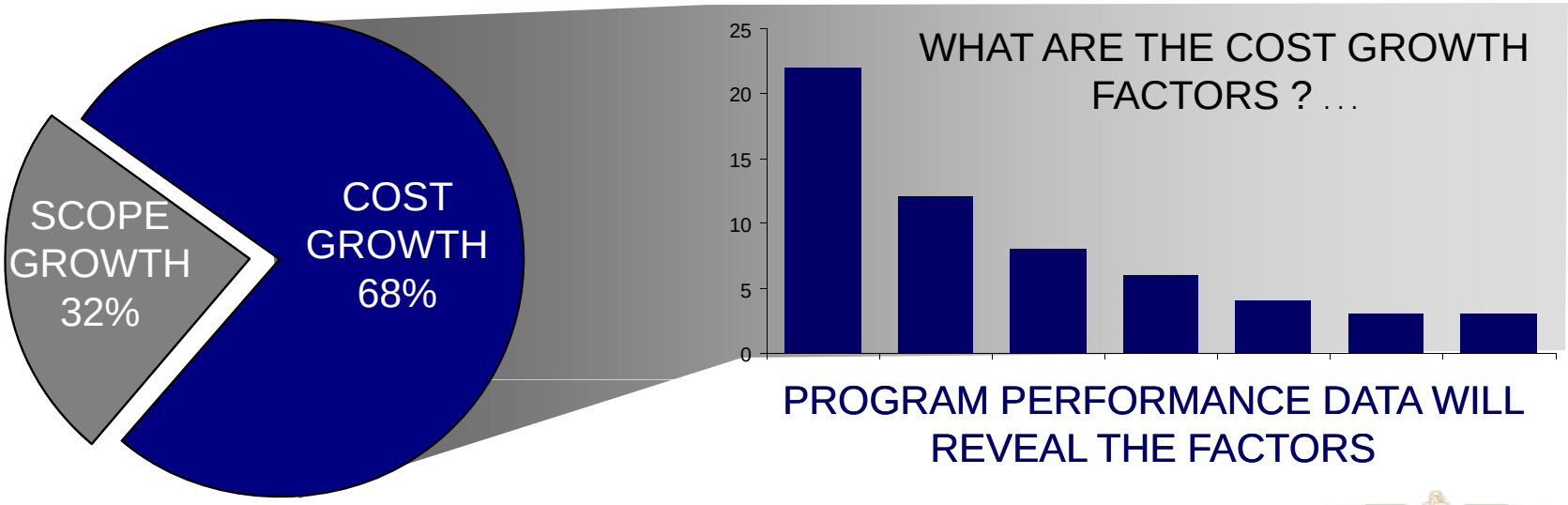
- Break down cost by:
  - Appropriation (RDT&E, APN, OMN, etc.)
  - Acquisition Phase (Development, Production, O&S, Disposal)
  - Program (F/A-18 E/F, F-35, V-22, etc.)
  - Service (USN, USMC)
  - Contractor (Lockheed, Boeing, Northrop Grumman, etc.)



STATUS OF NAVAIR EARNED VALUE CONTRACTS

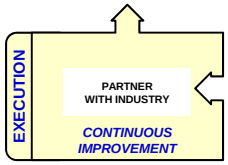






PROGRAM PERFORMANCE DATA WILL REVEAL THE FACTORS

FOCUS INITIATIVES FOR 2010



AIR-4.2

VISION

Be the foremost leader in Cost Estimating/analysis and Earned Value Management and the provider of choice for Cost-related products and services

MISSION

Deliver Quality Cost Analysis and Estimates throughout the Life Cycle of Programs

ALIGN THE REQUIREMENTS, RESOURCES, AND ACQUISITION PROCESSES TO ACHIEVE ACCOUNTABILITY AND DELIVER THE RIGHT CAPABILITY AND CAPACITY ON TIME AND AT THE OPTIMUM COST THROUGHOUT THE LIFECYCLE — **CNO GUIDANCE 2010**

DELIVER NEW AIRCRAFT, WEAPONS, AND SYSTEMS ON TIME AND WITHIN BUDGET THAT MEET REQUIRED RELIABILITY AND CAPABILITY. — **NAVAIR COMMANDER'S GUIDANCE 2010**

