



Project Controls

E X P O

Project Controls Expo – 13th Nov 2013
Twickenham Stadium, London

EVM for the Rest of Us



Project Controls
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About the Speaker

Javier Sloninsky

- ❑ CEO of EcoSys - powerful, easy-to-use enterprise project controls software
- ❑ Helping Global 1000 companies and government agencies to measure, forecast, and improve project performance
- ❑ Over 16 years of leadership and hands-on experience in the commercial software industry
- ❑ Software Designer/Developer at Eagle Ray Software Systems where he helped develop the software now known as Primavera P6.

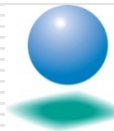
Agenda

- Earned Value Management Fears and Hopes
- Critical Success Factors to EVM
- Elements of EVM
- Transitioning from Compliance to Standard Business Practice
- Recap and questions

EcoSys Company Background

- **Founded in 2000 – Enterprise Control Systems**
- **Enterprise Project Controls Software Experts**
Designers & Developers of original Primavera P6 and EcoSys EPC
- **Implementation of Project Controls Best Practices**
- **Strong Technology and Implementation Partner Networks**
- **Global Standard for Leaders in Industry and Public Sector**

EcoSys Representative Customers



Is EVM Really This Scary?

Overhead
Difficult
Unintelligible
Inappropriate
Mine field
Incorrect
Headaches



Earned Value Management Simplified

What is EVM for the Rest of Us?

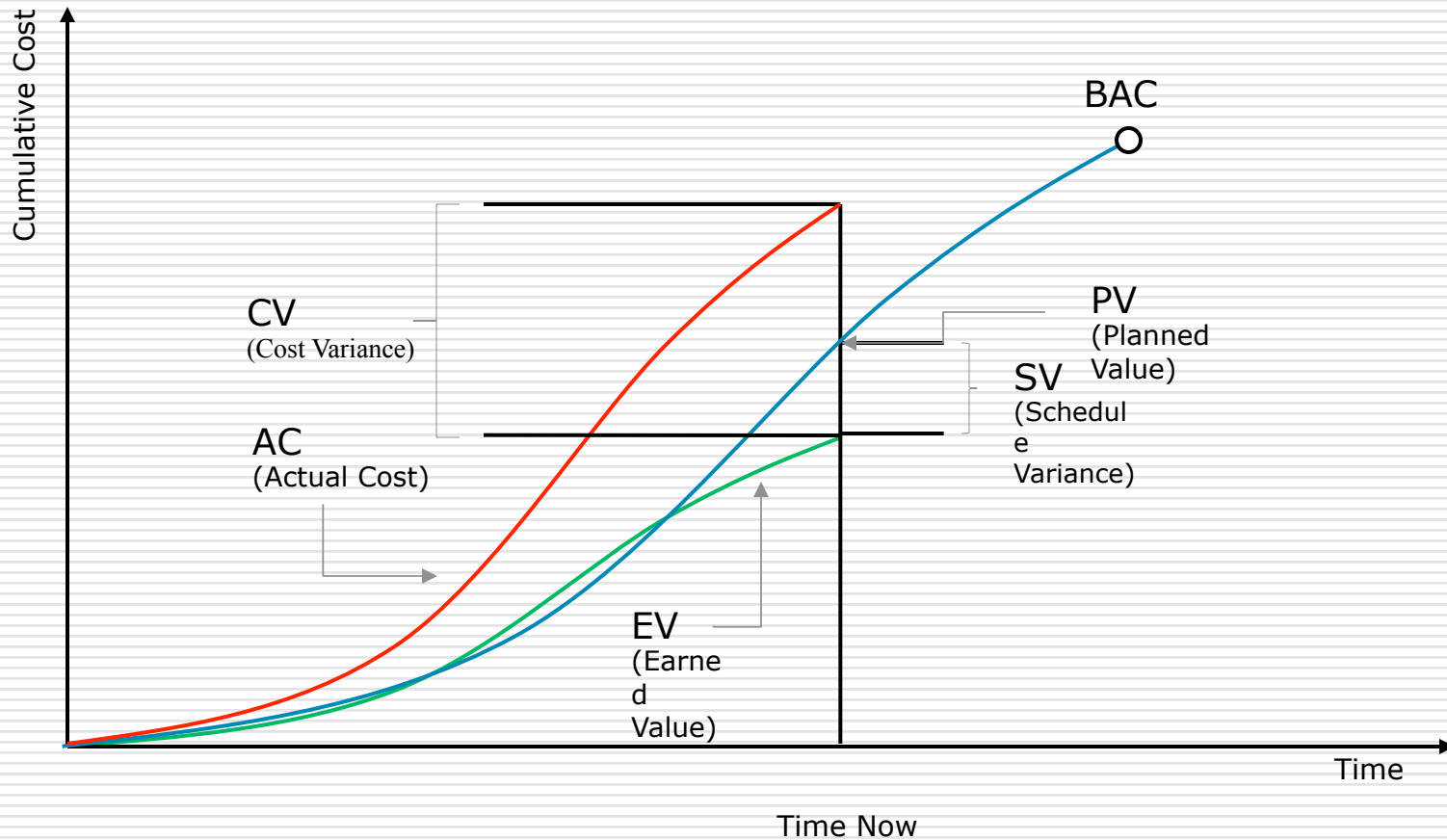


- Earned Value is a measure of project performance comparing work completed against work planned, as of a given date.
- Earned Value Management is using Earned Value to measure, forecast, and improve project performance.
- Principles of EVM are positive predictors of project success.
- **EVMFRU: Focus on those principles and remove anything extraneous.**

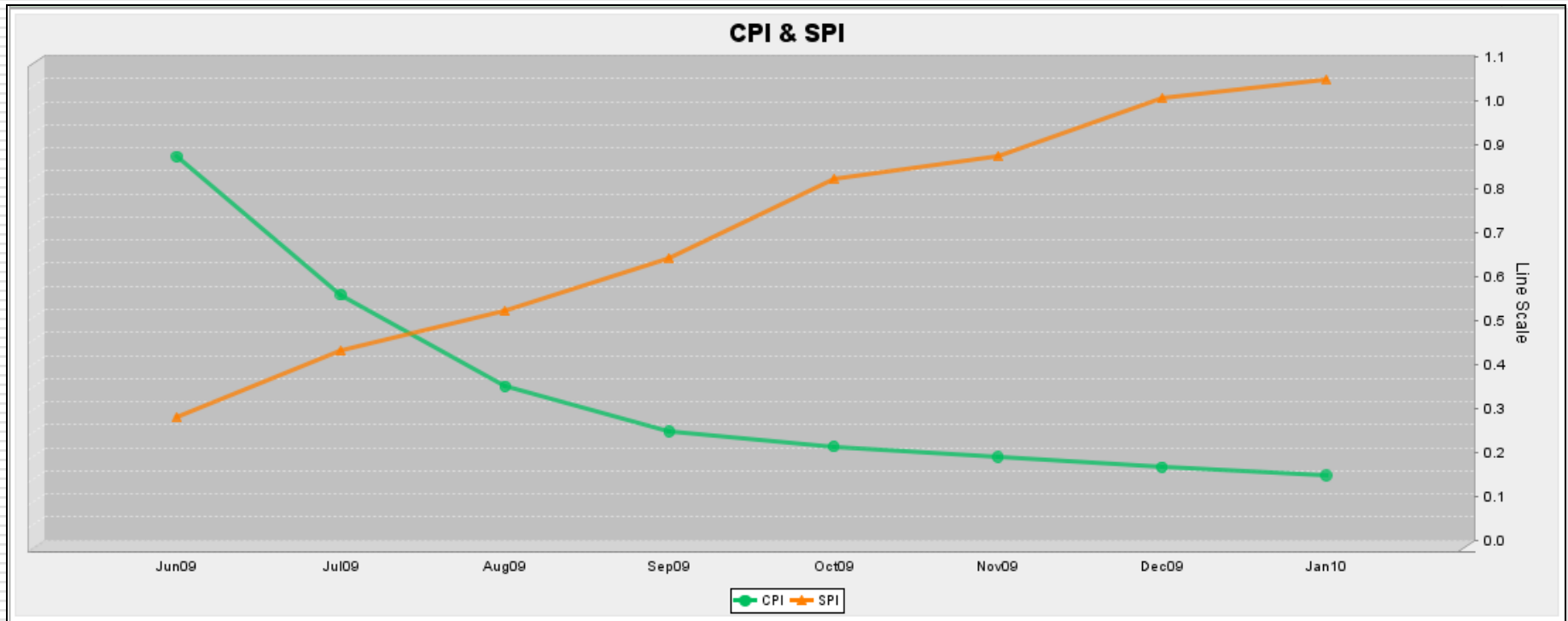
Why is EVM valuable?

It is a good way to measure progress.

Why is EVM valuable?



Why is EVM valuable?



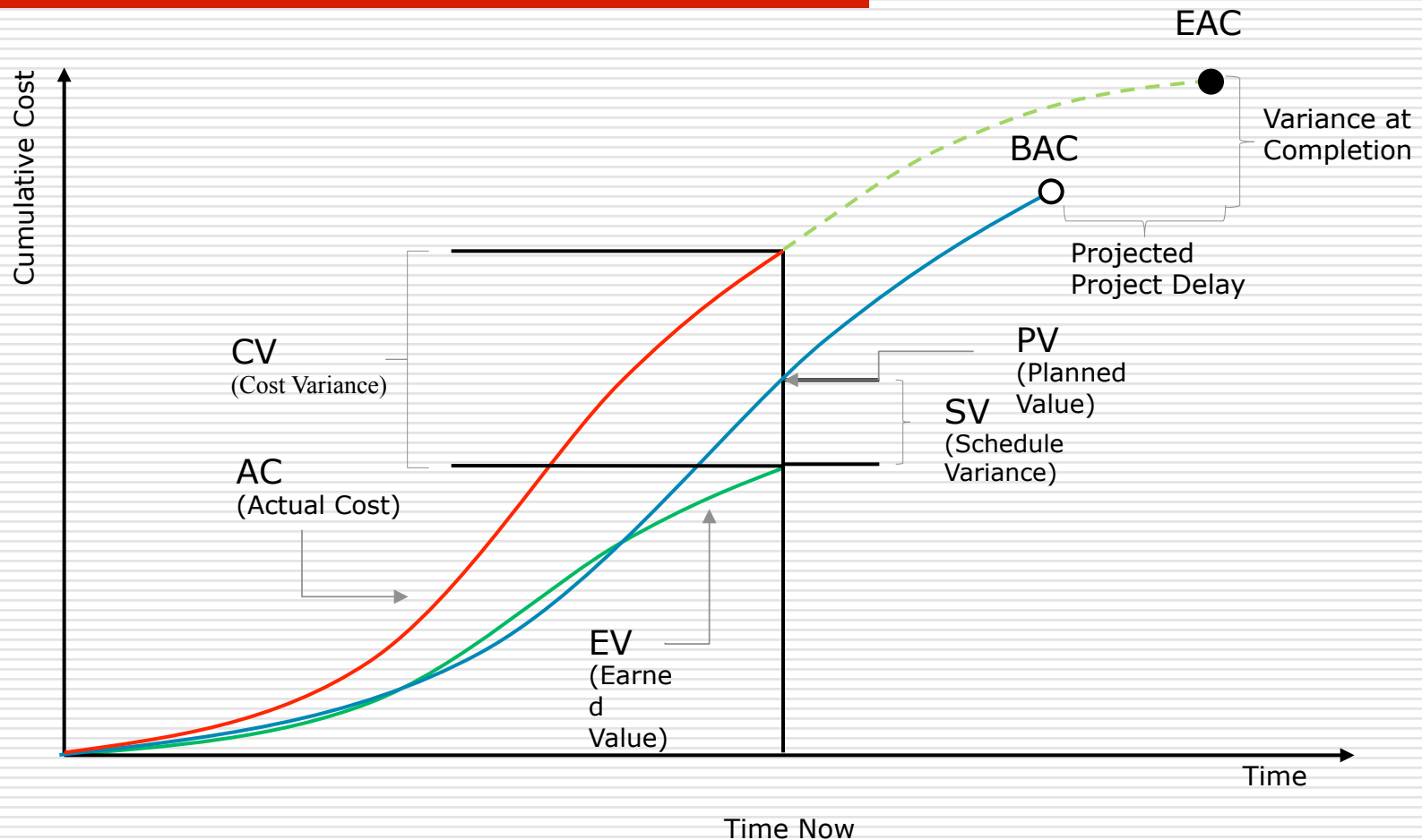
Why is EVM valuable?

