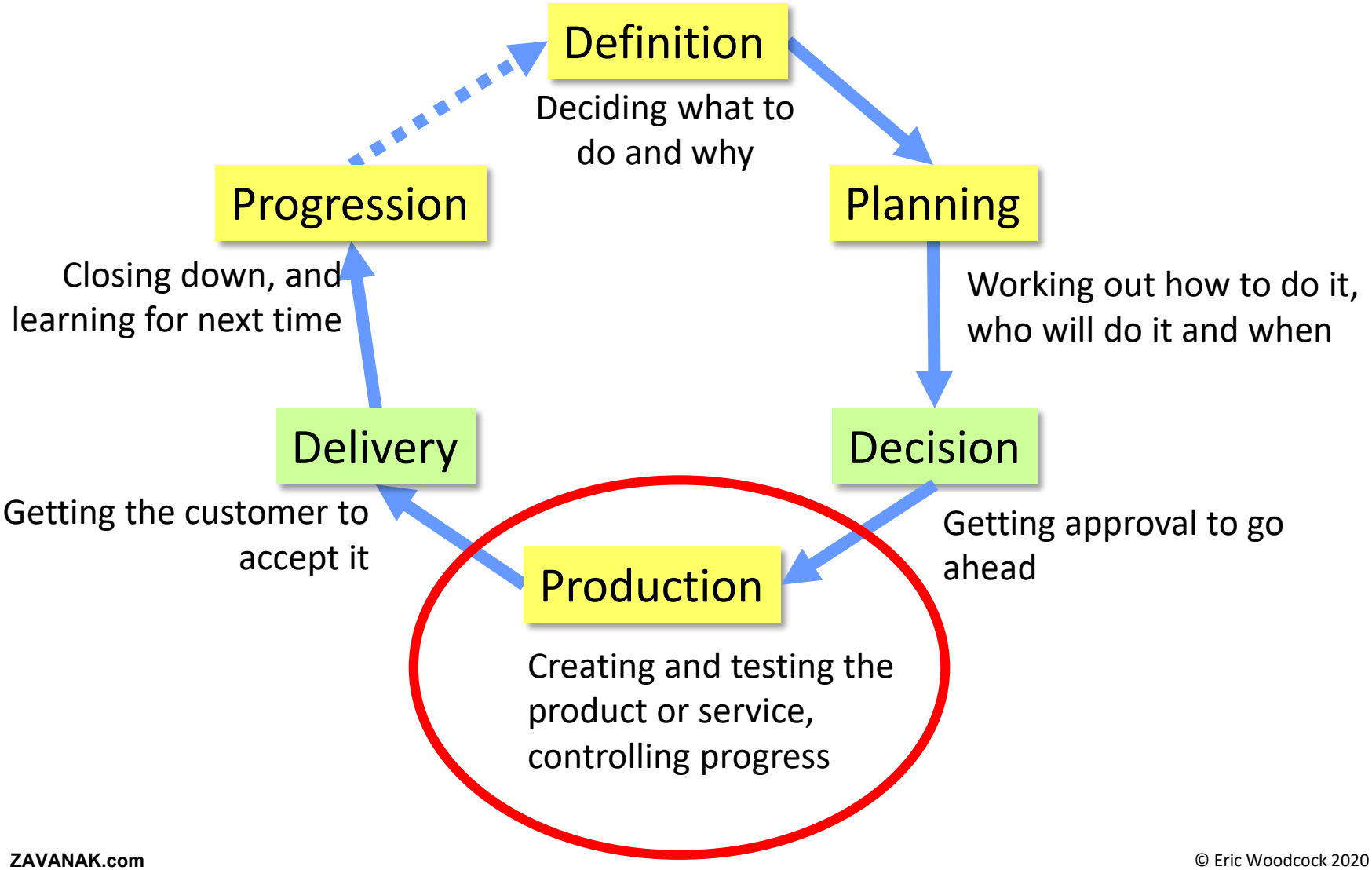
PM101: Lecture 18
Tracking progress

The typical project life cycle



