eyeon
YEARS AHEAD

EARNED VALUE MANAGEMENT

IN CONTROL OF BIG PRODUCTIONS

AN EYEON WHITE PAPER

OCTOBER 2013

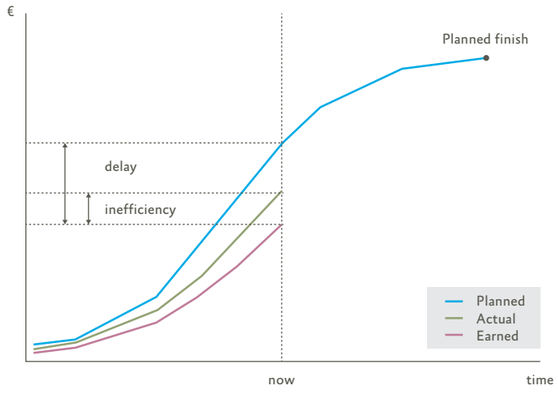
CONTENTS

EARNED VALUE MANAGEMENT

Projects like the (re-)construction of the A2 highway between Amsterdam and 's-Hertogenbosch, the building of a frigate or the installation of a new conveyor belt system at Schiphol airport require dedicated planning solutions. These projects have a common challenge and can be characterized by a lot size of one, a large number of activities with many interdependencies, multi-site building strategies and the frequent use of subcontractors. These kind of projects require "Earned Value Management and Milestone Based Planning."

EARNED VALUE MANAGEMENT

Earned Value Management is a project management technique to measure project performance in an objective manner. EVM combines measurements of scope, schedule and costs in a single integrated system.



Earned Value Management is based on monitoring "Planned value", "Earned value" and "Actual costs" of a project, where;

- Planned value is the value of a project that should have been accomplished at a certain moment in time. Planned value of a project is based on the project planning and is the sum of the planned values of all project activities, where for each activity the planned value = Planned % progress for an activity at a certain moment in time multiplied by the budget for that activity.
- Earned value is the value of a project actually completed to date. Earned value is based on the progress you make on a project and is the sum of the earned values of all project activities, where for each activity the earned value = Actual % progress for an activity multiplied by the budget for that activity.
- Actual costs is the actual costs incurred for a project to create earned value and is the sum of the actual costs of all project activities to date.

Earned Value Management is to be applied to the entire scope of a project.

Example A:

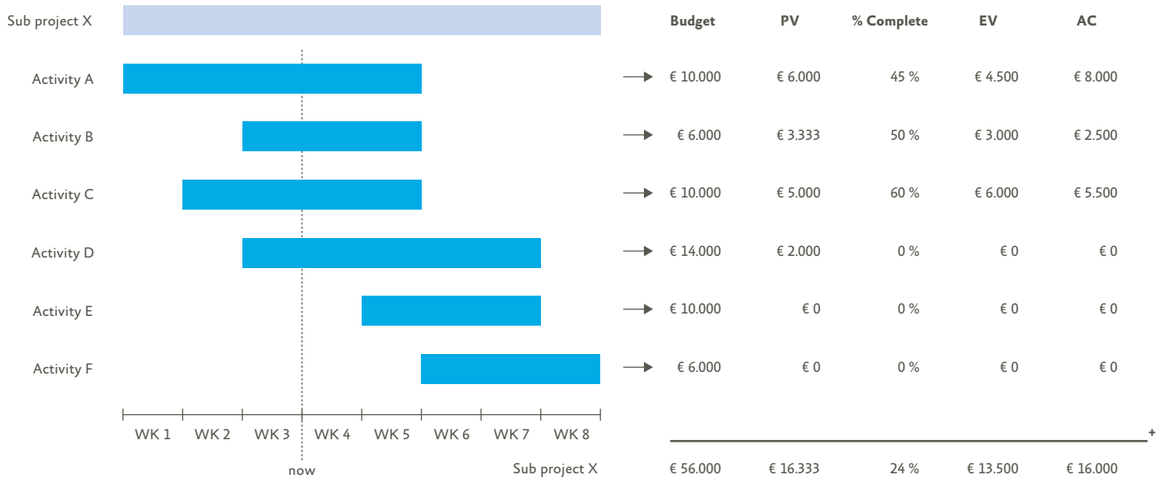
Planned value: Activity A has a budget of € 10.000 and has a planned % progress of 60% (3 out of 5 weeks). 60% x € 10.000 = € 6.000.
Earned value: Activity A has a % complete of 45%. 45% x € 10.000 = € 4.500.
Actual costs: All costs booked on activity A, in this example € 8.000.

