

The easiest way to implement Earned Value Analysis

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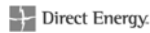
Presented at: Project World 2005



Presentation overview

The presentation is:

- A case study showing how Earned Value Analysis (EVA) has been implemented at Direct Energy.
- A step-by-step review on the implementation process
- Providing you with tips, advices and supporting material ease the implementation.



A case study and proven results

- Earned Value Analysis (EVA) has always been a challenge for Project Managers.
 - Too Complex
 - Difficult to implement
 - Require high level of maturity
 - Require infrastructure such as Activity Based Costing
 - Other
- A revolutionary and extremely easy way to implement it even in an immature PM environment has brought extraordinary results.
- Going through a case study, you will see how this technique helped a company achieve these results:
 - In less than 18 months the Program Management Office...
 - Increased from 6% to 96% its ability to deliver projects on time.
 - Saved more than \$7.2M in direct and tangible cost



Some background and context

- Direct Energy is
 - An emerging company offering energy related essential home and business services.
 - Part of the Centrica family (www.centrica.com) Direct Energy is operating in North America.
- In its second year of existence, the PMO initiated a project called "Project Management Maturity Improvement".
 - One of the initiatives in this project was to introduce the Earned Value Analysis (EVA).
 - At the time, the majority of projects in the PMO didn't have project plans and very few Project Managers (PM) were using Project Management software such as Microsoft Project™.
 - Very few PM also knew about EVA.
- In this context, we needed to use a revolutionary approach ...

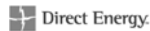


First we made sure everyone understood the concept of EVA

The **Earned Value Analysis** is a technique:

- That allows you to "**Earn**" a value over time as you make progress towards an ultimate goal. The "**Value**" can be a percentage, unit of work, fuel, energy or most commonly dollars.
- Where the "**Value**" is predetermined and you "Earn" it either:
 - At the beginning or
 - At the end or
 - Prorated as you progress towards the objective (e.g. % completion).

This is like a contractor who "Earns" the "Value" of the contract either at the beginning, the end or prorated as the work gets done.



Then we treated PMs as contractors to their project sponsor

Contract:

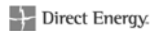
"I _____ (Sponsor) agree to pay _____ (Project Manager) the value of \$1.00 for each task and milestone listed on the attached project plan. The value of \$1.00 is earned at the completion of each task and milestone and payable the last day of the month. In addition, a bonus of \$_____ will be awarded at the end of the year if the Project Manager maintains his/her project on time or at +/- 10% of the plan."

This forced all PMs to have a project plan, save a baseline and monitor it!

The Schedule Performance Index (SPI) has been used to determine if the project is maintained on time:

$$SPI = \text{Earned Value} / \text{Planned Value}$$

Although this was not real money, it was considered very seriously and...



On a monthly basis capture the "Earned Value"

On a monthly basis:

1. Enter the progress in the field "% complete".
2. Record the value earned for the total project by copying the "Actual Cost" field from MsProject to the excel template.

ID	Task Name	Cost	% Complete	Actual Cost	Details	2nd Quarter			3rd Quarter		
						Feb	Mar	Apr		May	Jun
1	Develop detailed Program Management Plan	\$3,000	11%	\$4,000	Cost	\$1,000	\$4,000	\$5,000	\$4,000	\$5,000	\$5,000
2	Scope Management		40%	\$1,000	Ag. Ct	\$500	\$4,000				
3	Develop a Program Charter	\$1,000	50%	\$0,000	Cost	\$1,000	\$1,000				
4	Create a Work Breakdown Structure (W)	\$1,000	100%	\$1,000	Ag. Ct	\$0,000	\$1,000	\$1,000			

The value is only earned When the task is 100%

Current Month		Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	TOTAL
Baseline - Planned Value (\$)		1	8	5	4	10	5	33
Accomplishment - Earned Value (\$)		0	4					4
Baseline - Planned Value (%)		3%	24%	15%	12%	30%	15%	100%
Accomplishment - Earned Value (%)		0%	12%	0%	0%	0%	0%	12%