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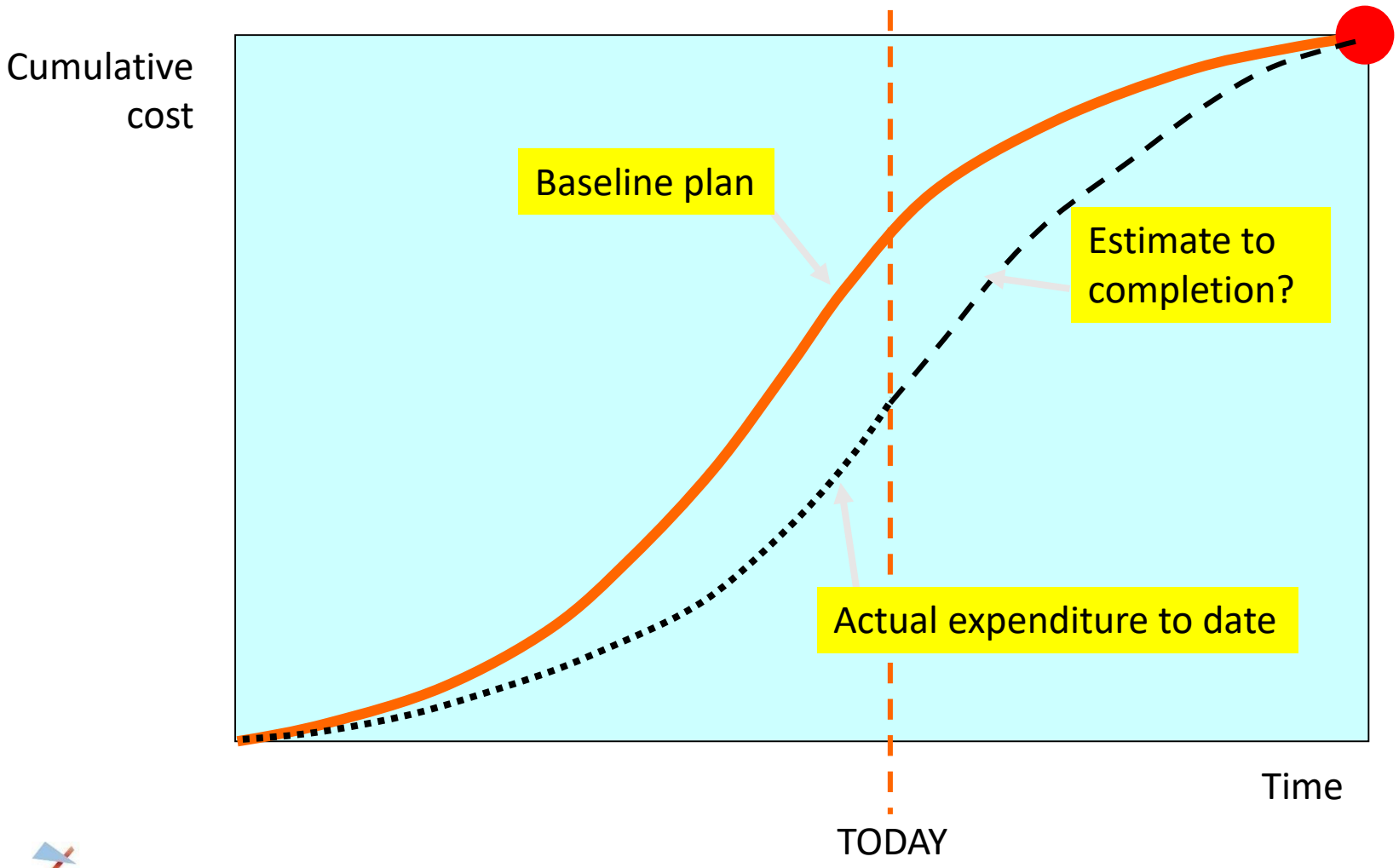
Forecasting the finish: this?...



