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NATIONAL RECONNAISSANCE OFFICE

NRO Program Assessments

Best Practices and Lessons Learned

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June 2012

VIGILANCE FROM ABOVE

Agenda

- Mission / Drivers
- Goals
- Where Are We Now?
  - Current Processes
- Define Good Metrics - Best Practices/Lessons Learned
  - PM Survey
  - Industry Research
  - Recommendations
- Ongoing Improvements
  - Cross Program Analysis
  - NRO Program Assessment Dashboard (N-PAD)

Mission

- Indentify and implement better metrics to provide the ability to identify program-specific and systemic issues earlier in a program than current cost, schedule and performance metrics provide.

Drivers

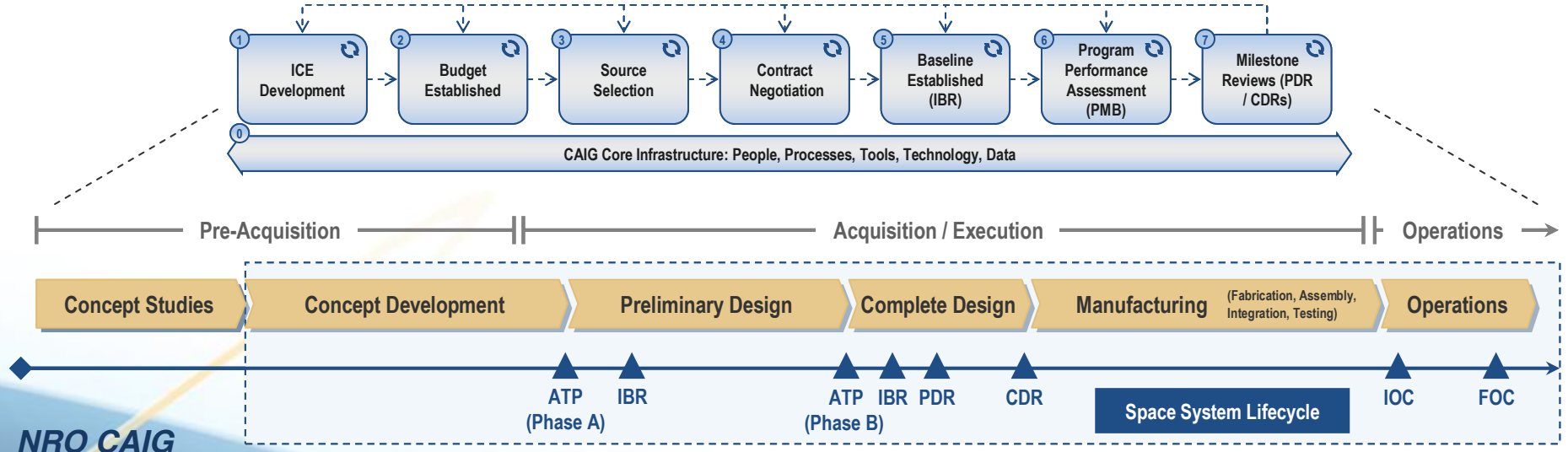
- The USD (AT&L) memo “Better Buying Power” (Sept. 14, 2010)
  - Conduct reviews that “support major investment decisions or to uncover and respond to significant program execution issues”
- OMB has asked for additional details programs funded to an Agency Cost Position (ACP) rather than an Independent Cost Estimate (ICE) from an oversight organization (e.g. ODNI, OSD CAPE)
- Ms. Betty Sapp (Principal Deputy Director, NRO)
  - Current tools provide too little emphasis on program vice contract performance
  - Difficult to interpret impact of current data on PMP performance baseline
  - Same level of detail for “good” and “poor” performing programs
  - Current program assessments don’t give sufficient insight to decision makers