PROVIDE ANALYSIS, TOOLS, TRAINING AND ASSISTANCE TO SUPPORT AND IMPROVE THE PLANNING, EXECUTION, AND TOTAL OWNERSHIP COST OF NAVAIR PROGRAMS — **AIR-4.2 FOCUS OBJECTIVE**

TOC TRANSPARENCY

- DEVELOP TOC TEMPLATES
  - DEVELOPMENT
  - PROCUREMENT
  - SUSTAINMENT
- PORTFOLIO VIEWS
- SUPPORT EXTERNAL TOC INITIATIVES

PRODUCTION METRICS

- QUALITY ANALYSIS
- LEADING INDICATORS
- COCKPIT CHARTS
- METRIC SUITE

SUPPLIER NETWORK

- PROGRAM PBOMS
- BILL OF MATERIAL ANALYSIS
- SUPPLY BASE DEPENDENCIES
- SUPPLIER HEALTH & PERFORMANCE
- CONTRACT RQMTS

BUSINESS INSTITUTE

- IMS / EVMS
- PRODUCTION MANAGEMENT
- LESSONS LEARNED
- BOOK OF TRUTHS

INDUSTRY COLLABORATION

- PLATFORM FOR NAVAIR/ INDUSTRY COLLABORATION ON FOCUS INITIATIVES
  - TOC
  - PRODUCTION
  - SUPPLY NETWORK
  - QUALITY ANALYSIS

RATES

- CONTRACTOR RATE ANALYSIS (DIRECT/INDIRECT)
- PENSION LIABILITY
- COORDINATION WITH DCMA

2010 OBJECTIVES FOCUS PRIMARILY ON TOTAL OWNERSHIP COST AND PORTFOLIO VISIBILITY

CIC - COMMAND INFORMATION CENTER

(DEVELOPMENT, TEST, PRODUCTION, AND SUSTAINMENT)

