Earned Value Management in Primavera P6

PROJECT MANAGEMENT SOLUTIONS THAT *SIMPLY WORK* SINCE 1989.

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May 2019 Technical Webinar

Thank you for joining today's webinar

- Mute – all call in phones are automatically muted in order to preserve the quality of the audio for all attendees.

- Questions – during the session, questions can be submitted through the Questions Box on the right side of the screen . We will try to address your questions at the end of the presentation, time permitting.

- Follow up – all registrants will receive an Excel file listing all questions and responses along with a link to the recorded webinar.
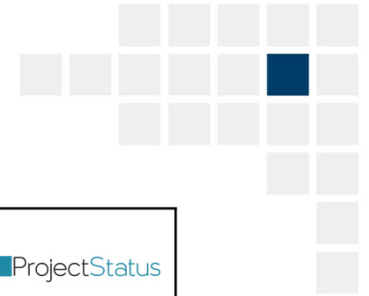
Safe Harbor

- The statements made in this technical presentation are based on our current knowledge of the tools.

- Our statements should not be construed to be an official "Vendor perspective", but are intended to be the sharing of technical and user knowledge gained as we explore new paths and technologies, usually in advance of our clients.

- You need to make your own judgments as to the application of our shared ideas in your own, unique environment.

Products and Services

- Project Controls System Implementation

- Cloud Based, Global Managed Hosting Services

- Software Training Services

- Integration, Analytics, Dashboards, Risk and Role-based User Access Tools

- Program and Project System Support Services and Partnering

- Mentored and Supported SB/DVBE Project Staffing Resources

Tool Matrix

Business Process	ORACLE PRIMAVERA	ARES PRISM	Deltek | ACUMEN	ORACLE + aconex	ProjectStatus
Portfolio Management	P6, Unifier			Aconex	View
Planning & Budgeting	Unifier	G2		Aconex	Collaborate
Estimating		Estimating		Aconex	
CPM Scheduling	P6	Scheduling	Fuse		Status
Cost Management & Reporting	P6, Unifier	G2	Fuse	Aconex	Collaborate
Document Management	Unifier	Prism Docs		Aconex	
Change Management	Unifier	G2		Aconex	
Engineering Forms	Unifier	G2		Aconex	
BIM/Schedule Integration				Aconex	
Risk Analysis	P6 Risk		Risk		Collaborate
Risk Management & Mitigation	P6		Risk	Aconex	Collaborate
Role Based Cloud Dashboard	Dashboard	Dashboard		Aconex	View
Earned Value	P6	Earned Value		Aconex	
Claims Support & Analysis	P6		Fuse	Aconex	
Facility Management/Work Orders	Unifier			Aconex	
Mobile online/offline support	Mobile			Aconex	Browser
Integration with Finance/ERP	Gateway	Integrator		Aconex	Gateway

DRMcNatty supports these project controls tools as an authorized partner, trainer and implementer as well as providing trained and supported project staffing resources.

Abstract

Earned Value Management (EVM) is a technique to measure performance and progress for your project. The basic premise of Earned Value is that the cost is relative to the work, and an assessment can be done at any given time to see if the work or costs are not relative.

Earned Value requires 3 basic elements for its calculations: Planned value – (PV); Earned Value – (EV); and Actual Costs – (AC). Oracle's Primavera P6 simplifies the EVM Technique by allowing the data already captured in a Cost/Resource Loaded schedule to be "Earned-Value Ready". The result is a user can now assess the project health via (SPI) Schedule Performance Index and/or the (CPI) Cost Performance Index at any given time through the project lifecycle.

Project Lifecycle in P6

P6 Project
Status

Schedule Creation and Baseline

Planned

- Create Project Schedule
- Route the Schedule For Approval – Revise & Resubmit
- Baseline The Schedule