Program Assessment Goals

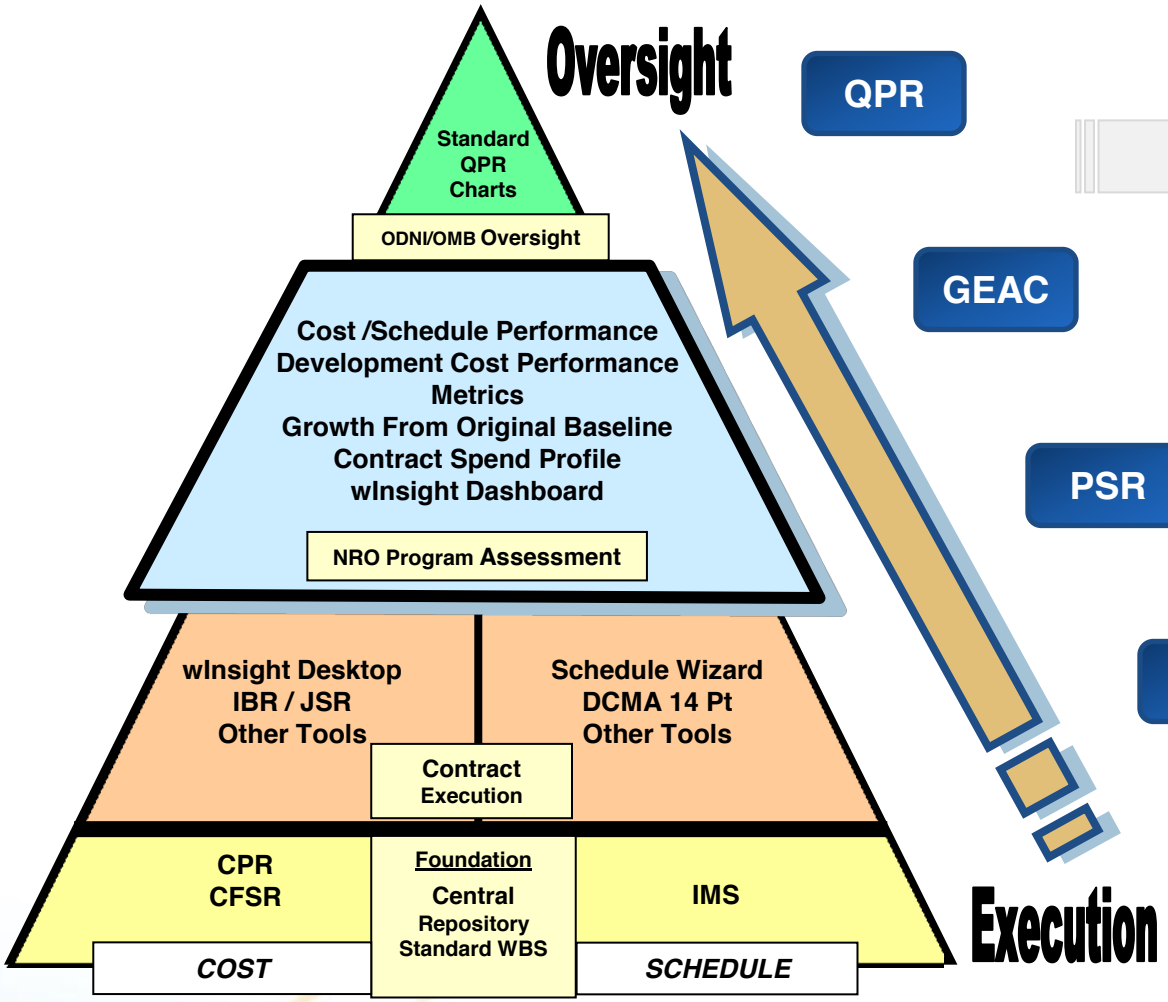
- Leverage existing data and processes to maximum extent possible
- Minimize the effort of data collection while improving the usage of objective performance data
  - Only measure what provides genuine insight
- Synthesize data to efficiently focus leadership on potential trouble areas
  - Focus on technical metrics that provide necessary insight at major decision points
- Emphasize leading/predictive measures
- Include input and buy-in from Program Offices and other stakeholders

Where Are We Now?

- NRO CAIG provides diverse cost and EVM support throughout program acquisition life cycle
- Maintains a database of over 2000 space hardware data points
- Vast program historical data (cost data plus EV Central Repository data)
  - CFSR, CPR, IMS, CDRL, etc
- Current capabilities do not include automated data processing or reporting
- Due to the raw state of CPR data in the central repository, many of the basic earned value metrics such as Cost Performance Index, Schedule Performance Index, Cost variance, etc. are not directly accessible.



Current Processes



Program assessment occurs continuously throughout the acquisition cycle

Must determine the "right" metrics

Approach to Improved Metrics

- Conducted an NRO Program Manager survey to assess effectiveness and relevance of current metrics
- Conducted outside research to better understand the application of program metrics/indicators in program performance reviews
  - Held discussions with other Government entities
    - Federal Aviation Administration (FAA)
    - Naval Air Systems Command (NAVAIR)
  - Reviewed public domain information regarding other Government entities established program performance rating systems
    - Defense Acquisition Executive Summary (DAES)
    - Probability of Program Success (POPS)
  - Reviewed papers written on the topic
    - Leading Indicators vs. Lagging Indicators
    - What makes a good metric
- Compared all information to current package and developed gap analysis as well as recommended best practices/lessons learned

Current Program Assessment Gap Analysis

- Primarily focuses on lagging indicators rather than leading indicators
- Weak representation of technical metrics and indicators which could be leading indicators of future cost and schedule issues
- Lacks program roll-up summary based on detailed metrics (summary level scorecard)
- Current assessments tend toward a snapshot in time versus trending over time
- No synthesis of varied information into an overall program health
- Data fails to relate a comparison to the cost, schedule, or technical baseline

Summary of PM Survey Comments

- *Redundant cost data*
- *Allow PMs to discuss what they believe is important*
- *Should have traceability to the PMP parameters.*
- *Reported as numbers should be shown as historical trend over time.*
- *Should show quality of work completed, which indirectly relates to performance.*
- *Need to see trends in Master Schedule over extended periods (i.e. several quarters) to see how margin is decreasing, critical path is doing*
- *Criteria for risk impact and probability*
- *Discuss more on how delivered capabilities enhanced mission success.*
- *Discuss contract performance with a single backup chart showing overall performance to the PMP criteria similar to past QPRs.*
- *For rebaselined programs, metrics should be measured against new baseline.*
- *Top line Cum SPI and Cum CPI are useless metrics for a program that has reset S & P equal to A - use metrics since contract reset*
- *Measurement should be at PMP baseline level, not technical or contract level.*

Characteristics of a Good Metric

- **Consistent** - Criteria and calculations must be consistent with respect to time
- **Honest** assessment - good, bad or ugly
- **Actionable** – include only metrics that you will act on
- **Predictable** – predictability statement should be made when time-series tracking indicates that a process is predictable
- **Time-series** tracking – can describe trends and provide leading rather than lagging indicators
- **Relevant** – Must provide insight to performance, issues and requirements
- **Repeatable** and reproducible - Measurements should have little or no subjectivity
- **Specific** – Well defined measure that includes metric owner, frequency, definition and rating criteria