It is a very good predictor based upon past performance.

The cumulative CPI is known to stabilize once a project is twenty percent complete and “will not likely change by more than plus or minus 10% at the point of project completion”

(Fleming, Q. W., and Koppelman, J. M. (2006). Earned Value Project Management).

Why is EVM valuable?



Why is EVM valuable?

It leads to better scope definition

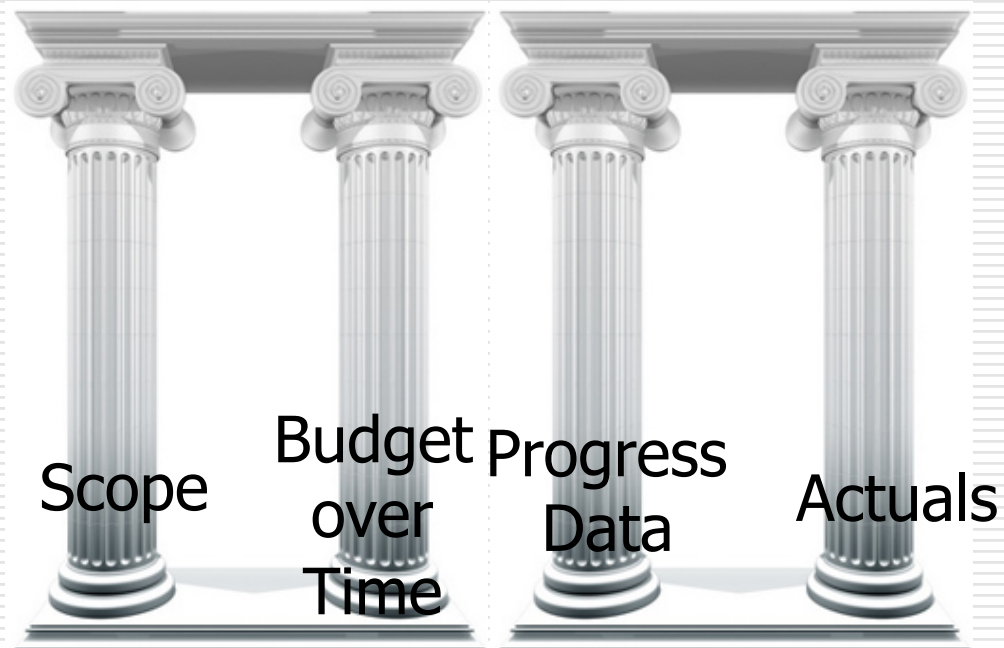
Based on a survey of 534 managers, over 70 percent agree that "a major benefit of the criteria is more thorough planning than would otherwise be accomplished."

(Little, Arthur D.. "Survey Relating to the Implementation of Cost/Schedule Control Systems Criteria Within the Department of Defense.")

Critical Success Factors to EVM

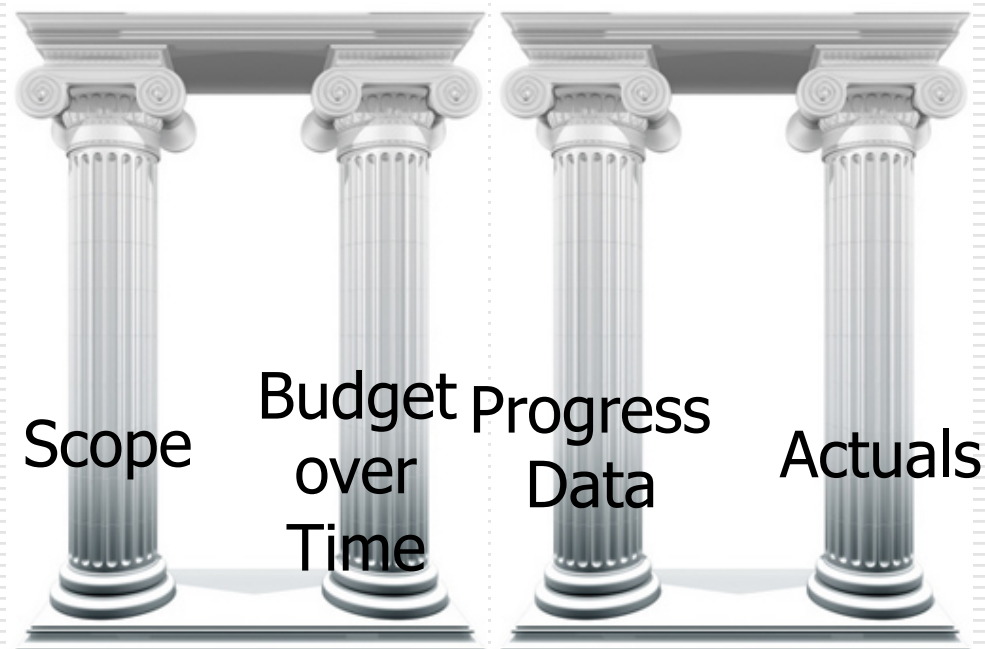
- 1.It builds on a solid project controls framework.
- 2.It's user friendly.
- 3.Efficient and integrated with project controls lifecycle.
- 4.EVM becomes standard business practice.

Elements of EVM



Elements of EVM

Control Account

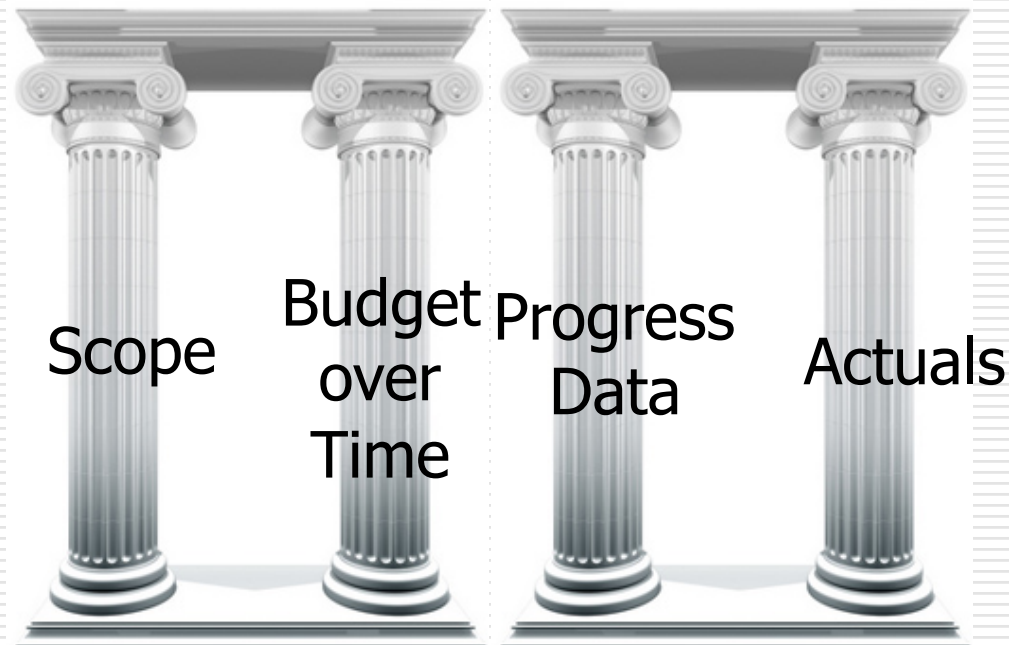


Elements of EVM

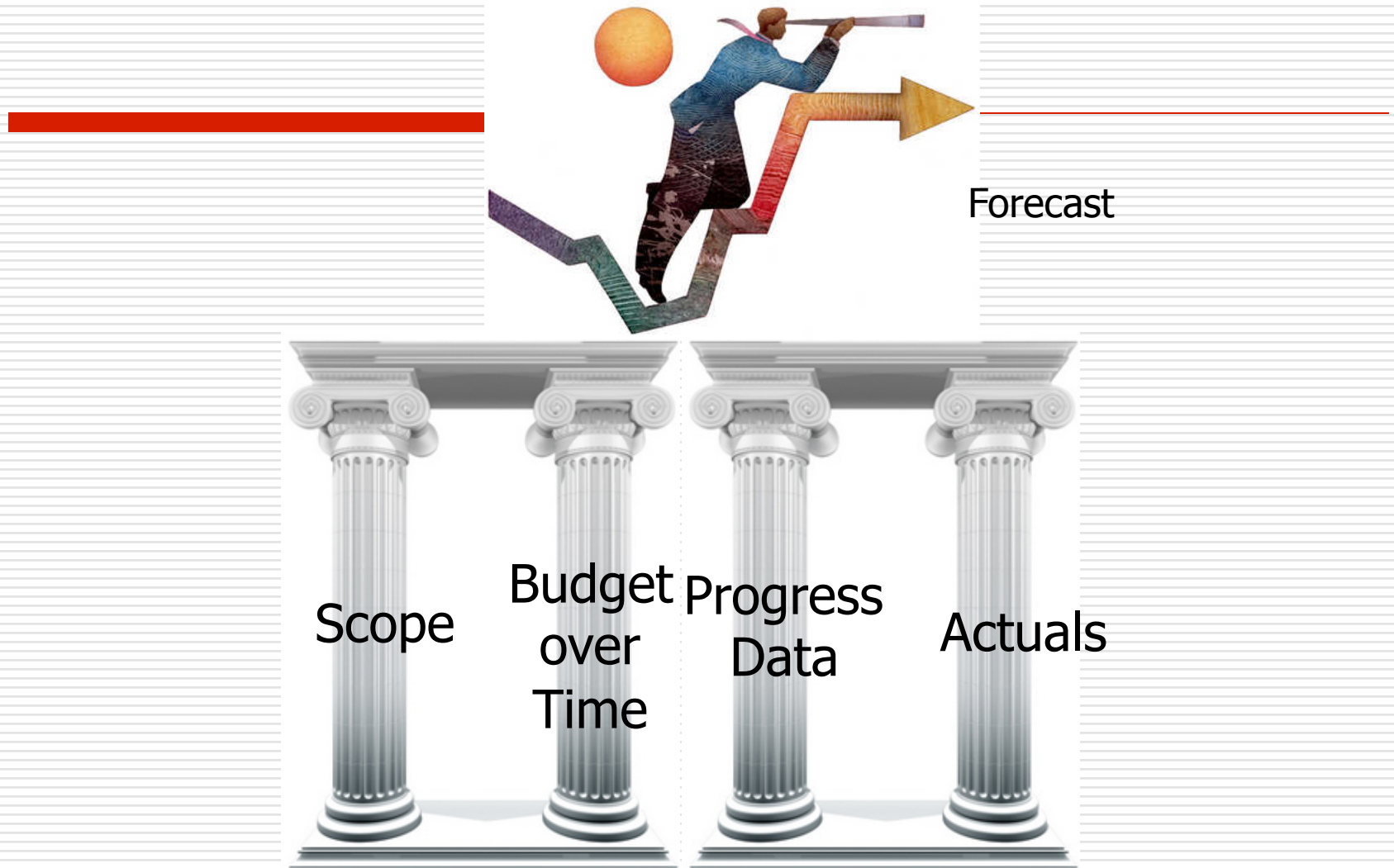
Control Account:

