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Implementing an EVM System at Bell Helicopter

Michael J Breuker
Pinnacle Management Systems, Inc.

Bell Helicopter Textron, Inc (BHTI) makes a wide range of vertical lift solutions (helicopters & tilt-rotor vehicles) for government and commercial clients

BHTI has several major DoD contracts for military vehicles, including

- H-1 (Huey & Cobra)
- V-22 Osprey
- Army Armed Reconnaissance Helicopter (ARH)
- US-101 Presidential Helicopter

These Programs alone constitute over \$20 Billion in revenue, with most individual contracts exceeding the \$20 Million threshold required for formal EVMS reporting

ANSI 748 certification is determined by the DCMA

Additional oversight provided by DCAA, NavAIR 4.2, Office of the Secretary of Defense (OSD), Internal Audit and Bell's Customer (Joint Surveillance efforts)

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EVMS Replacement Project

2002 to 2004

EVMS Replacement: BHTI Selects Primavera®

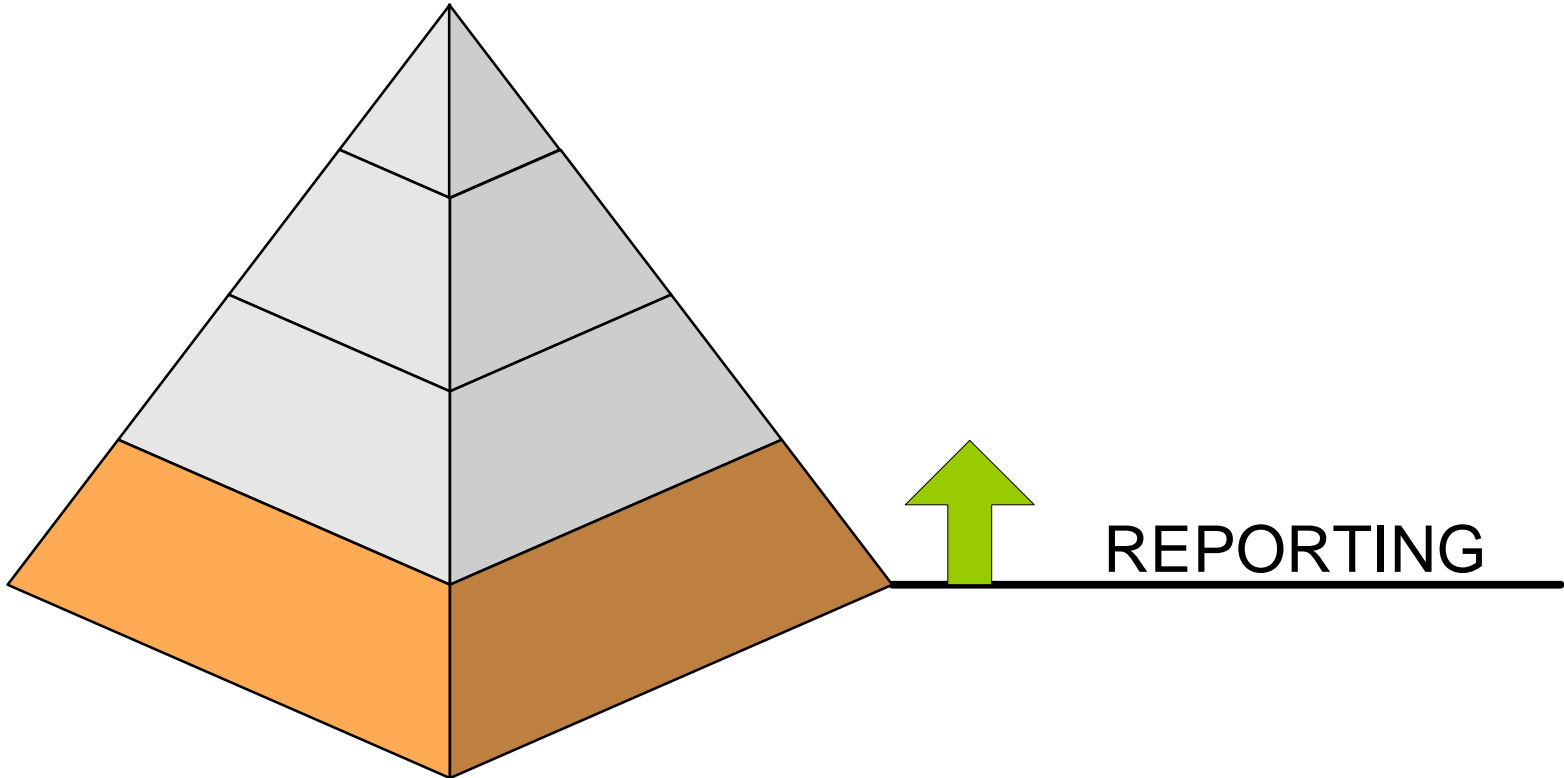
- In the summer of 2002, BHTI chose to replace their legacy EVMS
- BHTI chose Primavera® Teamplay (v.3.51) and Cost Management for scalability, integration and enterprise capabilities
- Bell partnered with Pinnacle to plan and execute the EVMS Replacement Program consisting of:
 - EVMS Business Process & Procedure Development
 - Primavera Tool Implementation
 - Legacy Systems Integration
 - Data Migration
 - Process & Tool Training
- Goal to produce CPRs for the H-1 and V-22 Programs by year-end 2003

Background (2002 – 2004)

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Organization Evolution of an EVM System



Background (2002 – 2004)

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PRIMAVERA TeamPlay™

- Program planning
- WBS & work definition
- Resource pool
- Working calendars
- IPT & other program structures
- Control Account Planning
- Work Package scheduling
- Resource planning
- Labor hour forecasts
- Schedule status updates & progress reporting
- Integrated Program Schedule

Program WBS & EOC structures
Time-phased budgeted resources
Weekly Earned Value performance updates
Forecast of remaining resources & schedule

WBS, OBS, IPT & other structures
Weekly & monthly BCWS, BCWP, ACWP & ETC



PRIMAVERA Cost Manager™

- BHTI fiscal calendar
- Direct labor rates
- Indirect rates (Overheads, G&A, Cost of Money)
- Rate escalation tables
- Calculation of weekly EV data
- Maintenance of PM baseline



wInsight

C/S Solutions, Inc.

- Weekly & monthly EV reporting
- Graphical trend analysis charts
- Variance Analysis Reports (VAR)
- CPR & C/SSR Reporting (using wInsight Administrator)

BHTI “Feeder” Systems

- Cost/billing ledger
- Labor
- Materiel
- Manufacturing

Weekly & monthly ACWP
by Work Package & EOC

BCWS, BCWP,
ACWP & ETC

Replacement Program Challenges: Data Migration

- For V-22 Program alone, over 30 Microsoft Project schedules to migrate into a single Primavera® project
- Not all work packages had schedule data
- Schedule dates did not match cost spreads in MCS (BHTI's legacy cost management system)
- MCS did not correspond with MRS (legacy EVMS reporting system)
- Accounting ledger at a higher level of detail and did not match the Labor system (used for work package actuals)

Resolution

- Historical schedules developed programmatically from cost data
- Past CPR data must remain true so MRS data was used to feed costs
- Reconciliation work packages created to collect difference between ledger and Labor system actuals

Replacement Program Challenges: Database Performance

- Some migrated projects contained over 50,000 activities and over a **million** resource assignments
- Hundreds of thousands of timesheet records produced every week
- In 2004, BHTI had one of the largest Primavera databases in existence
- Database and Citrix servers undersized
- Oracle tuning experience was lacking
- Limitations with SDK

Resolution

- Instituted archiving procedures for historical project data
- Purchased additional hardware
- Hired Oracle tuning experts to dramatically improve Db performance

Replacement Program Challenges: Data Accuracy & Validation

- After initial deployment, accuracy of data was perceived to decrease
 - Manual manipulation of data was eliminated
 - Increased visibility of existing legacy data problems
 - Reconciliation problems
 - Cultural changes (data entry vs. data analysis)

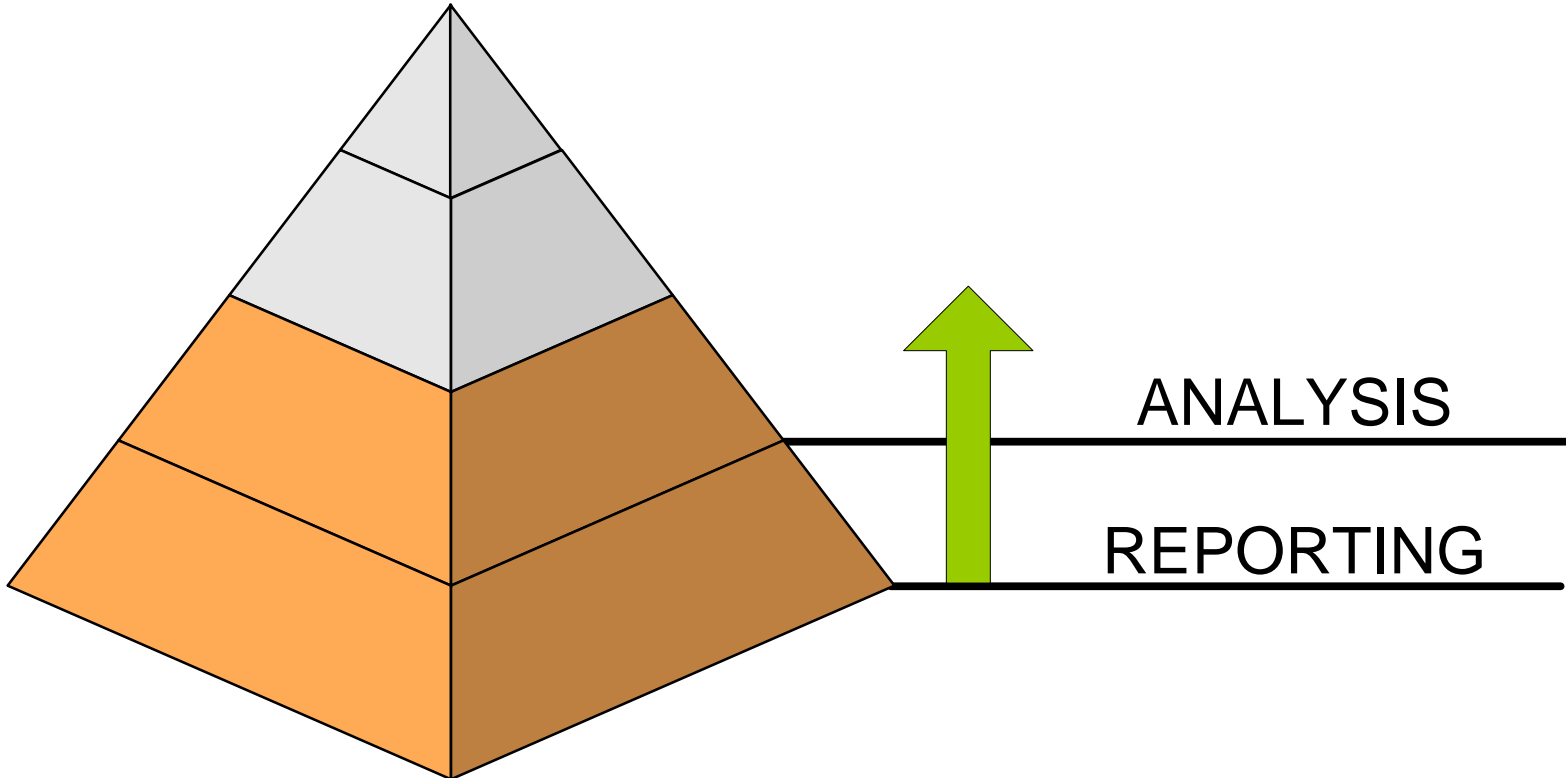
Resolution:

- EVM Center of Excellence created to push data and validate feeds
- Management attention forced many legacy system corrections
- Additional training & mentoring of Control Account Managers (CAMs) to help them understand the data and explain true variances

Replacement Program Success

- By year-end 2003, BHTI was producing CPRs for H-1 and V-22
- By year-end 2004, all major government Programs (approximately 20) were migrated to the new system
- Several new Programs were started over the next two years, including the US101 Presidential Helicopter and Army Armed Reconnaissance Helicopter (ARH)
- Over 500 people attended Primavera training
- Significant improvements to data accuracy and traceability

Organization Evolution of an EVM System



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EVMS Future State Project

2005 to Present

EVMS Future State Project

- In mid-2005, BHTI chose to improve their EVMS capability and drive the discipline throughout the organization
- Bell selected Pinnacle to plan and execute a new project to:
 - Upgrade Primavera to 5.0 to take advantage of new features
 - Consolidate system interfaces
 - Utilize the API for performance improvements
 - Create an online process library to improve standards & compliance
 - Develop a product-oriented, role-based process & tool training Program to improve organizational knowledge & discipline

Upgrade to Primavera Project Management and Cost Management 5.0

- Performance improvements with Oracle cost-based optimization
- WBS UDFs to identify control accounts and send control account and work package codes to Cost Management
- New global change capabilities to status LOE performance
- Enhanced security profiles for role-based security
- LDAP authentication for IT security compliance
- “Multiple Float Paths” feature for better critical path calculation
- Enhanced Microsoft Project import / export capabilities
- Fiscal Calendar
- Negative Units

Primavera 5.0 Upgrade

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WBS UDFs

Layout: WBS - WBS Codes

WBS Code	WBS Name	Control Account Flag	Charge #
X-21 EMD AP	X-21 EMD Project (Active Project - Post-IBR)		
X-21 EMD AP.0	Program Milestones		
X-21 EMD AP.1	1000 - Aircraft System		
X-21 EMD AP.1.1	1100 - Air Vehicle		
X-21 EMD AP.1.1.1	1110 - Airframe		
X-21 EMD AP.1.1.1.1	1111 - Structures		
X-21 EMD AP.1.1.1.1.1	[EV01] Structures - (Engineering)		
X-21 EMD AP.1.1.1.1.1.001	Design Component A		
X-21 EMD AP.1.1.1.1.1.002	Design Component C		

Name	Description	Control Account Flag	Charge #
BELL	Bell Helicopter Textron Inc		
Government	Government Programs		
Other	Other Projects		
Training	Training Program		
X-21 EMD	X-21 EMD		
Actuals	Actuals		
Baseline	Baseline		
X-21 EMD	X-21 EMD Project		
1	1000 - Aircraft System		
1.1	1100 - Air Vehicle		
1.1.1	1110 - Airframe		
1.1.1.1	1111 - Structures		
1.1.1.1.1	[EV01] Structures - (Engineering)		
1.1.1.1.1.001	Structures Planning Package		
1.1.1.1.1.002	[3AE001] Structure Design Component A		
1.1.1.1.1.002.A67133209	Design - Structure Component A		
1.1.1.1.1.002.A67133270	BEIMS Release - Structure Component A		
1.1.1.1.1.002.A68201400	XworX Design - Structure Kit A		
1.1.1.1.1.002.A68201402	BEIMS Release - Structure Kit A		
3AE001	[3AE001] Structure Design Component A		
1.1.1.1.1.003	[3AE002] Structure Design Component C		
1.1.1.1.1.004	[3AE003] Provisions for Lights		
1.1.1.1.1.005	[3AE004] Airframe Mounted Tiedown Fitting		
1.1.1.1.1.006	Support		
1.1.1.1.1.007	Direct Costs - Structures		
1.1.1.1.1.008	(Manufacturing Engineering)	1	
1.1.1.1.1.009	for Structure Component A		3AE095
1.1.1.1.1.010	for Structure Component C		3AE099
1.1.1.1.1.011	for Lights		3AE100
1.1.1.1.1.012	for Airframe Mounted Tiedown Fitting		3AE101
1.1.1.1.1.013	ns		
1.1.1.1.1.014	ns - (Engineering)	1	
1.1.1.1.1.015	tems		3AE007
1.1.1.1.1.016	tems Analytical Integration		3AE008
1.1.1.1.1.017	ns (Procurement)	1	
1.1.1.1.1.018	ATERIEL - NORMAL		MTEV03001
1.1.1.1.1.019	ns		
1.1.1.1.1.020	ms (Procurement)	1	

Global Change for LOE Status

From ANSI 748 A – Intent Guideline 12

"The earned value for level of effort work packages equal the time-phased budget"

- $BCWP$ (Earned Value Labor Units) = $BCWS$ (Planned Value Labor Units)
- $BCWP = BAC$ (Baseline Planned Units) x % Complete
- Therefore, to calculate LOE % Complete
 - **% Complete = Planned Value Units / Baseline Planned Units x 100**

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Global Change for LOE Status

Modify Global Change

Select Subject Area: Activities | Global Change Name: IPS - LOE - Update 2

If	Parameter	Is	Value	High Value
<input checked="" type="checkbox"/>	(All of the following)			
<input type="checkbox"/>	Where	BL Project Labor Units	is not equal to	
<input type="checkbox"/>	And	-EV Method	equals	LE
<input type="checkbox"/>	And	Activity Type	equals	Level of Effort

Then	Parameter	Is	Parameter/Value	Operator	Parameter/Value
<input checked="" type="checkbox"/>	Activity Status	=	In Progress		
<input checked="" type="checkbox"/>	And	Physical % Complete	=	Planned Value Labor Units /	BL Project Labor Units
<input checked="" type="checkbox"/>	And	Physical % Complete	=	Physical % Complete *	100

Else	Parameter	Is	Parameter/Value	Operator	Parameter/Value
------	-----------	----	-----------------	----------	-----------------

LOE % Complete is calculated so that $BCWP = BCWS$

Using this method, it is possible for a not-started activity to be greater than 0% complete or for a completed activity to be less than 100% complete

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Global Change for LOE Status

Modify Global Change

Select Subject Area: Activities
Global Change Name: IPS - LOE - Update 1

If	Parameter	Is	Value	High Value
<input type="checkbox"/>	(All of the following)			
Where	Activity Type	equals	Start Milestone	
And	BL Project Start	is less than or equals	DD	
And	-EV Method	equals	LE	

Then	Parameter	Is	Parameter/Value	Operator	Parameter/Value
<input type="checkbox"/>	Actual Start	=	BL Project Start		

Else	Parameter	Is	Parameter/Value	Operator	Parameter/Value
------	-----------	----	-----------------	----------	-----------------

Buttons: OK, Cancel, Change, Add, Delete, Cut, Copy, Paste, Help

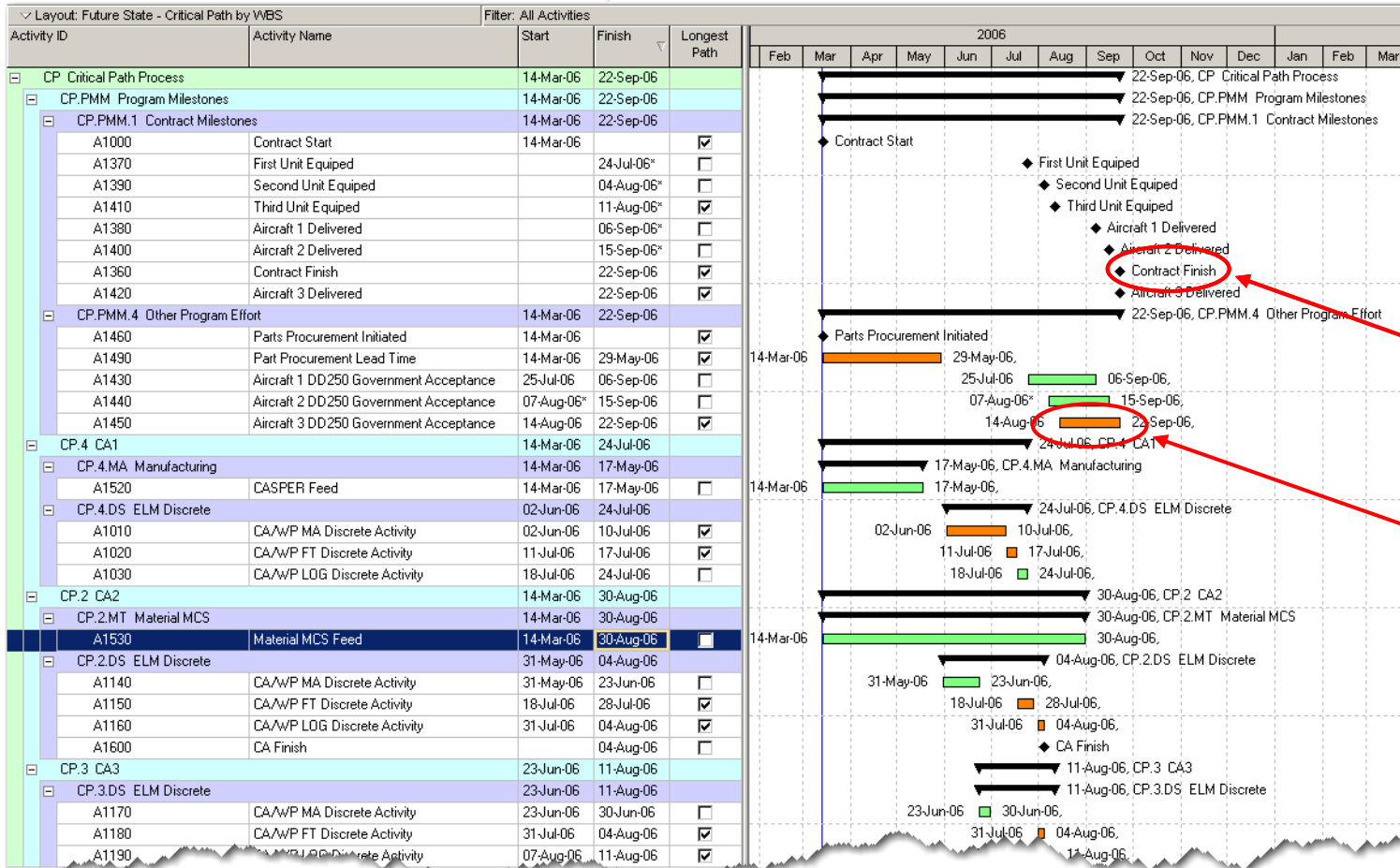
Global Change can compare to Data Date and start LOE activities in order to accept the performance calculation