By analysing the differences between "Planned value" (PV),"Earned value" (EV) and "Actual costs" (AC) it can be determined whether a project is going as planned concerning schedule and costs. EVM presents these differences as the Cost Performance Indicator and the Schedule Performance Indicator, where;

- CPI = Cost Performance Indicator = Earned value / Actual costs. CPI indicates the efficiency of a project taking into account the project budget. CPI focuses on the cost aspect of a project.
  - CPI < 1 -> Project is over budget.
  - CPI = 1 -> Project is on budget.
  - CPI > 1 -> Project is under budget.
- SPI = Schedule Performance Indicator = Earned value / Planned value. SPI indicates to what extend the project is following the planning. SPI focuses on the schedule aspect of a project.
  - SPI < 1 -> Project is running late.
  - SPI = 1 -> Project is on schedule.
  - SPI > 1 -> Project is ahead of schedule.

Looking at example A, the following indicators can be calculated.
CPI = EV / AC = € 4.500 / € 8.000 = 0,56. Activity A currently is over budget.
SPI = EV / PV = € 4.500 / € 6.000 = 0,75. Activity A currently is running late.

Example B:



	Budget	PV	% Complete	EV	AC
Activity A	€ 10.000	€ 6.000	45 %	€ 4.500	€ 8.000
Activity B	€ 6.000	€ 3.333	50 %	€ 3.000	€ 2.500
Activity C	€ 10.000	€ 5.000	60 %	€ 6.000	€ 5.500
Activity D	€ 14.000	€ 2.000	0 %	€ 0	€ 0
Activity E	€ 10.000	€ 0	0 %	€ 0	€ 0
Activity F	€ 6.000	€ 0	0 %	€ 0	€ 0
Sub project X	€ 56.000	€ 16.333	24 %	€ 13.500	€ 16.000

Example A is based on only one activity. Normally, a (sub) project exists out of several, sometimes thousands, activities. The illustration above shows how EVM parameters are calculated.

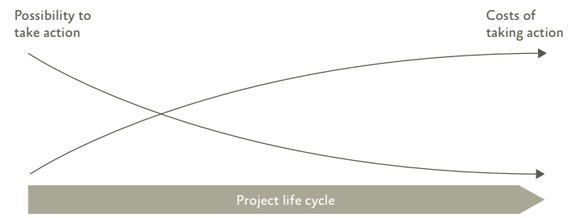
Sub project X includes six activities. By adding up the EVM parameters of the activities the EVM parameters of a (sub) project can be calculated.

Planned value: Sum of planned values of activities = € 16.333
Earned value: Sum of earned values of activities = € 13.500
Actual costs: Sum of actual costs of activities = € 16.000

CPI = EV / AC = € 13.500 / € 16.000 = 0,84. Sub project X is over budget.
SPI = EV / PV = € 13.500 / € 16.333 = 0,83. Sub project X is running late.

TIMELY ESCALATION

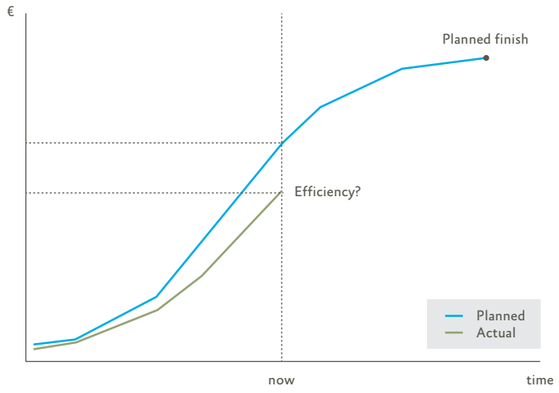
EVM enables to escalate quickly in case of schedule and / or budget overruns. This is one of the main advantages of EVM to control complex projects. For large complex projects, the real possibilities to take action in case of these overruns lie in the early hours of the project. Costs of taking action will increase significantly the further within the project life cycle. EVM parameters signal problems when they can still be dealt with.