Schedule Maintenance

Active

- Obtain Detailed Updates
- Apply Progress to the Schedule
- Report Progress

Project Archiving

Inactive

- Issue Final Schedule Reports
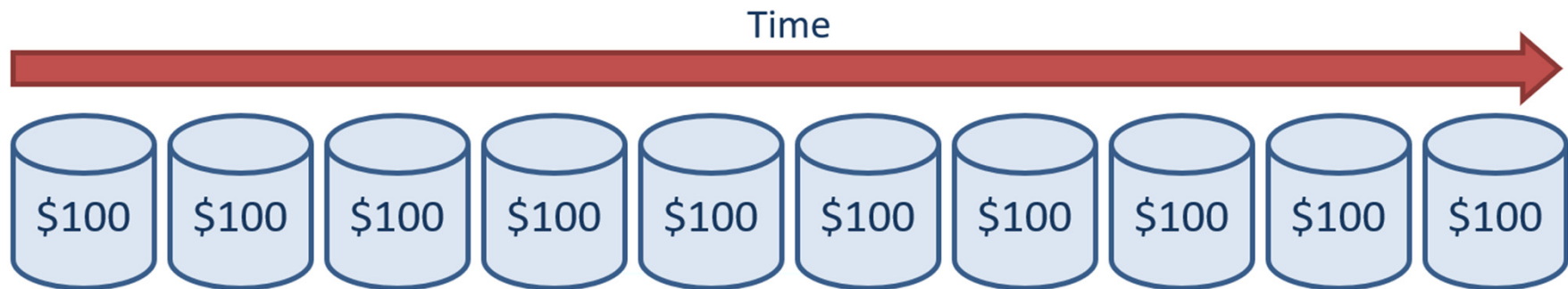- Export or Move Project to Inactive Archive Node

Earned Value Basics

- Planned Value
    - Cost & Schedule information comes from baseline
- Actual Value
    - Actual cost
- Earned Value
    - What has physically been built

A Simplified Example: (PV)
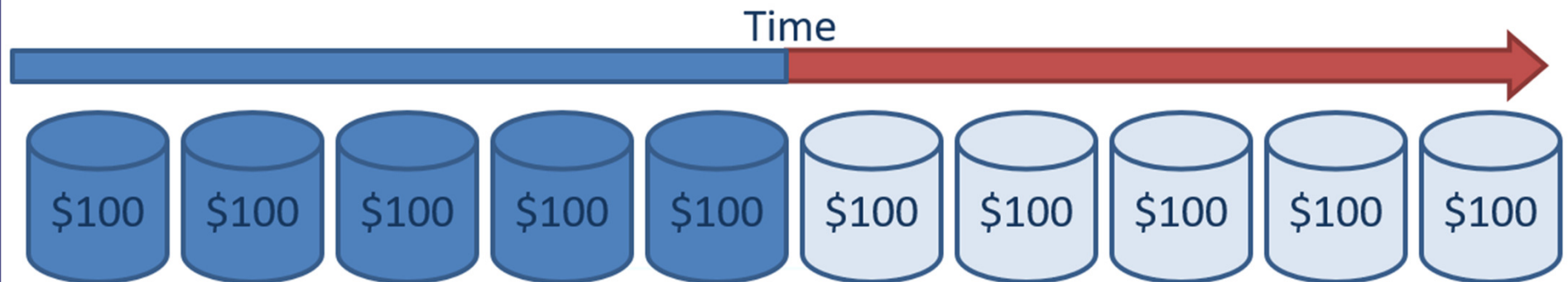
10 Day Project to build 10 Concrete Forms

- 1 Form Per Day
- $100 Per Day

Time

$100 | $100 | $100 | $100 | $100 | $100 | $100 | $100 | $100 | $100

At the end of day 5

- 5 Forms Completed
- $500
- Planned Value – (PV) = 500

Time

$100 $100 $100 $100 $100 $100 $100 $100 $100 $100

Let's Just Say..

- Day 5
  - Only 2.5 Forms Completed
- Our Earned Value – (EV) = 250

Time

$100 | $100 | $50 | $100 | $100 | $100 | $100 | $100 | $100 | $100

Let's also say we have a cost over-run..

- Day 5
  - Only 2.5 Forms Completed
  - Each form cost $200 to build
  - Actual Cost – (AC) - ($200 x 2.5 Forms) = $500