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Improved CPM Analysis



Last activity =
Contract Finish

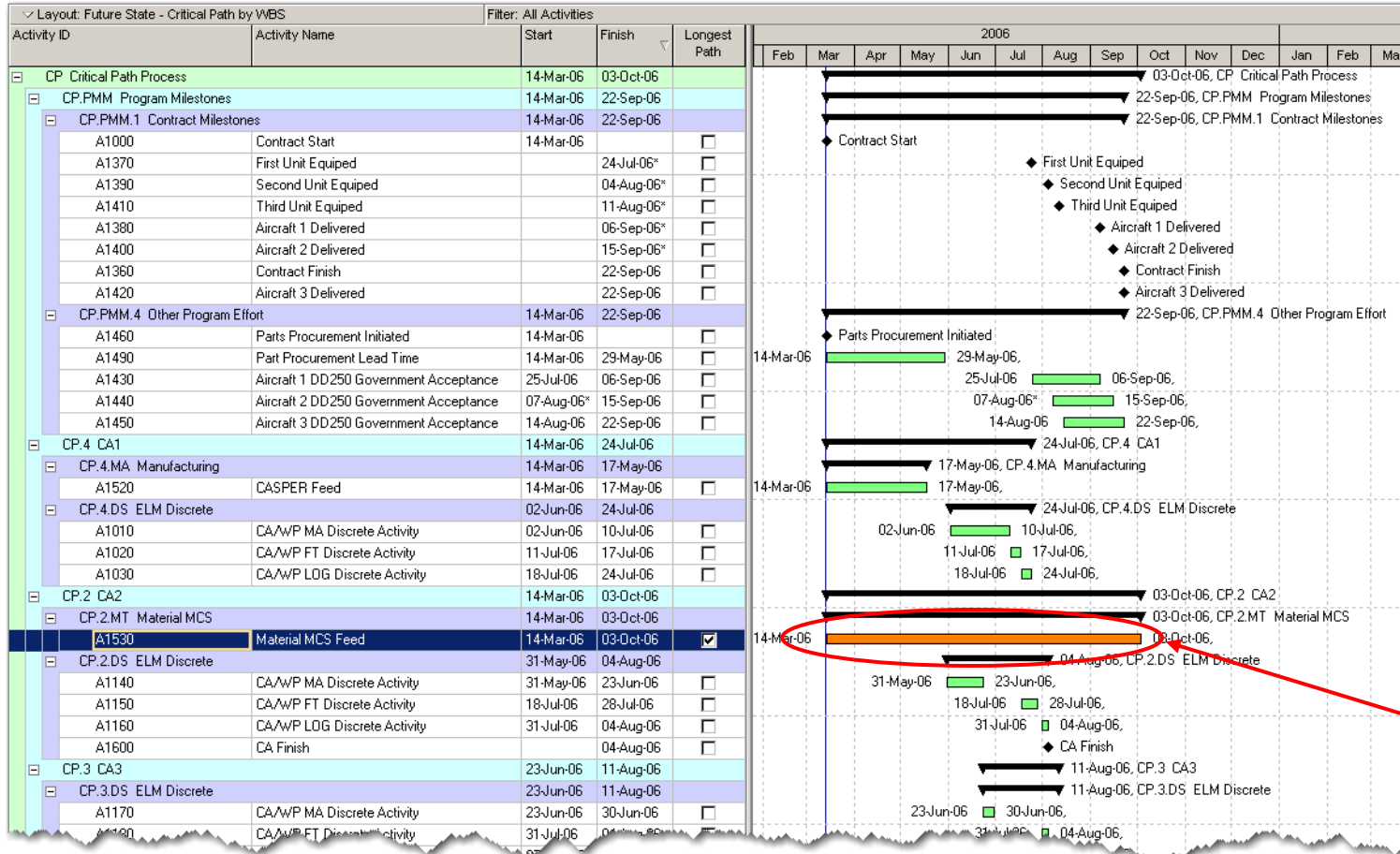
Longest Path
activities (orange)

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Improved CPM Analysis



Last activity =
Material Feed
(Longest Path)

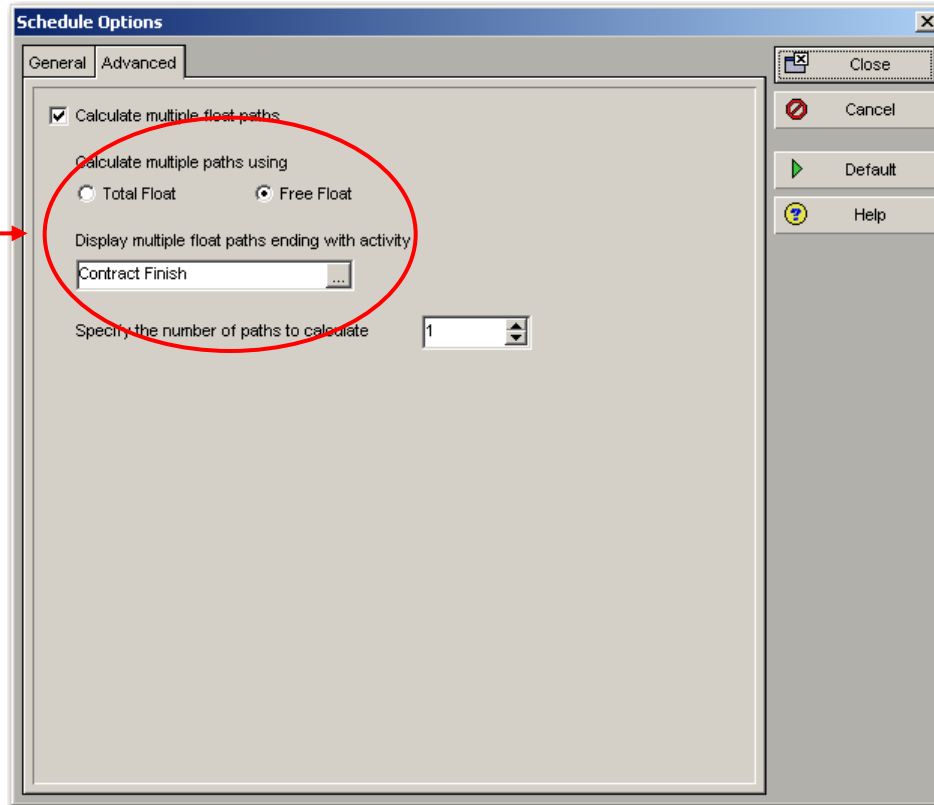
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Improved CPM Analysis

Calculates free-float path
to selected activity
(Contract Finish)

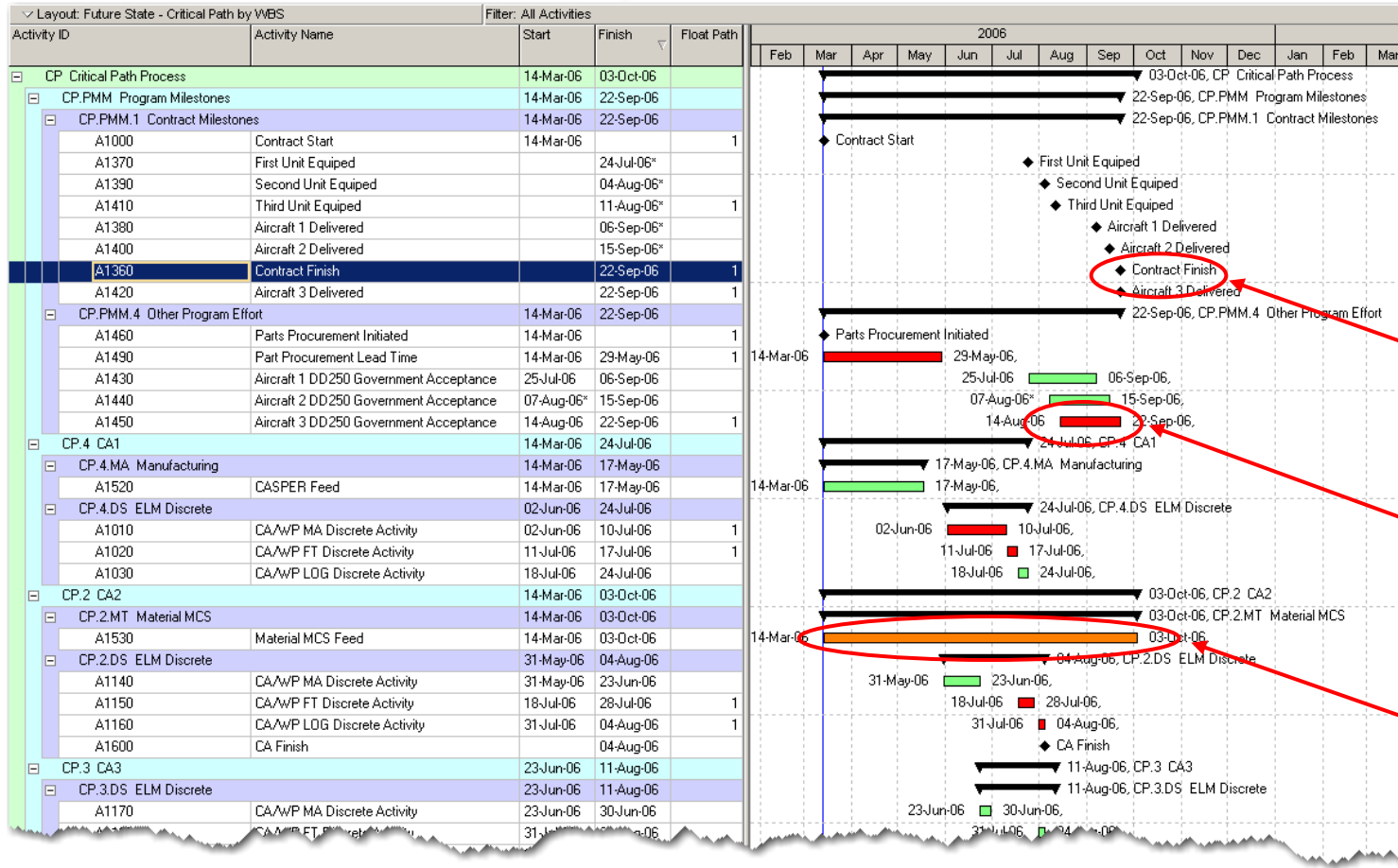


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Improved CPM Analysis



Selected activity

Float path calculation

Last activity =
Material Feed
(ignored by Float
Path calculation)

