Unit 16 – monitoring, control and reporting

Unit 15 - Learning Objectives

To gain an understanding of project monitoring and control including:

- What project monitoring and control is
- What effective reporting looks like
- What EVA (earned value management) is and its attendant terminology
- What cost control consists of

Monitoring and Control overview

Monitor and Control is the process of tracking, reviewing, and regulating the progress to meet the baselined objectives defined in the Project Execution Plan

Monitoring includes:

- Measuring progress in terms of achievements
- Measuring actual cost v planned cost
- Measuring time taken v baseline schedule
- Checking risk status and exposure
- Monitoring the number of changes and their impact on the project

Corrective actions can only occur once the project status is understood.

These processes track, review, and regulate the progress and performance of the project, identify any areas in which changes to the plan are required and initiate the corresponding changes.

The key benefit of this is that project performance is observed and measured regularly and consistently to identify variances from the project management plan. Monitoring and controlling also includes:

- Controlling changes and recommending preventive action in anticipation of possible problems (note change control is covered in another unit of this course)
- Monitoring the ongoing project activities against the project management plan and the project performance baseline
- Influencing the factors that could circumvent integrated change control so only approved changes are implemented.

This continuous monitoring provides the project team insight into the health of the project and identifies any areas requiring additional attention.. In multi-phase projects, monitoring and controlling coordinates project phases in order to implement corrective or preventive actions to bring the project into compliance with the project management plan. This review can result in recommended and approved updates to the project management plan.

For example, a missed activity finish date may require adjustments to the current staffing plan, reliance on overtime, or trade-offs between budget and schedule objectives.

Monitoring and controlling includes the following project management processes.

Monitor and control project work

Monitor and Control Project Work is the process of tracking, reviewing, and regulating the progress to meet the processes performance objectives defined in the Project Management Plan. Monitoring includes status reporting, progress measurement, and forecasting. Performance reports provide information on the project's performance with regard to scope, schedule, cost, resources, quality, and risk, which can be used as inputs to other processes.

Inputs and outputs:

Inputs	Outputs
1. Project Management Plan 2. Work performance data 3. Performance reports 4. Forecasts 5. Enterprise environmental factors 6. Organisational process assets	1. Change requests 2. Project management plan updates 3. Project document updates

Perform Integrated Change Control

Perform Integrated Change Control is the process of reviewing all change requests, approving changes, and managing changes to the deliverables, organisational process assets, project documents, and the project management plan.

Inputs and outputs:

Inputs	Outputs
1. Change requests 2. Organisational process assets	1. Change request status update 2. Project management plan updates 3. Project document updates

Verify Scope

Verify Scope is the process of formalising acceptance of the completed project deliverables.

Inputs and outputs:

Inputs	Outputs
1. Scope baseline 2. Stakeholder requirements documentation 3. Requirements traceability matrix 4. Validated deliverables	1. Accepted deliverables 2. Change requests

Control Scope

Control Scope is the process of monitoring the status of the project and product scope and managing changes.

Inputs and outputs:

Inputs	Outputs
1. Project management plan 2. Scope baseline 3. Work performance data 4. Stakeholders requirements documentation 5. Requirements traceability matrix	1. Work performance measurements 2. Change requests 3. Organisational process assets updates 4. Project management plan updates 5. Project document updates

Control Schedule

Control Schedule is the process of monitoring the status of the project to update project progress and managing changes to the schedule.

Inputs and outputs:

Inputs	Outputs
1. Project management plan 2. Project schedule 3. Work performance data 4. Organisational process assets	1. Work performance measurements 2. Organisational process assets updates 3. Change requests 4. Project management plan updates 5. Project document updates

Control Costs

Control Costs is the process of monitoring the status of the project to update the project budget and managing changes to the cost baseline.

Inputs and outputs:

Inputs	Outputs
1. Cost performance baseline 2. Project funding requirements 3. Work performance data 4. Organisational process assets	1. Work performance measurements 2. Forecasted completion 3. Organisational process asset updates 4. project management plan updates 5. Project document updates

Perform Quality Control

Perform Quality Control is the process of monitoring and recording results of executing the Quality Plan activities to assess performance and recommend necessary changes.