CHAPTRRS

Leading Indicator Definition

- A measure for evaluating the effectiveness of a how a specific activity is applied on a program in a manner that provides information about impacts that are likely to effect the system performance objectives
  - An individual measure or collection of measures that are *predictive of future system performance*
    - Predictive information (e.g., a trend) is provided before the performance is adversely impacted
  - Measures factors that *may impact the system engineering performance*, not just measure the system performance itself
  - Aids leadership by providing insight to take actions regarding:
    - Assessment of process effectiveness and impacts
    - Necessary interventions and actions to avoid rework and wasted effort
    - Delivering value to customers and end users

Choosing Your Metrics

- Likely program performance measures include:
  - Cost
  - Schedule
  - Performance
  - Risks
  - Funding
  - PM Assessment

Choose and define specific metrics within each performance measure that fit your program

Cost

CPI
Obligation Rate
TCPI
Cost VAC
GEAC
Mgmt Reserve

Schedule

SPI
Schedule Goals
Milestones
Schedule VAC
Schedule Margin

Performance

System Defects
Test Results
Requirements Stability
Performance VAC
Technology Readiness Level

Risks

Mitigated Risk Impact
Impact of CR

Funding

PM Assessment

Subjective assessment based on PM knowledge and experience

Metric Definition Example

Metric: Cost Performance Index (CPI)

Metric Owner: EVM Team

Data Provider: Program Office

Frequency: Monthly

Definition: The ratio of budgeted costs to actual costs.
A value greater than 1 indicates that costs are running under budget. A value less than 1 indicates that costs are running over budget.

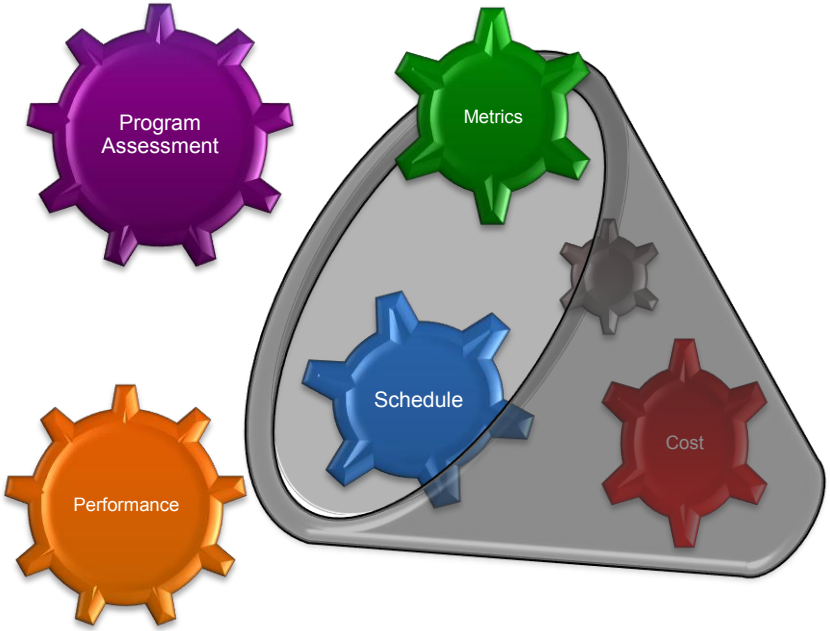
Formula: CPI = Earned Value/Actual Costs

Red/Yellow/Green Criteria:

- Green: CPI > 0.95
- Yellow: 0.90 < CPI < 0.95
- Red: CPI < 0.90

Determine a precise description that defines a method to obtain the value for the metric being measured as well as the criteria for success.

