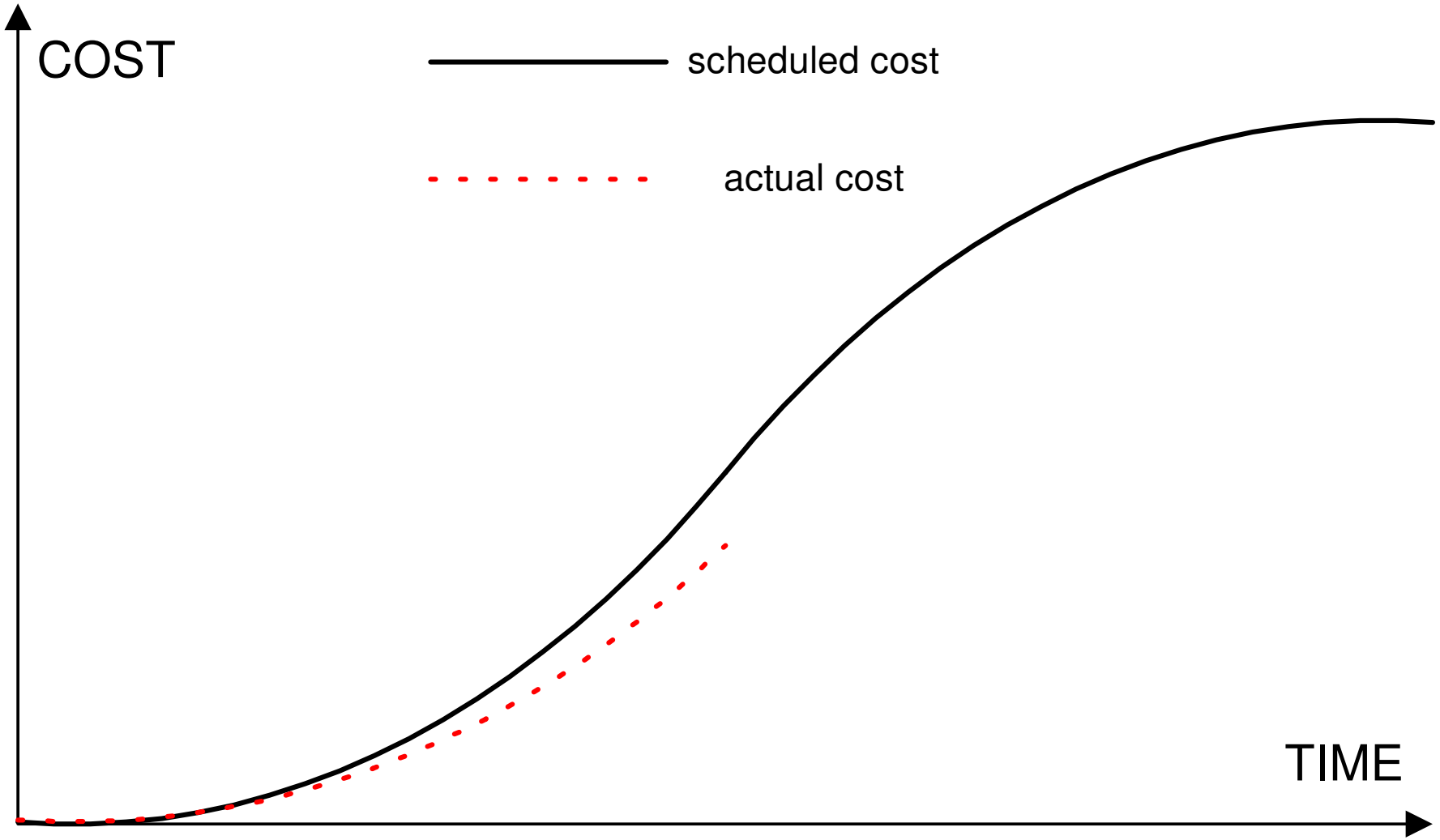
An Introduction to Earned Value Performance Measurement

All projects are different, and therefore have a variety of work. A standard is needed for control purposes, so expenditure, money or man-hours, is used for comparisons.

