Earned value management explained: PV, EV, AC, CPI and SPI with an example

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Earned value management answers a question a budget alone cannot: for the money spent so far, how much work is actually done? It compares three numbers and turns them into two ratios that show whether a project is ahead or behind on cost and schedule.

TL;DR The short version

- Earned value management shows how much work is actually done for the money spent so far.
- It compares planned value, earned value and actual cost, giving cost and schedule variances and the CPI and SPI ratios.
- It is only as honest as your definition of done, and it measures progress against the plan, not whether the plan is right.

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The three numbers

- **Planned value (PV):** the budgeted cost of the work you planned to have finished by today.
- **Earned value (EV):** the budgeted cost of the work you have actually finished by today.
- **Actual cost (AC):** what you have really spent so far.

The formulas

- **Cost variance:** CV = EV − AC. Negative means over budget.
- **Schedule variance:** SV = EV − PV. Negative means behind schedule.
- **Cost performance index:** CPI = EV ÷ AC. Below 1 means each unit of money buys less work than planned.
- **Schedule performance index:** SPI = EV ÷ PV. Below 1 means work is getting done more slowly than planned.
- **Estimate at completion:** EAC = BAC ÷ CPI, where BAC is the total budget. It assumes the current cost efficiency continues.

A worked example

A team has a budget (BAC) of 100,000 to build 10 features of equal size over 10 weeks. At the end of week 5 the plan says 5 features done, so PV = 50,000. The team has finished 4 features, so EV = 40,000. It has spent 50,000, so AC = 50,000. Then CV = −10,000, SV = −10,000, CPI = 0.8 and SPI = 0.8. If nothing changes, EAC = 100,000 ÷ 0.8 = 125,000, and the work will take longer than planned too.

Using EVM on software projects

- EV is only as honest as your definition of done. Count a feature as earned only when it meets it; "90% done" earns nothing.
- Agile teams can use story points: PV is the points planned by now, EV the points accepted. Keep point values stable during the release.
- Read the trend, not one snapshot. A CPI drifting downward over several weeks is the signal.

What EVM does not tell you

EVM measures progress against the plan. It cannot tell you whether the plan was right, whether users want what you built, or whether quality is falling. Pair it with delivery and reliability measures such as DORA metrics.

> Related credential: Program Technical Practitioner. Explore the exam facts and syllabus.

Sources and further reading

1. IICTP. TPBOK, Engineering Governance & Agile Delivery. iictp.org/standards/tpbok.

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