Project Assessment Exercise

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We have been assigned the task of assessing the project status of a project, whose Gantt chart is presented in Illustration 1, where:

1. we are currently at the end of March (end of Month 3 of the project)
2. the lower bars represent the initial plan
3. the upper bars represent the current situation

The meaning of the columns is the following:

1. Resource is the resource needed for a task. (Notice that the usage percentage is the **actual (current) use of resources**.)
2. **Baseline Work** is the work (effort) initially planned for the task
3. **% Work Complete** is the technical progress. (It is expressed in terms of the effort consumed with respect to the **actual (current)** estimation of the work necessary to complete the task.)
4. **Actual Costs** are the actual costs incurred into so far
5. **Start Variance and Finish Variance** are the variations with respect to the planned start and the planned end.

We also have the following data concerning resources:

Resource	Max Units	Cost/Hour
Resource A	200%	€ 50.00
Resource B	200%	€ 50.00
Resource C	50%	€ 200.00
Resource D	10%	€ 500.00

Table 1. Resource Specification

where:

1. Resource is the resource type
2. Max Units is the maximum number of units we have at disposal for a resource (Resource A, for instance is available up to 200% - that is, we have two people full time of type “Resource A”)
3. Cost/hour is the cost per hour of **effort**. (This is rather different from the cost of one calendar unit, which depends on how many units we put at work in parallel.)

Perform an analysis of the project and provide your estimations to end and your considerations about the plan.

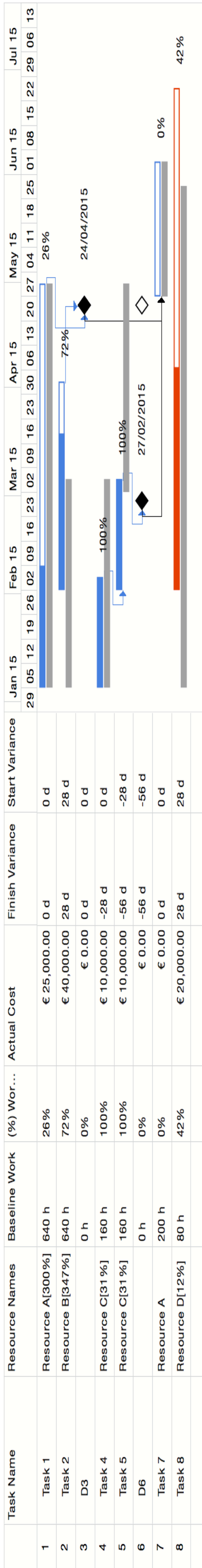


Illustration 1: A project and its status at the beginning of April

Solution

The preliminary observation is that the data we have been given about the nominal and the actual plan is expressed in a non-uniform way.

The second is the project does not clearly show whether we are late or early: some activities seem to be late (e.g., Tasks 1 and 2), but others finished considerably earlier (e.g., Tasks 4 and 5). Similar considerations can be done for the budget.

The third and final preliminary observation is that some resources are **currently** over-allocated, usually a sign of trouble.

A systematic approach, however, is necessary. We decide to use Earned Value Analysis to assess our project.

We organize the work in two main steps:

1. Assess the initial plan.
2. Compare the initial plan with the current plan using EVA.

Part 1. Assess the initial plan. With the information we have we can only assess the quantitative data (e.g., we do not have any information to assess whether the baseline effort was adequate).

Concerning the quantitative assessment we:

1. Compute the budgeted cost of each activity in the plan
2. Understand the initial allocation of resources

The computation of the budgeted costs is straightforward: we have the baseline work and the effort cost of each resource:

Task	**Resource**	**Baseline work (h)**	**Effort Cost (euros/h)**	**Total (euros)**
Task 1	Resource A	640	50	32000
Task 2	Resource B	640	50	32000
Task 4	Resource C	160	100	16000
Task 5	Resource C	160	100	16000
Task 7	Resource A	200	50	10000
Task 8	Resource D	80	500	40000

Table 1.Task Planned Costs

Notice that the computation requires only the baseline work and the unit cost of work. All the other information (number of units, task duration, etc) are not needed.

The computation of the planned load of resources is performed by looking at the work and schedule. More in details, given the planned duration and the planned work, the units of work we need is given by the relation D = E / M, where D is the duration, E is the effort and M is the manpower (number of units).

The data is shown in the following table (where we have transformed calendar days into hours using the relationship 1 calendar-day = 8 calendar-hours):

Task	**Resource**	**Baseline Work (h)**	**Baseline Duration (h)**	**Total Units (%)**
Task 1	Resource A	640	640	100%
Task 2	Resource B	640	320	200%
Task 4	Resource C	160	320	50%
Task 5	Resource C	160	320	50%
Task 7	Resource A	200	200	100%
Task 8	Resource D	80	800	10%

With respect to resource allocation in the initial plan, we do not have particular surprises: the only consideration we can make is that Resource A was under-allocated in the initial plan (we have an availability of 200% and use only 100% in the plan).