Resource Plan Graphical Summary



But …

- It does not show:
- If the project is obtaining value for money
- If the money has been spent in the right areas
- If the project is ahead or behind schedule
- If the project is under or over spent
- If the problems are over or just beginning
- Where the project is heading!

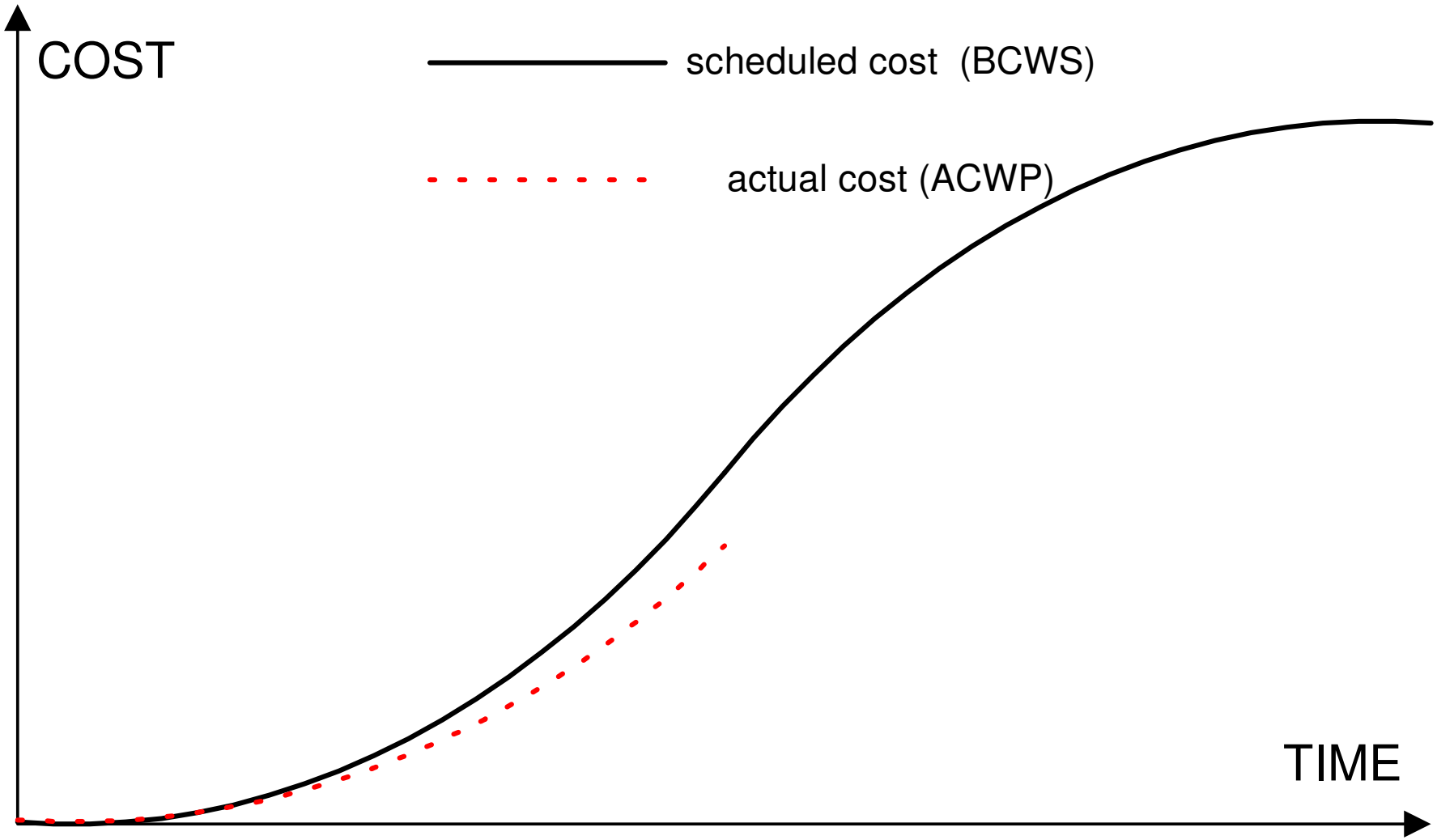
Definition

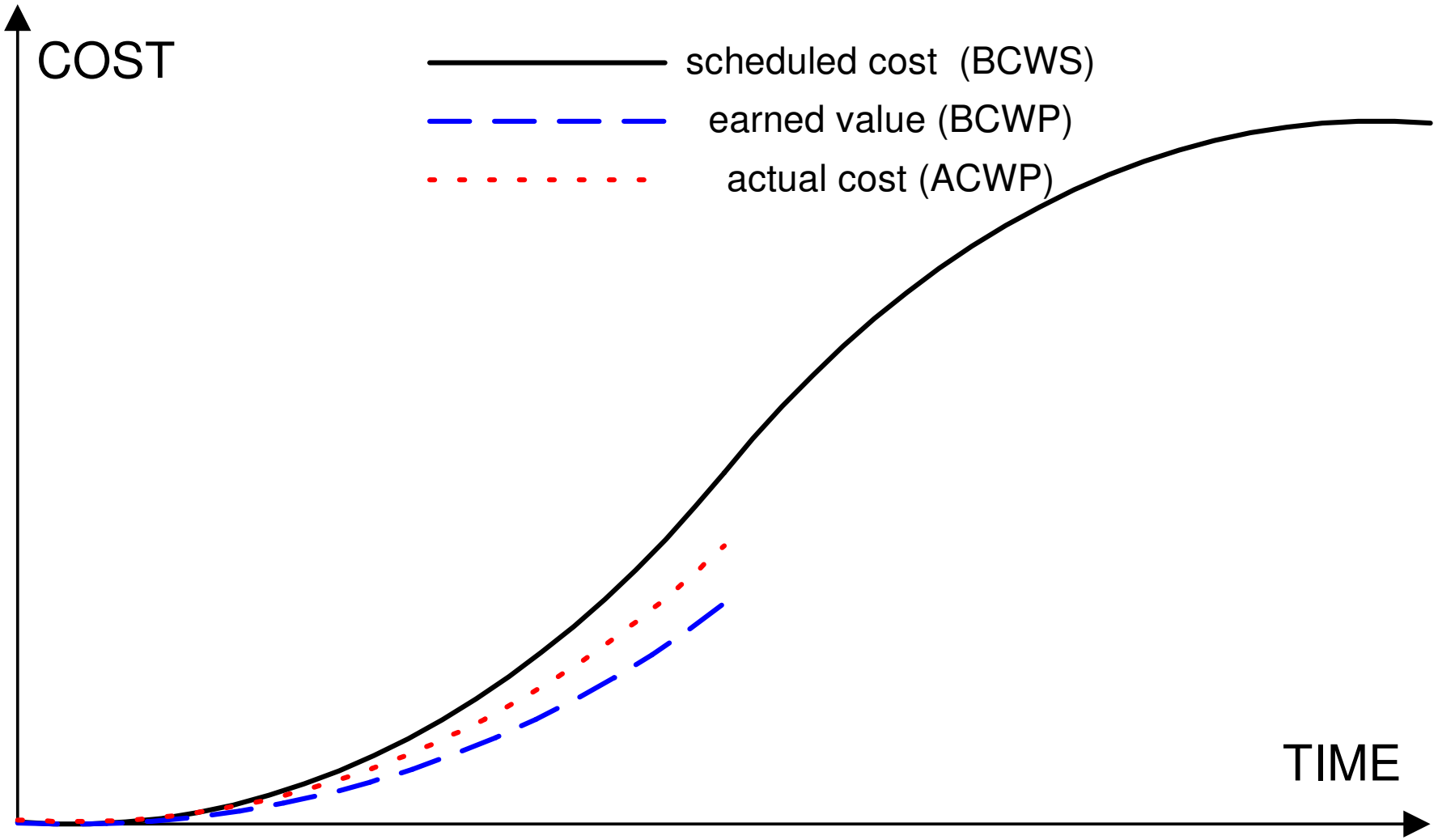
Earned value is the amount of budget you can claim, representing completed work, without reference to actual costs.

Put simply …
the amount of money you should have spent (based on the budget) for the amount of work that has been done.

the jargon...

- BCWS
  - budgeted cost for work scheduled
- ACWP
  - actual cost of work performed
- BCWP
  - budgeted cost for work performed (earned value).