UNDERSTAND HOW VALUE IS CREATED

BY

ESTABLISHING AN INTEGRATED PERFORMANCE MEASUREMENT FRAMEWORK

TO

LEVERAGE COST, SCHEDULE & TECHNICAL METRICS

&

CONDUCT VALUE STREAM PERFORMANCE ANALYSIS

&

GAIN PROFOUND KNOWLEDGE

TO

DRIVE PREVENTATIVE & CORRECTIVE ACTIONS

DATA *to* INFORMATION *to* KNOWLEDGE *to* ACTIONS = PERFORMANCE

CIC - COMMAND INFORMATION CENTER
PRODUCTION

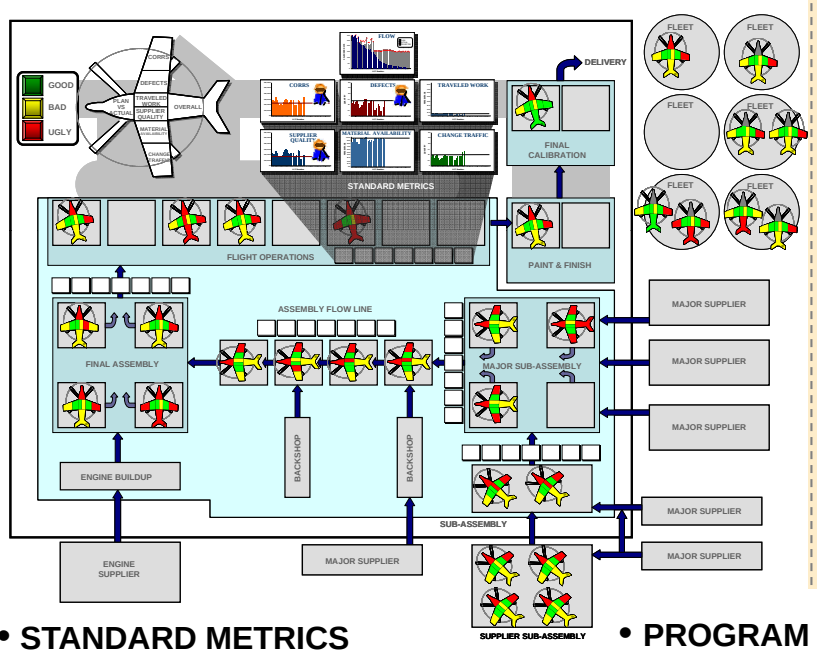
TRANSFORM DATA INTO ACTIONABLE INFORMATION
VISIBILITY
EXECUTION

PRODUCTION METRICS

PROGRAM DATA & REPORTS

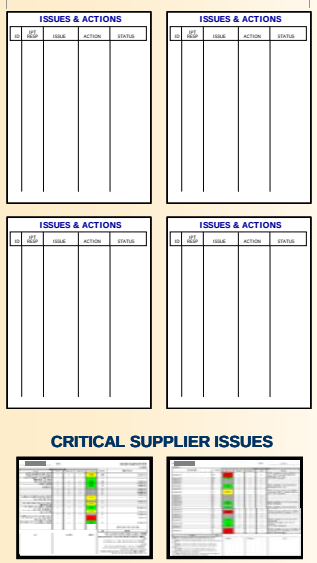
LEADING INDICATORS

VISUAL ASSEMBLY, CHECKOUT & DELIVERY



DATA TO INFORMATION → ACTION PLAN →

ISSUES & ACTIONS



FOCUS METRICS

- **STANDARD METRICS @ PROGRAM LEVEL**
- **ALIGNED IN PRODUCTION CONTEXT**
  - *CONFIGURATION CHANGES*
  - *SCHEDULE STABILITY*
  - *RESOURCE STATUS*
  - *MATERIAL ORDERED*
  - *EXECUTION TO PLAN*
  - *QUALITY OF PRODUCT*
  - *FLEET KICK-BACKS*

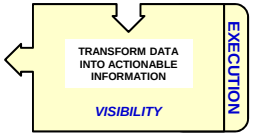
- **STANDARD METRICS @ A/C x AREA LEVEL**
  - *CHANGE TRAFFIC*
  - *CORRS*
  - *DEFECTS*
  - *SUPPLIER QUALITY*
  - *MATERIAL AVAILABILITY*
  - *TRAVELED WORK*
  - *FLOW VS PLAN*
- **VISUAL TRACKING OF HEALTH & LOCATION x AIRCRAFT**

- **PROGRAM ISSUES & RISKS**
- **INDEXED TO VISUAL TRACKING**
- **RESPONSIBILITY**
- **CORRECTIVE ACTION**
- **STATUS**
- **CRITICAL SUPPLIERS**
  - *QUALITY*
  - *DELIVERY*
  - *COST*

- **PROGRAM SPECIFIC METRICS**
- **TRACKING KEY ISSUES/ RISKS**
- **ALIGNED WITH CORRECTIVE ACTION PLANS**

VISUAL "HEAT MATRIX" (SDD EXAMPLE)