Time

| $200 | $200 | $100 | $100 | $100 | $100 | $100 | $100 | $100 | $100 |

Estimate to Complete
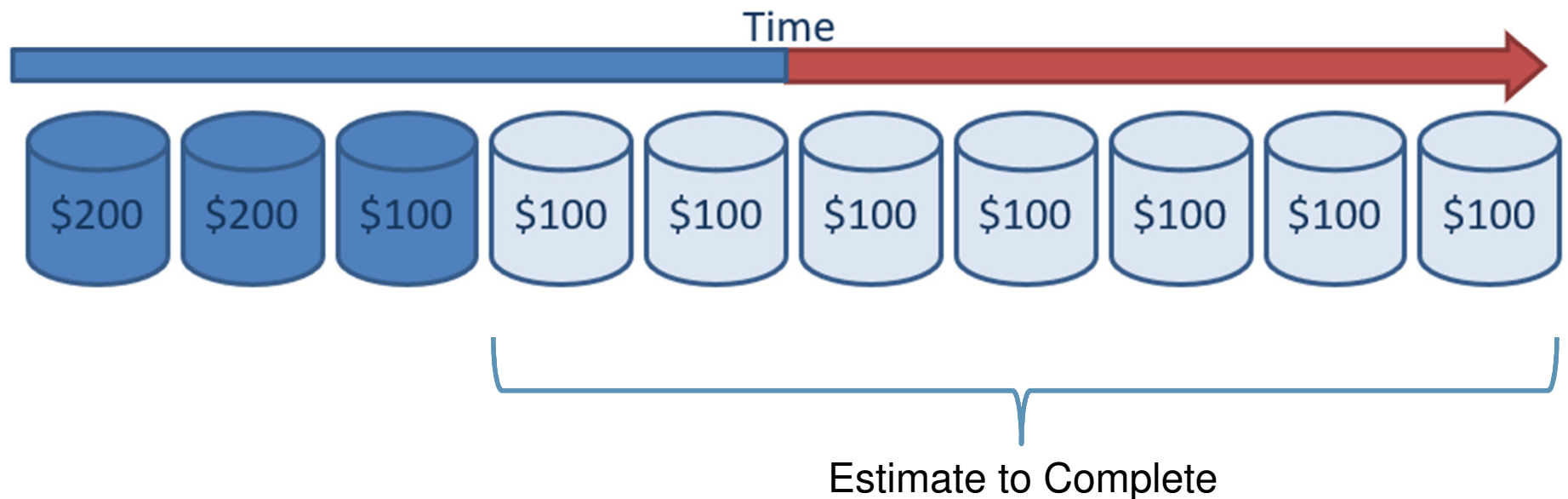
We now have our variables for Earned Value

- Day 5
  - (PV – Planned Value) = 500
  - (EV – Earned Value) = 250
  - (AC – Actual Costs) = 500

- SCHEDULE VARIANCE (EV) – (PV) = -250
  - Behind Schedule

- COST VARIANCE (EV) – (AC) = -250
  - Over Budget

REQUIREMENTS FOR P6 EVM

- Set % Complete Type to Physical
  - Earned Value Can Only be calculated when the Duration of the Activity is separated from the % of the work completed

- Build Activities at the appropriate level of detail
  - Cost Estimate may be a greater level of detail; Contracts may require specific levels etc.
  - Must be a resource/cost loaded schedule for Cost Variance Calcs.

- Ensure a tight logic path to your schedule

- Standardize your Data Date Progress Updates

- <u>MUST</u> Create & Assign Baseline to Schedule for (PV)

Customize Recommended Layouts

Layout 1 – Earned Value Analysis
- Activity ID
- Activity Name
- Original Duration
- Planned Value Cost
- Actual Cost
- Earned Value Cost
- Budget At Completion
- Schedule % Complete
- Performance % Complete
- Start
- Finish
- BL1 Start
- BL1 Finish

Layout 2 – Estimate To Complete
- Activity ID
- Activity Name
- Earned Value Cost
- Planned Value Cost
- Actual Cost
- Cost Performance Index
- Schedule Performance Index
- Budget At Completion
- Estimate To Complete
- Estimate At Completion Cost

Baseline your Project
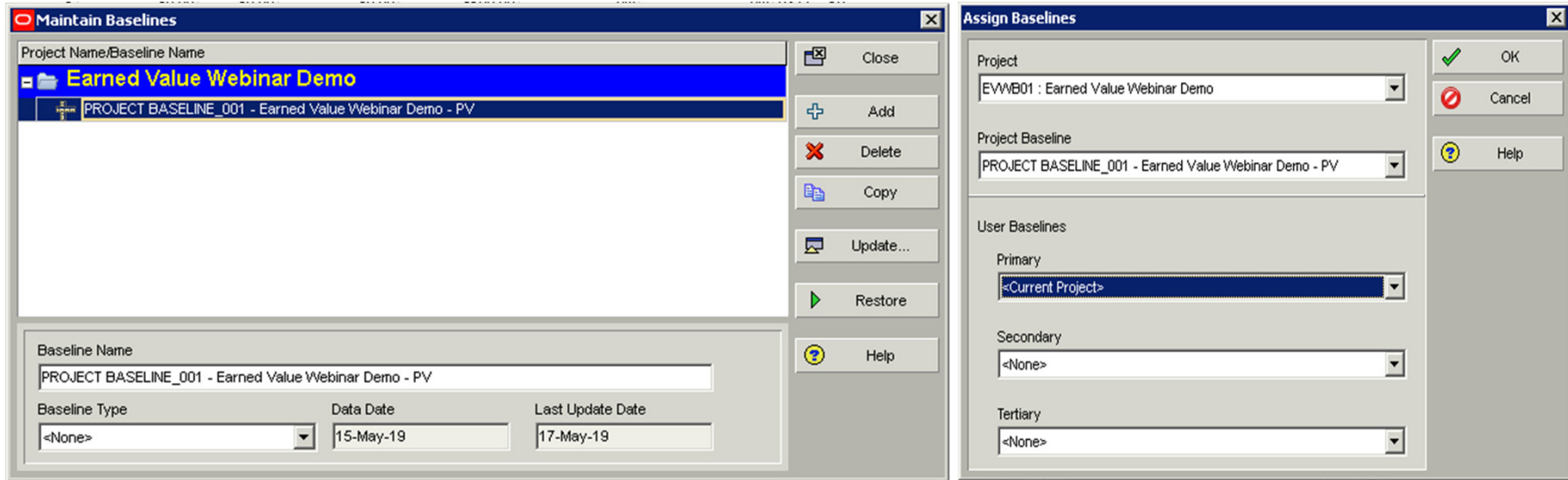
* Your Planned Value Cost column populates after progress has been applied