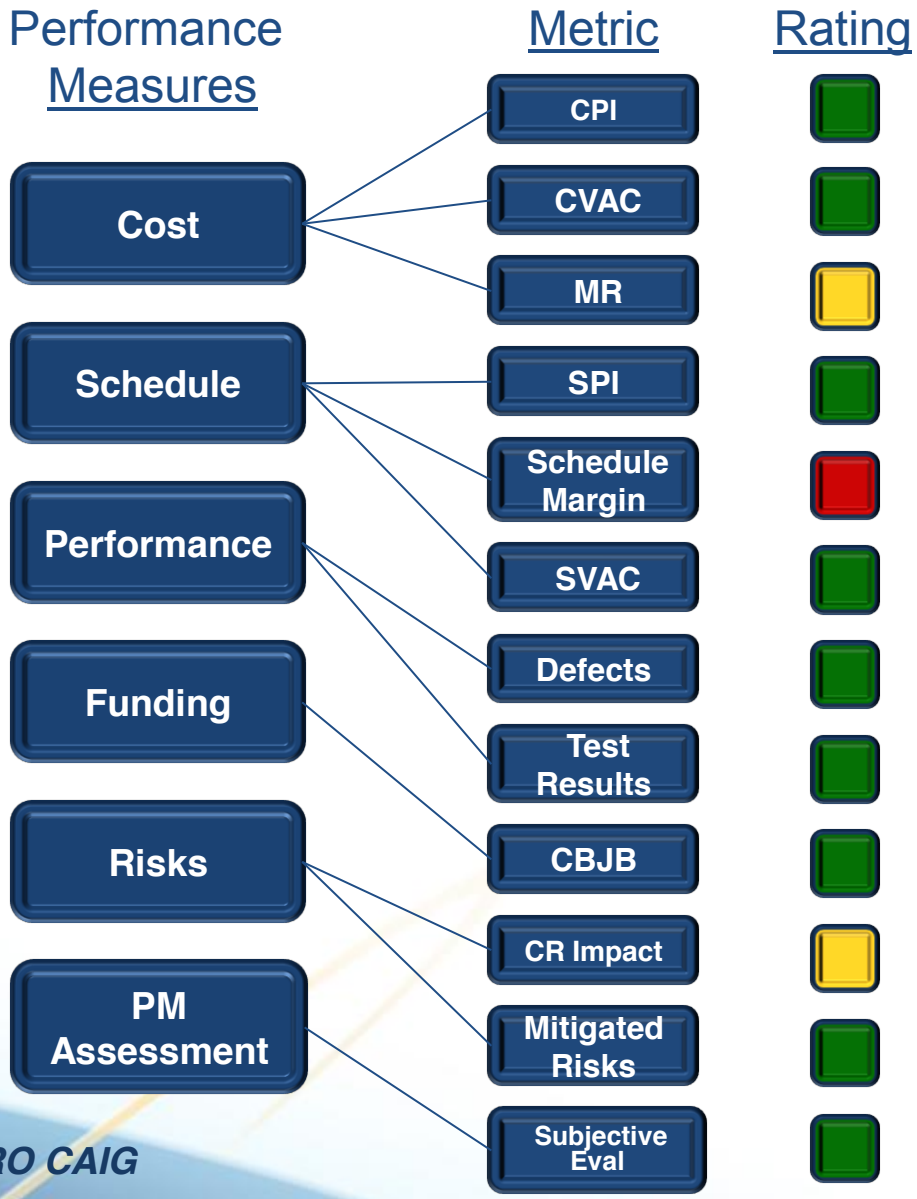
Refining the Data



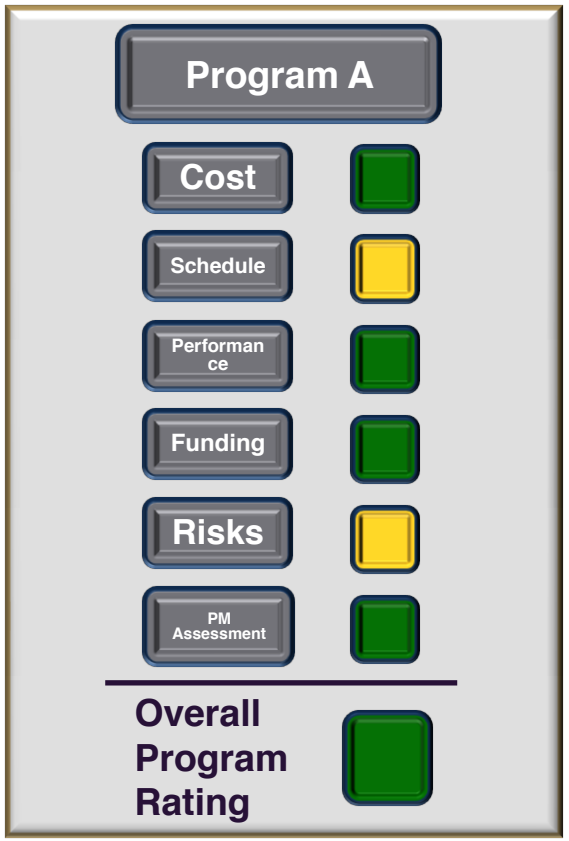
- The key is to:
  - leverage the tools already in place
  - choose the right metrics
  - refine and synthesize disparate information into a coherent overall picture for decision makers.

- There are multiple metrics and assessment tools already in place at all levels of the management pyramid, but they may be looked at in isolation.