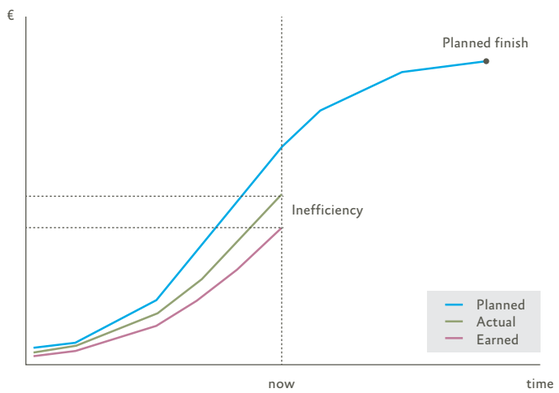
LINKING PLANNING AND COST CONTROL

By linking planning and cost control budgets it is possible to make better usage of planning information for indicating whether the project is on budget. With this link EVM links planning directly to cost control. Both “planned value” and “earned value” are based on cost control budgets resulting in a correct analysis whether a project progresses as budgeted.

From only taking into account planned and actual costs to also taking into account your earned progress.



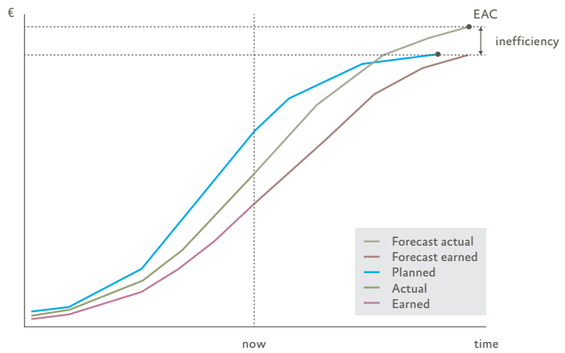
Cost control without Earned Value.



Cost control with Earned Value.

When analysing the cost performance without taking into account the earned value, the project seems to be efficient. However, by adding the earned value information it becomes clear that the project is inefficient.

COST FORECASTING



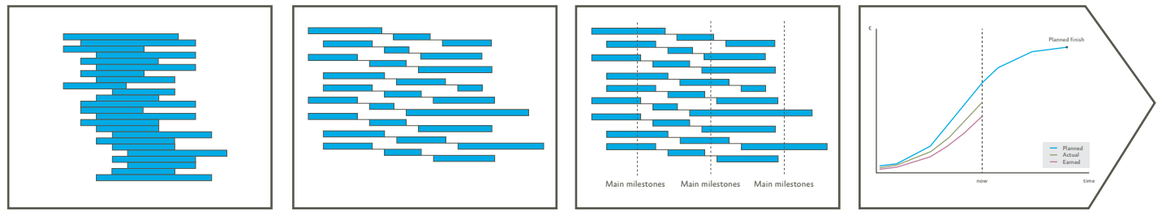
The EVM parameters can also be used in the forecasting process. Using the CPI and SPI information you can calculate an Estimate At Complete (EAC). This is an estimate for the total costs of the project when it is finished. This can be done using a variety of formulas, for example;

- EAC1 = Budget At Completion (BAC) / CPI.
- EAC2 = BAC / CPI / SPI.
- EAC3 = AC + (BAC – EV).

What method is most reliable differs per organization and type of project. Analysis of historical data of previous projects can help to determine the appropriate EAC calculation method and the (sub) project level to apply the calculation to.

IMPLEMENTATION TOWARDS EFFECTIVE PROJECT PLANNING & CONTROL

EyeOn has expert knowledge and a proven track record in maturing the Project Planning & Control process, including the selection and application of the appropriate project planning tools. EyeOn can assess a Project Planning & Control process against best practice. Considering the maturity of the Project Planning & Control process, EyeOn recognizes four maturity levels as illustrated on the next page.



1. Planning as action list
• No real planning

2. Planning correct in time
• For driving and linking processes

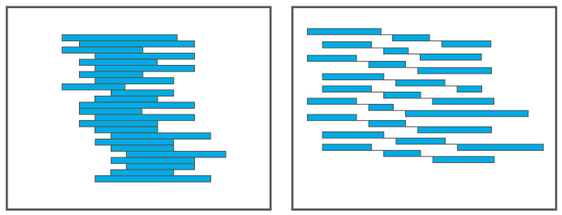
3. Milestones integrated in planning
• Timely escalation on critical activities

4. Main milestones and EVM prerequisites maintained in planning
• Planning and cost control are linked
• Timely escalation concerning schedule delay
• Timely escalation concerning inefficiency

IMPROVEMENT APPROACH

Determination of the maturity level applicable teaches where to start the improvement trajectory. Consequently, the necessary steps can be taken towards effective Project Planning & Control.

