Software Development Methods
Lab 2: Earned Value Management

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September, 2018

Note:

The lab exercises go a bit beyond those seen in the lectures last week. Here, we add actual costs to our planning. Same approach, but now with budget and costs considered. In the lectures, we considered the Planned Value (PV) and the Earned Value (EV). Here, we consider the following indicators:

- Actual Cost (AC): the actual cost of the activities
- Cost Variance (CV): $CV = EV - AC$. CV greater than 0 means the project is under budget. CV lower than 0 means the project is over budget.
- Cost Performance Index (CPI): $CPI = EV/AC$.
  - If the CPI is less than one, you are earning less than the amount spent. In other words, you're over budget.
  - If the CPI is greater than one, you are earning more than the amount spent. In other words, you are under budget.
  - If the CPI is equal to one, this means earning and spending are equal. You can say that you are proceeding exactly as per the planned budget spending, although this rarely happens.
- Schedule Performance Index (SPI): $SPI = EV/PV$
  - If the SPI is greater than one, this means more work has been completed than the planned work. In other words, you are ahead of schedule.
  - If the SPI is less than one, this means less work has been completed than the planned work. In other words, you are behind schedule.
  - If the SPI is equal to one, this means work is being completed at about the same rate as planned, you are on time.

1 Earned Value Management - First task

Consider you have the following project plan, where we present the task ID, its description, the immediate predecessors, the task duration, in days, the budget, in euros, the current status, the Actual Start (days), the Actual Duration (days), and the Actual costs (euros):

Table 1: Task list for this project

Id	Task	Preds	Dur	Budget	Status	ActStart	ActDur	ActCosts
A	Meet with client		5	500	100%			1500
B	Write software	A	20	10000	100%	+5 days	+10 days	9000
C	Debug software	B	5	1500	100%	As per other delays	+5 days	2500
D	Prepare draft manual	B	5	1000	100%	As per other delays		1000
E	Meet with clients	D	5	1000	100%	As per other delays		1000
F	Test software	C, E	20	2000	75%	As per other delays		1000
G	Make modifications	F	10	8000	0%	As per other delays		0
H	Finalize manual	G	10	5000	0%	As per other delays		0
I	Advertise	C, E	20	8000	10%	As per other delays		1000

Assumptions:

- all direct dependencies are of type *Finish to Start*
- each week has 5 working days
- each task is payed in two phases:
  - 50% when the activity starts
  - 50% upon completion

Please perform a project status analysis at week 13, using EVA. Use *CPI* and *SPI* to determine project efficiency. Is this project late, or ahead of schedule? Are we under- or over-budget, at this point? How much?

Suggestion:

- Create an *AON* diagram for this project plan
- Create a *Gantt chart* from the *AON* diagram (*i.e.* of the plan)
- Create a *Gantt chart* of the actual plan execution (*i.e.* progress status)
- Perform the analysis by plotting *PV*, *AC*, *EV*, *CPI* and *SPI*.

2 Earned Value Analysis - Practice makes perfection

You have a project that is scheduled to be completed in 10 days at a budgeted cost of 100,000 euros. At the end of day 6 you do an analysis and you determine the job is 70% complete and you have spent 65,000 euros. Perform an Earned Value Analysis assuming:

- The plan has a purely linear distribution rate of daily planned value and daily planned percentage complete.

Is this project late, or ahead of schedule? Are we under- or over-budget, at this point? How much?

3 Earned Value Analysis - Really, perfection :-)

Consider the following project: your company has identified a set of tasks, the precedence relationships among them (all of the *finish to start* kind) and the expected duration for each task (Table 2).

Table 2: Task list for this project

Task	Predecessors	Duration (days)
A		2
B	A	2
C	A	4
D	B, C	2
E	D	4
F	C	4
G	F	3
H	E, G	1

After 8 days of work, activity A has been completed on time. Three out of the 4 (similarly sized) deliverables of activity C have been completed. No other activities have started, yet. Assuming that each day's work costs 100 euros, please compute the CV, SV the CPI and SPI for this project. Is this project late, or ahead of schedule? Are we under- or over-budget, at this point? How much?