Aggregating The Data

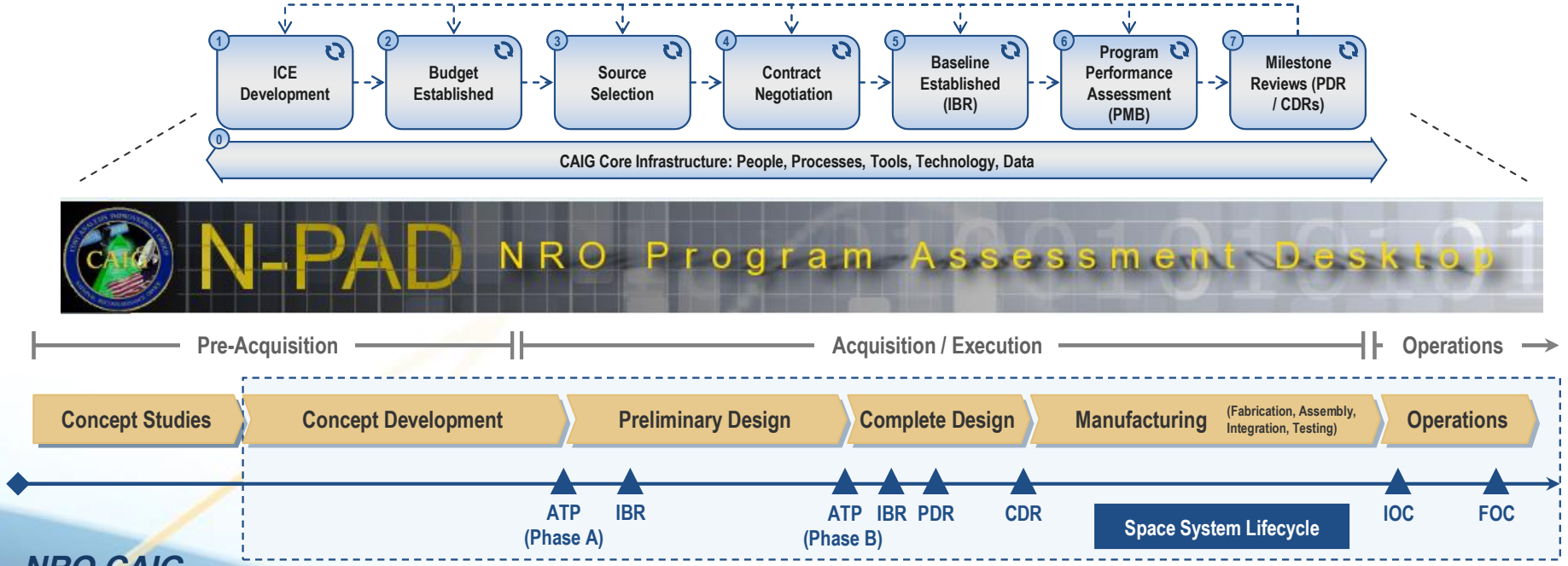


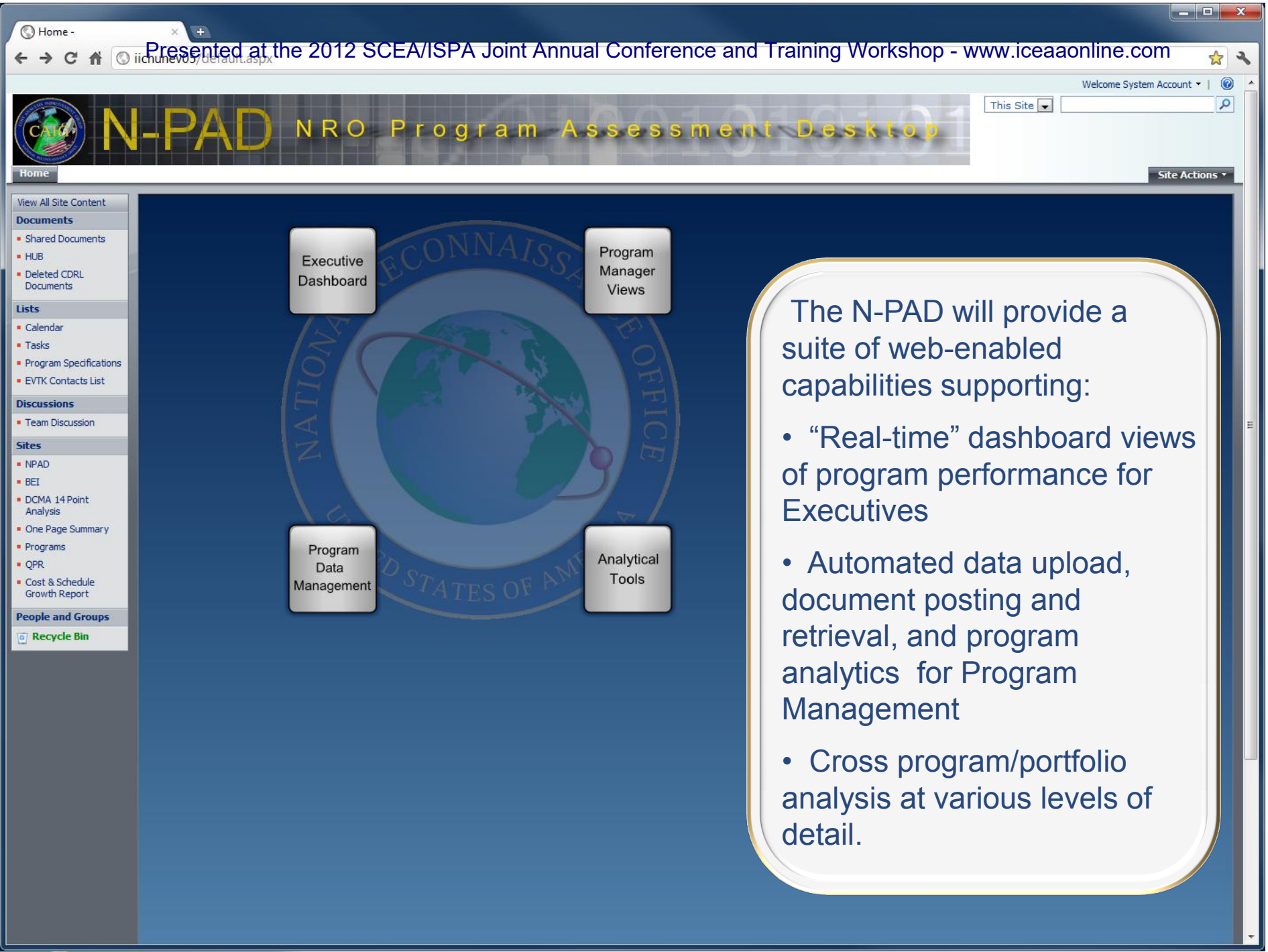
You can then determine / define consolidated performance measure ratings and an overall program rating in the same way based on individual metric ratings.



Where Are We Going?