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Fiscal Calendars

Layout: Future State - Fiscal Month Spread			Filter: All Activities	Planned Labor Units	Planned Labor Units	FY2007						FY2008			
Activity ID	Activity Name	Planned Labor Units	FM6			FM7	FM8	FM9	FM10	FM11	FM12	FM1	FM2	FM3	FM4
[-] X-21 EMD BL 2007-09	X-21 EMD 2007-09 Baseline Project	153654			5665	3120	7661	7455	9695	10642	10762	12528	1049		
[+] X-21 EMD BL 2007-09.0	Program Milestones	0													
[-] X-21 EMD BL 2007-09.1	1000 - Aircraft System	153654			5665	3120	7661	7455	9695	10642	10762	12528	1049		
[-] X-21 EMD BL 2007-09.1.1	1100 - Air Vehicle	69225			4544	1900	4822	3567	5616	6644	6898	8037	540		
[-] X-21 EMD BL 2007-09.1.1.1	1110 - Airframe	48042				713	4665	3425	4117	4810	3704	5468	398		
[-] X-21 EMD BL 2007-09.1.1.1.1	1111 - Structures	10806				431	2310	1274	948	859	674	701	68		
[-] X-21 EMD BL 2007-09.1.1.1.1.1	[EVO1] Structures - (Engineering)	10337				431	2310	1274	948	817	635	676	45		
[-] X-21 EMD BL 2007-09.1.1.1.1.1.001	[3AE001] Structure Design Component A	424						22	234	166	3				
A67133209	Design - Structure Component A	277						22	199	55					
A67133210	XworX Release - Structure Component A	0													
A68201400	XworX Design - Structure Kit B	138							34	103					
A67133215	Expedited Parts Fab - Structure Component A	0													
A67133270	BEIMS Release - Structure Component A	5								5					
A68201405	XworX Release - Structure Kit B	0													
A68201410	Expedited parts Fab - Structure Kit B (Possible Xwor...	0													
A68201402	BEIMS Release - Structure Kit B	5								3	3				
[-] X-21 EMD BL 2007-09.1.1.1.1.1.002	[3AE002] Structure Design Component C	276							26	52	100	81	1		
A60170	Layout - Structure Component C	65							22	44					
A60220	Preliminary Stress Review	12							4	8					
A60222	Design - Structure Component C	126									84	42			
A60223	Final Stress Analysis and Drawing Review - Structure	24									16	8			

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Systems Integration

Application Conversion

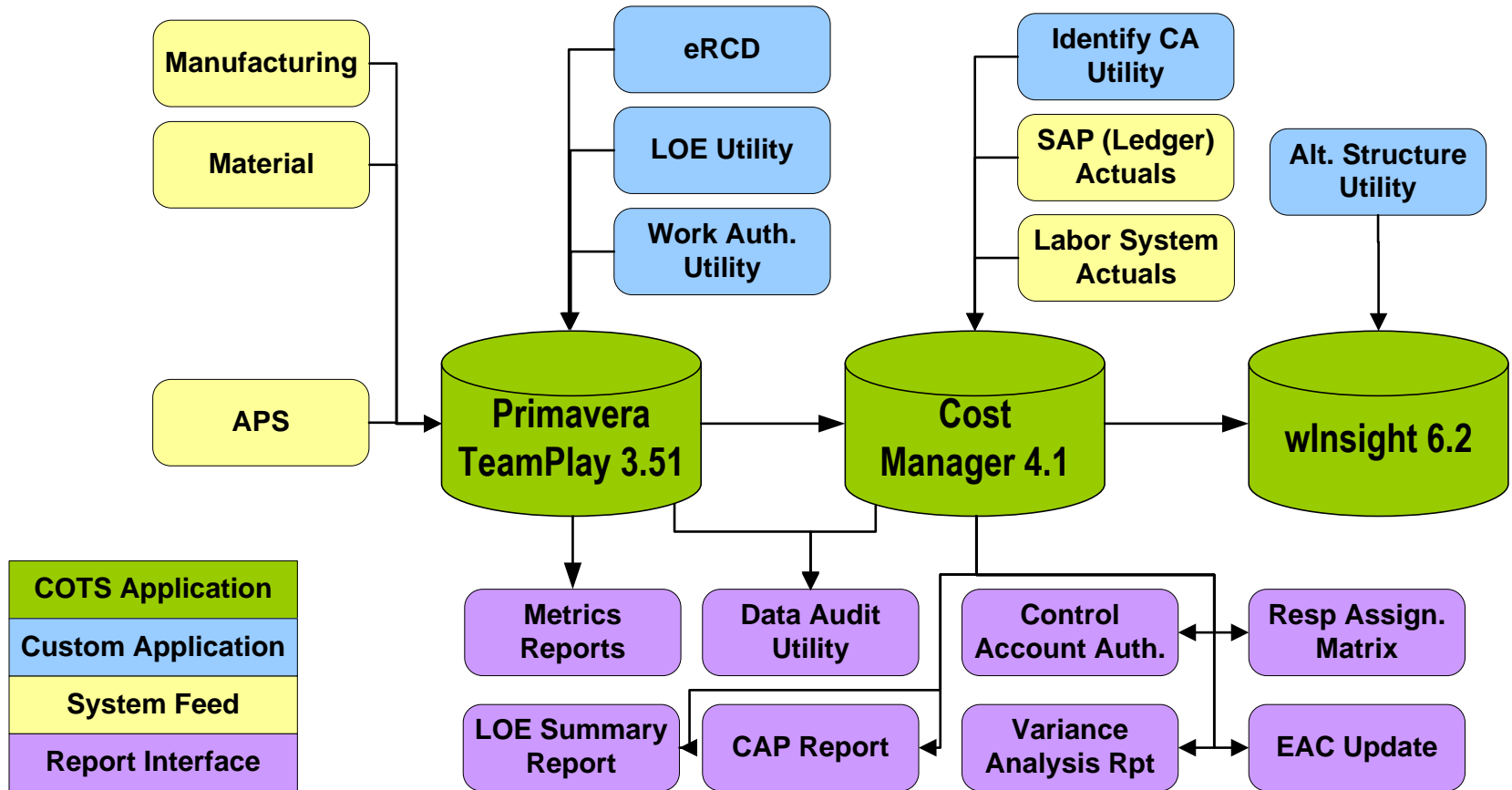
- Converting all interfaces from Visual Basic applications to Java Server based applications
 - Allows all applications to use a common framework and code-base
 - Improved performance and capabilities with the Primavera API
 - Standards-based, modular approach for enhanced maintainability
 - Maximize COTS features to reduce number of interfaces
 - Lower Total Cost of Ownership (TCO)

Integration Improvements

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Before Consolidation

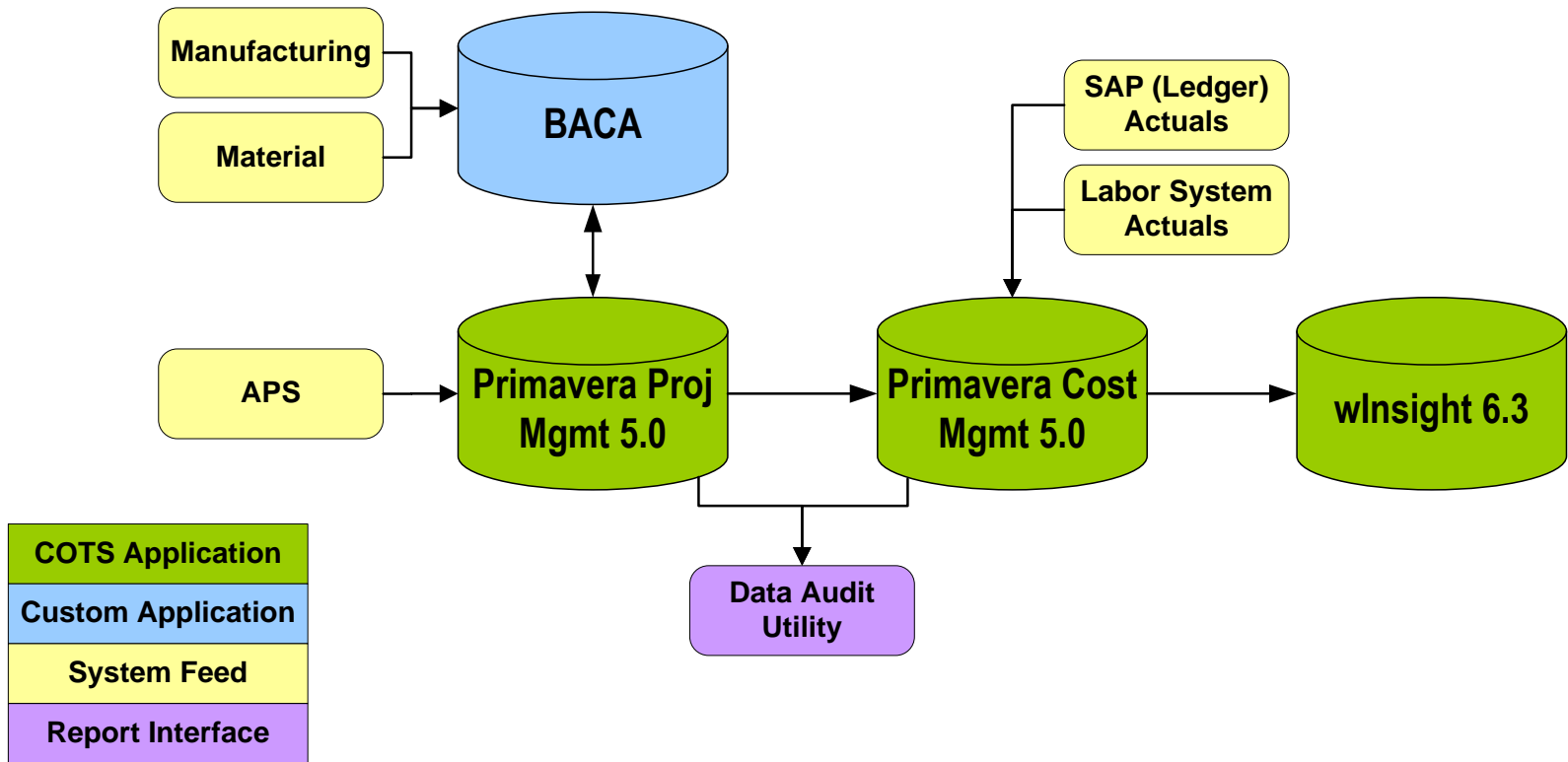


Integration Improvements

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After Consolidation



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Baseline Authorization & Control Application (BACA)

Baseline Authorization & Control Application (BACA)