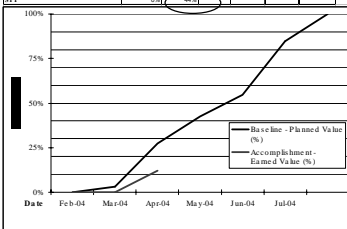
Cumulative Month		Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	LAC (Days)
Baseline - Planned Value (%)		3%	27%	42%	55%	85%	100%	130
Accomplishment - Earned Value (%)		0%	12%					
SPI			0%	44%				



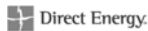
Screen Sample - Creating a Performance Chart (using excel)

Current Month		Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	TOTAL
Baseline - Planned Value (\$)		1	8	5	4	10	5	33
Accomplishment - Earned Value (\$)		0	4					4
Baseline - Planned Value (%)		3%	24%	15%	12%	30%	15%	100%
Accomplishment - Earned Value (%)		0%	12%	0%	0%	0%	0%	12%

Cumulative Month		Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	LAC (Days)
Baseline - Planned Value (%)		3%	27%	42%	55%	85%	100%	130
Accomplishment - Earned Value (%)		0%	12%					
SPI			0%	44%				293



Based on the SPI, the duration is estimated at 293 instead of 130 days
(Estimated Duration = duration / SPI)



Alone, the use of SPI brought extraordinary results

The ability to deliver projects on time has improved from 6% to 96% in less than 18 months.

Case Study	2002			2003		
	Initial (Aug)	Dec-02	Mar	Jun	Sep	Dec
Delivery Capability:						
Ability to maintain projects on time (SPI)						
% of Projects Progressing on time (>=80%)	6%	96%	76%	87%	81%	96%
% of Projects Progressing slightly behind plan (>=80% to <90%)		19%	20%	13%	9%	4%
% of Projects Progressing behind schedule (<80%)						

Based on the number of projects completed since EVA has been introduced and their delivery success, the direct savings are:

Tangible savings of EVA	Assumption	2002	2003
Number of Projects Completed during the year		24	30
Number of projects delivered on time (using SPI)		13.44	28.5
Minus the original 6% of projects that would have been delivered on time without EVA		1.44	1.8
Number of projects delivered on time as a result of EVA implementation		12	27
Savings based on average team size and average of 3 months delay	\$ 184,800	\$ 2,217,600	\$ 4,989,600
Cumulative Tangible Benefits of EVA		\$ 2,217,600	\$ 7,207,200

The cost of one project late by 3 months is:



The next step is the implementation of CPI

This is the most complex part so it is better to implement it progressively (baby steps) as the environment and quality of the plan improve.

The steps to implement the Cost Performance Index (CPI) are:

1. Replace the \$1/task value by a % of the estimated cost using only the cost you have control over or the one you are able to measure.
2. Increase the control and cost captured until you are able to capture all project cost:
 - Start with capital cost only, add operating cost, determine fixed and variable cost...
 - Use standard rate at first, then apply real cost as information becomes available
3. Use fixed and variable cost to determine the real cost of each task

See how the Planned Value (\$1/task) is replaced and analysis is performed....



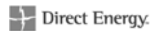
Implementing CPI

Divide the total project cost by the number of tasks to determine their Value

Replacing the \$1/task by the new value will recalculate the PV.
 Entering the Actual cost Will allow you to calculate the CPI

Current Month	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	TOTAL
Baseline - Planned Value (\$)	\$15,152	\$12,212	\$75,758	\$60,606	\$121,515	\$75,758	\$500,000
Accomplishment - Earned Value (\$)	\$0	\$60,606					\$60,606
Baseline - Planned Value (%)	3%	24%	15%	2%	30%	15%	100%
Accomplishment - Earned Value (%)	0%	12%	0%	0%	0%	0%	12%
Actual Cost (AC)	\$0	\$72,320	\$0	\$0	\$0	\$0	\$72,320