- The NRO Program Assessment Desktop (N-PAD) under development will serve as automated and flexible tool that will assist senior management, acquisition managers, and analysts in monitoring program execution and performance as well as enabling cross-program/portfolio analysis.
- The N-PAD will integrate data at all levels across the life cycle of a program allowing for more efficient and in-depth analysis, and updated status of program health over time.

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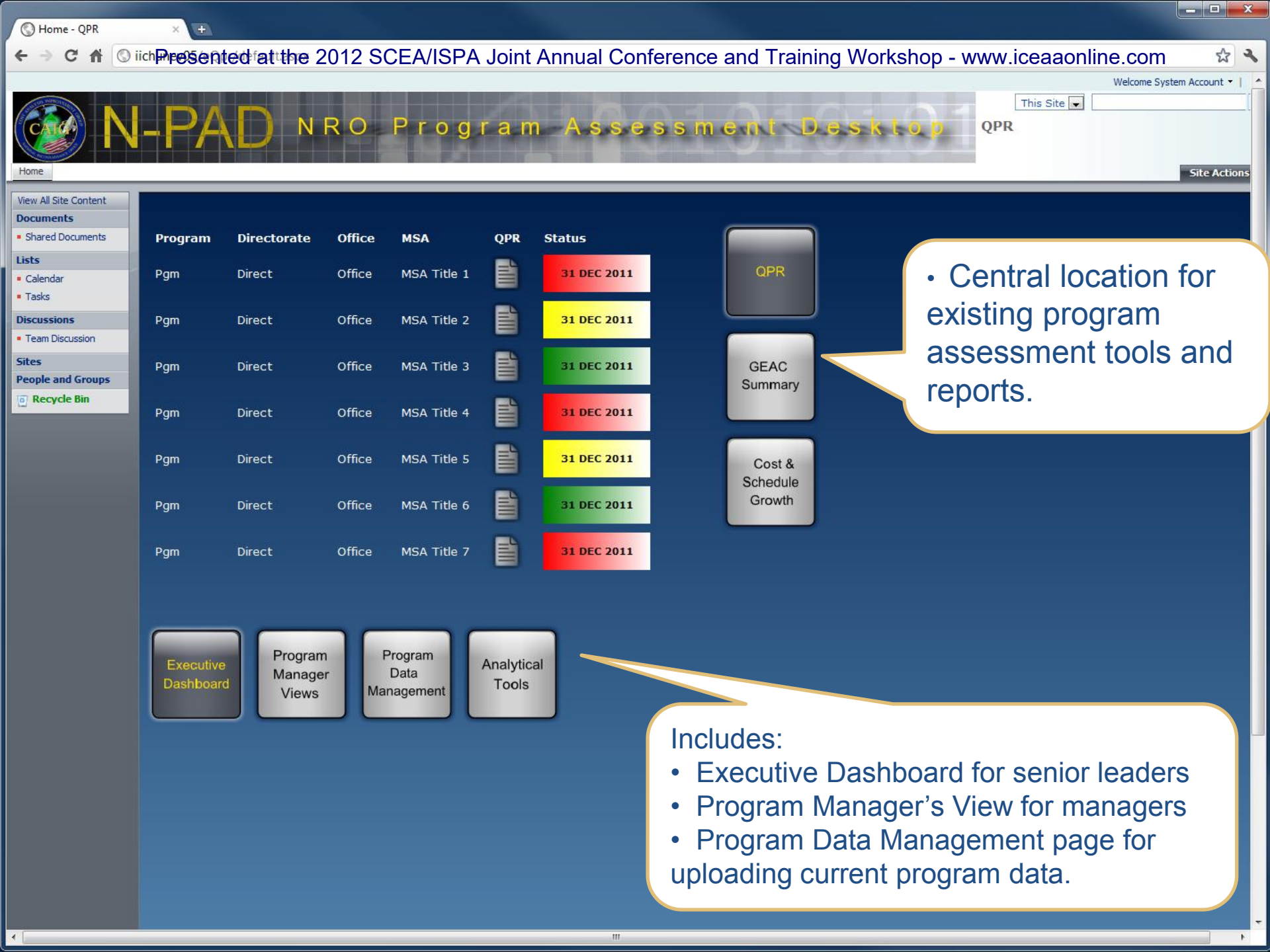
BEI
DCMA 14 Point Analysis
One Page Summary
Programs
QPR
Cost & Schedule Growth Report
People and Groups
Recycle Bin
Executive Dashboard
Program Manager Views
Program Data Management
Analytical Tools
The N-PAD will provide a suite of web-enabled capabilities supporting:
• "Real-time" dashboard views of program performance for Executives
• Automated data upload, document posting and retrieval, and program analytics for Program Management
• Cross program/portfolio analysis at various levels of detail.



- Central location for existing program assessment tools and reports.

Includes:

- Executive Dashboard for senior leaders
- Program Manager's View for managers
- Program Data Management page for uploading current program data.