- Point at which Budgets compare to Progress and Actuals
- Management Point for Planning and Control
- Earned Value Reporting Point

Control Account

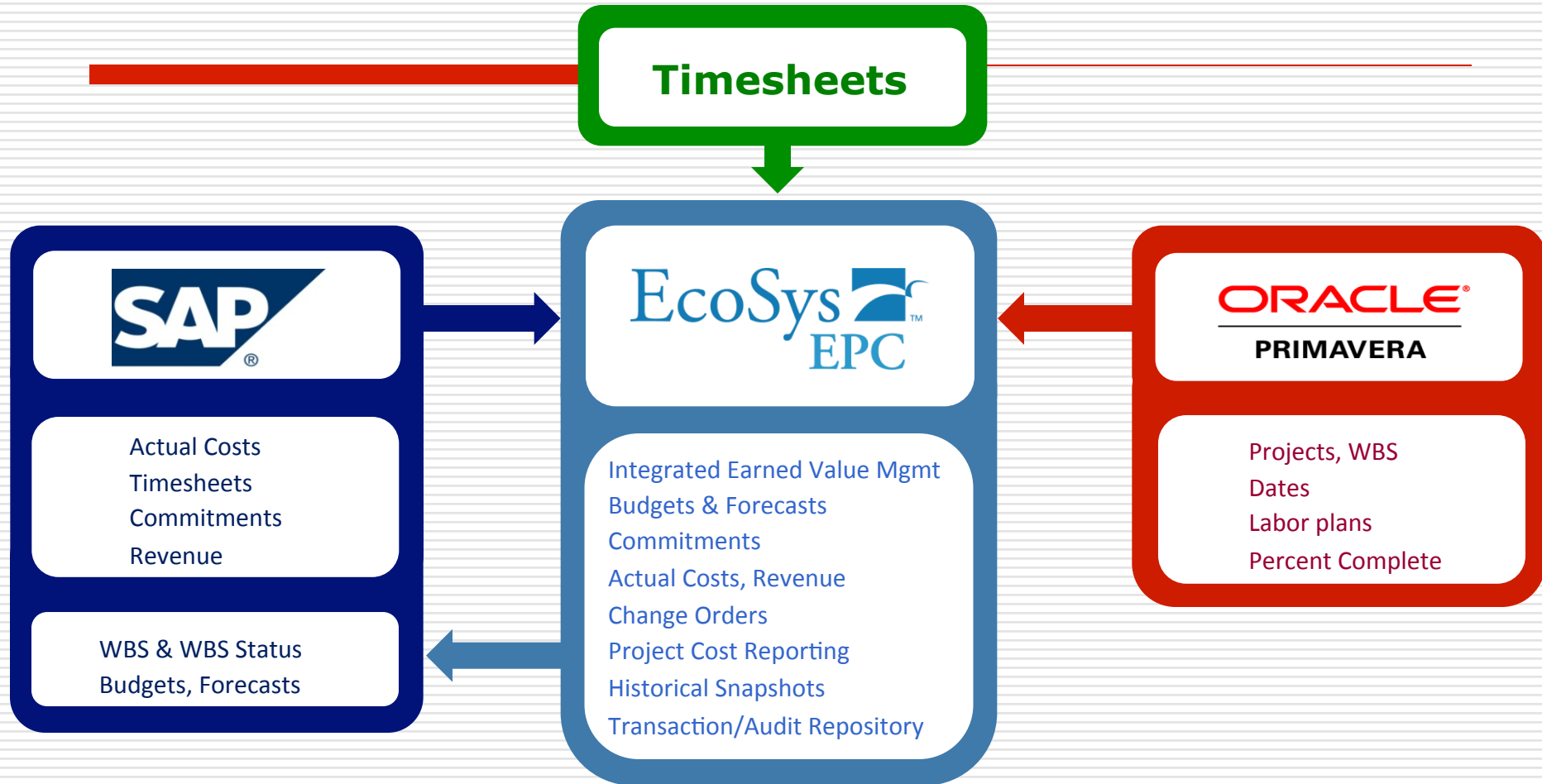


EV Trends inform Forecasting



Architecture

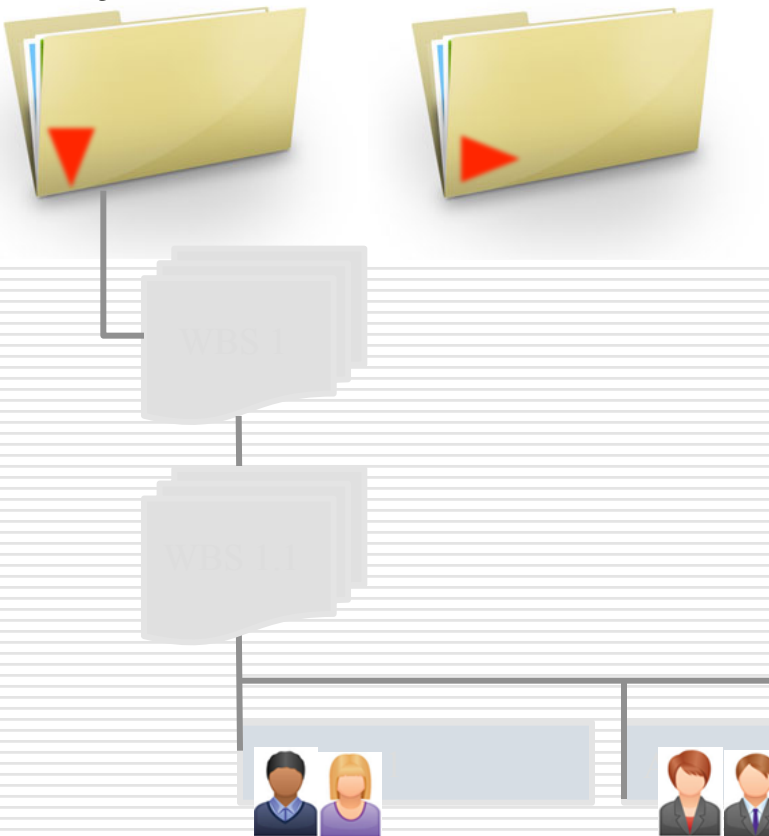
Define Integration Approach



Define Scope

EV Tracking

Projects:



- Detailed Tracking
- Resource Loading for every activity

EV Tracking

Projects:



Requirements

Design

Development

Testing

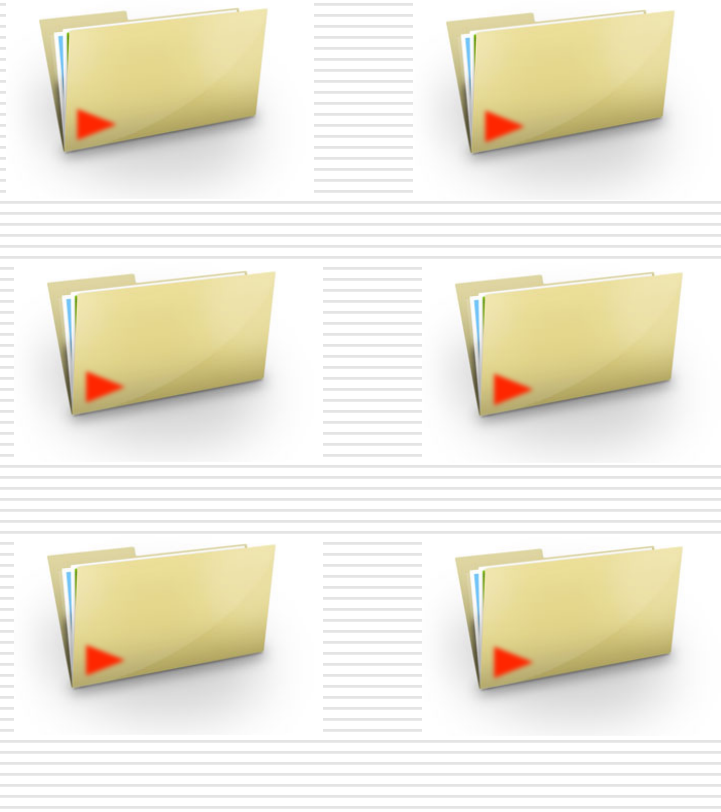
Go-Live



- Milestone Driven Progress
- Simpler Execution

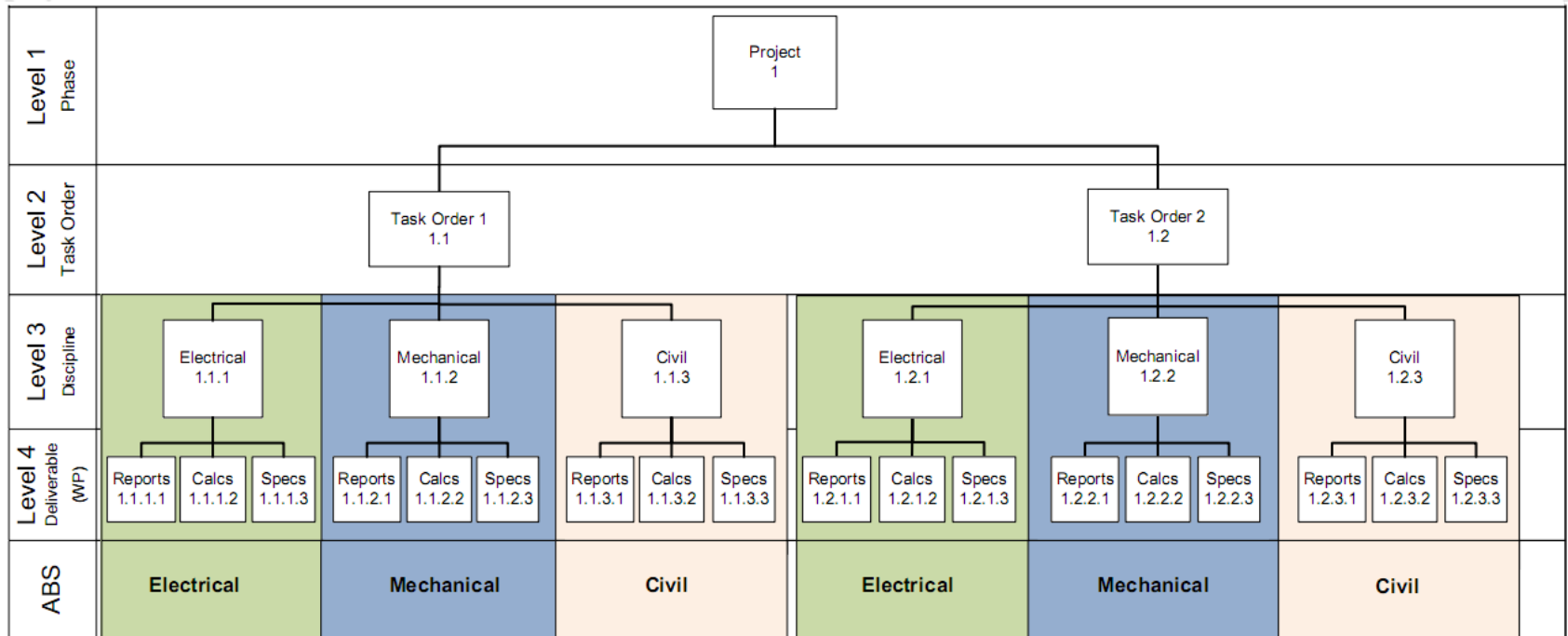
EV Tracking

Projects:



- Portfolio Visibility
- EV Metrics for Each Project
- Rolled-up for aggregate performance analysis

Define Alternate Breakdowns



WBS	Planned Value A	Earned Value B	Actual Cost C	CPI D=B/C	Cost Var E=B-C	SPI F=B/A	Sch Var G=B-A	TCPI H
1.1.1.1 Reports								
1.1.1.2 Calcs								
1.1.1.3 Specs								
1.2.1.1 Reports								
1.2.1.2 Calcs								
ABS	Planned Value A	Earned Value B	Actual Cost C	CPI D=B/C	Cost Var E=B-C	SPI F=B/A	Sch Var G=B-A	TCPI H
Electrical								
Mechanical								
Civil								

Scope

Organizing > Edit Project WBS Attributes				
* Project: DEMO - Current Project Schedule - Plant 1 - EcoSys EPC				
Sheet Edit Display Rows				
WBS	Name	WBS Type	PMT	OBS
DEMO	Current Project Schedule - Plant 1 - EcoSys EPC	Projects		
02	Systems	IWBS		
CA	Systems-Auxiliary Feedwater (CA)	IWBS		
CA0	Sys-Aux Feedwater-CA_0 Engr Turnover Pkg	Control Account		Dept of System
CALC	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Calculations	IWBS		
CAL1	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Calculations-Seismic Calculations	Work Package	MSP % Complete	
CAL2	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Calculations-System Calculations	Work Package	MSP % Complete	
CAL3	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Calculations-Hanger Calculations	Work Package	MSP % Complete	
CAL4	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Calculations-Alternate Analysis	Work Package	MSP % Complete	
CAL4NL	NONLABOR_BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Calculations-Alternate Analysis	Work Package	Weighted Milestones	
DRWG	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Drawings/Diagrams	IWBS		
DWG1	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Drawings/Diagrams-Drawings	Work Package	MSP % Complete	
ENSP	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Engr Spt Const/Sys Test	IWBS		
ENS1	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Engr Spt/Test-Engineering Spt Construction/System L	Work Package	MSP % Complete	
PRSP	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Procurement Specifications	IWBS		
PRC1	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Procurement Specifications-Proc Spec	Work Package	MSP % Complete	
REVN	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Rework/Revisions	IWBS		
RV01	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Rework/Revision-Engr Revisions	Work Package	MSP % Complete	
RW01	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Rework/Revision-Engr Rework	Work Package	MSP % Complete	
UVAS	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Unverified Assumptions	IWBS		
UV01	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Engr Spt/Test-Unverified Assumptions Resolution	Work Package	MSP % Complete	
WKD1	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Walkdowns	IWBS		
SYWD	BL1-Sys-Aux Feedwater-CA_0 Engr Turnover Pkg-Walkdowns-System Walkdown	Work Package	MSP % Complete	
CAP	Sys-Aux Feedwater-CA_P Proc Turnover Pkg	Control Account		Department of S

Scope

Organizing > Project > Project Threshold Variances										
* Project: DEMO - Current Project Schedule - Plant 1 - EcoSys EPC ... * WBS Type: Control Account Report Level: (all)										
Sheet Edit Display Rows										
CA	Current Period Threshold - Cost	Current Period Threshold - Cost \$	Current Period Threshold - Schedule	Current Period Threshold - Schedule \$	CTD Threshold - Cost	CTD Threshold - Cost \$	CTD Threshold - Schedule	CTD Threshold - Schedule \$	Threshold Minimum Dollars	
DEMO-02-CA-CA0	0%	\$0	5%	\$0	10%	\$0	0%	\$0	\$0	
DEMO-02-CA-CAP	0%	\$0	5%	\$0	0%	\$0	0%	\$0	\$0	

Define Budget over Time

Budget over Time

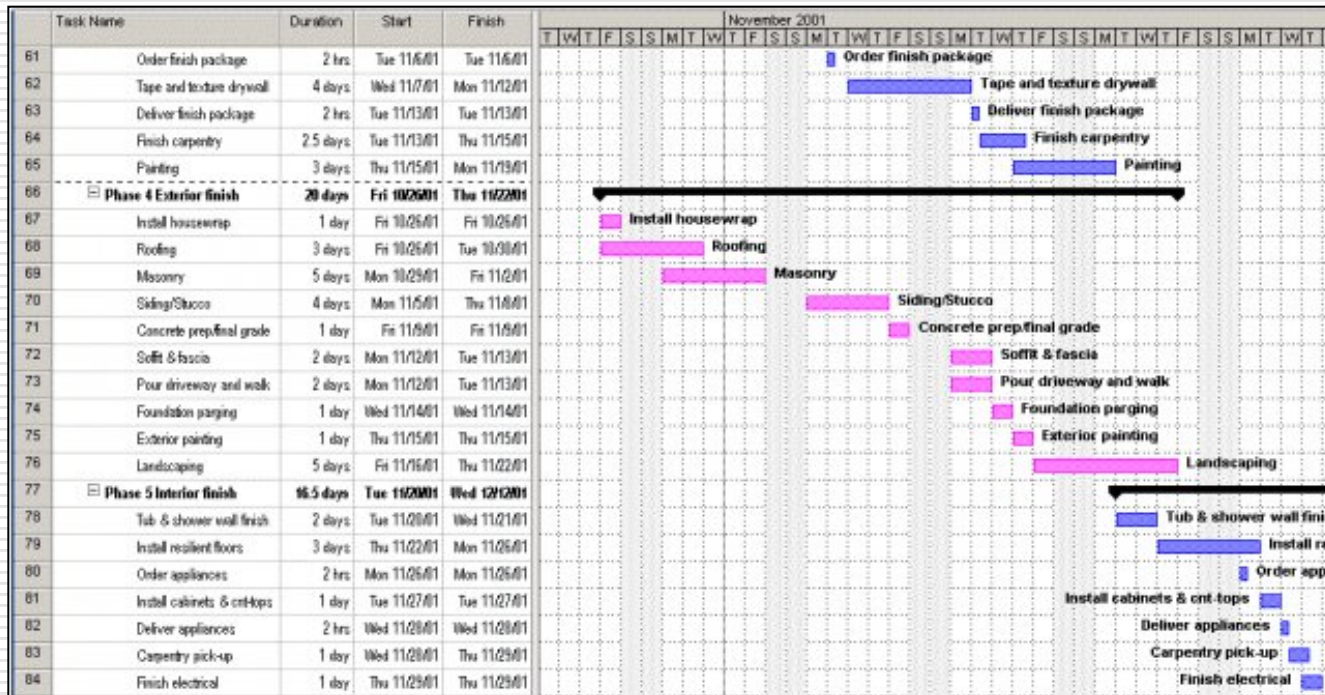
Budget over Time

- Budget Costs, Hours, and/or Quantities over Time

WBS	Cost Category	Current Budget	May09	Jun09	Jul09	Aug09	Sep09	Oct09
		10,237,561	1,958,695	880,061	1,137,795	1,490,903	1,639,561	777,851
pipeline								
Onshore Field Development		10,237,561	1,958,695	880,061	1,137,795	1,490,903	1,639,561	777,851
Pipeline		10,237,561	1,958,695	880,061	1,137,795	1,490,903	1,639,561	777,851
Pipeline - Scope		230,007	42,197	30,100	30,100	30,100	30,100	30,100
Pipeline - Scope	Labor - External	0	0	0	0	0	0	0
Pipeline - Scope	Labor - Internal	121,800	42,097	30,000	30,000	30,000	30,000	30,000
Pipeline - Scope	Material	108,207	100	100	100	100	100	100
Pipeline - Design		2,109,660	608,998	468,918	534,268	357,409	532,517	151,909
Pipeline - Design	Labor - External	1,377,750	8,089	20,000	30,000	30,000	30,000	30,000
Pipeline - Design	Labor - Internal	307,964	10,000	58,000	174,000	159,500	79,750	0
Pipeline - Design	Material	386,257	0	25,000	55,268	37,000	31,858	31,000
Pipeline - Design	General & Administrative	0	0	0	0	0	0	0
Pipeline - Design	Overhead	6,116	0	0	0	0	0	0
Pipeline - Design	Subcontracts	31,573	0	25,000	25,000	25,000	300,000	0
Pipeline - Design	Other Direct Costs	0	90,909	90,918	0	90,909	90,909	90,909
Pipeline - Design	Cost of Money	0	500,000	250,000	250,000	15,000	0	0
Pipeline - Procurement		2,964,162	44,000	150,000	164,500	173,200	146,750	209,047
Pipeline - Procurement	Labor - Internal	146,450	29,000	0	14,500	23,200	21,750	14,500
Pipeline - Procurement	General & Administrative	34,667	15,000	25,000	25,000	25,000	0	0
Pipeline - Procurement	Material	2,783,045	0	125,000	125,000	125,000	125,000	194,547

Budget over Time

Schedule-driven Budgeting



Collect Actuals

Actuals

Actual Costs, Hours, and/or Quantities over Time

Actuals > Actuals

* Project: Project ABC - Project for Base Config

Actuals Import Reports Approve

WBS ID	Description	Life To Date Hrs	Life To Date Cost	Staging Hrs (Nov 2012)	Staging Cost (Nov 2012)	Production Hrs (Nov 2012)	Production Costs (Nov 2012)	Life Total Hrs	Life Total Cost
Project ABC	Project for Base Config	5,100	\$578,243	0	\$0	0	\$0	5,100	\$578,243
Conceptual	Conceptual	0	\$145,800	0	\$0	0	\$0	0	\$145,800
Construct Mgt	Construct Mgt	0	\$6,000	0	\$0	0	\$0	0	\$6,000
Consultant Svs	Consultant Svs	0	\$7,800	0	\$0	0	\$0	0	\$7,800
Contingency	Contingency	0	\$0	0	\$0	0	\$0	0	\$0
Facilities	Facilities	0	\$2,000	0	\$0	0	\$0	0	\$2,000
Other Direct	Other Direct	0	\$0	0	\$0	0	\$0	0	\$0
Preliminary Engineering	Preliminary Engineering	0	\$87,000	0	\$0	0	\$0	0	\$87,000
Project Management	Project Management	0	\$43,000	0	\$0	0	\$0	0	\$43,000

Rows 1 - 20 of 36 Show All Page Size 20 << First < Prev Next > Last >>

Details (Staging) Details (Production) **Time Phased Actuals**

* WBS: Project ABC - Project for Base Config Cost Account: (all)