"Let's Say Today is Day 5"

- Planned Value of $500 to Finish 5 Forms on Day 5 - $500 (PV)

- Only 2.5 Forms Completed at an Actual Cost of $200 Per Form - $500 (AC)

- Only Earned $300 of Work Based on the Original Plan - $250 (EV)

Conclusion Based on Earned Value Analysis

- ## Schedule Performance
  - The baseline indicates that 50% of the work should be complete. With only 25% Performance % Complete (Actual Labor Units) This shows the project is behind schedule.

- ## Cost Performance
  - The baseline indicates that $500 worth of work should be complete (Planned Value Cost) As of the Data Date, (Actual cost) is $500 to achieve $250 worth of work (Earned Value Cost). This shows the project is over budget

SPI/CPI

Cost & Schedule Indices

- <u>Schedule Index</u>
    - A ratio of what was earned vs. what was planned
    - An index less than 1 is behind schedule
    - An index greater than 1 is ahead of schedule
    - EV/PV = SPI (Schedule Performance index)
    - 250/500 = .5

SPI/CPI

Cost & Schedule Indices

- Cost index
  - A ratio of what we Earned vs. the Actual Cost
  - An index less than 1 is over budget
  - An index greater than 1 is under budget
  - EV/AC = Cost Performance Index
  - $250/$500 = .5

Using SPI/CPI to Analyze Project Efficiency

- Cost Performance index
  - Relates to the amount of physical work completed vs. the $ spent to accomplish the work
  - CPI = (EV) / (AC)

Activity Name	Original Duration	Earned Value Cost	Planned Value Cost	Actual Cost	Cost Performance Index	Schedule Performance Index	Budget At Completion	Estimate To Complete	Estimate At Completion Cost
Project: Earned Value Wel	13	$250.00	$500.00	$500.00	0.50	0.50	$1,000.00	$900.00	$1,400.00
Form 1	1	$100.00	$100.00	$200.00	0.50	1.00	$100.00	$0.00	$200.00
Form 2	1	$100.00	$100.00	$200.00	0.50	1.00	$100.00	$0.00	$200.00
Form 3	1	$50.00	$100.00	$100.00	0.50	0.50	$100.00	$200.00	$300.00
Form 4	1	$0.00	$100.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 5	1	$0.00	$100.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 6	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 7	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 8	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 9	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 10	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00

Layout: Earned Value 02   Filter: All Activities

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Using SPI/CPI to Analyze Project Efficiency

- <u>Schedule Performance index</u>
  - Relates to the amount of physical work completed vs. the amount planned
  - SPI = (EV) / (PV)

Activity Name	Original Duration	Earned Value Cost	Planned Value Cost	Actual Cost	Cost Performance Index	Schedule Performance Index	Budget At Completion	Estimate To Complete	Estimate At Completion Cost
Project: Earned Value Wel	13	$250.00	$500.00	$500.00	0.50	0.50	$1,000.00	$900.00	$1,400.00
Form 1	1	$100.00	$100.00	$200.00	0.50	1.00	$100.00	$0.00	$200.00
Form 2	1	$100.00	$100.00	$200.00	0.50	1.00	$100.00	$0.00	$200.00
Form 3	1	$50.00	$100.00	$100.00	0.50	0.50	$100.00	$200.00	$300.00
Form 4	1	$0.00	$100.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 5	1	$0.00	$100.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 6	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 7	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 8	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 9	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 10	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00

Layout: Earned Value 02 — Filter: All Activities

Using SPI/CPI to Calculate Estimate to Complete (ETC)