Home - BEI

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Welcome System Account

N-PAD NRO Program Assessment Desktop

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BEI

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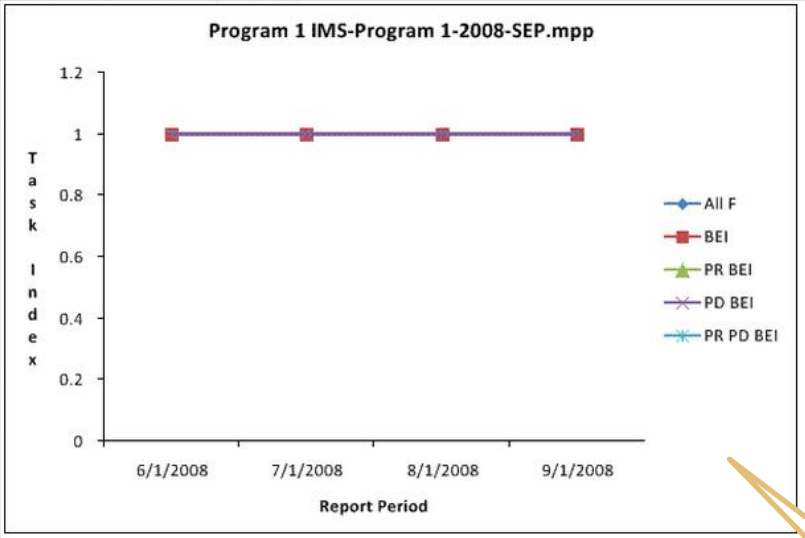
Baseline Execution Index (BEI) Report



BEI Report Options

Program: Program 1

Report Periods: 12

IMS: IMS-Program 1-2008-SEP.mpp

Baseline Execution Index (BEI)

DCMA 14 Point Analysis

One Page Summary

Executive Dashboard

Program Manager Views

Program Data Management

Analytical Tools

- Level of detail provided depends on which tier you are in and what permissions you have.

Home - One Page Summar

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N-PAD NRO Program Assessment Desktop

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One Page Summary

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One Page Summary

EVM REPORT FOR Program 1 [[PMB] - PERF MEASURE BL] - AS OF: 1/6/2012

DELTA PERIOD Represents EOM 5/30/2007 through EOM 6/30/2007

PMB EARNED VALUE DATA

WBS	Description	% Comp	BCWR ($K)	Cum CPI	TCPI-EAC	Cum CV ($K)	VAC ($K)	CV	Cum SPI	Cum SV ($K)	SV
[PMB]	PERF MEAS BL	3.2%	16,045	0.996	0.985	-2	-248	↓	0.912	-51	↑

SUMMARY DATA

BAC ($K)	EAC ($K)	VAC ($K)	CUM CPI FC ($K)	CPIxSPI FC ($K)	3 PER FC ($K)	6 PER FC ($K)
16,575	16,823	-248	16,637.6	18,187.3	N/A	N/A

It should be noted that NONE of the statistical forecasts are GREATER THAN THE CONTRATOR EAC
Contractor EAC was UNCHANGED (16,823 $K to 16,823 $K [delta of 0 $K]) during the delta period

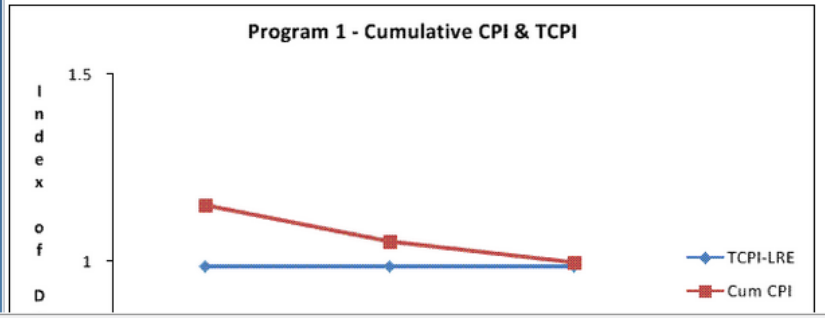
BRIEF EVM NARRATIVE

- This effort is an OVERRUN CONDITION (-2 $K).
- CUMULATIVE COST VARIANCE has IMPROVED 12 $K to -2 $K (delta of -14 $K) during the delta period.
- The Contractor is projecting a -248 $K OVERRUN AT COMPLETION. The Contractor must achieve a 0.985 performance (TCPI - EAC) to achieve this forecast. The cumulative CPI for this effort is 0.996. Based on historical peformance, CONTRACTOR EAC SEEMS ACHIEVEABLE.
- BUDGET has REMAINED CONSTANT during the delta period (16,575 $K to 16,575 $K)

OTHER RELEVANT DATA

- MANAGEMENT RESERVE is 3.926% of the remaining budget (should be AT LEAST 7-8%).
- MANAGEMENT RESERVE has REMAINED CONSTANT during the delta period

CUMULATIVE CPI vs TCPI



Baseline Execution Index (BEI)

DCMA 14 Point Analysis

One Page Summary

- Analysts will use N-PAD to perform detailed EV surveillance of programs as well as cost estimation for current and future programs.
- N-PAD leverages existing tools and infrastructure in the NRO Enterprise. It will provide capabilities to export data in formats required by NRO standard tools such as wInsight, MS Project, and MS Excel.

Questions

Contacts

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DCMA 14 Point Analysis

IMS-Program 1-2008-SEP (Full)

		ACT	
	TOTAL EVENTS (<100% Complete)	58	58
	TOTAL RELATIONSHIPS (<100% Complete)	7	0.12
1	Logic Problems (<5%)	0	0%
2	Leads (0%)	0	0%
3	Lags (<5%)	0	0%
4	FS Relationships (>90%)	52	743%
5	Hard Constraints (<5%)	29	50%
6	Total Float >44d (0%)	0	0%
7	Negative Float (0%)	55	95%
8	Duration >44d (<5%)	104	179%
9	Invalid Dates (0%)	82	141%
10	No Resourced (No LB Work and No Cost)	0	0%
11	Missed Tasks (0%)	52	90%
12	Critical Path Test - Add 600d (+/-10%)		
13	Critical Path Length Index (>.95)		
14	Baseline Execution Index (>.95)	0	0%

This metric ensures that high amounts of total float are not found within the schedule. Should the schedule fail the Metric #6 test, some areas to begin the investigation are: missing predecessors/successors; incorrect sequencing of predecessors/successors; too many predecessors/successors connected to a milestone/task; or missing scope. This is list is not all inclusive and the failure maybe a result of several of these factors combined. Default setting is 44d. Customer may specify different time value as long as it is agreed upon by all parties involved. Investigation into values over 5% should be initiated.