Cumulative Month	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	TOTAL
Baseline - Planned Value (\$)	\$15,152	\$116,364	\$172,121	\$272,727	\$424,242	\$500,000	\$1,290,606
Accomplishment - Earned Value (\$)	\$0	\$60,606				\$0	\$60,606
Actual Cost (AC)	\$0	\$72,320	\$0	\$0	\$0	\$0	\$72,320
SPI	0%	44%	0%	0%	0%	0%	44%
CPI	0%	84%					84%



The "Earned Value Analysis" is now complete

The foundation for **Earned Value** is in place:

- The Planned Value (PV) is determined based on fixed and variable cost
- The Earned Value (EV) is based on the % completion of each task
- The Actual Cost (AC) reflects what you can measure

Therefore you can perform the standard **Analysis**.

$SPI = EV / PV$ $CPI = EV / AC$
 $SV = EV - PV$ $CV = EV - AC$
 EAC =
 BAC - CV: Assuming future tasks would be done as planned
 AC + ETC / CPI: Assuming the same rate of spending on future tasks

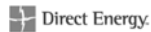
Estimated Duration at Completion = Planned Duration / SPI



Sample Analysis

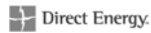
By implementing EVA, two months after the project started, we have enough information to determine that this 130 days project budgeted at \$500K will most likely finish 163 later and exceed its budget by \$524,320

Analysis	
\$500,000	<<-BAC
\$136,364	<<-PV
\$60,606	<<-EV
\$72,320	<<-AC
44%	<<-SPI
84%	<<-CPI
-\$75,758	<<-SV
-\$11,714	<<-CV
\$1,024,320	<<-EAC
130	<<-Planned Duration (days)
292.5	<<-Estimated Duration (days)
163	<<-Delayed by (days)
\$524,320	<<-Overbudget by



Recap – Process to implement EVA

1. Implement SPI:
 1. Develop a contract between the PM and sponsor forcing the PM to have a plan and maintain it.
 2. Assign a \$1 value to each task and milestone payable upon completion.
 3. Collect EV based on % completion.
 4. Monitor SPI to keep it within +/-10% of the baseline.
2. Implement CPI:
 1. Replace the \$1 value by a % of the project cost using the number of tasks and milestone.
3. Improve CPI:
 1. Replace the task value by its real cost (fixed and variable) as you are able to measure it.



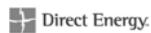
Closing remarks

FOCUS ON PLANNING!

Earned Value Analysis (EVA) is just a technique to help you manage your project. Without a plan you cannot be on time or budget!

**If you don't know where you are going
there is no tool that can tell you when you'll get there.**

Yves Racine, PMP



**Tips and supporting material
implementing Earned Value Analysis**

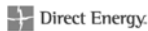
Appendix

- A) Definitions
- B) Cost & Schedule Performance Chart
- C) Tips: How to face the resistance implementing EVA



Definitions

- **Planned Value (PV)** (also called **Budget Cost of Work Schedule**):
This is the estimated cost to perform a task for a specific moment in time. By adding the PV of each task, you obtain the PV (estimated cost) of doing the entire project at each point in time during the project. The cumulative number which eventually (at the end of the project) gives you the Total Project Cost which is also defined as the Budget At Completion (**BAC**)
- **Earned Value (EV)** (also called **Budget Cost of Work Performed**):
This number reflects the accomplishment (Work Performed) and is calculated by the % completion. When a task is on target, the EV equals 100% of the PV. A number greater than 100% indicates that we are ahead of schedule (have accomplished more than we have planned) and respectively a number less than the PV (estimated cost) indicates that we are behind schedule.
- **Actual Cost (AC)** (also called **Actual Cost of Work Performed**):
This is the real cost (Actual Cost) spent to perform a task. Once again, added together, you obtain the Actual Cost of doing the project. This is usually captured by the time reporting or financial system.