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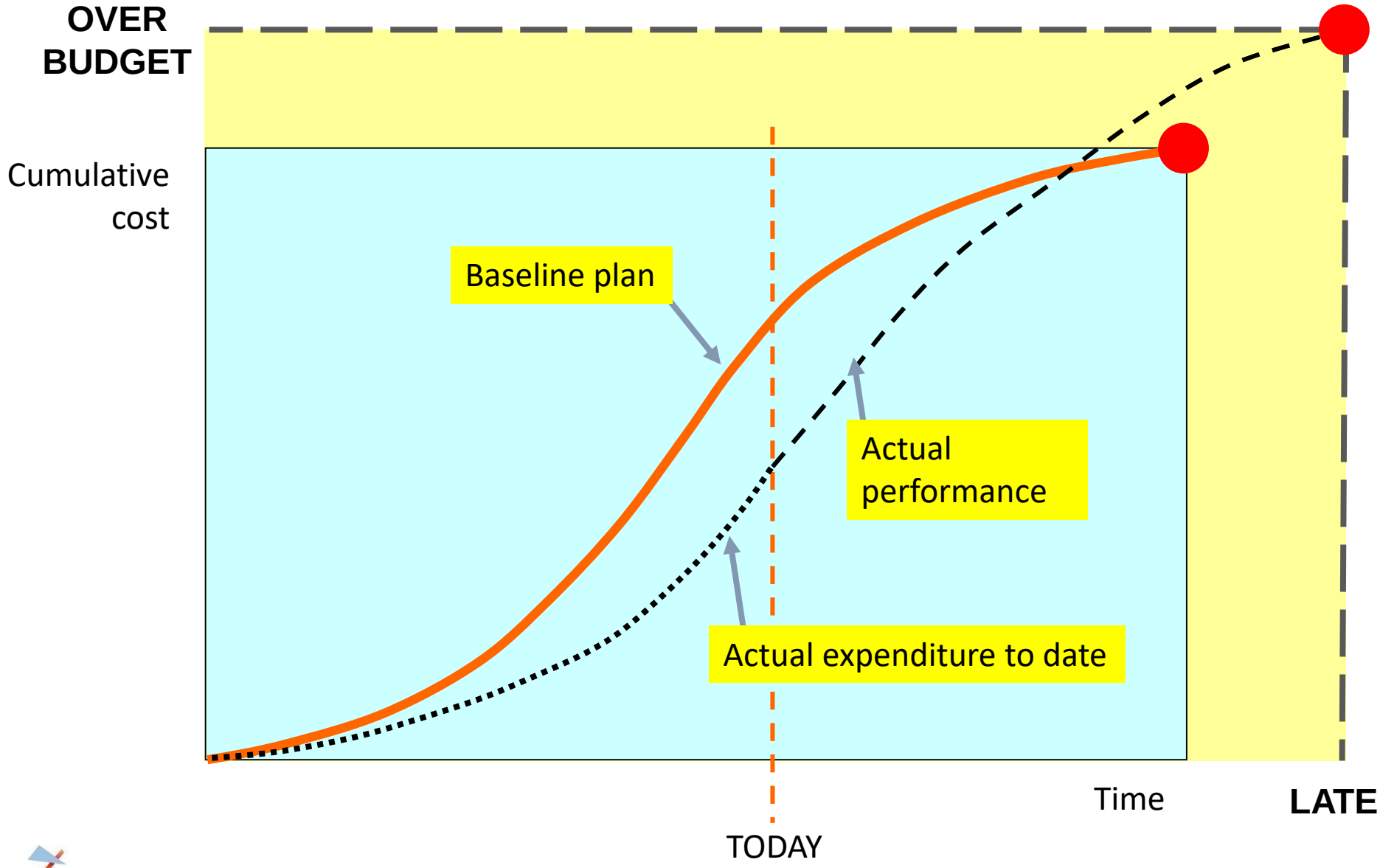
… or this?



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Time is money: Earned Value Management

EVM attempts to show what Earned Value has been produced up to now, against what was planned.

Earned Value = The planned cost of work that is defined as being completed.

EVM predicts what it will cost and how much time it will take to produce the Earned Value that was planned to be achieved at completion.

EVM combines time, cost and production data to present this analysis. Therefore the data used has to be as up to date and accurate as possible.