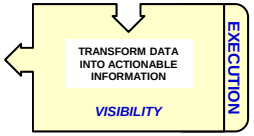
CIC - COMMAND INFORMATION CENTER



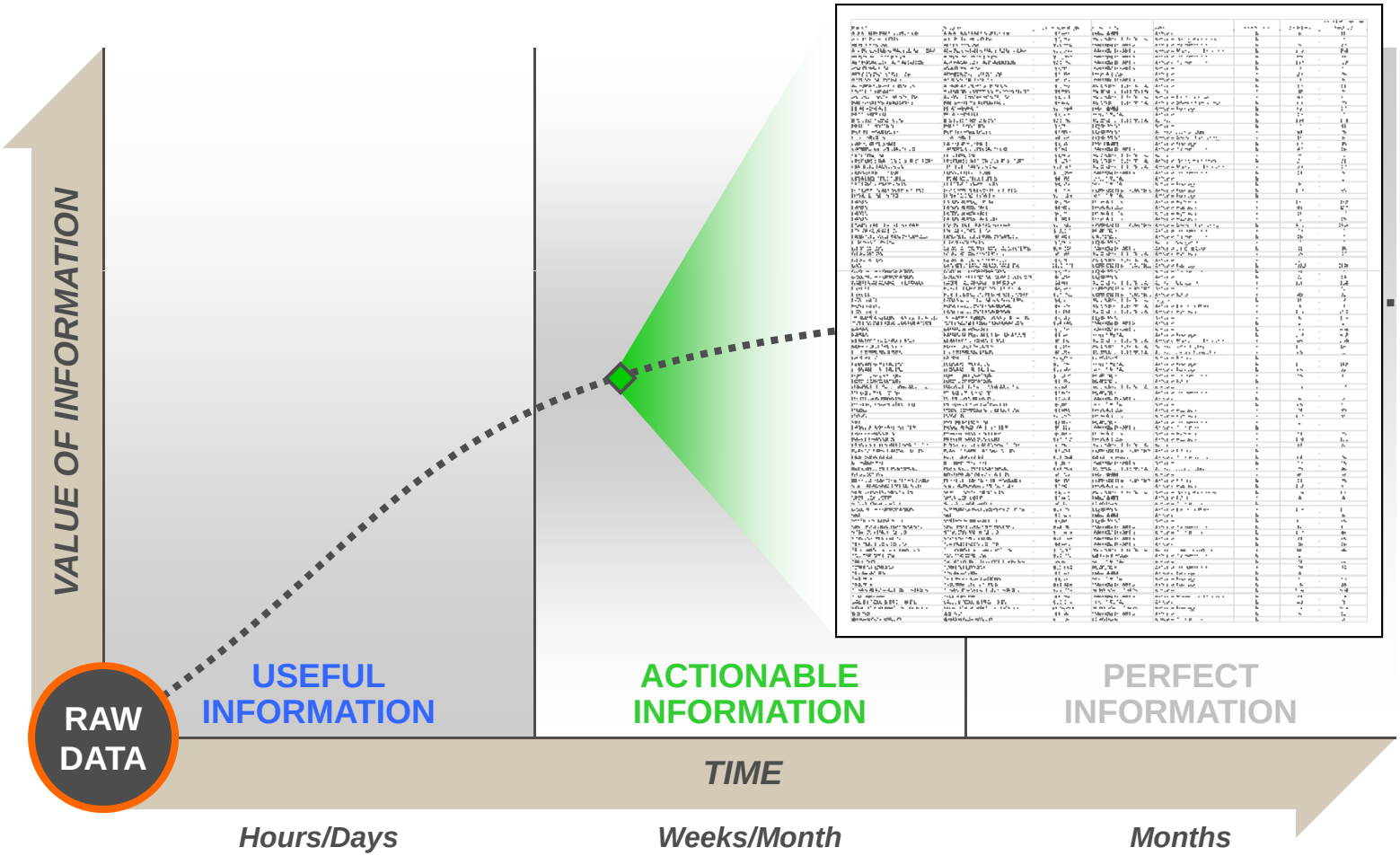
	% Complete	BCWR	ETC	VAC %	CV %	CPI	BEI Starts	BEI Finishes	DurG	SPI	CEI Starts	Volatility Starts	CEI Finishes	Volatility Finish
WBS 1	84.6%	208,913	192,984	1.7%	1.01%	1.01	0.8625	0.8407	1.1818	0.978	0.3000	0.7400	0.3900	0.6800
WBS 2	97.4%	66,624	42,357	-3.6%	-7.42%	0.931	0.9814	0.9615	0.9767	0.996	0.4200	0.5800	0.6500	0.3500
WBS 3	91.8%	243,128	228,331	-1.7%	-4.02%	0.961	0.8873	0.8734	1.2042	0.979	0.4300	0.6400	0.4200	0.6800
WBS 4	86.6%	789,292	746,119	-3.5%	-8.45%	0.922	0.8279	0.8064	1.2789	0.972	0.2000	0.8800	0.1700	0.8700
WBS 5	62.1%	223,643	219,140	-0.6%	-3.33%	0.968	0.8168	0.7750	0.9681	0.947	0.2600	0.8500	0.2200	0.9300
WBS 6	80.4%	154,401	140,966	-0.2%	-3.31%	0.968	0.9232	0.9067	1.2832	0.98	0.3700	0.8000	0.4000	0.7400
WBS 7	85.8%	167,921	142,452	-0.5%	-3.64%	0.965	0.9320	0.9186	1.1289	0.969	0.3900	0.8100	0.4900	0.5900
WBS 8	94.8%	4,353	5,270	1.3%	2.99%	1.031	0.9635	0.9621	1.0922	0.993	0.2500	0.7500	0.6200	0.3800
WBS 9	63.9%	307,137	287,385	3.0%	1.86%	1.019	0.9729	0.9721	1.0016	0.981	0.1000	1.3100	0.0900	1.3100
WBS 10	65.3%	176,641	154,771	5.1%	1.51%	1.015	0.9377	0.9251	1.1531	0.967	0.2100	1.1600	0.2600	0.9300
WBS 11	83.6%	53,397	52,116	-1.7%	-3.57%	0.966	0.9548	0.9538	1.0548	0.976	0.5300	0.5500	0.5100	0.6200
WBS 12	95.0%	2,308	645	8.1%	4.75%	1.05	0.9138	0.8839	1.1487	0.984	0.9100	0.1300	0.7800	0.4100