Step 1: From “Planning as action list” to “Planning correct in time”



1. Planning as action list **2. Planning correct in time**

The first step is to make sure the planning is both complete and correct in time.

A complete planning includes all work to be done for finishing a project, including;

- The entire scope of the project over time.
- Subcontractors.
- Contingencies.

Benefits to be achieved

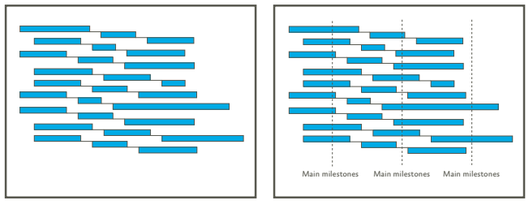
- Project planning can be used to drive the different processes.
- Delays and changes in the schedule become visible and can be dealt with.
- Planning layouts to support the execution of the project activities.
- A smooth transition between the different processes.

At the start of a project the project planning has to be a realistic representation of the work to be done. Also, the correct relationships between activities have to be created so the effect of shifting activities on other activities can be calculated automatically. A progress update cycle has to be available to keep the planning up-to-data, this cycle has to include;

- Correct frequency.
- Correct % complete information.
- Actual start and finish information.

A meeting and reporting structure has to be in place to report the project status based on the project planning.

Step 2: From "Planning correct in time" to "Milestones integrated in planning"



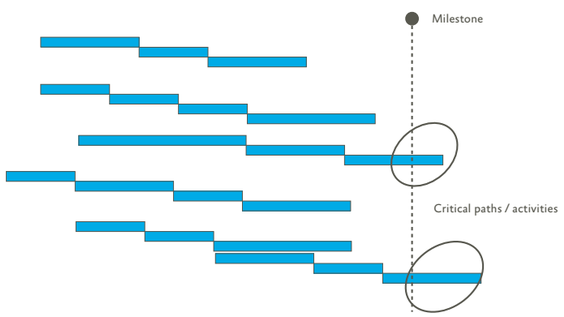
2. Planning correct in time

3. Milestones integrated in planning

Benefits to be achieved
- Early escalation on critical activities.
- Timely escalation on planning delays on all levels of the project.
- Schedule control on all levels of the project.
- Embedding corrective actions in the business.
- Forward looking planning.
- Focus on making a good plan rather than short term firefighting.

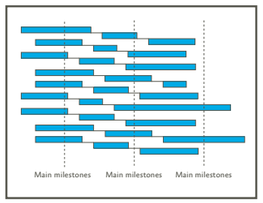
This second step is to make sure the planning includes milestones that can be used to report on critical activities.

These milestones have to provide information for all levels of the project management organisation. That is why three levels of milestones are used;
- Main Project Milestones = Milestones to control criticalness of entire project.
- Sub Project Milestones = Milestones to control criticalness of sub projects.
- Control points = Milestones to control the detailed planning.

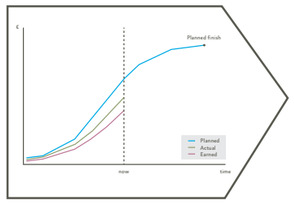


A meeting and reporting structure has to be in place to report the project status based on the project planning including milestones.

Step 3: From "Milestones integrated in planning" to "Main milestones and EVM prerequisites maintained in planning"



3. Milestones integrated in planning

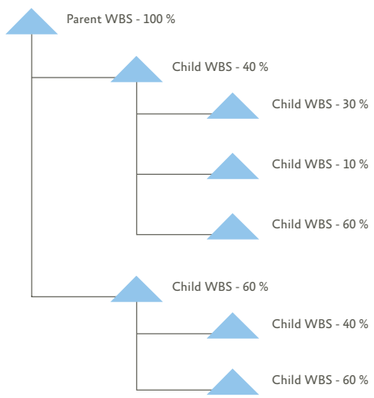


4. Main milestones and EVM prerequisites maintained in planning

Benefits to be achieved
- 1:1 link between planning and cost control
  - One source of truth.
  - Forecast information available from planning.
- Simple method using 2 performance indicators and milestones to present the status of a project.
- Timely escalation on inefficiencies on all levels.
- Embedding of corrective actions in the business.
- Accurate real-time reports and analyses from different perspectives.

Last of all, the project planning must be prepared for EVM reporting. The project planning has to include;
- Process budgets divided to activities.
- Work Breakdown structure that matches Cost Breakdown Structure.
- Contingencies in time and budget.