Photo: Anamul Rezwan from Pexels

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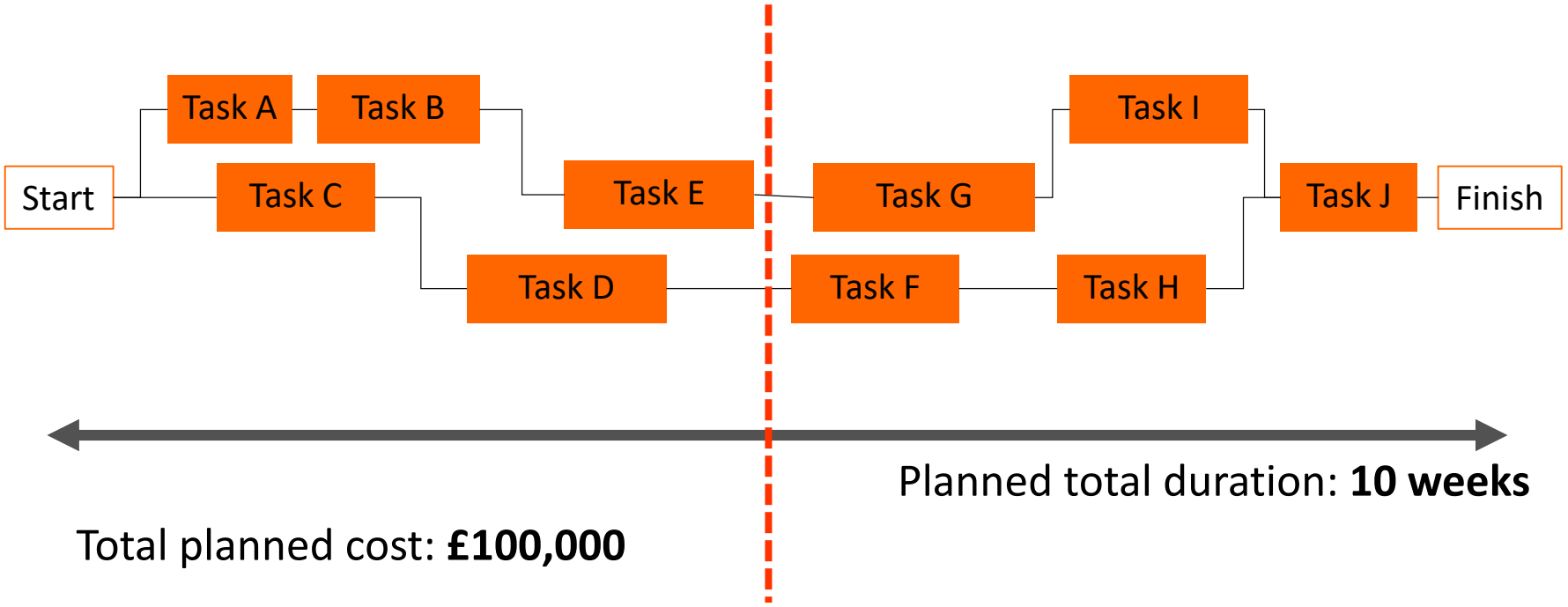
Earned Value Management



Total planned cost: **£100,000**

Today – end of week 5:

Where are we up to?

Are we on target for time and cost?

Maylor, H (2010). *Project management*. Harlow: Pearson, p297

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Earned Value Management

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£5,000	£5,000
B	£8,000	Done	£9,000	£8,000
C	£10,000	Done	£11,000	£10,000
D	£12,000	Done	£10,000	£12,000
E	£8,000	WIP	£5,000	
	£43,000		**£40,000**	**£35,000**

Maylor, H. (2010) *Project management.* 3rd ed. Harlow: Pearson, p297. WIP = Work In Progress

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Earned Value Management

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£5,000	£5,000
B	£8,000	Done	£9,000	£8,000
C	£10,000	Done	£11,000	£10,000
D	£12,000	Done	£10,000	£12,000
E	£8,000	WIP	£5,000	
	£43,000		**£40,000**	**£35,000**

If we carry on in the way we have done up to now, will the project be completed on time and budget? Or, if not, how far off plan will it be?