- Used to authorize & distribute control account budgets
- Automates baseline changes in Primavera
- Electronic approvals & signatures (audit traceability)
- Automated CBB Log
- Establishes & controls charge numbers for labor system
- **Ensures compliance on Guidelines 3, 8, 9, 28, 29, 31 & 32**

Control Account Budgets & MR

Budget Alloc
Directed Guidelines

Bcr Num:
Control Account:
Eoc:
 Add

2006	2007	2008	2009	2010	MR %	PRTY
<input type="text"/> Hrs:	<input type="text"/> Hrs:	<input type="text"/> Hrs:	<input type="text"/> Hrs:	<input type="text"/> Hrs:	<input type="text" value="0"/>	<input type="checkbox"/>
<input type="text"/> \$:	<input type="text"/> \$:	<input type="text"/> \$:	<input type="text"/> \$:	<input type="text"/> \$:		

OK
 Cancel

CA	EOC	2006	2007	2008	2009	2010	SO DIRECT	SO TOTAL	MR %	MR TOTAL	PRTY
CA11	010 N/E 11	Hrs: 2 \$: 22	Hrs: 2 \$: 22	Hrs: 66 \$: 66	Hrs: 6 \$: 66	Hrs: 7 \$: 77	0	0	5	0.0	N
CA22	010 N/E 15	Hrs: 10 \$: 20	Hrs: 20 \$: 30	Hrs: 40 \$: 45.88	Hrs: 8 \$: 88.9	Hrs: 8 \$: 99	0	0	44	0.0	N
CA22	000	Hrs: 2 \$: 2	Hrs: 2 \$: 2	Hrs: 2 \$: 2	Hrs: 2 \$: 2	Hrs: 2 \$: 2	0	0	7	0.0	N
CA11	000	Hrs: 4 \$: 44	Hrs: 4 \$: 44	Hrs: 5 \$: 55	Hrs: 5 \$: 55	Hrs: 6 \$: 66	2500	5000	3	150.0	N

PRICE

Initial Control Account Planning

WBS Code	WBS Name	Control Account Flag	Charge #
X-21 EMD AP	X-21 EMD Project (Active Project - Post-IBR)		
X-21 EMD AP.0	Program Milestones		
X-21 EMD AP.1	1000 - Aircraft System		
X-21 EMD AP.1.1	1100 - Air Vehicle		
X-21 EMD AP.1.1.1	1110 - Airframe		
X-21 EMD AP.1.1.1.1	1111 - Structures		
X-21 EMD AP.1.1.1.1.1	[EV01] Structures - (Engineering)	1	
X-21 EMD AP.1.1.1.1.1.001	[3AE001] Structure Design Component A		3AE001
X-21 EMD AP.1.1.1.1.1.002	[3AE002] Structure Design Component C		3AE002
X-21 EMD AP.1.1.1.1.1.003	[3AE003] Provisions for Lights		3AE003
X-21 EMD AP.1.1.1.1.1.004	[3AE004] Airframe Mounted Tiedown Fitting		3AE004
X-21 EMD AP.1.1.1.1.1.005	[3AE005] Internal Loads		3AE005
X-21 EMD AP.1.1.1.1.1.006	[3AE006] IPT/EVM Support		3AE006
X-21 EMD AP.1.1.1.1.1.007	[ODCEV01] Other Direct Costs - Structures		ODCEV01
X-21 EMD AP.1.1.1.1.2	[EV57] Structures - (Manufacturing Engineering)	1	
X-21 EMD AP.1.1.1.1.2.001	[3AE095] Planning for Structure Component A		3AE095
X-21 EMD AP.1.1.1.1.2.002	[3AE099] Planning for Structure Component C		3AE099
X-21 EMD AP.1.1.1.1.2.003	[3AE100] Planning for Lights		3AE100
X-21 EMD AP.1.1.1.1.2.004	[3AE101] Planning for Airframe Mounted Tiedown Fitting		3AE101
X-21 EMD AP.1.1.1.2	1112 - Drive Systems		
X-21 EMD AP.1.1.1.2.2	[EV02] Drive Systems - (Engineering)	1	
X-21 EMD AP.1.1.1.2.2.001	[3AE007] Drive Systems		3AE007
X-21 EMD AP.1.1.1.2.2.002	[3AE008] Drive Systems Analytical Integration		3AE008
X-21 EMD AP.1.1.1.2.1	[EV03] Drive Systems (Procurement)	1	
X-21 EMD AP.1.1.1.2.1.001	MM - [200] MFG. MATERIEL - NORMAL		MTEV03001
X-21 EMD AP.1.1.1.3	1113 - Rotor Systems		
X-21 EMD AP.1.1.1.3.1	[EV04] Rotor Systems (Procurement)	1	

Initial Control Account Planning

BCR
Search BCR

Worksheet Summary
[Hide Header](#)

BCR Reason: CAM INITIATED BASELINE CHANGE

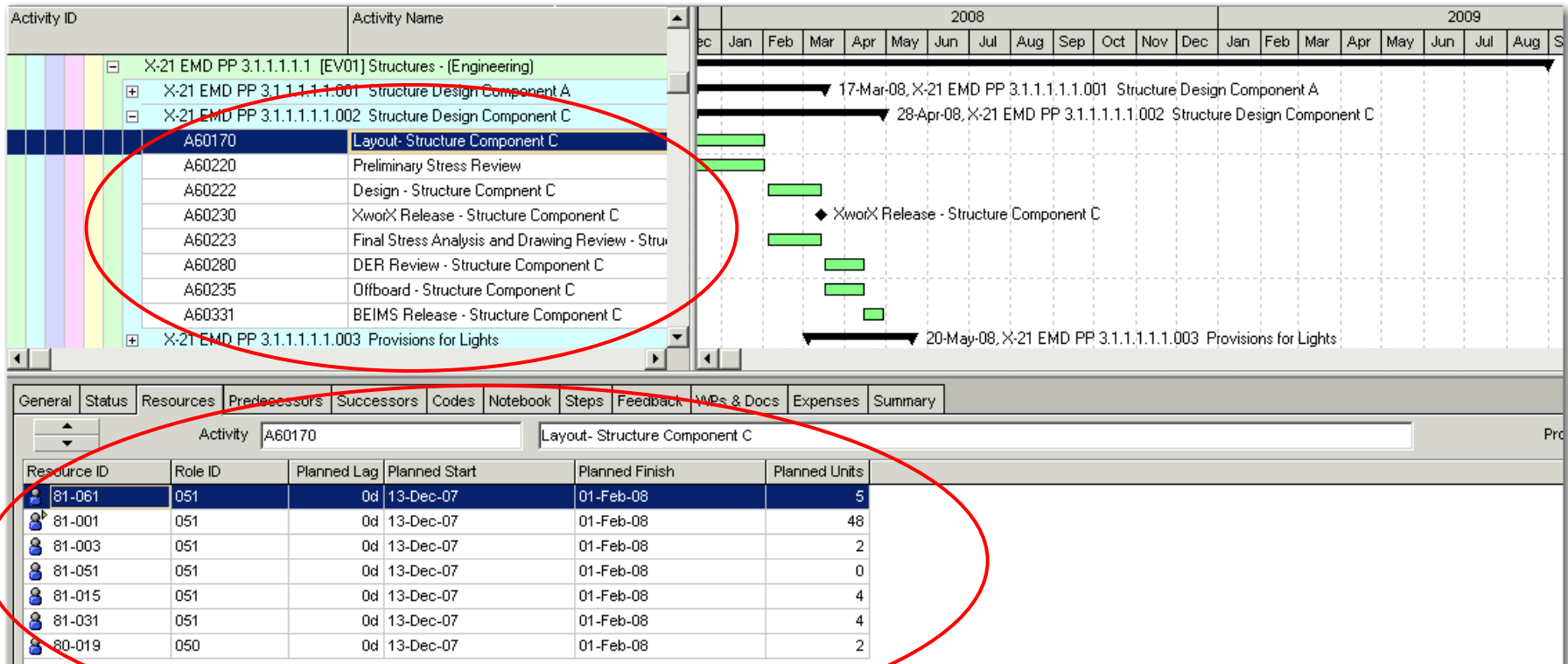
Status: BCR APPROVED

Description: Current door pocket design does not meet customer requirement to house Magic Lasso (ML), so pocket must be redesigned and electrical design changed to accommodate increased size of pocket.

Commit Re-Price Cancel BCR

			Current Budgets				Proposed Budget				BCR Var	VAR Desc
CA	CAM	Approval	Hours	Dir \$	Ind\$	Total\$	Hours	Dir \$	Ind\$	Total\$		
EV01	ii88888 Coombs, Sheila	APPROVED	10337	1,061,700	976,674	2,038,464	100637	1,091,700	1,004,364	2,096,064	(57,600)	Redesign door pocket
EV07	ii99999 Goldstein, Ron	APPROVED	3205	352,550	324,346	676,896	3405	374,550	344,550	719,136	(42,240)	Redesign electrical around larger door pocket
EV08	ii99999 Goldstein, Ron	APPROVED	7655	842,050	774,686	1,616,736	7905	869,550	799,987	1,669,536	(52,800)	Redesign electrical around larger door pocket
Planned Start			2007-09-28									
Planned Completion			2009-11-11									
Schedule Impacts			Final design will be delayed by 6 weeks.									
IPT/CA Impacts			EV01, EV07, EV08									
BCR Approval			PCA		IPT		IPS		CAM		Prog Mgr	
			Name Garner, Penelope	Status PENDING	Name Ambrosino, Jason Diez, Mike	Status APPROVED APPROVED	Name Eng. Yumi	Status APPROVED	Name Coombs, Sheila Goldstein, Ron	Status APPROVED APPROVED	Name Baker, Elizabeth	Status APPROVED

Initial Control Account Planning



CBB Logs

Contract Budget Base Detail Log

PROJECT NAME	APPROVAL DATE	ACCOUNTING PERIOD	BCR NUM	BCR REASON	CONTRACT COST	AUTHORIZED UNPRICED WORK	CONTRACT FEE	CONTRACT PRICE	CURRENT MR	TOTAL MR	CURR UB	TOTAL UB	DIRECT COST	INDIRECT COST	BCR TOTAL
X-21 EMD	11-AUG-2007	200708	450	BUDGET DISTR					732,796	732,796	(732,796)	19,611,795	216,627	516,169	732,796
X-21 EMD	05-AUG-2007	200708	351	SALES ORDER	20,219,591	125,000	2,100,000	22,319,591	0	0	20,344,591	20,344,591	10,899,222	9,320,369	20,344,591

1-2

Management Reserve Log

PROJECT NAME	APPROVAL DATE	ACCOUNTING PERIOD	BCR NUMBER	BCR REASON	CURRENT MR	TOTAL MR	DIRECT COST	INDIRECT COST	BCR TOTAL
X-21 EMD	11-AUG-2007	200708	450	BUDGET DISTR	732,796	732,796	216,627	516,169	732,796