Description	Cost Account	Fiscal 2010 Hrs	Fiscal 2010 Costs	Fiscal 2011 Hrs	Fiscal 2011 Costs	Jan 2012 Hrs	Jan 2012 Costs	Feb 2012 Hrs	Feb 2012 Costs	Mar 2012 Hrs	Mar 2012 Costs	Apr 2012 Hrs	Apr 2012 Costs	Ma
Detail Engineering	Labor	0.0	0	1,700.0	159,000	0.0	0	0.0	0	0.0	0	0.0	0	
Project Management	Labor	0.0	0	1,000.0	123,000	0.0	0	0.0	0	0.0	0	0.0	0	
Preliminary Engineering	Labor	0.0	0	0.0	87,000	0.0	0	0.0	0	0.0	0	0.0	0	
Facilities	Labor	0.0	0	0.0	2,000	0.0	0	0.0	0	0.0	0	0.0	0	
Project Management	Labor	0.0	0	0.0	43,000	0.0	0	0.0	0	0.0	0	0.0	0	
Other Direct	Labor	0.0	0	0.0	29,000	0.0	0	0.0	0	0.0	0	0.0	0	

Collect Progress Data

Progress Data

Earned Value > Earned Value

* Project: Project ABC - Project for Base Config

Earned Value Import from File Import from Schedule Reports Generate EV

Sheet Edit Display Rows

WBS	Description	AC	PV	EV	BAC	EAC	EV % Complete Entry
Project ABC	Project for Base Config	\$578,243.00	\$21,419,306.50	\$740,767.00	\$21,419,306.50	\$21,408,147.50	
+ Conceptual	Conceptual	\$145,800.00	\$1,020,000.00	\$180,000.00	\$1,020,000.00	\$994,000.00	
+ Construction	Construction	\$0.00	\$17,847,159.00	\$75,000.00	\$17,847,159.00	\$17,850,000.00	
- Detail Design	Detail Design	\$432,443.00	\$2,552,147.50	\$485,767.00	\$2,552,147.50	\$2,564,147.50	
Construct Mgt	Construct Mgt	\$87,000.00	\$200,000.00	\$82,000.00	\$200,000.00	\$200,000.00	41.0%
Consultant Svs	Consultant Svs	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0.0%
Contingency	Contingency	\$0.00	\$150,000.00	\$0.00	\$150,000.00	\$150,000.00	0.0%
Detail Engineering	Detail Engineering	\$159,000.00	\$576,810.00	\$403,767.00	\$576,810.00	\$576,810.00	70.0%
Detail Engineering - Ma	Detail Engineering - Mat (new)	\$0.00	\$601,500.50	\$0.00	\$601,500.50	\$601,500.50	0.0%
Facilities	Facilities	\$0.00	\$148,837.00	\$0.00	\$148,837.00	\$148,837.00	0.0%
Maint/Ops	Maint/Ops	\$0.00	\$150,000.00	\$0.00	\$150,000.00	\$150,000.00	0.0%
Other Direct	Other Direct	\$29,000.00	\$75,000.00	\$0.00	\$75,000.00	\$75,000.00	
Project Management	Project Management	\$123,000.00	\$350,000.00	\$0.00	\$350,000.00	\$350,000.00	0.0%

Progress Data

Performance > Progress Measurement > Engineering Steps Progress										
* Project: 1001 - Plant Construction										
Panel Sheet Edit Display Rows										
ID	Description	WP Progress Method	Budgeted Hours	Budgeted Hours (Resource Spread)	Earned Hours	Budgeted Cost	Budgeted Quantity	Earned Quantity	E	
1001	Plant Construction		201,550	75	61,068.1	\$418,125	0	0		
1	Bid / Award	Manual % Comp	0	0	0.0	\$0	0	0		
2	Design		325	0	297.0	\$148,750	0	0		
3	Permitting		0	0	0.0	\$0	0	0		
4	Construction	Schedule % Co	201,225	75	60,771.1	\$156,000	2,400	960		
01	Electrical		0	0	0.0	\$0	0	0		
02	Mechanical		223	75	220.3	\$117,000	0	0		
5000	Hangers	Milestone Credi	0	0	0.0	\$0	0	0		
5100	Large Bore Piping	Milestone Credi	0	0	0.0	\$0	0	0		
5200	Small Bore Piping	Milestone Credi	223	75	220.3	\$78,000	0	0		
1	Piping Plan 1	Milestone Credi	115	0	115.0	\$20,000	0	0		
2	Piping Plan 2	Milestone Credi	108	0	105.3	\$19,000	0	0		

Panel Sheet Edit Display Rows											
Task	Step Number	Description	Weight	% Complete	Weighted % Complete	Earned Hours	Earned Cost	Budgeted ManHours	Budgeted Cost	Budgeted Quantity	Unit of Measure
						75.60	\$13,300	108.00	19,000.00		
Piping Plan 2	1	Define Scope of	35%	100%	35	38	\$6,650	37.80	6,650	0	
Piping Plan 2	2	Review Client S	20%	100%	20	22	\$3,800	21.60	3,800	0	
Piping Plan 2	3	Issue Draft for C	30%	50%	15	16	\$2,850	32.40	5,700	0	
Piping Plan 2	4	Incorporate Con	10%	0%	0	0	\$0	10.80	1,900	0	
Piping Plan 2	5	Revise / reissue	5%	0%	0	0	\$0	5.40	950	0	

Progress Data

Import % Complete from Primavera Options

Cost Object Category Filter: All Cost Objects

Source of % Complete
Primavera

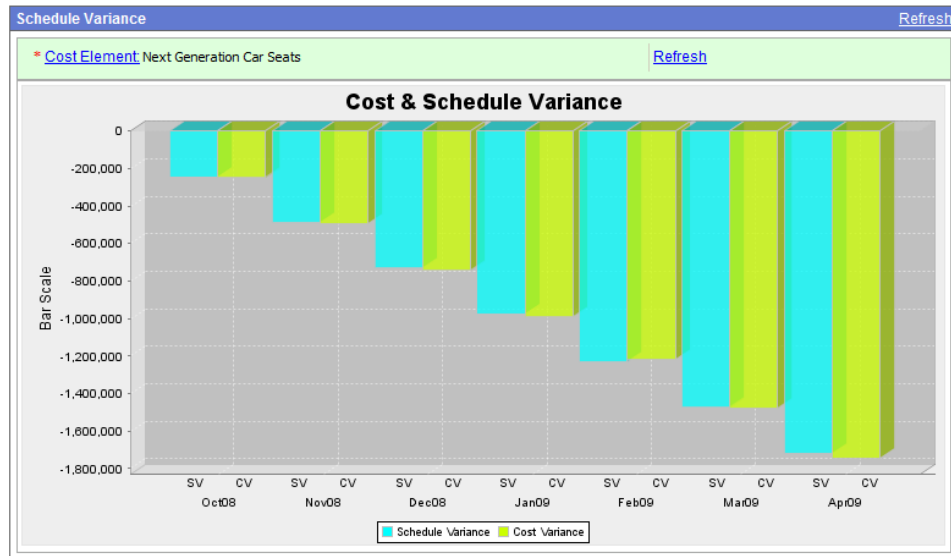
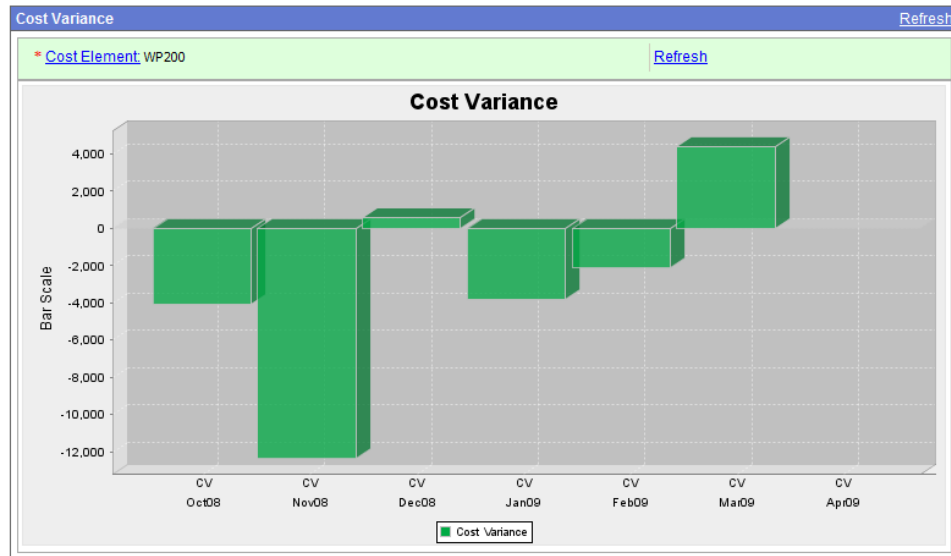
* Import % Complete Type
Performance % Complete
Cost % Complete
Performance % Complete
Performance % Complete (Units)
Schedule % Complete
Schedule % Complete (Units)
Units % Complete