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Earned Value Management

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£5,000	£5,000
B	£8,000	Done	£9,000	£8,000
C	£10,000	Done	£11,000	£10,000
D	£12,000	Done	£10,000	£12,000
E	£8,000	WIP	£5,000	
	£43,000		**£40,000**	**£35,000**

Budgeted or Planned Cost of Work Scheduled
BCWS

Actual Cost of Work Performed
ACWP

Budgeted Cost of Work Performed
BCWP
EARNED VALUE

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Earned Value Management

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£5,000	£5,000
B	£8,000	Done	£9,000	£8,000
C	£10,000	Done	£11,000	£10,000
D	£12,000	Done	£10,000	£12,000
E	£8,000	WIP	£5,000	
	£43,000		**£40,000**	**£35,000**

Cost Performance Index (**CPI**) = $\frac{\text{BCWP}}{\text{ACWP}} = \frac{\text{Earned value}}{\text{Actual cost}} = \frac{35{,}000}{40{,}000} =$ **0.875**

Estimated cost at completion = $\frac{\text{Original Cost Estimate}}{\text{CPI}} = \frac{£100{,}000}{0.875} =$ **£114,300**

Current forecast: **14.3% over budget** at completion

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Earned Value Management

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£5,000	£5,000
B	£8,000	Done	£9,000	£8,000
C	£10,000	Done	£11,000	£10,000
D	£12,000	Done	£10,000	£12,000
E	£8,000	WIP	£5,000	
	£43,000		**£40,000**	**£35,000**

Schedule Performance Index (**SPI**) = $\frac{\text{BCWP}}{\text{BCWS}} = \frac{\text{Earned value}}{\text{Planned cost}} = \frac{35{,}000}{43{,}000} =$ **0.814**

Estimated time at completion = $\frac{\text{Original time estimate}}{\text{SPI}} = \frac{10}{0.814} =$ **12.3 weeks**

Current forecast: Duration will be **23% over plan** at completion

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Dealing with Work In Progress

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£5,000	£5,000
B	£8,000	Done	£9,000	£8,000
C	£10,000	Done	£11,000	£10,000
D	£12,000	Done	£10,000	£12,000
E	£8,000	WIP	£5,000	£4,000
	£43,000		**£40,000**	**£39,000**

Options:

- **100% or nothing.** Only fully finished work counts. Favours the customer (later payment). Can show the project to be seriously behind when it is not.
- **Have rules when EV can be taken.** Allow say 20% when task is half done; 70% when output is made; 90% when output is tested; 100% when client accepts it.
- **Judge progress subjectively.** Work teams estimate what EV has been achieved to date. The trouble is, too many tasks spend 90% of the time 90% finished.

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Dealing with Work In Progress

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£5,000	£5,000
B	£8,000	Done	£9,000	£8,000
C	£10,000	Done	£11,000	£10,000
D	£12,000	Done	£10,000	£12,000
E	£8,000	WIP	£5,000	£4,000
	£43,000		**£40,000**	**£39,000**

Cost Performance Index = Earned Value ÷ Actual Cost = 39,000/40,000 = **0.975**
Estimated cost at completion = £100,000/0.975 = **£102,600** (2.6% over budget)

Schedule Performance Index = Earned Value ÷ Planned Cost = 39,000/43,000 = **0.907**
Estimated time at completion = 10/0.907 = **11.0 weeks** (10% over plan)

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Spending less than planned

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£4,000	£5,000
B	£8,000	Done	£7,000	£8,000
C	£10,000	Done	£8,000	£10,000
D	£12,000	Done	£9,000	£12,000
E	£8,000	Done	£7,000	£8,000
	£43,000		**£35,000**	**£43,000**

Cost Performance Index = Earned Value ÷ Actual Cost = 43,000/35,000 = **1.229**
Estimated cost at completion = £100,000/1.229 = **£81,400** (18.6% under budget)

Schedule Performance Index = Earned Value ÷ Planned Cost = 43,000/43,000 = **1**
Estimated time at completion = 10/1 = **10 weeks**

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Will starting a task early help us?