COST
scheduled cost (BCWS)
actual cost (ACWP)
TIME


COST
scheduled cost (BCWS)
earned value (BCWP)
actual cost (ACWP)
TIME

Variance analysis

BCWS - budgeted cost for work scheduled
BCWP - budgeted cost for work performed (earned value)
ACWP - actual cost of work performed

Cost variance = BCWP - ACWP

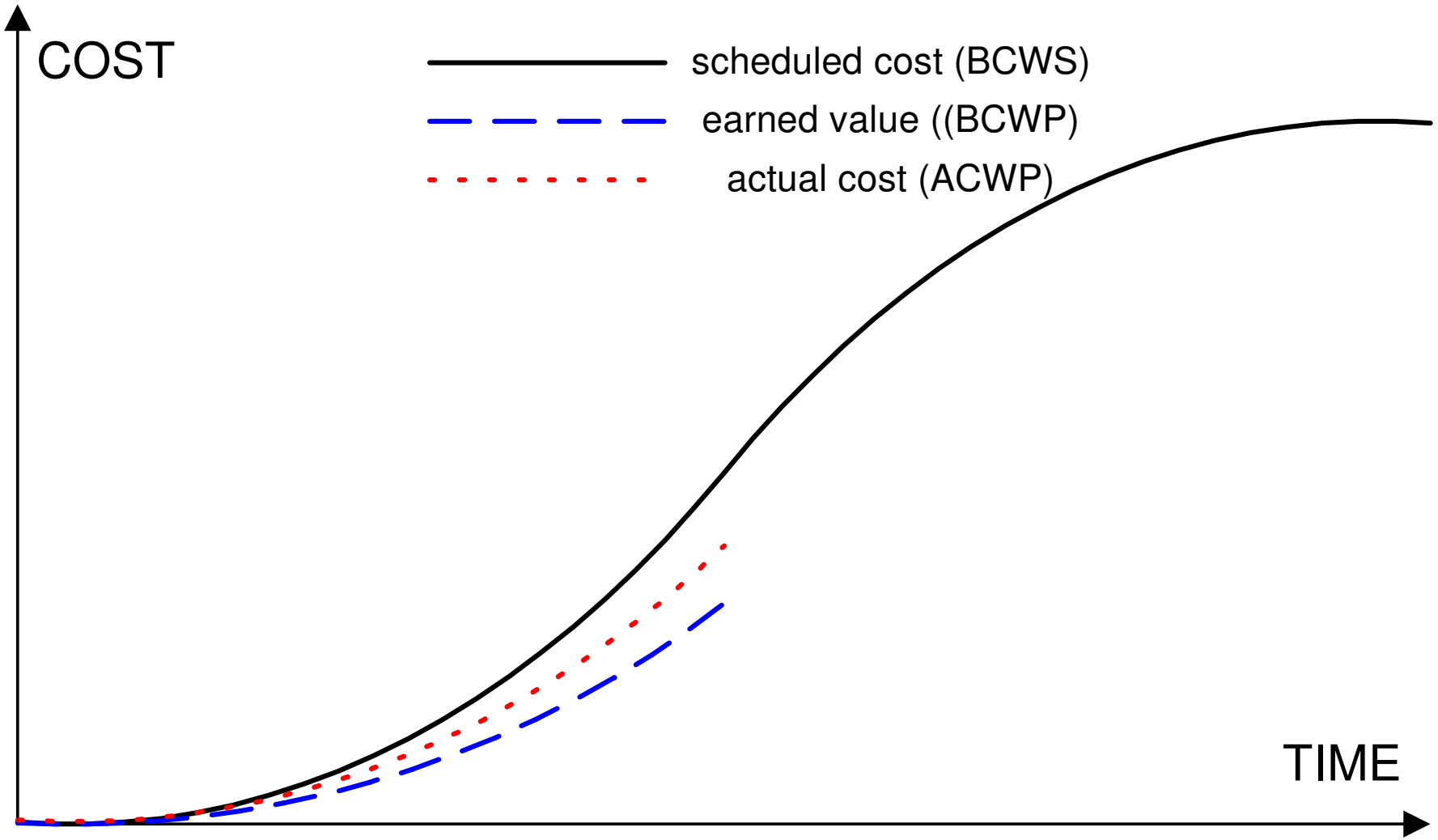
COST VARIANCE
If result is negative then project is over spent
If result is positive then project is under spent.