Import % Complete into Custom Field
P6 % Complete

Run Import % Complete

Earned Value Analysis

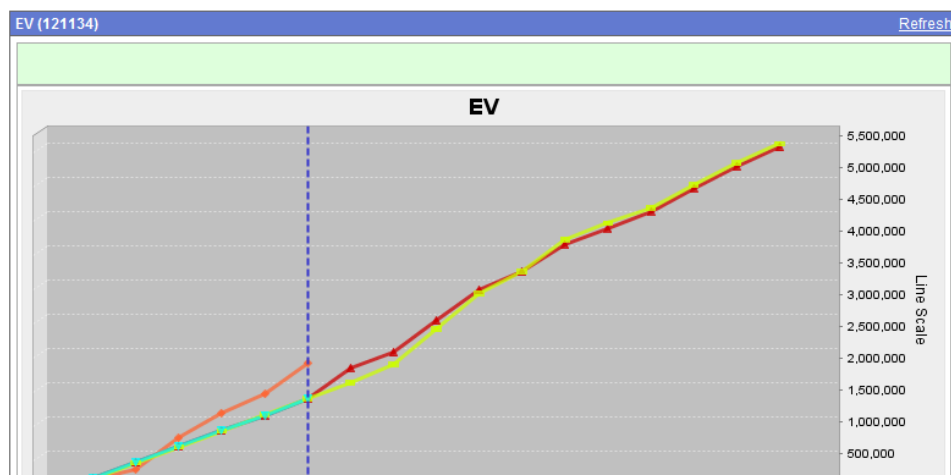
EV Analysis



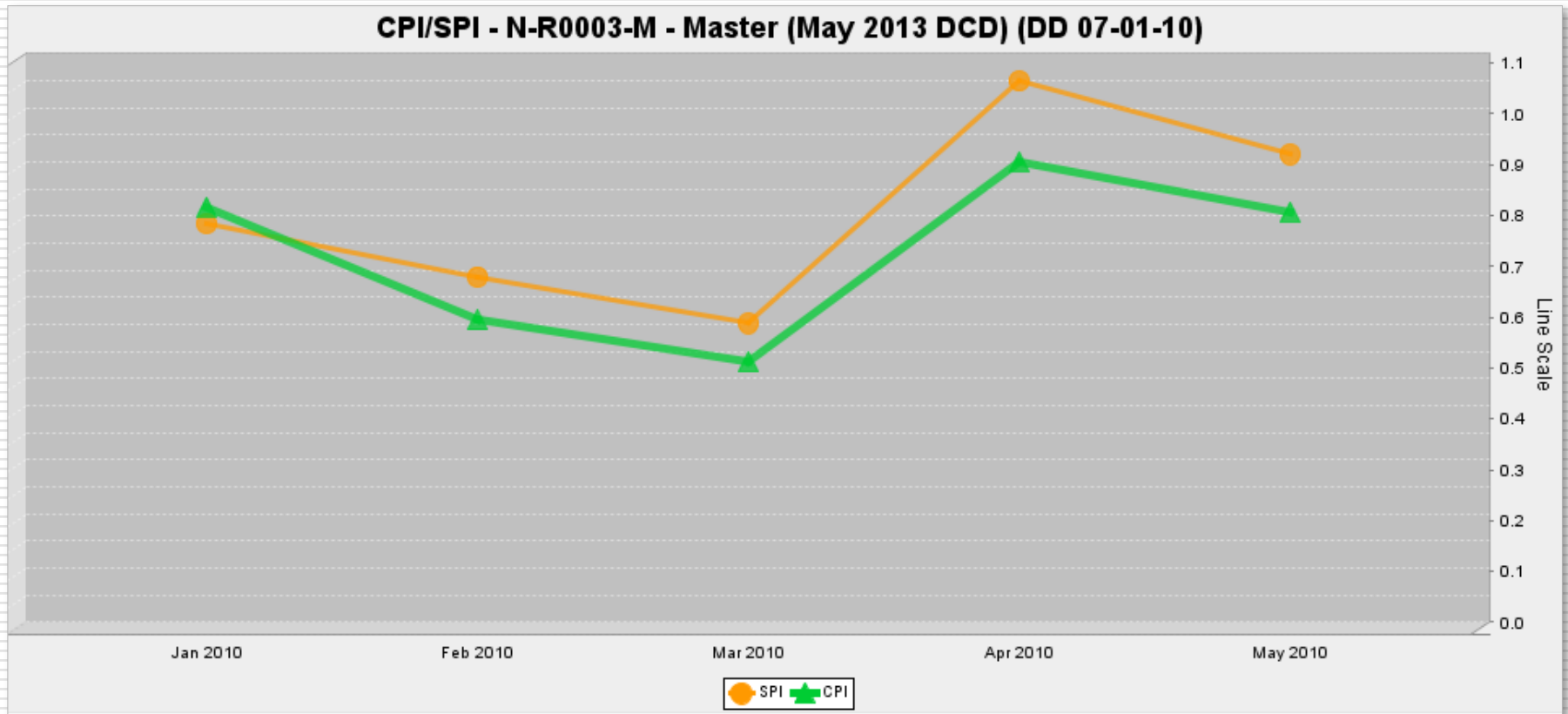
Earned Value (121134) [Refresh](#)

Export to : PDF

Earned Value						
Project ID	Project Name	Original Budget	Current Budget	Planned Value (BCWS)	Actual Cost (ACWP)	Perce
121134	Next Generation Car Seats	\$5,429,373	\$5,640,854	\$1,473,238	\$1,477,427	
121134.0	Project Management	\$503,032	\$503,032	\$57,492	\$70,045	
121134.1	Survey	\$114,972	\$114,972	\$114,972	\$121,057	
121134.1.100	WP100	\$114,972	\$114,972	\$114,972	\$121,057	
121134.2	Feasibility	\$149,976	\$149,976	\$99,984	\$111,780	
121134.2.100	WP100	\$119,979	\$119,979	\$79,986	\$85,006	
121134.2.200	WP200	\$29,997	\$29,997	\$19,998	\$26,774	
121134.3	Design	\$2,709,697	\$2,921,178	\$881,092	\$873,624	
121134.3.1	Design - Modifications	\$382,564	\$394,814	\$119,500	\$122,345	
121134.3.1.100	WP100	\$211,758	\$211,758	\$57,750	\$73,645	
121134.3.1.200	WP200	\$170,806	\$183,056	\$61,750	\$48,700	
121134.3.2	Design - Prototype	\$523,620	\$567,120	\$69,990	\$66,155	
121134.3.2.100	WP100	\$523,620	\$567,120	\$69,990	\$66,155	
121134.3.3	Design - Crash Tests	\$559,253	\$559,253	\$252,642	\$254,392	
121134.3.3.100	121134.3.3.100	\$559,253	\$559,253	\$252,642	\$254,392	



EV Analysis



EV Analysis

* Project: 10-016 - Bluefire Fulton Construction Schedule

Control Account	Name	Internal Threshold - Cost	Internal Threshold - Schedule	Customer Threshold - Cost	Customer Threshold - Schedule	Threshold Minimum Dollars
A	Administrative Bldg	5%	5%	10%	10%	\$30,000
B	Warehouse Bldg	5%	5%	10%	10%	\$75,000
C	Water Treatment	5%	5%	10%	10%	\$50,000
D	Acid Neutralization/Lime Slaking	40%	80%	25%	95%	\$15,000
E	Ethanol Storage/Loadout	5%	5%	10%	10%	\$5,000
F	Distillation & Dehydration	5%	5%	10%	10%	\$40,000
G	General Area	5%	5%	10%	10%	\$32,000
H	Acid Recovery	5%	5%	10%	10%	\$3,000
I1	Construction Equipment	5%	5%	10%	10%	\$25,000
I2	Scaffolding	5%	5%	10%	10%	\$50,000

Control Account	CAM (Name)	Cost Variance	Schedule Variance	ACWP	BCWP	ETC	BAC	CPI	SPI	CPR5 Explanation	CPR5 Impact	CPR5 Corrective Action	CPR5 Monthly Summary	Cost Thresholds Captions - Internal	Schedule Thresholds Captions - Internal
		\$14,798	\$82,350	\$67,552	\$82,350	\$1,668,185	\$1,773,785		0.00						
10-016		\$14,798	\$82,350	\$67,552	\$82,350	\$1,668,185	\$1,773,785	1.22	0.00	---	---	---	---		
SUBP		\$14,798	\$82,350	\$67,552	\$82,350	\$1,668,185	\$1,773,785	1.22	0.00	---	---	---	---		
CON		\$14,798	\$82,350	\$67,552	\$82,350	\$1,668,185	\$1,773,785	1.22	0.00	---	---	---	---		
A	Dan Cox	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	[none]	[none]	[none]	[none]		
B	Frank Moreno	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	[none]	[none]	[none]	[none]		
C	Jeff Aune	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	[none]	[none]	[none]	[none]		
D	Josh Johnson	\$14,798	\$82,350	\$67,552	\$82,350	\$1,668,185	\$1,773,785	1.22	0.00	START CPR5	START CPR5	START CPR5	START CPR5		Over Internal Schedule Threshold
E	Matthew Smith	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	[none]	[none]	[none]	[none]		
F	Matthew Smith	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	[none]	[none]	[none]	[none]		
G	Dan Cox	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	[none]	[none]	[none]	[none]		

Forecasting

Forecast based on Performance

Forecast > Forecasting

* Project: Project ABC - Project for Base Config

Forecasting Reports Copy Forecasts

WBS	Actual Hrs	Actual Cost	Current Budget Hrs	Current Budget Cost	Current Forecast Hrs	Current Forecast Cost	Working Forecast Hrs	Working Forecast Cost
Project ABC	5,100.0	\$578,243	20,600.0	\$21,419,307	22,050.0	\$21,408,148	22,050.0	\$21,408,148
Conceptual	0.0	\$145,800	100.0	\$1,020,000	0.0	\$994,000	0.0	\$994,000
Construction	0.0	\$0	0.0	\$17,847,159	0.0	\$17,850,000	0.0	\$17,850,000
Detail Design	5,100.0	\$432,443	20,500.0	\$2,552,148	22,050.0	\$2,564,148	22,050.0	\$2,564,148
Construct Mgt	0.0	\$87,000	0.0	\$200,000	0.0	\$200,000	0.0	\$200,000

Forecast by Cost

Rows 1 - 15 of 15 Show All Page Size 20 << First < Prev Next > Last >>

Forecasting Time Phased Cost

* Project: Construct Mgt - Construct Mgt * Currency: US Dollar

Cost

* WBS2: Project ABC.Detail Design.Construct Mgt * Cost Account: Labor Currency: USD

CPI: 0.94 CPI EAC: 1.00 TCPI: 1.04

Actual Costs: 87,000 Original Budget Costs: 200,000 Current Budget Costs: 200,000 Current Forecast Costs: 200,000 Prior Period Forecast Costs: 200,000

Direct EAC CPI: 0.00 Direct TCPI: 0.00 Direct EAC Costs: 0 Direct ETC Costs: 0 Forecast Cost Method: Direct ETC Cost

**Derived Forecast Cost: 87,000 Forecasting Standard: 205,000 Working Forecast Costs: 200,000 Analyze Post To Working Forecast

Example Independent EACs

Project: 10-016 - Bluefire Fulton Construction Schedule																	Refresh	Save
WBS	WBS Name	WBS Type	PMT	% Complete Rollup	BCWP Calculated	ACWP	BAC	ETC	EAC	IEAC1	IEAC2	IEAC3	IEAC4	CPI	SPI	Cost Variance	Schedule Variance	
					\$82,350	\$67,552	\$1,773,785	\$1,668,185	\$1,735,737	\$1,455,042	\$1,801,915	\$0	\$0					
10-016	Bluefire Fulton Cons Projects			4.64	\$82,350	\$67,552	\$1,773,785	\$1,668,185	\$1,735,737	\$1,455,042	\$1,801,915	\$0	\$0	1.22	0.00	\$14,798	\$82,350	
SUBP	SUB PROJECT	Sub Projects		4.64	\$82,350	\$67,552	\$1,773,785	\$1,668,185	\$1,735,737	\$1,455,042	\$1,801,915	\$0	\$0	1.22	0.00	\$14,798	\$82,350	
CON	CONSTRUCTION	WBS		4.64	\$82,350	\$67,552	\$1,773,785	\$1,668,185	\$1,735,737	\$1,455,042	\$1,801,915	\$0	\$0	1.22	0.00	\$14,798	\$82,350	
A	Administrative Bldg	Control Account		0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
B	Warehouse Bldg	Control Account		0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
C	Water Treatment	Control Account		0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
D	Acid Neutralizaiton/L	Control Account		4.64	\$82,350	\$67,552	\$1,773,785	\$1,668,185	\$1,735,737	\$1,455,042	\$1,801,915	\$0	\$0	1.22	0.00	\$14,798	\$82,350	
014500	Scaffold	Discipline		0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
020000	Civil	Discipline		0.00	\$0	\$0	\$59,420	\$59,420	\$59,420	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
2300-D	Pile Driving	Work Package	50/50	0.00	\$0	\$0	\$26,520	\$26,520	\$26,520	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
2500-D	Excavate/Backfill	Work Package	50/50	0.00	\$0	\$0	\$32,900	\$32,900	\$32,900	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
030000	Concrete	Discipline		46.02	\$82,350	\$67,552	\$178,950	\$73,350	\$140,902	\$146,793	\$166,604	\$0	\$0	1.22	0.00	\$14,798	\$82,350	
3250-D	Anchor bolts/Groutin	Work Package	25/75	0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
3311-D	Pile Caps	Work Package	25/75	100.00	\$45,000	\$53,252	\$45,000	\$45,000	\$98,252	\$53,252	\$53,252	\$53,252	\$0	0.85	0.00	(\$8,252)	\$45,000	
3312-D	Footings/Foundation	Work Package	50/50	100.00	\$30,600	\$14,300	\$30,600	\$26,100	\$40,400	\$14,300	\$14,300	\$14,300	\$0	2.14	0.00	\$16,300	\$30,600	
3313-D	Mat Foundations	Work Package	Level	0.00	\$0	\$0	\$76,350	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	
3315-D	Building Slab & Con	Work Package	25/75	25.00	\$6,750	\$0	\$27,000	\$2,250	\$2,250	\$0	\$0	\$0	\$0	0.00	0.00	\$6,750	\$6,750	
3300-D	Wet cure / Coatings	Work Package	[none]	0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.00	0.00	\$0	\$0	

- IEAC1, assumes future cost performance will be same as past performance
- IEAC2, assumes future cost performance will be influenced by 80% past cost and 20% past schedule performance
- IEAC3, assumes future cost performance will be influenced by the last 3 months cost performance
- IEAC4, assumes future cost performance will be influenced by past cost and schedule performance

$$\begin{aligned}
 IEAC_1 &= AC + \frac{(BAC - EV)}{CPI} = \frac{BAC}{CPI} \\
 IEAC_2 &= AC + \frac{(BAC - EV)}{0.8 \times CPI + 0.2 \times SPI} \\
 IEAC_3 &= AC + \frac{(BAC - EV)}{(CPI_1 + CPI_2 + CPI_3) / 3} \\
 IEAC_4 &= AC + \frac{(BAC - EV)}{CPI \times SPI}
 \end{aligned}$$

Critical Success Factors to EVM

1. It builds on a solid project controls framework.
2. It's user friendly.
3. Efficient and integrated with Project Controls Lifecycle.
4. EVM becomes standard business practice.