Inputs and outputs:

Inputs	Outputs
1. Quality management plan 2. Quality metrics 3. Quality checklists 4. Work performance measurement 5. Approved change requests 6. Deliverables 7. Organisational process assets	1. Quality control measurements 2. Validated deliverables 3. Organisational process asset updates 4. Change requests 5. Project management plan updates 6. Project document updates

Report Performance

Report Performance is the process of collecting and distributing performance information including status reports, progress measurements, and forecasts.

Inputs and outputs:

Inputs	Outputs
1. Project management plan 2. Work performance data 3. Work performance measurements 4. Organisational process assets	1. Performance reports 2. Organisational process assets updates 3. Change requests

Monitor and Control Risks

Monitor and Control Risks is the process of executing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating the risk process throughout the project.

Inputs and outputs:

Inputs	Outputs
1. Risk register 2. Risk management plan 3. Work performance data 4. Performance reports	1. Risk register updates 2. Organisational process assets updates 3. Change requests 4. Project management plan updates 5. Project document updates

Administer Procurements

Administer Procurements is the process of managing procurement relationships, monitoring contract performance, and making changes and corrections as needed. It includes the contract and relationship between the buyer and seller, reviewing and documenting how a seller is performing or has performed and, when appropriate, managing the contractual relationship with the external buyer of the project.

Inputs and outputs:

Inputs	Outputs
1. Procurement documents 2. Procurement management plan 3. Selected sellers 4. Performance reports 5. Approved change requests 6. Work performance data	1. Procurement data 2. Organisational process assets updates 3. Change requests 4. Project management plan updates

Project Reporting

Project managers walk a fine line when it comes to requesting (*and actually getting*) status reports from staff members. On one hand, status reporting procedures shouldn't be too cumbersome or intrusive. Project staff may come to resent the attention and the perceived lack of trust and confidence. However, no project manager can afford to be caught unaware by performance or scheduling problems. He or she must rely on the team to provide timely, effective and realistic feedback, the quality and quantity of that feedback cannot be left to chance.

While status reporting requirements may vary by project complexity, duration and scope, regular reporting routines should always be established. These routines should be set as soon as the project starts, be enforced consistently and should include the following:

Communication Guidelines:

The specification of meeting methods and protocols, including the usage of group meetings, one-on-one's, phone conferences, emails, memos, forms or project management software.

Content Guidelines:

The specification of the format and content of status reporting, including information to be included in reports and standardised agenda formats for meetings.

Scheduling Guidelines:

Determination of the expected frequency, timing and duration, of meetings, phone conferences and the submission of status reports. While flexibility must be considered, these guidelines can help staff members better allocate their time and will help the project manager schedule sufficient time for status reviews, analysis and feedback.

Feedback Guidelines:

Status reporting should be a two way street, with staff status reports being acknowledged and feedback provided when appropriate. In addition, a regular routine for management reporting should be established, to keep team members advised on the status of global project issues.

Consolidation Guidelines:

Depending on the size and organisation of the project team, status report consolidation may be necessary and appropriate. For example, individual status reports may have to be viewed as a whole if progress statistics are to have any real meaning.

Earned value management

What is EVM and why use it?

EVM is a project control process based on a structured approach to planning, cost collection and performance measurement. It facilitates the integration of project scope, time and cost objectives and the establishment of a baseline plan of performance measurement (APM BoK).

It is a method of controlling a project by tracking performance against agreed plans and identifying any significant differences so that corrective action to meet defined objectives can be taken.

Earned Value (EV) is a measure of progress that expresses costs committed and work achieved in the same units (APM BoK).

Example: A task is planned to cost £10,000. Once the task has started, progress is checked, and it is found that 30% of the task has been completed. The EV is therefore £10,000 x 0.3 (30%) = £3,000. This represents the 'value' of the work done. Value can also be expressed in man/hour units.

This concept becomes very powerful when the EV at a point in time is compared to what was planned to be achieved at that same point and what the actual cost of that achievement was. These comparisons allow cost variance (CV) and schedule variance (SV) to be calculated as well as efficiencies and productivity. This in turn, allows final cost and duration to be predicted.