WBS 13	100.0%	0	49	-3.9%	-1.57%	0.984	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
WBS 14	57.3%	6,167	5,449	5.8%	1.44%	1.015	0.8913	0.8992	1.1953	0.965	0.1400	0.8600	0.1500	0.8800
WBS 15	94.6%	93,868	14,357	-4.4%	-10.44%	0.906	0.9286	0.9253	1.2776	0.961	0.4300	0.7900	0.4400	0.7800
WBS 16	99.9%	214	583	0.2%	0.49%	1.005	1.0000	1.0000	0.8979	1	?	?	?	?
WBS 17	96.3%	926	3,736	-9.3%	2.49%	1.026	LOE	LOE	LOE	LOE	LOE	LOE	LOE	LOE
WBS 18	99.9%	77	-1,002	-3.7%	-6.75%	0.937	LOE	LOE	LOE	LOE	LOE	LOE	LOE	LOE
WBS 19	100.0%	11	34	2.8%	4.65%	1.049	?	?	?	1	?	?	?	?
WBS 20	75.8%	18,683	16,123	8.4%	8.08%	1.088	LOE	LOE	LOE	LOE	LOE	LOE	LOE	LOE
WBS 21	97.4%	48,893	29,095	-7.2%	-11.67%	0.896	1.0000	0.9843	1.0708	0.987	?	?	?	?
WBS 22	98.3%	308	398	15.8%	16.78%	1.202	?	?	?	0.983	?	?	?	?
WBS 23	82.7%	103,653	101,639	1.4%	1.28%	1.013	0.8800	0.8500	1.4000	0.981	?	?	?	?
WBS 24	88.3%	130,045	171,622	-6.2%	-3.84%	0.963	?	?	?	1	?	?	?	?
WBS 25	91.8%	11,503	11,411	1.1%	34.52%	1.527	Future	Future	Future	0.998	Future	Future	Future	Future
WBS 26	118.6%	-54,858	46,276	-31.7%	4.62%	1.048	1.0000	1.0000	0.8471	1	?	?	?	?
WBS 27	95.4%	17,037	31,090	-11.6%	-10.05%	0.909	LOE	LOE	LOE	1	LOE	LOE	LOE	LOE
WBS 28	73.8%	3,257	3,184	-4.7%	-8.56%	0.921	LOE	LOE	LOE	0.997	LOE	LOE	LOE	LOE
WBS 29	100.0%	0	3	-4.6%	-4.58%	0.956	Complete	Complete	Complete	1	Complete	Complete	Complete	Complete
WBS 30	90.0%	4,215	6,110	-10.6%	-6.75%	0.937	?	?	?	0.989	?	?	?	?