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Example of Iterative Rollout

Phase of Rollout



Functionality

Validated EVM

- Budgeting
- Progress
- Change Mgmt

Wide Rollout

- Corporate EVM
- Corporate Dashboards

Proposals

- Rates,
- Estimation
- Pricing

Adv. Forecasting

- Cost & Revenue Forecasting
- Risk Mgmt

Corporate Planning

- Capital Planning
- Portfolio Mgmt
- S&OP

Integration

- ERP
- Scheduling

- Contract / Procurement

- Monte-Carlo Risk Tools

- Portfolio Management

Sunset Tools

- EVM
- EVM Reporting

- Excel Models
- Project Reporting

- Estimation
- Pricing

- Excel Models

- Portfolio Management

Earned Value Case Studies

Nuclear Case Study

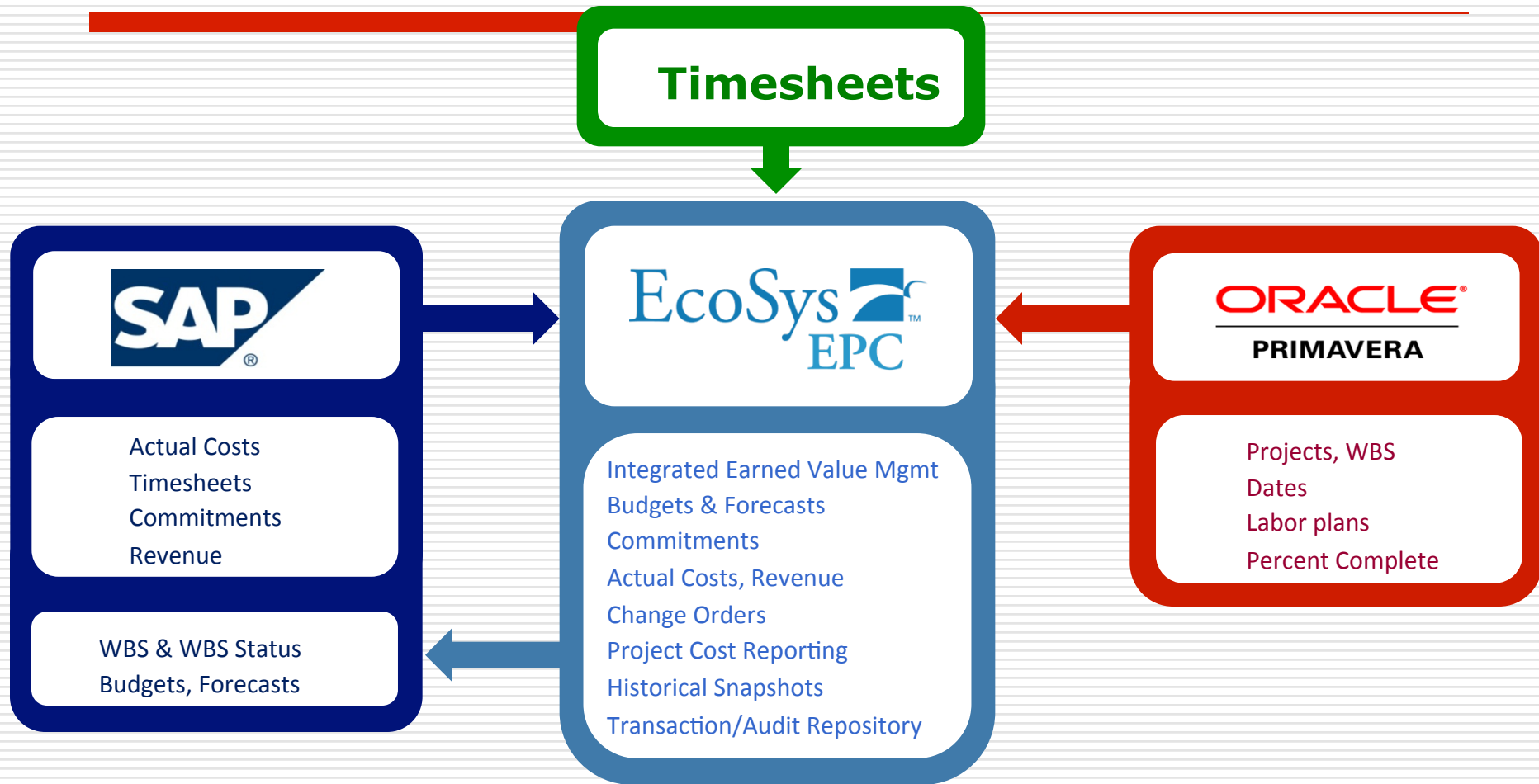
Nuclear Contractor Joint Venture

- Nuclear Power Generation & Operations company with major R&D, Construction, and Services projects in Canada & US
- Standardized on SAP and Primavera P6
- Requirement for centralized platform went beyond need for integration
- Deployed integrated system for EVM / performance management, reporting, and controls
- Utilized on Small Modular Reactor program



Nuclear Case Study

Integration Approach



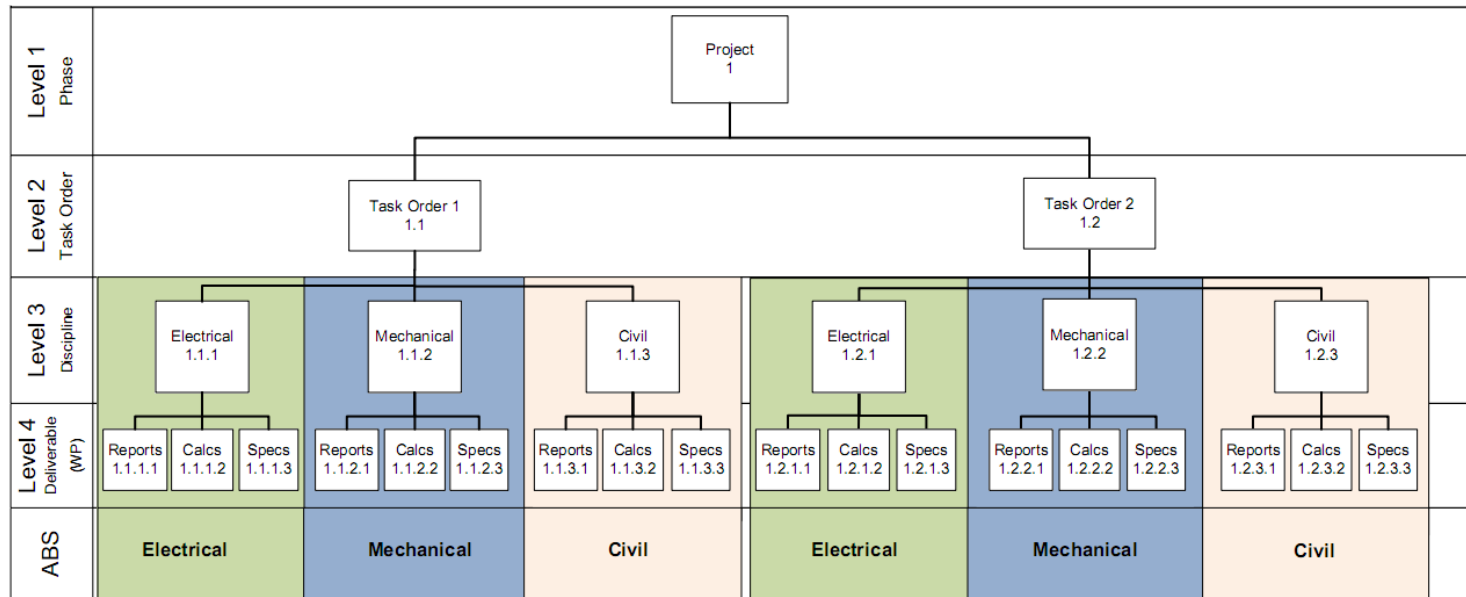
Nuclear Case Study

Highlights

- EV Technique Varies by Work Package
- Full Time-Phased History of Earned Value by Month
- EV Measures based on both Hours and Costs
- Performance analysis by Month, Year, and Project Life
- Change & Trend Management integrated into Current Budget & Current Forecast
- EV Reports can be run by toggling Baseline Budget = Cur Budget or Cur FC
- Ability to analyze performance & ETC by Alternate Breakdown Structures:
 - Discipline
 - OBS
 - Cost Type (Labor, Material, ODCs, etc)

Nuclear Case Study

Planning Process: WBS and ABS



WBS	Planned Value A	Earned Value B	Actual Cost C	CPI D=B/C	Cost Var E=B-C	SPI F=B/A	Sch Var G=B-A	TCPI H
1.1.1.1 Reports								
1.1.1.2 Calcs								
1.1.1.3 Specs								
1.2.1.1 Reports								
1.2.1.2 Calcs								

ABS	Planned Value A	Earned Value B	Actual Cost C	CPI D=B/C	Cost Var E=B-C	SPI F=B/A	Sch Var G=B-A	TCPI H
Electrical								
Mechanical								
Civil								