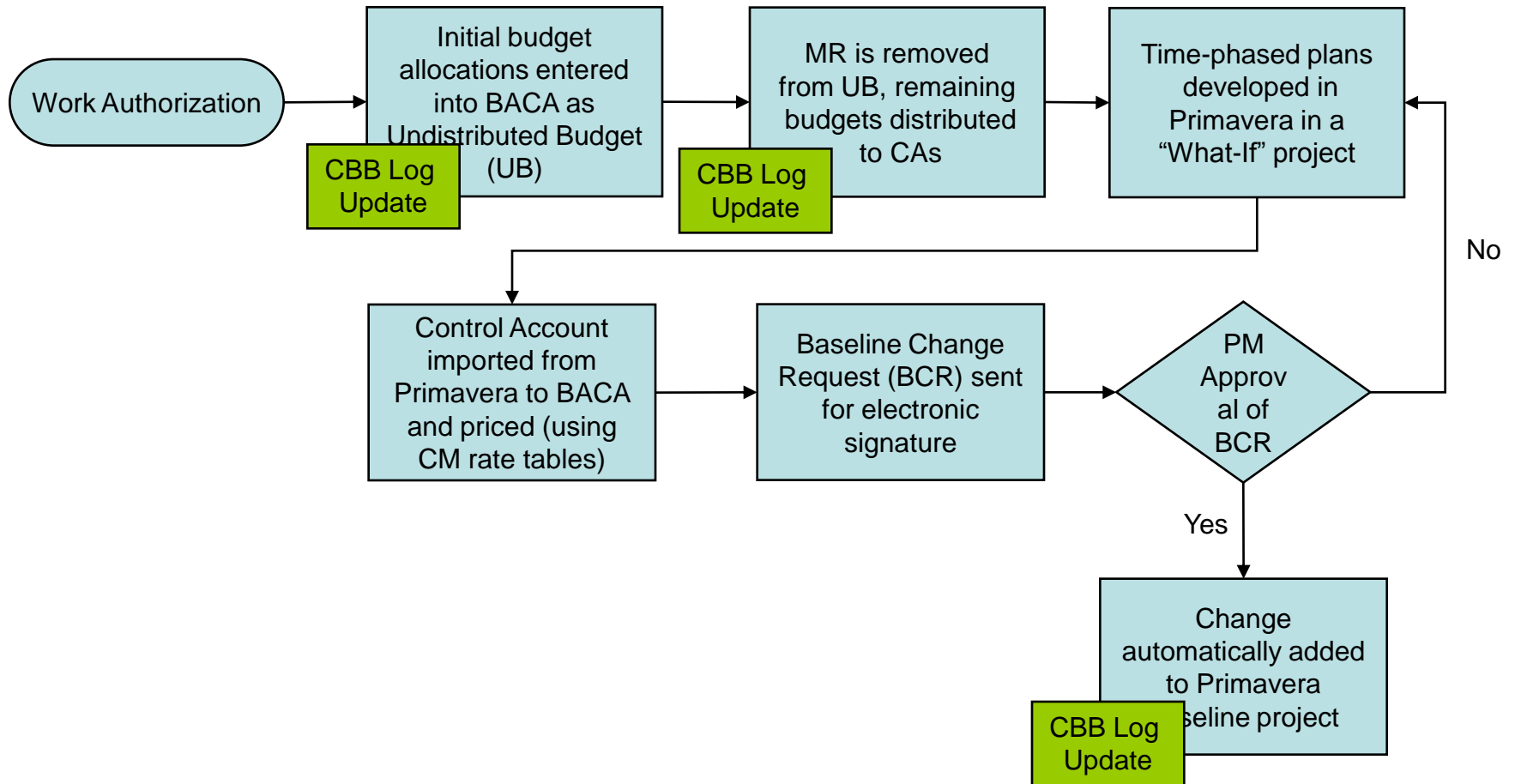
1-2

Undistributed Budget Log

PROJECT NAME	APPROVAL DATE	ACCOUNTING PERIOD	BCR NUMBER	BCR REASON	CURRENT UB	TOTAL UB	DIRECT COST	INDIRECT COST	BCR TOTAL
X-21 EMD	11-AUG-2007	200708	450	BUDGET DISTR	(732,796)	19,611,795	(216,627)	(516,169)	732,796
X-21 EMD	05-AUG-2007	200708	351	SALES ORDER	20,344,591	20,344,591	10,899,222	9,320,369	20,344,591

1-2

BACA Workflow



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Online EVMS Process Library

EZ-EV: Earned Value Made Easy

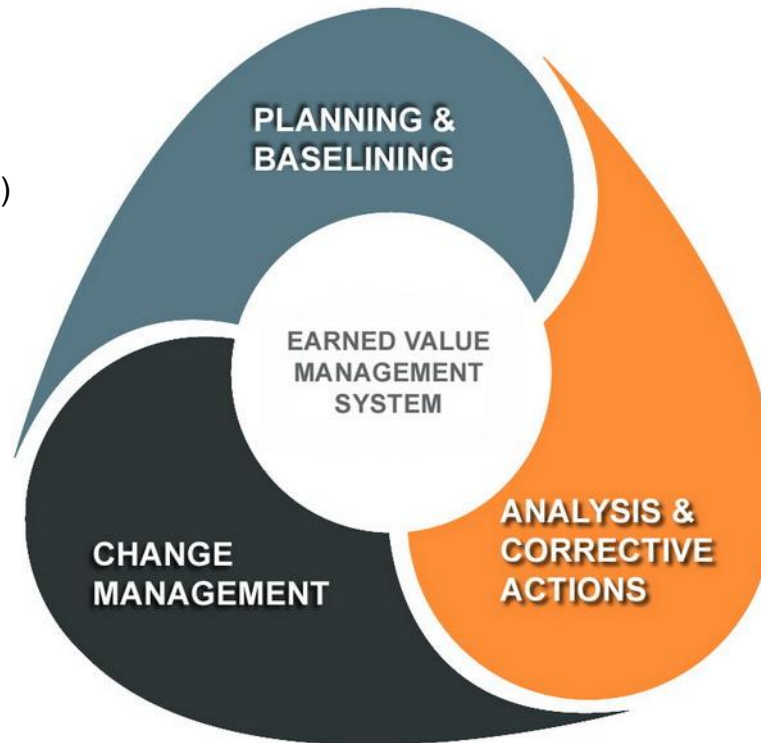
- Single source for tiered process information
- Divided into three key phases
 - Planning & Baselineing
 - Analysis & Corrective Action
 - Change Management
- EVM lifecycle work products identified by phase
- Incorporates process RAM (drill down by EV role)
- Integrated linkage between high-level business processes and low-level Primavera tool instructions



Work Product Oriented Approach

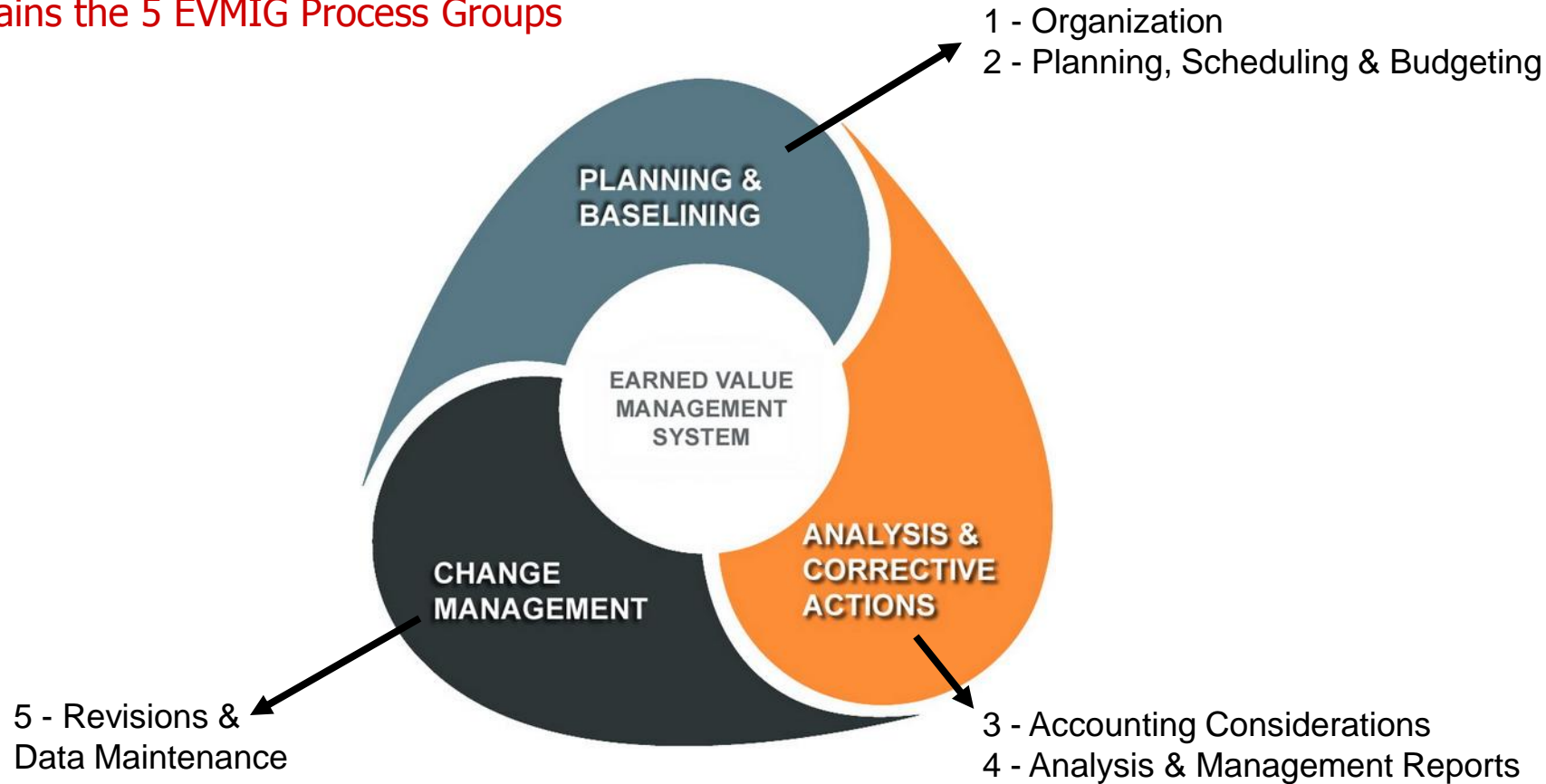
- WBS Dictionary
- RAM
- PMB
- CBB Logs
- Program Operating Instructions (POI)
- Integrated Master Plan (IMP)
- Integrated Master Schedule (IMS)

- Baseline Change Request (BCR)



- IMS Status
- Estimate At Complete
- Risk Management Database
- Corrective Action Plans
- Work Authorization Documents
- Charge Numbers
- CPR & Other Reports

Contains the 5 EVMIG Process Groups



Work Product Descriptions

Work Product Description Pages contain the following information:

- What is it?
- What does it do?
- Who is involved?
- Links to associated Work Instructions
- Example (if applicable)

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- Feedback / Suggestions / Help
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- 02-Roles and Responsibilities
- 03-EVMIG Process Groups
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 - WP 01-Sales Order Description
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 - WP 06-CCN Description
 - WP 07-WBS Dictionary Description
 - WP 08-IPT Structure Description
 - WP 09-RAM Description
 - WP 10-BCR Description
 - WP 11-Action Items List Description
 - WP 12-EV Performance Rpts Description
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 - WP 14-EAC Description
 - WP 15-CPR Description
 - WP 16-CAP Description
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- 08-Work Instructions
- 09-Special Topics
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- 11-Concepts
- 12-eLearning
- 13-Supporting Documentation

Work Product Description

WP 03 Integrated Master Schedule

What is it?