Part 1. Earned Value Analysis.

Earned Value Analysis is discussed in: **http://www.spmbook.com/downloads/slides/pdf/C03-08-09-ExecutionMonitoringControl.key.pdf**

We start by computing the **planned value**. Given the budgeted costs in Table 1 and the plan in Illustration 1, the computation is simple: we need to allocate the **budgeted costs** of each activity to time using the **initial plan** and then compute the costs for each unit of time.

This is shown in the following table:

	Budgeted Cost	Jan 15	Feb 15	Mar 15	Apr 15	May 15
Task 1	€ 32,000	€ 8,000	€ 8,000	€ 8,000	€ 8,000	
Task 2	€ 32,000	€ 16,000	€ 16,000			
D3						
Task 4	€ 16,000	€ 8,000	€ 8,000			
Task 5	€ 16,000			€ 8,000	€ 8,000	
D6						
Task 7	€ 10,000					€ 10,000
Task 8	€ 40,000	€ 8,000	€ 8,000	€ 8,000	€ 8,000	€ 8,000
	TOTAL	€ 40,000	€ 40,000	€ 24,000	€ 24,000	€ 18,000
	CUMULATIVE	**€ 40,000**	**€ 80,000**	**€ 104,000**	**€ 128,000**	**€ 146,000**

where, for each task, the budgeted costs computed in Table 1 have been equally for the whole planned duration of tasks (the lower bars of Illustration 1). The cumulative values provide the planned value or the planned cumulative expenditure for the project.

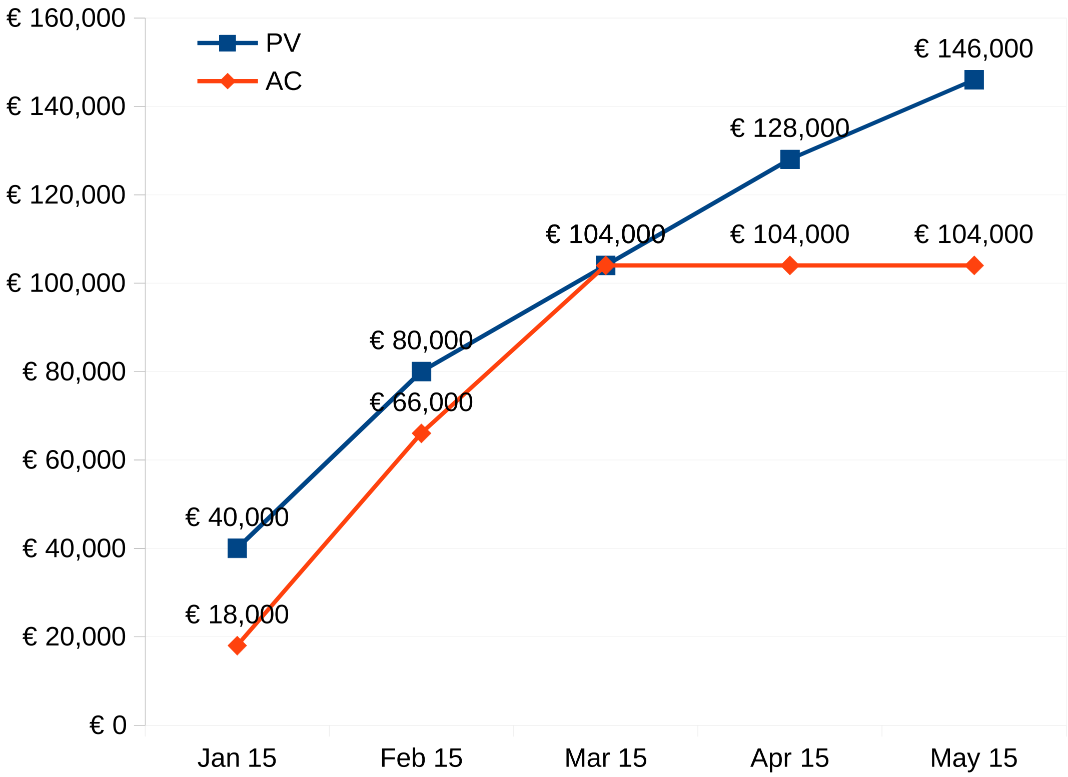
The continue by computing the **actual costs**. This are the costs we actually incurred into for the different tasks. We want to look at the column "Actual Cost" of Illustration 1 and allocate the amounts similarly to what we did for the planned value. The only point of attention is that costs are allocated up to the monitoring date; that is, for those tasks which have not finished yet, we allocate costs uniformly up to the monitoring date.

The result is shown in the following table:

Actual Costs

	Actual Costs	Jan 15	Feb 15	Mar 15	Monitoring Date	
Task 1		€ 8,000	€ 8,000	€ 8,000		
Task 2			€ 20,000	€ 20,000		
D3						
Task 4		€ 10,000				
Task 5			€ 10,000			
D6						
Task 7						
Task 8			€ 10,000	€ 10,000		
	TOTAL	€ 18,000	€ 48,000	€ 38,000	€ 0	€ 0
	AC	**€ 18,000**	**€ 66,000**	**€ 104,000**		

If we plot PV and AC we can compare the actual expenditure with the planned expenditure and draw some initial (and incomplete) considerations. The graph is shown in the following diagram:



(notice that AC does not change after the monitoring date – in fact the plot makes sense up to the monitoring date.)