The WBS is a hierarchical tree structure that forms the basis for the project planning reporting structure. The WBS has to include 100% of the scope of work defined by the project.



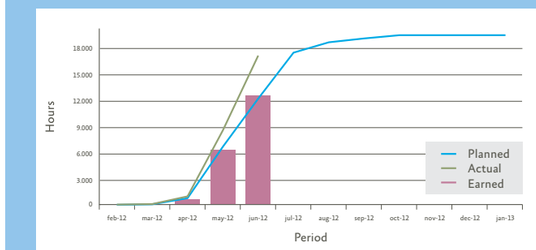
EARNED VALUE MANAGEMENT

For each WBS level the EVM parameters can be reported on, therefore the WBS has to match with the reporting structure for a project. The progress update cycle must include;
- Correct frequency linked to cost control cycle.
- Accurate % complete information.
- Actual hour information.

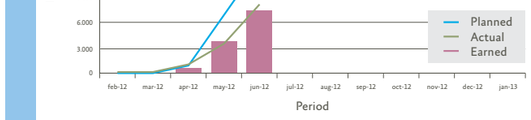
Accompanied with correct meeting and reporting structure.

Experience of a customer:
"The result of the work of EyeOn's is a single, transparent and uniform planning method set up together with the planners from the Project Department and taking into consideration all stakeholders. The Earned value management and milestone based planning method is now used for all projects and also takes into account multi project information. Extensive training was recently given with EyeOn's help to a core of more than 100 people from all levels of the organization to ensure proper embedding within the organization."

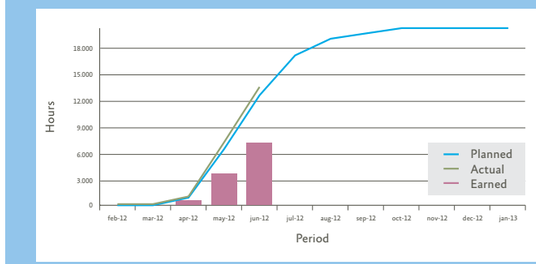
Examples of customer EVM charts



Possible conclusions / corrective actions:
- Sub project is inefficient.
- Focus on improving efficiency.
- Check budget, possibly adjust planning budgets.
- Possible resource problem for other sub projects.
- Project is on schedule.



Possible conclusions / corrective actions:
- Project is efficient.
- Project is behind schedule.
- Check / change planning to get back on schedule.
- Increase capacity.
- Check budget, possibly adjust planning budgets.



Possible conclusions / corrective actions:
- Project is inefficient.
- Project is behind schedule.
- Check / change planning to get back on schedule.
- Check budget, possibly adjust planning budgets.
- Check quality of Project Team.

EARNED VALUE MANAGEMENT

SUMMARY

Earned value management and milestone based planning is an ideal project management method to control large complex projects. EVM links planning and Cost Control and makes it possible to accurately monitor project status concerning both schedule and costs, including cost forecasting for your project. Together with Milestone Based Planning this method enables to escalate quickly in case of schedule delays and project inefficiencies, still making it possible to do something about it.

EyeOn has expert knowledge and a proven track record in maturing the Project Planning & Control process. EyeOn can assess your Project Planning & Control process, determine the maturity level and setup, and implement an improvement roadmap towards effective planning & control.

ABOUT

CONTACT

For additional information on this subject, please contact EyeOn.

Paul Husslage
Business Consultant
+31 6 29 07 23 88
paul.husslage@eyeon.nl

Emile van Geel
Business Consultant
+31 6 51 88 87 96
emile.vangeel@eyeon.nl

Freek Aertsen
Business Consultant & Partner
+31 6 29 07 23 87
freek.aertsen@eyeon.nl

ABOUT EYEON

In striving for success, large companies have to continuously struggle against growing internal complexity. We help our clients manage this complexity by designing, implementing and executing excellent planning processes as a discriminating factor for this success. In order to achieve this, we develop and share knowledge about top level planning and forecasting, with constantly demonstrable return on investment for our clients.

Clients are amongst others: Damen, MSD, NXP, Johnson & Johnson, Philips, ASML, Océ, GlaxoSmithKline, CSM, Heineken and Bavaria.

For more information: www.eyeon.nl.

EyeOn bv

Croylaan 14
5735 PC Aarle-Rixtel
The Netherlands

T +31 492 38 88 50
www.eyeon.nl

EyeOn België BVBA

Drie Eikenstraat 661
2650 Edegem
Belgium

T +32 38 26 93 46
www.eyeon.eu