The *Integrated Master Schedule (IMS)* is an integrated Critical Path Method (CPM) schedule containing the logic-driven, detailed tasks necessary for successful program execution. The *IMS* is constructed to support all contract milestones and other key milestones defined by program management. The *IMS* is traceable to the *Integrated Master Plan (IMP)* events, the *Work Breakdown Structure (WBS)*, and the *Statement of Work (SOW)*.

When resources are applied to detailed *IMS* activities that are linked to Work Packages, the *IMS* provides a mechanism for developing Control Account budgets and for assessing Earned Value as work is performed.

What does it do?

The *IMS* is a vital tool that is essential to the achievement of successful programs. The following is a list of just a few of the ways the *IMS* aids in effective program management:

- Defines a detailed methodology for completing all required work
- Breaks work down into specific tasks that need to be performed and specifies anticipated and actual start and completion dates
- Identifies the types and quantities of resources needed to do specific tasks and when the resources need to be available
- Identifies "bottlenecks" that have the potential to affect work progress
- Shows how all tasks affect other work efforts
- Provides a measurement of progress at detailed and summary levels
- Enables budgets to be integrated with schedules
- Enables objective measurement of Earned Value

Who is involved in its preparation?

CAM	CSA	IPS	IPT Lead	Prog Mgr
A, L, S	S	S	A, S	A

A = Authorize, Approve, Verify, (i.e. signature or formal confirmation required)
 L = Lead or Coordinate the effort required to produce or issue the Work Product
 S = Provide Support (Data, Advice, Administrative, or Other)

Where is it discussed in Work Instructions?

Phase	WI	Lead	Work Instruction Name
J: Planning and	L02-a	Prog Mgr	Develop the IMS

Work Instructions

- Each Work Instruction is tied to one of the Work Products
- Each Work Instruction contains the following information:
 - Process owner
 - Objective
 - Participants and responsibilities
 - Process summary
 - Process steps and responsibilities
 - Business rules
 - Applicable EVMS Guidelines and EVMIG interpretations

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 - 01-Sales Order
 - 02-Integrated Master Plan
 - 03-Integrated Master Schedule
 - WI I.03.a Develop the IMS**
 - WI I.03.b Establish IMS Logic and R
 - WI I.03.c Integrate the IMS
 - WI II.03.a Status the IMS
 - WI II.03.b Analyze Schedule Status
 - WS I.03.a Develop the IMS
 - WS I.03.b Establish IMS Logic and f
 - WS I.03.c Integrate the IMS
 - WS II.03.a Status the IMS
 - WS II.03.b Analyze Schedule Status
- 04-Contract Budget Base Log
- 05-Program Operating Instruction
- 06-Cost Collection Numbers
- 07-WBS and WBS Dictionary
- 08-IPT Structure and IPT Charter
- 09-Responsibility Assignment Matrix
- 10-Baseline Change Request
- 11-Action Items List
- 12-EV Performance Reports
- 13-Variance Analysis Reports
- 14-Estimate at Completion
- 15-Contract Performance Report
- 16-Control Account Plan
- 17-Meetings and Reviews
- 09-Special Topics
- 10-Work Aids
- 11-Concepts
- 12-eLearning

Work Instruction

I.03.a **Develop Preliminary *Integrated Master Schedule (IMS)* Structure**

[Click HERE](#) to view the IMS Product Description

Process Owner: Integrated Program Scheduler

Objectives

- Establish the Program Cost, Schedule, and Reporting Infrastructure.
- Establish the Milestone schedule for the Program based on the IMP.

Participants and Roles

CAM	CSA	EVM COE	IPS	IPT Lead	Prog Mgr
A, S	S	S	L	A, S	A

A = Authorize, Approve, Verify, i.e. signature or formal confirmation required)
L = Lead or Coordinate the effort required to produce or issue the Work Product
S = Provide Support (Data, Advice, Administrative, or Other)

Process Summary

The Integrated Master Schedule (IMS) is an integrated Critical Path Method (CPM) schedule containing the logic driven, detailed tasks necessary for successful program execution. The IMS is constructed to support all contract milestones and other key milestones defined by program management. The IMS is vertically traceable to the Integrated Master Plan (IMP) events, the Work Breakdown Structure (WBS), and the Statement of Work (SOW). The IMS is used to assess the attainability of contract objectives, to evaluate progress toward meeting program objectives, and to integrate the schedule activities across the program. This Work Instruction focuses on setting up the PPM scheduling database with all the elements required to load the detailed tasks, work packages, resources, and logic as identified by the CAMs.

Related Sub-Processes and Responsibilities

[Click icon to view interactive Swim Lane Workflow](#)

Sub-Process	Role	Sub-Process Summary
predecessor		WI I.02.a Review IMP with PMO
		WI I.03.a Establish IMS Logic and R

Work Instruction

I.03.a Develop the Preliminary *Integrated Master Schedule (IMS)*

Click [HERE](#) for a printable PDF version of the Swimlane Workflow.

Click [HERE](#) to view detailed Work Instruction.

- As you mouse-over the boxes in the Process Overview, you will see your mouse change to a hand . This means you can click through to view more details on this aspect of the flow.
- To return to this workflow, simply click the "Back" button on your browser.

Develop Preliminary IMS Structure

I.03.a

```
graph TD; IMP[IMP I.02.a] --> S1[Step 1: Establish Cost & Schedule Infrastructure for IMS]; S1 --> S2[Step 2: Define WBS Elements in IMS]; S2 --> WBS[WBS];
```

Work Aids

- Process Work Aids contain:
 - Explanations
 - Checklists
 - Links to Application Work Aids
- Application Work Aids contain:
 - Step-by-Step instructions including application screenshots
 - Links to other Work Aids

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A Textron Company


Work Aid: Primavera Project Management

Updating Remaining Duration on Activities

This work aid assists users in updating the Remaining Duration of activities in a Primavera Project Management (PPM) project.

1. [Launch Primavera Project Management](#). [link to work aid: Launching PPM](#)
2. [Open the project](#).
3. [Navigate to the Activities View](#).
4. [Open the Layout: Weekly Project Update](#).
5. Highlight the activity that you wish to update in the Activity Table.
6. Select the **Status** tab.
7. Under the Duration panel type the remaining duration in the space next to the Remaining field.

Note: You can display the Remaining Duration field by [adding it as a column](#) to the Activity Table.



8. The resulting finish date shown in the Finish field is computed as the Data Date plus the number of work days shown in the Remaining field (calculated on the activity's calendar).

Note: You can also enter the finish date by highlighting the text in the finish date field and typing directly over the date. This will compute the required Remaining Duration.

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Customized Role-Based Training

Product-Oriented, Role-based Process & Tools Training

- Training answers the question “How do I do my job?”
 - Unique track for each EVM role
 - Integrates understanding of compliance throughout
 - Provides OJT roadmap for supervisors & leads
- Integrated Process & Tool Training
 - Process and tool training integrated into the same courses
 - Courses organized around Work Products in the EVM Lifecycle
- Modular approach to limit classroom time and allow for refresher/remedial training in key process areas

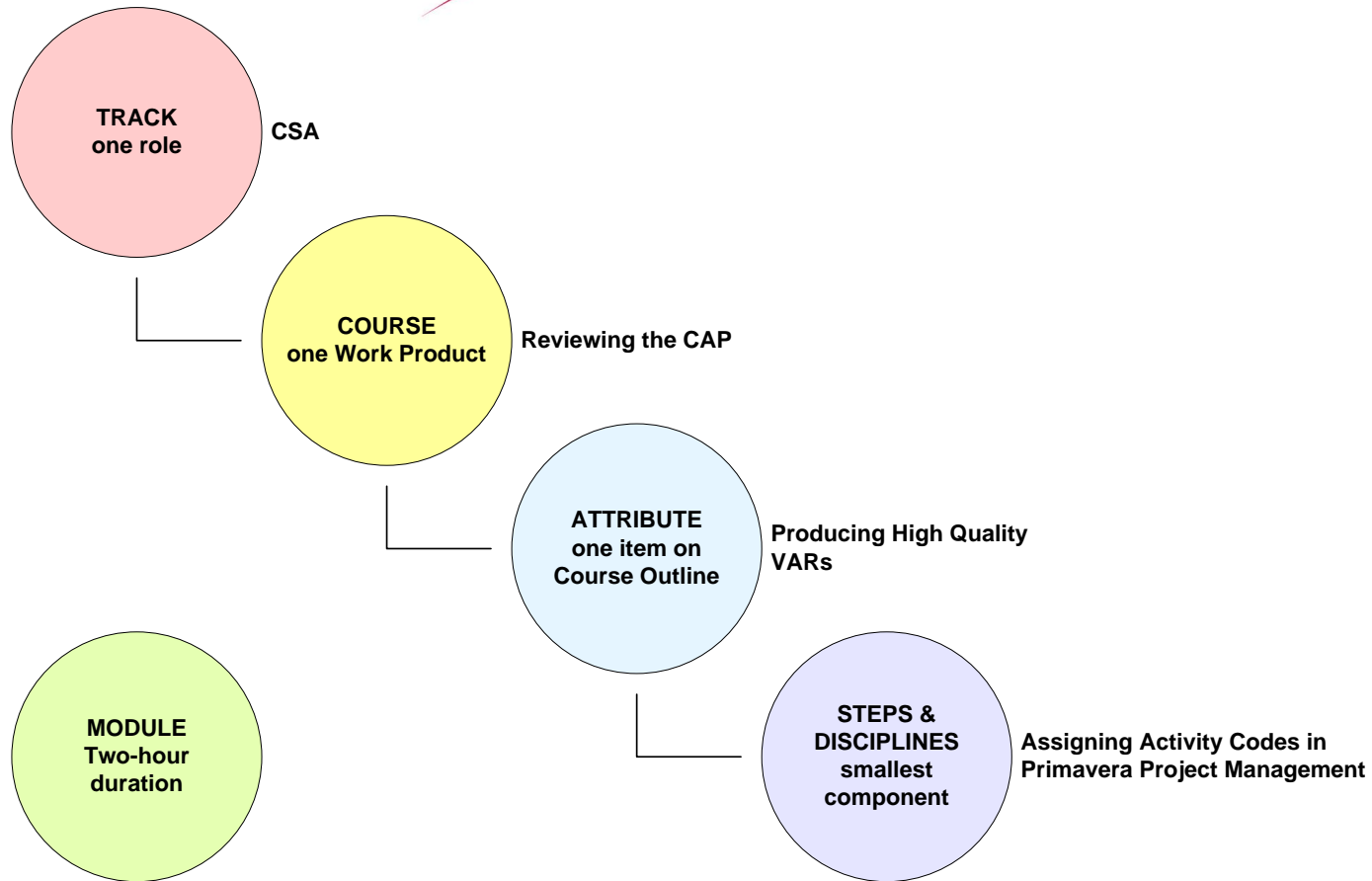
EVMS Roles to be Trained

- Program Manager
- Business Manager
- Performance Manager
- Integrated Program Scheduler (IPS)
- Cost/Schedule Analyst (CSA)
- Material Analyst
- Manufacturing Analyst
- Program Controls Analyst (PCA)
- IPT Lead
- Control Account Manager (CAM)
- Work Package Manager (WPM)
- Functional Manager
- EVMS Center of Excellence (COE)