Select File Location

EVTK: ☐

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Baseline Execution Index (BEI)

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> Program 1

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Comment:
File: Choose File No file chosen
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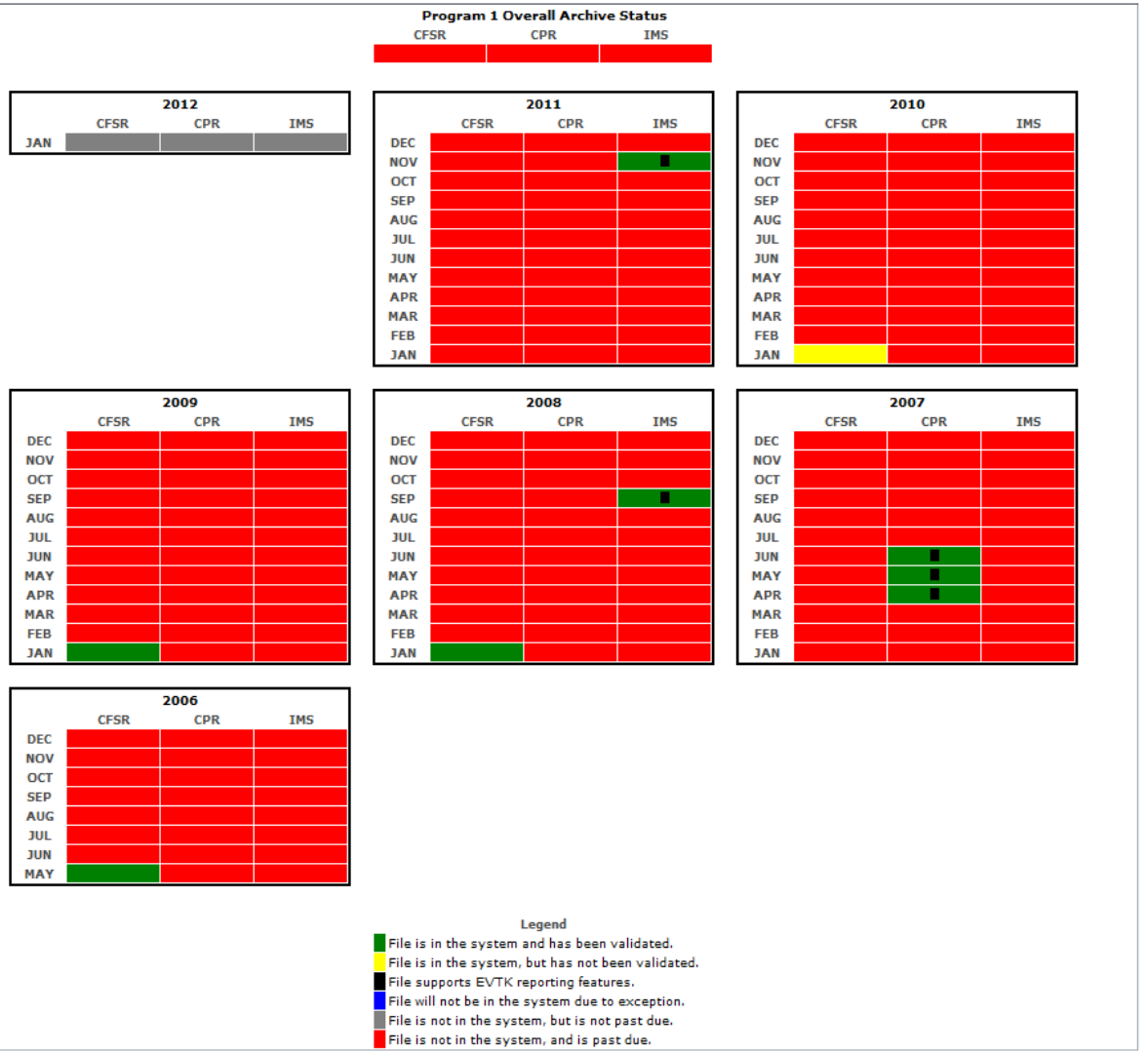
Document Archive

Tree View of **Archive**:

- Archive
  - 2006
    - 05
      - CFSR
        - CFSR-Program 1-2006-MAY.txt
  - 2007
    - 04
      - CPR
        - CPR-Program 1-2007-APR.xml
    - 05
      - CPR
        - CPR-Program 1-2007-MAY.xml
    - 06
      - CPR
        - CPR-Program 1-2007-JUN.xml
  - 2008
    - 01
      - CFSR
        - CFSR-Program 1-2008-JAN.txt
    - 09
      - IMS
        - IMS-Program 1-2008-SEP.mpp
  - 2009
    - 01
      - CFSR
        - CFSR-Program 1-2009-JAN.txt
  - 2010
    - 01
      - CFSR
        - CFSR-Program 1-2010-JAN.txt

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