Task	Planned cost	Task status	Actual cost	Earned value
A	£5,000	Done	£5,000	£5,000
B	£8,000	Done	£9,000	£8,000
C	£10,000	Done	£11,000	£10,000
D	£12,000	Done	£10,000	£12,000
E	£8,000	WIP	£5,000	£4,000
F		WIP	£8,000	£6,000
	£43,000		**£48,000**	**£45,000**

Cost Performance Index = Earned Value ÷ Actual Cost = 45,000/48,000 = **0.938**
Estimated cost at completion = £100,000/0.938 = **£106,700** (6.7% over budget)

Schedule Performance Index = Earned Value ÷ Planned Cost = 45,000/43,000 = **1.047**
Estimated time at completion = 10/1.047 = **9.6 weeks** (4% ahead of plan)

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Using the results of EVM analysis

Estimates are based on performance to date

- You are looking backwards to estimate forwards
- The shape of what's ahead may be different from what's been done
- The high risk less predictable work may be over or may lie ahead
- The learning curve may come into play to help you

Judgments as well as calculations

Active management is necessary

- Consider how to do things differently – act smarter
- Find short cuts and ways to catch up
- Trade off time, cost and quality

Photo: Snapfish from Pexels

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The project office

The **project office** supports the project manager in the administration of a project, where the scale of the project is too big for the project manager to do it alone.

Typical activities include:

- Project planning – re-planning in the light of events occurring after Production launch
- **Knowledge management – documentation and archiving**
- Project tracking and control – comparing progress with plan
- **Project auditing and review – keeping quality records**
- Preparation of project status reports – regular reports and presentations
- **Configuration management – maintaining exact version control**
- Change management – logging and monitoring issue resolution and justifying changes
- **Risk tracking and mitigation planning – maintaining the overall picture**
- Administrative support – maintaining key documents, organising meetings, taking minutes, booking events, etc.

CSC (1999), *Project Management*, pF-3. Photo: Fauxels from Pexels

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The project management office

A **project management office** coordinates the management of projects across the organisation to ensure project efficiency and alignment with the organisation's aims.

It is a organisation-wide entity, with responsibilities like:

- Sharing and co-ordinating resources across projects
- **Developing and owning the common methodology and project standards**
- Operation and management of software tools
- **Managing organisation level risks risks**
- Co-ordination of project communications with senior stakeholders
- **Co-ordination of quality standards across projects**
- Managing interdependencies between projects
- **Optimising the use of the organisation's resources**
- Ensuring projects stay aligned with the organisation's mission.

Project Management Institute (2004), *A Guide to the PMBOK*, p17. Photo: Pxfuel, Creative Commons, C0 1.0 Universal (CC0 1.0) Public Domain Dedication.

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Tracking progress: core ideas

The pattern of cumulative cost in a project generally follows an S-curve. It is often difficult to infer the status of the project by comparing the planned S-curve with the actual S-curve on a given date.

Earned Value Management attempts to use real project data to predict whether the project will complete on time and budget, and if not, by how much.

How work in progress is treated can have a major effect on the predictions.

Using historic data to forecast the outturn of the project has shortcomings. The data may not future of the project may be more or less challenging than what has gone on so far.

Using EVM results it is possible to consider ways to get back on target, such as reducing the output specification, doing overtime or cutting out activities of little value.

The project office supports the administrative side of running the project; the project management office overall looks after control of project activity within the organisation.

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Basic EVM terms

Classic	Classic meaning	New	New meaning
BCWS	Budgeted cost of work scheduled	PV	Planned value
ACWP	Actual cost of work performed	AC	Actual cost
BCWP	Budgeted cost of work performed	EV	Earned value
CV = EV - AC	Cost variance	SV = EV - PV	Schedule variance
CPI = EV / AC	Cost performance index	SPI = EV / PV	Schedule performance index
BAC	(Original) budget at completion	EAC = BAC / CPI	Estimate at completion
ETC = EAC - AC	Estimate to completion (from here)	EAC = AC + ETC	EAC = AC + (BAC – EV)
VAC = BAC - EAC	Variance at completion		

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