- Located in WBS Tab
  - Allows user to define formula for Estimate to Complete values

| General | Notebook | Budget Log | Spending Plan | Budget Summary | WBS Milestones | WPs & Docs | Earned Value |

Technique for computing performance percent complete

- ● Activity percent complete
  - ☐ Use resource curves / future period buckets

- ○ WBS Milestones percent complete
- ○ 0/100
- ○ 50/50
- ○ Custom percent complete [6]

Technique for computing Estimate to Complete (ETC)

- ○ ETC = remaining cost for activity

or

ETC = PF * (Budget at Completion - Earned Value), where:

- ○ PF = 1
- ● PF = 1 / Cost Performance Index
- ○ PF = 1 / (Cost Performance Index * Schedule Performance Index)
- ○ PF = [0.88]

Performance Factors

- 4 Optional Methods

  - PF = 1 *Optimistic Result
    - ETC = (PF * (Budget at Completion – Earned Value Cost
  - PF = 1/CPI *Most likely Result
    - ETC = (1/CPI)* Budget at Completion – Earned Value Cost
  - PF = 1/CPI*SPI *Pessimistic Result
    - ETC = [1/(CPI * SPI)] * Budget at Completion – Earned Value Cost
  - PF = _____
    - ETC = your custom PF * Budget at Completion – Earned Value Cost

Performance Factors

Activity Name	Original Duration	Earned Value Cost	Planned Value Cost	Actual Cost	Cost Performance Index	Schedule Performance Index	Budget At Completion	Estimate To Complete	Estimate At Completion Cost
Project: Earned Value Wel	13	$250.00	$500.00	$500.00	0.50	0.50	$1,000.00	$750.00	$1,250.00
Form 1	1	$100.00	$100.00	$200.00	0.50	1.00	$100.00	$0.00	$200.00
Form 2	1	$100.00	$100.00	$200.00	0.50	1.00	$100.00	$0.00	$200.00
Form 3	1	$50.00	$100.00	$100.00	0.50	0.50	$100.00	$50.00	$150.00
Form 4	1	$0.00	$100.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 5	1	$0.00	$100.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 6	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 7	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 8	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 9	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00
Form 10	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$100.00	$100.00

Activity Name	Original Duration	Earned Value Cost	Planned Value Cost	Actual Cost	Cost Performance Index	Schedule Performance Index	Budget At Completion	Estimate To Complete	Estimate At Completion Cost
Project: Earned Value Wel	13	$250.00	$500.00	$500.00	0.50	0.50	$1,000.00	$1,500.00	$2,000.00
Form 1	1	$100.00	$100.00	$200.00	0.50	1.00	$100.00	$0.00	$200.00
Form 2	1	$100.00	$100.00	$200.00	0.50	1.00	$100.00	$0.00	$200.00
Form 3	1	$50.00	$100.00	$100.00	0.50	0.50	$100.00	$100.00	$200.00
Form 4	1	$0.00	$100.00	$0.00	0.00	0.00	$100.00	$200.00	$200.00
Form 5	1	$0.00	$100.00	$0.00	0.00	0.00	$100.00	$200.00	$200.00
Form 6	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$200.00	$200.00
Form 7	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$200.00	$200.00
Form 8	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$200.00	$200.00
Form 9	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$200.00	$200.00
Form 10	1	$0.00	$0.00	$0.00	0.00	0.00	$100.00	$200.00	$200.00

Key Concepts

- Perform Earned Value Analysis to compare the budgeted cost of the work to the Actual Cost

- Calculate the Planned Value, Earned Value, and Actual Cost to determine how much work should have been completed, How much work was completed, and how much the completed work cost to build

- Use Estimate to Completion to calculate what the remaining cost of the activity(s) in progress will be

Questions & Comments
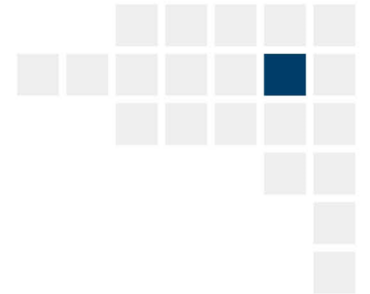
- All questions are gathered into a master sheet, answered and distributed to all registrants as well as posted on our website.

- Answers are based on our own experiences using the various software products covered in this webinar.

Thank you for participating

Contact - Dbeck@drmcnatty.com

Upcoming Events

2019 AACE International Conference & Expo

June 16 - 19, 2019
Sheraton New Orleans
New Orleans, LA, USA

AACE INTERNATIONAL

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