A project manager may use EVM because:

- It is superior to separate tracking of spend or work achieved as it provides opportunities to look at efficiency of spend (through the cost performance indicator - CPI) and productivity (through the schedule performance indicator - SPI). By progressively monitoring these, trends can be understood and used to predict outcomes.
- It can also be used as an incentivised way of paying suppliers based on EVM performance measurements. Because the EV is percentage complete x planned value, a supplier will try and maximise revenue and improve cashflow by improved performance. This approach often combined with key milestones drives a collaborative approach which results in a win-win outcome.
- It improves project control by using a structured approach to planning, cost collection and performance measurement. Costs are established at a work package level to ensure that budget is allocated and monitored at an appropriate level. It establishes a baseline for cost, schedule and scope against which actual performance is measured. It also ensures that changes to scope are subject to a formal revision which minimises scope creep.

A project manager may update plans based on EVM information because:

- The forecast of time and cost outcomes may indicate that the project is due to overspend and overrun. This would entail updating the budget and the schedule to inform stakeholders of the likely outcome and prepare them accordingly. While this may cause initial conflict, it will help manage their expectations.
- They may have to add more resources to the plan to bring the project back on schedule. The resourced schedule will be updated in this case and assist in

procuring the necessary resources (e.g. labour). This in turn may cause the risk plan to be updated due to increased activity on the project (e.g. potential safety incidents and available skills).

- The forecast of time and cost outcomes may indicate that the project is due to underspend and be delivered early. This would entail updating the budget and the schedule to inform stakeholders of the likely outcome and prepare them accordingly. This will help manage their expectations.

Interpretation of EVM data

One way that EVM can be understood is by use of an example:

A project is to build a 10-km highway in 10 months (at a rate of 1-km/month).

The agreed cost [the budget at completion (BAC)] is £100million.

The EV of every kilometre (10% of the total length) is £10m, regardless of how much it actually costs to build (EV = actual work done in percentage-complete terms x BAC)

At month 5, 4km of highway has been laid:

- The planned budget is £50m
- the EV is £40m (40% complete x BAC)
- the actual cost is £30m

The project manager wants to know the following:

- Planned percentage complete and actual percentage complete
- Schedule and cost variances
- The final estimated cost if things continue
- When the highway will be completed

Percentage complete

The project should be 50% complete (planned budget of £50m / BAC of £100m (expressed as a percentage)

The actual percentage complete is 40% (EV of £40m / BAC of £100m expressed as a percentage)

Schedule and cost variances (at month 5)

Cost variance = EV (£40m) – actual cost (£30m) = £10m

Schedule variance (in cost terms) = EV (£40m) – planned budget (£50m) = - £10m

Negative variances show that the project is underperforming while positive variances show that the project is overperforming.

Final estimated cost (EAC*)

First the ‘efficiency’ of the project must be calculated:

Cost performance index (CPI) = EV (£40m) / actual cost (£30m) = 1.33 (i.e. 133% efficient)

EAC = BAC (£100m) / CPI (1.33) = £75m (equating to £25m under budget)

*Estimate at Completion

The project is costing less than the value it is generating. The project manager should investigate why this is and recommend action. It may be that the original estimate was

inaccurate or that resources are costing less than the original estimates. The project manager should also look at the work remaining to assess whether this higher than planned rate of efficiency is likely to continue. The project manager's response should, however, consider the forecast of completion.

A CPI greater than 1 means the task is forecast to underspend while a CPI of less than 1 means the task is forecast to overspend its budget. Tracking the CPI is a very powerful way of monitoring the project and spotting trends.

Completion forecast

First the productivity must be calculated:

SPI = EV (£40m) / planned budget (£50m) = 0.8

Estimated final duration = 10 months / 0.8 = 12.5 months

This means that that the project is likely to overrun by 2.5 months

The project can now consider spending more money (see EAC above) to accelerate the project and bring it in on time.

A SPI greater than 1 means the task is forecast to be completed earlier than planned while a SPI of less than 1 means the task is forecast to be completed later than planned. Tracking the SPI is a very powerful way of monitoring the project and spotting trends.