Definitions (Continued)

- Schedule Performance Index (SPI):**
This is an index indicating if the project is on time compared to the plan. It is calculated as follow:
$$SPI = \text{Earned Value (EV)} / \text{Planned Value (PV)}$$
- Cost Performance Index (CPI):**
This is an index indicating if the project is on budget compared to the plan. It is calculated as follow:
$$CPI = \text{Earned Value (EV)} / \text{Actual Cost}$$
- Cost Variance (CV)**
This is the variance between what you have paid and what you should have paid to complete the work you have done. It is calculated as follow:
$$CV = \text{Earned Value} - \text{Actual Cost}$$
- **Schedule Variance (SV)**
This is the cost of the variance in the schedule. When a project is behind schedule, this is the cost you have to spend to complete the work that should have been done by now. It is calculated as follow:
$$SV = \text{Earned Value} - \text{Planned Value}$$



Definitions (Continued)

Budget At Completion (BAC):

This is the cost of the project. At the end of the project, the cumulative PV is equal to the BAC.

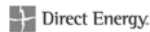
Estimated To Complete (ETC):

This is the planned cost for the remaining work: $ETC = BAC - EV$

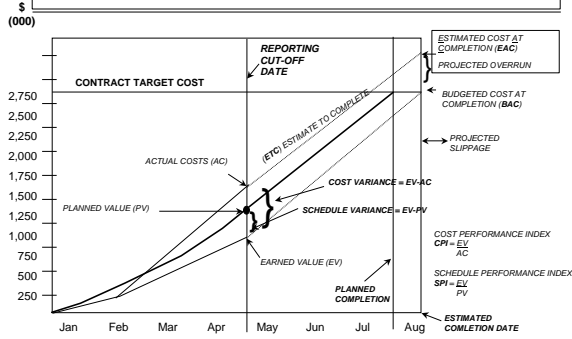
Estimated At Completion (EAC):

Based on the current performance, this is an estimation of what the project will have cost when it is complete. There are many ways to determine the EAC depending on the assumption you want to use:

1. Assuming future tasks are performed as planned (time and cost).
 $EAC = BAC - CV$
2. Assuming future tasks are performed using the same spending rate (CPI)
 $EAC = AC + (ETC / CPI)$
3. Assuming future tasks would be completed at the same performance rate (SPI)
 $EAC = AC + (ETC / SPI)$



Cost & Schedule Performance Chart



Tips: How to face the resistance implementing EVA.

What happen if:

- Q** The organization is not mature and my boss or client will never support it?
A They don't need to know you are doing it. This is a tool for the PM. You can still apply the \$1/task and imagine that you have signed the contract.
- Q** There are no financial systems in place providing us with actual cost or the information comes much later?
A You can develop a manual process to track your own cost or
A You can assume your actual cost is equal to your EV until you can measure and report on it.
- Q** PMs don't even have a plan? They only have a list of milestones?
A Put a \$1 per milestone and it works – you earn it when they are done. – They will realize that it is difficult to keep an SPI >90% with only few milestones so they will start adding tasks and eventually plan appropriately.



Tips: How to face the resistance implementing EVA (Continued)

What happen if:

Q PM says they don't have the time?

A It takes only few minutes to up front to assign the \$1 value and requires few minutes every month to update the % completed which they should be doing anyway.

Q Project plans only have few long tasks?

A It still works but it is harder for the PM to maintain the SPI which gives an incentive to better plan.

Q Projects are adding or removing tasks?

A This means more or less work will get done so you should earn more or less money. Therefore, using normal Change request, the sponsor should be informed and agree to pay more.

Q PMs are only using excel and they don't have MsProject?

A This can still be done through excel but you will have to determine manually how many tasks and milestones are completed each month.

Other than "unwilling to do it", there is no reason preventing you from implementing it and obtaining great results.