From the comparison of PV and AC we can draw the following considerations:

1. The project started with a “slow” expenditure. In fact the AC are below the PV. There are two possible explanations: we started late or we produced results more efficiently than planned.
2. At the monitoring date AC and PV have the same value. Thus, at the monitoring date we are

perfectly on budget; however, similarly to the previous point, we do not know whether what we have spent has produced the planned results: we need to look at EV for that.

Earned Value measures the value we have produced in the project, in terms of costs and using the PV as a baseline. The ideal project, thus, has an EV perfectly matching the PV.

The computation of EV is performed as follows:

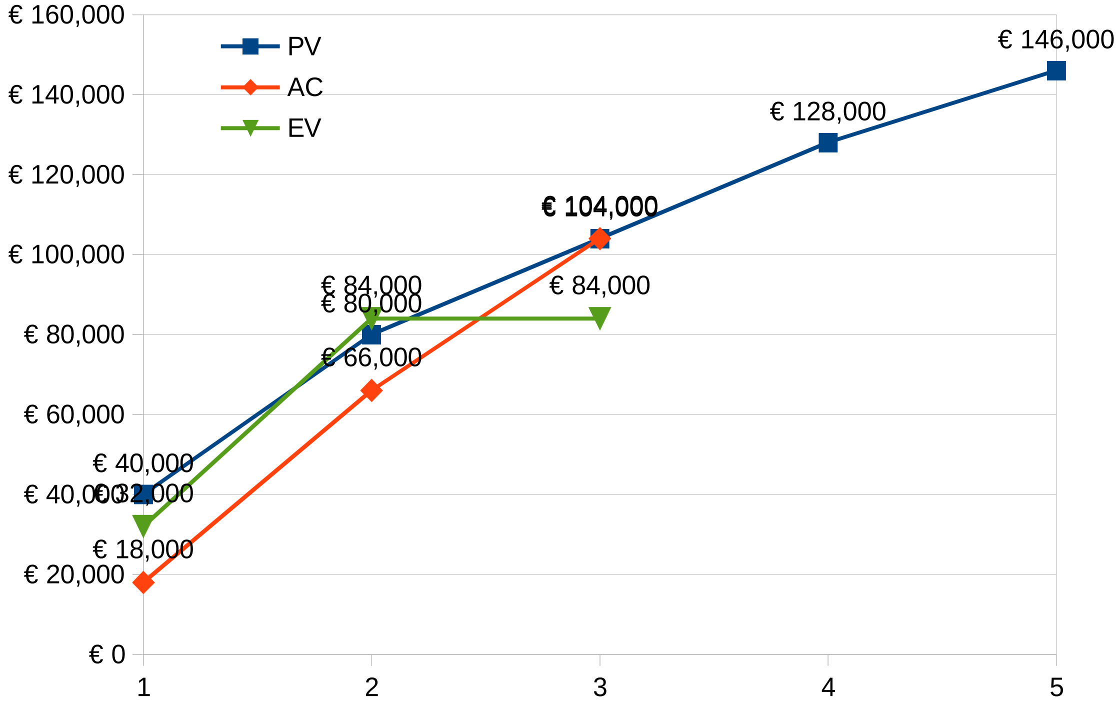
1. Activities not yet started: EV is 0
2. Activities started and not yet finished: 50% of PV at actual start
3. Activities finished: apply rule 2 and add the remaining 50% of PV at actual end

Given the rules above it is relatively simple to see that the EV is as follows:

Earned Value

	Completion	**Jan 15**	**Feb 15**	**Mar 15**	Monitoring Date	
Task 1	28%	€ 16,000				
Task 2	72%		€ 16,000			
D3						
Task 4	100%	€ 16,000				
Task 5	100%		€ 16,000			
D6						
Task 7	0%					
Task 8	42%		€ 20,000			
	TOTAL	€ 32,000	€ 52,000	€ 0	€ 0	€ 0
	EV	**€ 32,000**	**€ 84,000**	**€ 84,000**		

The plot now looks as follows:



The data allows us to draw the following conclusions:

- **Point 1 (end of January):** EV < PV tells us that the project is late; EV > AC tells us that we are efficient and that we will end the project under budget
- **Point 2 (end of February)** shows a situation which is better: EV > PV tells us that the project is early; EV > AC tells us that we are efficient and that we will end the project under budget
- **Point 3 (end of March),** however, tells a different story. EV < PV shows a delay, while PV = AC tells us that we are on budget.

However, in making true sense of the data we need to take into account the accrual method of EV: the 50%-50% rule, in fact, introduces some noise in the computation. This explains the early good performances in the project and the apparent stop between February and March.