Nuclear Case Study

Standardized Performance Reporting: Cumulative & Periodic Performance

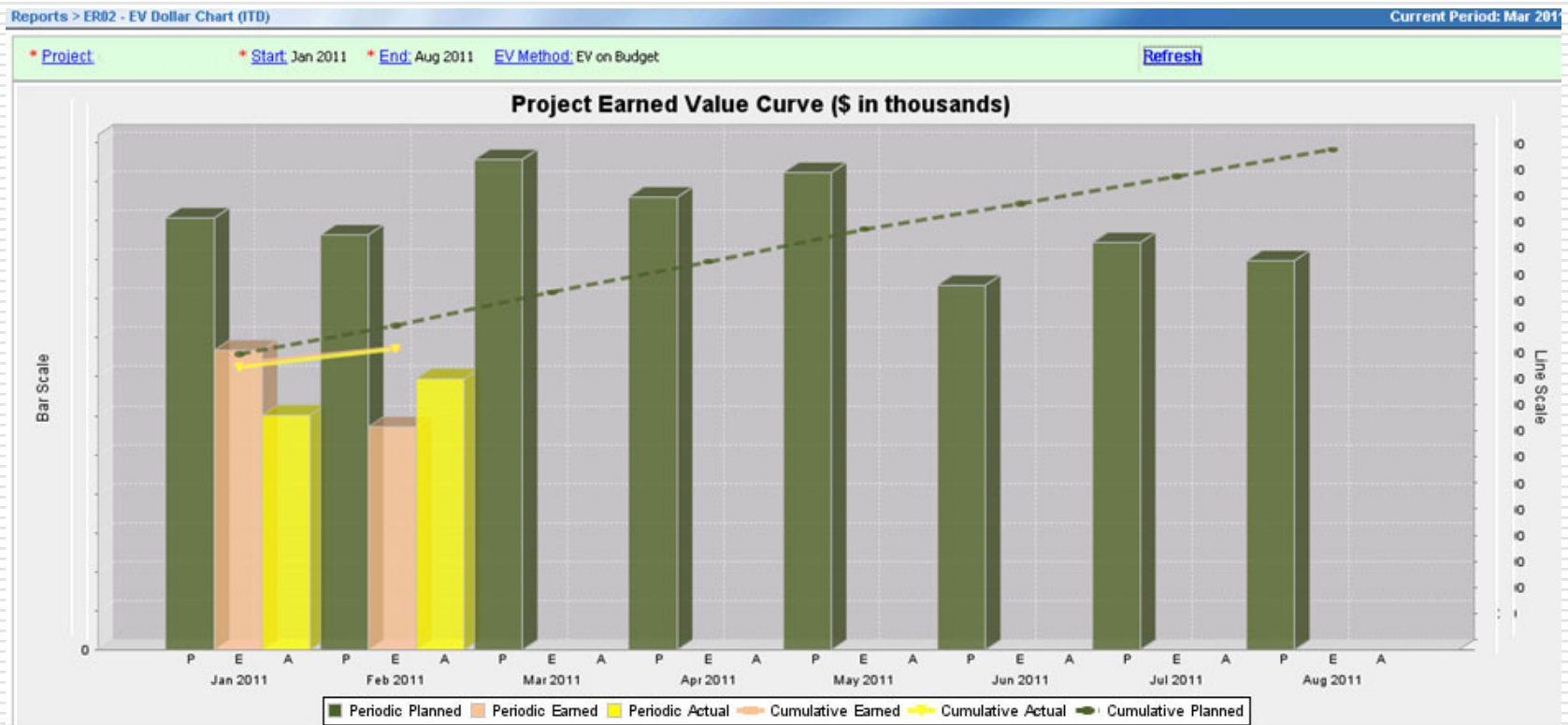
ER01 - Project Earned Value Report - Summary
EV on Budget - Dollars in Thousands

	Budget					Cumulative Performance								Periodic Performance						
	Original Budget	Scope Changes	Current Budget	Other Trends	Current Forecast	Sched Cost	Earned Cost	Actual Cost	SPI	CPI	TCPI	Sched % Comp	Earn % Comp	Sched Value	Earned Value	Actual Cost	SPI	CPI	Sched % Comp	Earn % Comp
	A	B	C = (A+B)	D	E = (C+D)	G	H	I	J = (H/G)	K = (H/I)	L	M = (G/C)	N = (H/C)	O	P	Q	R = (P/O)	S = (P/Q)	T = (O/C)	U = (P/C)
Nuclear Island	16,808		16,808		16,808	1,100	1,163	1,145	1.06	1.02	1.00	6.5%	6.9%	184	246	228	1.34	1.08	1.1%	1.5%
Turbine Island	2,017	350	2,367		2,367	264	281	272	1.07	1.03	1.00	11.2%	11.9%	40	57	48	1.43	1.19	1.7%	2.4%
Balance of Plant	11,389		11,389	2,500	13,889	676	762	660	1.13	1.16	0.99	5.9%	6.7%	145	231	128	1.59	1.80	1.3%	2.0%
Support Services	13,931		13,931		13,931	1,630	1,621	1,629	0.99	0.99	1.00	11.7%	11.6%	206	197	205	0.96	0.96	1.5%	1.4%
Core Team	6,954	120	7,074		7,074	856	856	846	1.00	1.00	1.00	12.1%	12.1%	110	110	100	1.00	1.10	1.6%	1.6%
Nuclear Steam Supply System	8,337		8,337	1,100	9,437	301	115	119	0.38	0.99	1.00	3.6%	1.4%	301	115	119	0.38	0.97	3.6%	1.4%
Component Design	9,456	1,100	10,556		10,556	388	206	135	0.53	1.53	0.99	3.7%	2.0%	388	206	135	0.53	1.53	3.7%	2.0%
Component Testing	2,189		2,189		2,189	37	5	1	0.12	8.01	1.00	1.7%	0.2%	37	5	1	0.12	8.01	1.7%	0.2%
ECCS Condensor	1,065		1,065		1,065						1.00					0				
Fuel	2,443		2,443		2,443	172	234	86	1.36	2.73	0.94	7.0%	9.6%	172	234	86	1.36	2.73	7.0%	9.6%
IST	5,071		5,071		5,071	2,546	2,370	2,367	0.93	1.01	1.00	50.2%	46.9%	730	564	551	0.77	1.02	14.4%	11.1%
CHF	835		835		835		10	1	2.13	9.64	0.99	0.6%	1.2%	5	10	1	2.13	9.64	0.6%	1.2%
Misc - NRC Fees etc	8,313		8,313		8,313	42	1	1	0.02	1.00	1.00	0.5%	0.0%	42	1	1	0.02	1.00	0.5%	0.0%
Support Services	4,444		4,444		4,444	3,317	3,317	3,290	1.00	1.01	0.98	74.6%	74.6%	98	98	71	1.00	1.38	2.2%	2.2%
Total:	302,648	1,570	304,218	3,600	307,818	11,334	10,950	10,551	0.97	1.04	1.00	3.7%	3.6%	2,458	2,074	1,675	0.84	1.24	0.8%	0.7%

SAMPLE DATA

Nuclear Case Study

Flexible Earned Value Analysis: By Project, Category Code, and EV Method



Nuclear Case Study

EVM Dashboard: Comparisons By Alliance Partner



FAA Case Study



FAA TAMR Program

Overview:

- Terminal Automation Modernization and Replacement (TAMR) Program within Air Traffic Control – Terminal (ATO-T) Organization
- Modernize Air Traffic Control Systems at Nation's Major Airports
- High Visibility Capital Program

Capital Program Management Innovations:

- Standardize Contractor Submissions with Oracle Primavera P6 Templates
 - EVM Reporting performed based upon FAA's structures
 - Resource loaded schedules drive budgets, forecasts and EVM in EcoSys
- Consolidate Funding Allocations, Budgets, Estimates, Forecasts, Obligations, Commitments, Expenditures, Performance/EVM into a single system
- ATO-T Maintains Vendors and Own Cost and Schedule Forecasts as Separate Versions
- G/L Actuals Are Reconciled against Vendor Submissions

FAA Case Study

- Project activities reported in scheduling system based on standard EVM techniques such as
 - Physical % complete – based on weighted Steps
 - Level of Effort - % duration
 - Milestone % complete
- Integrated with project controls system to import Units, % complete and dates
 - Planned, Actual and Remaining units used to calculate forecast, Actual and Remaining costs by project
 - Schedule and Performance % complete info that is calculated based on duration or Steps used for EVM metrics
 - Dates imported used for reporting purposes

FAA Case Study

Performance Measurement

Layout: Classic Schedule Layout Filter: All Activities

Activity ID	Primavera Activity Code	FAA WBS	Activity Step Count	Activity Name	Remaining Duration	Start	Finish	2011					
								Q1	Q2	Q3	Q4	Q1	
[-] Site Survey and Design				34		291	03-Jan-11	29-Feb-12	[Gantt Chart]				
[+] Dependencies				1		2	03-Jan-11	04-Jan-11					
[+] Overhead				0		291	03-Jan-11	29-Feb-12					
[-] Project Planning				19		52	03-Jan-11	17-Mar-11					
	411100	40115	1.1	0	Project Authorization (PA) for Advance Engineering	0	03-Jan-11						
	411120	40113	1.1	15	Develop Project Plan	50	05-Jan-11	17-Mar-11					
	411130	40117	1.1	0	Project Transfer and Assignment	5	20-Jan-11	26-Jan-11					
	411140	40118	1.1	4	Initial Site Survey and Report	20	10-Feb-11	10-Mar-11					
	411150	40217	1.1	0	Project Scope Agreement Complete (PJSA)	0		17-Mar-11					

Layout: Classic Schedule Layout Filter: All Activities

Activity: 411140 Initial Site Survey and Report

Step Name	Completed	Step Weight	Step Weight Percent
Facility Equipment Profile List	<input type="checkbox"/>	1.0	
Site Survey	<input type="checkbox"/>	3.0	
Exit Briefing	<input type="checkbox"/>	0.5	
Report	<input type="checkbox"/>	1.0	

Layout: Classic Schedule Layout Filter: All Activities

Activity: 3035N00010 HW Procurement

Step Name	Completed	Step Weight	Step Weight Percent
Customer Review and Approval of ISADSR	<input type="checkbox"/>	6.1	6.1
Disassembly and Pack for Shipping to Site	<input type="checkbox"/>	1.9	1.9
Drop 1 Adaptation check-out on String	<input type="checkbox"/>	8.2	8.2
Drop 1 for System Preparation	<input type="checkbox"/>	28.3	28.3
Drop 2 for FAT Dry Run	<input type="checkbox"/>	19.1	19.1
Equipment Delivered to System Preparation Facility	<input type="checkbox"/>	11.5	11.5
Factory Acceptance and Test - Dry Run	<input type="checkbox"/>	0.6	0.6
Formal Factory Acceptance and Test	<input type="checkbox"/>	0.6	0.6
Install Equipment at Site	<input type="checkbox"/>	4.5	4.5
Kick-off Preparation - Initial Adaptation	<input type="checkbox"/>	6.5	6.5
PCA	<input type="checkbox"/>	1.3	1.3
Start-Up and Check-Out	<input type="checkbox"/>	1.3	1.3
Start-Up and Check-Out - Final	<input type="checkbox"/>	10.2	10.2

Most Activities updated using weighted Steps

Conclusions

What to Strive For

□ Flexible Analysis

- Look at performance to date, but also more recent, appropriate trends
- Analyze by any Attribute, not just WBS



□ Integrate EVM with Forecasting

- Scenarios
- Change behavior



How to Deploy the “Right Amount” of EVM

- ❑ Build a solid platform for budgeting, forecasting, and change management
- ❑ Use templates for WBS and progress measurement rules
- ❑ Standard reports and views for periodic and cumulative trends
- ❑ Match terminology to organisation culture
 - CPI can be “Earned/Burned,” “Productivity,” etc.
 - Balance application of ANSI guidelines with organization’s existing know-how and processes



Summary Highlights

- ❑ A strong project controls foundation is necessary:
start simple if you need to
- ❑ Clear processes appropriate to each type of project
- ❑ Integrated Program and Project Management at all levels
- ❑ Make it easy to use and understandable
- ❑ Data and reporting automation
- ❑ Sell performance (and then perform!)

Questions? Thank you

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