Summary of SPI, CPI, SV and CV

CPI>1 = Forecast underspend, CPI<1 = Forecast overspend

SPI>1 = Forecast early delivery, SPI<1 = Forecast late delivery

SV>0 = Value to date more than scheduled, SV<0 = Value to date less than scheduled

CV>0 = Value to date greater than actual cost, CV<0 = Value to date less than actual cost

Sample responses to EVM data

If a project has a CPI of over 1 and an SPI of under 1 then more money can be spent on resources to speed the project up.

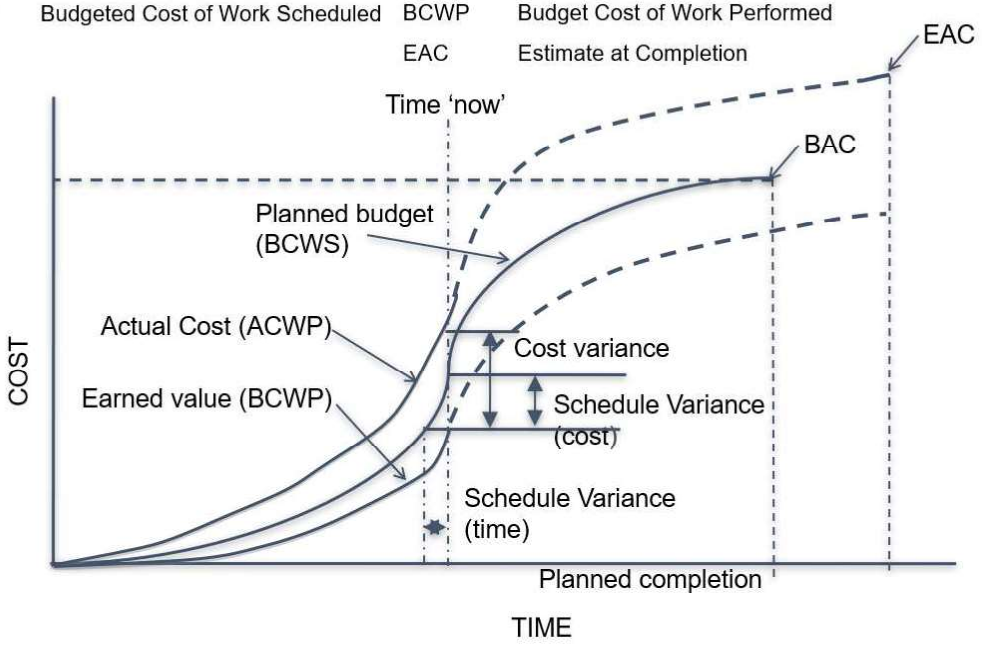
Conversely, if a project has a CPI of under 1 and an SPI of over 1 then resource can be potentially reduced to reduce cost and allow time to be extended.

If both CPI and SPI are under 1 then there may be a number of viable options including reducing scope, increasing efficiency and applying for more resources.

If both CPI and SPI are both over 1 then resources can be reduced to slow the project down.

Graphical representation of EVM

BAC	Budget at completion	ACWP	Actual Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled	BCWP	Budget Cost of Work Performed
		EAC	Estimate at Completion



Benefits of using the interpretation of earned value data

- Provides consistent reporting so that, at a senior management level, project progress can be compared across a set of projects that are of different size and complexity. This supports portfolio management and project governance. This will allow senior management to investigate projects that are performing poorly and provide appropriate support as required. This can include additional resources such as people and equipment.
- Supports better forecasting against time and budget. By using and correctly interpreting EV data, forecasts are based on objective analysis rather than a subjective approach (e.g. an individual view). By using actual data (based on evidence of progress) and the efficiency of work in progress (using CPI, SPI), likely outcomes can be visually plotted graphically. This assists with reporting.
- Allows incentivised payments to be made to suppliers based on what they have achieved rather than on costs alone. This in turn improves performance and supplier cash flow.
- Allows trends to be understood and outcomes predicted. It provides opportunities to look at efficiency of spend (through the cost performance indicator - CPI) and productivity (through the schedule performance indicator - SPI). By progressively monitoring these, trends can be used to drive actions where there is under/over performance.

Learning Objectives

You should now have an understanding of project monitoring and control including:

- What project monitoring and control is
- What effective reporting looks like
- What EVA (earned value management) is and its attendant terminology
- What cost control consists of