ACTIONABLE INFORMATION GOAL

REDUCE ANALYSIS CYCLE TIME TO HOURS, DAYS



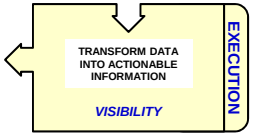
TRANSFORMING HIGH-DIMENSIONAL DATA INTO ACTIONABLE INFORMATION



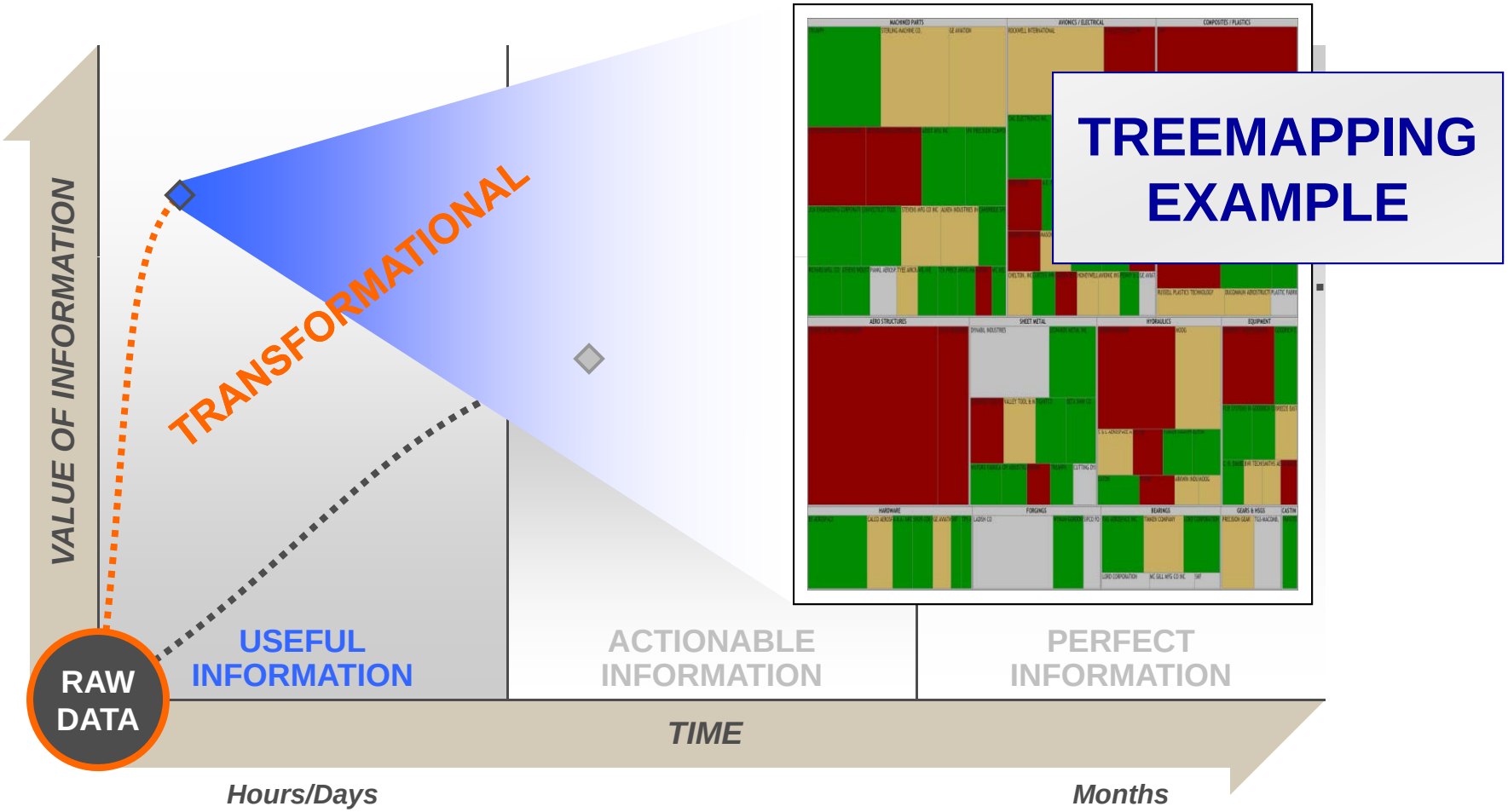
REDUCE ANALYSIS CYCLE TIME

ACTIONABLE INFORMATION GOAL

REDUCE ANALYSIS CYCLE TIME TO HOURS, DAYS



TRANSFORMING HIGH-DIMENSIONAL DATA INTO ACTIONABLE INFORMATION



REDUCE ANALYSIS CYCLE TIME

KEY TAKE-AWAYS

INPUTS

DATA... DATA... DATA...

"In God we trust... all others bring data."

PROCESSES
(Rapid)

TRANSFORM DATA INTO ACTIONABLE INFORMATION

"Program managers can't fix what they don't know or can't see."

OUTPUTS

COMMIT TO IMPROVING PROGRAM PERFORMANCE

"Tell programs what they need to hear; which is not always what they want to hear."

ANALYTICAL EXCELLENCE

AFFECTING THE OUTCOME