Custom Role-based Training

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Track: CSA

Course 1: EVM Overview CBT
Course 2: CPM Overview CBT
Course 3: BHTI Roles and EVM
Lifecycle CBT

Course 4: The Role of the Cost
Schedule Analyst
Course 5: Control Account
Authorization
Course 6: Integrated Master
Schedule
Course 7: EV Performance Reports
etc

Track: Program Manager

Course 1: EVM Overview CBT
Course 2: CPM Overview CBT
Course 3: BHTI Roles and EVM
Lifecycle CBT
Course 4: The Role of the Program
Manager
Course 5: Contract Budget Base Log
Course 6: Program Implementing
Instructions
Course 7: IPT Structure/IPT Charter
etc

Custom Role-based Training

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Course: Variance Analysis Report for CSAs

Attribute 1: VAR Overview

Attribute 2: VAR in the EVM Lifecycle

Attribute 3: Processes to produce the VAR

Attribute 4: Systems to produce the VAR

Attribute 5:

- 5.1 Types of Variance, etc.
- 5.2 VAR Workflow
- 5.3 Identify & Analyze Variances in Primavera Project Management
- 5.4 Exercise: Identify Significant Variances in Sample Project

Attribute 6: High-Quality VARs

Attribute 7: Regulations related to the VAR

Course: Variance Analysis Report for CAMs

Attribute 1: VAR Overview

Attribute 2: VAR in the EVM Lifecycle

Attribute 3: Processes to produce the VAR

Attribute 4: Systems to produce the VAR

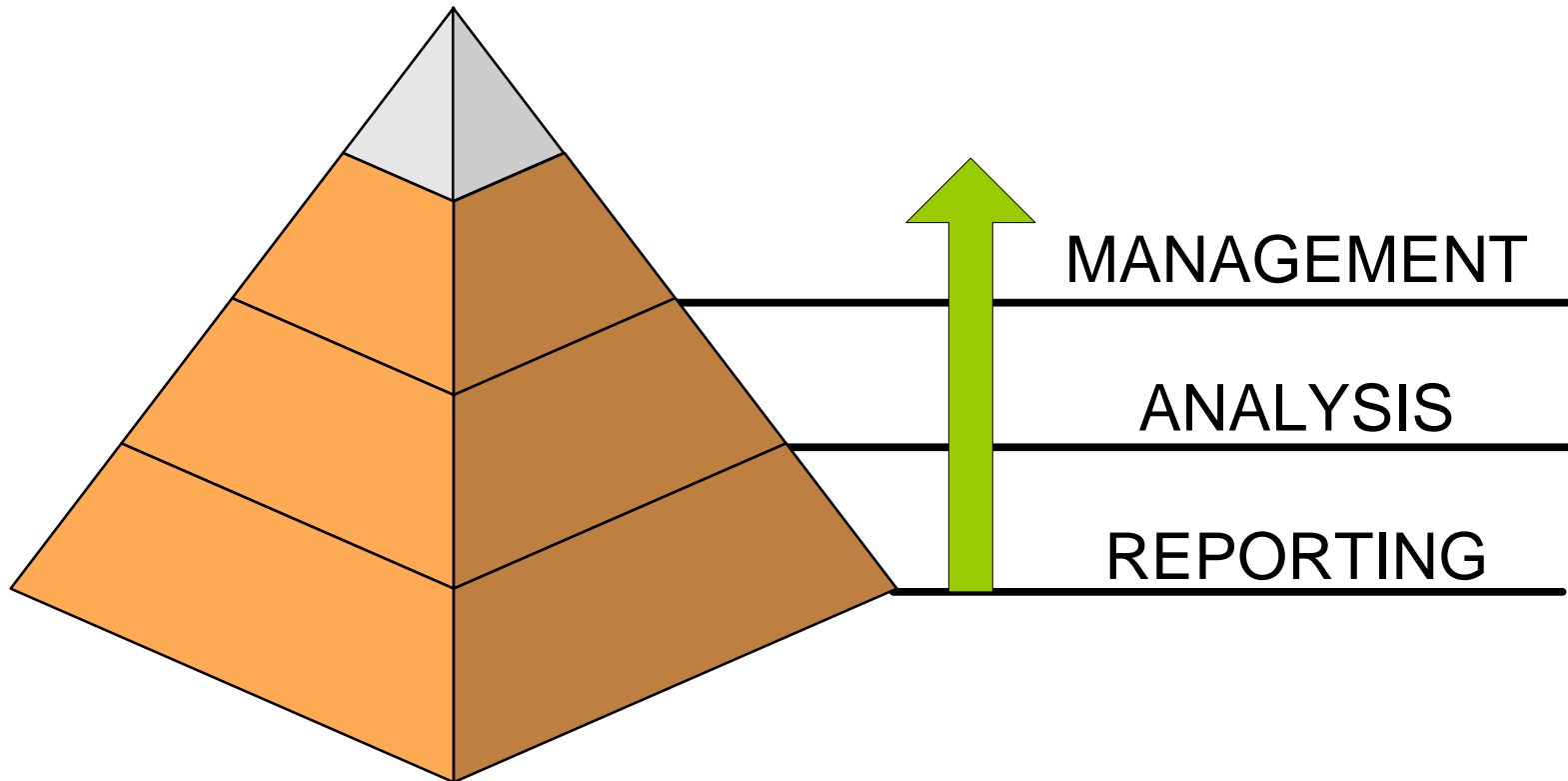
Attribute 5:

- 5.1 Types of Variance, etc.
- 5.2 VAR Workflow
- 5.3 Enter Variance Explanations in wInsight
- 5.4 Exercise: Write a Variance Explanation for Sample Project

Attribute 6: High-Quality VARs

Attribute 7: Regulations related to the VAR

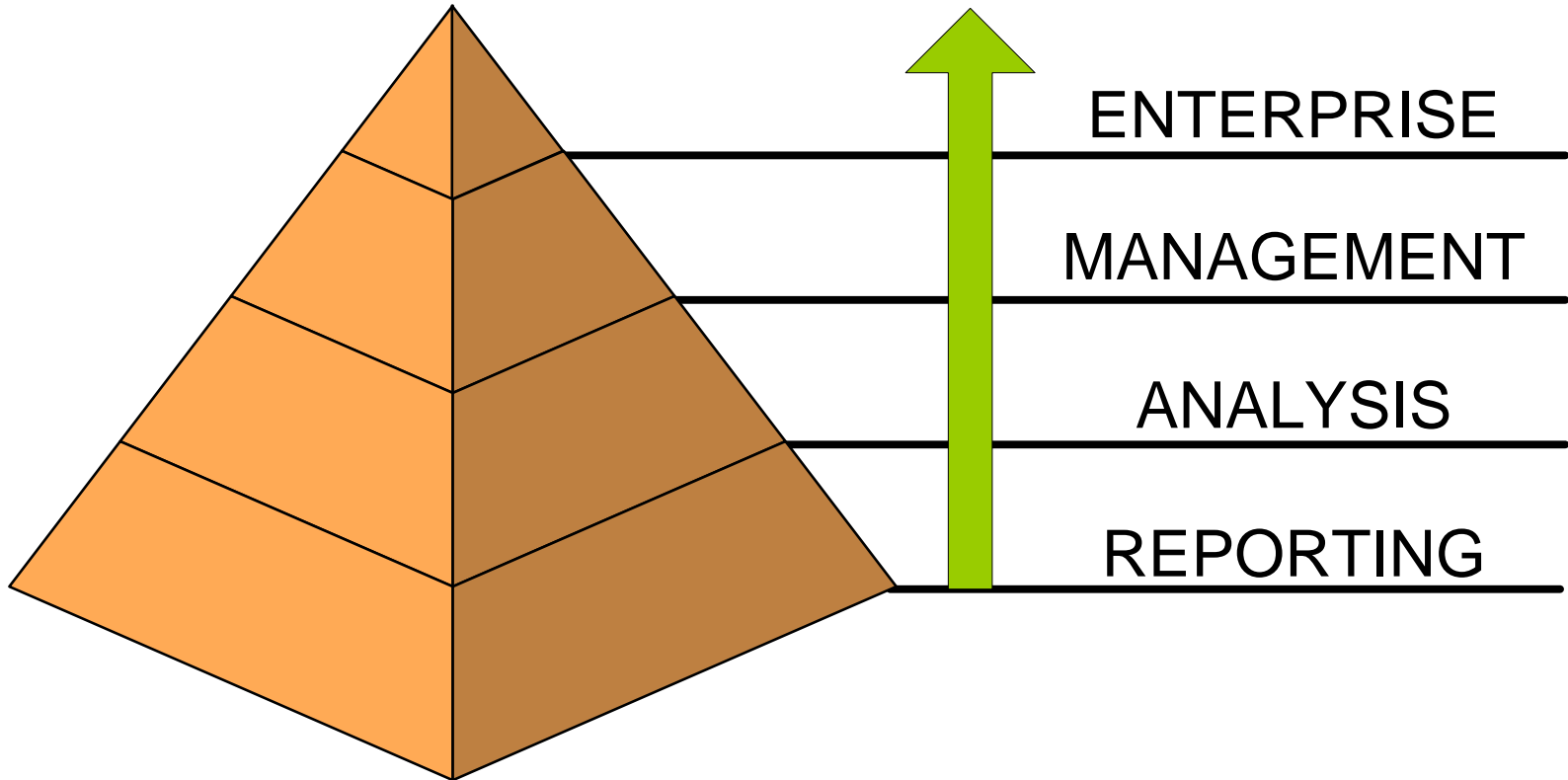
Organization Evolution of an EVM System



What's Next for Bell Helicopter?

- Enterprise Cost Management Integration (Business Intelligence)
- Risk Management
- SAP Integration
- Project Portfolio Management
- Enterprise Resource Management

Organization Evolution of an EVM System



Questions?

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Q & A

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