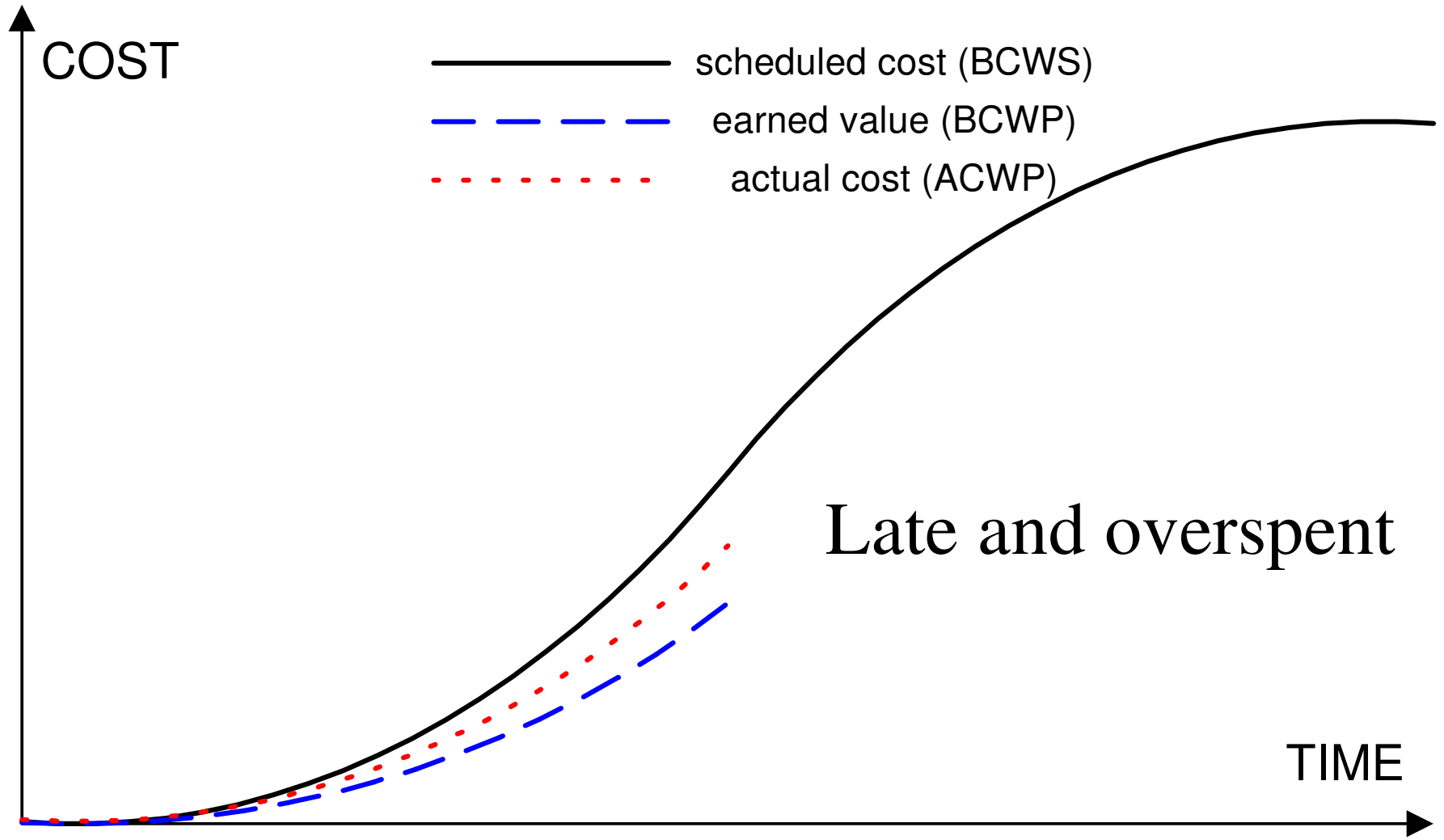
Variance analysis

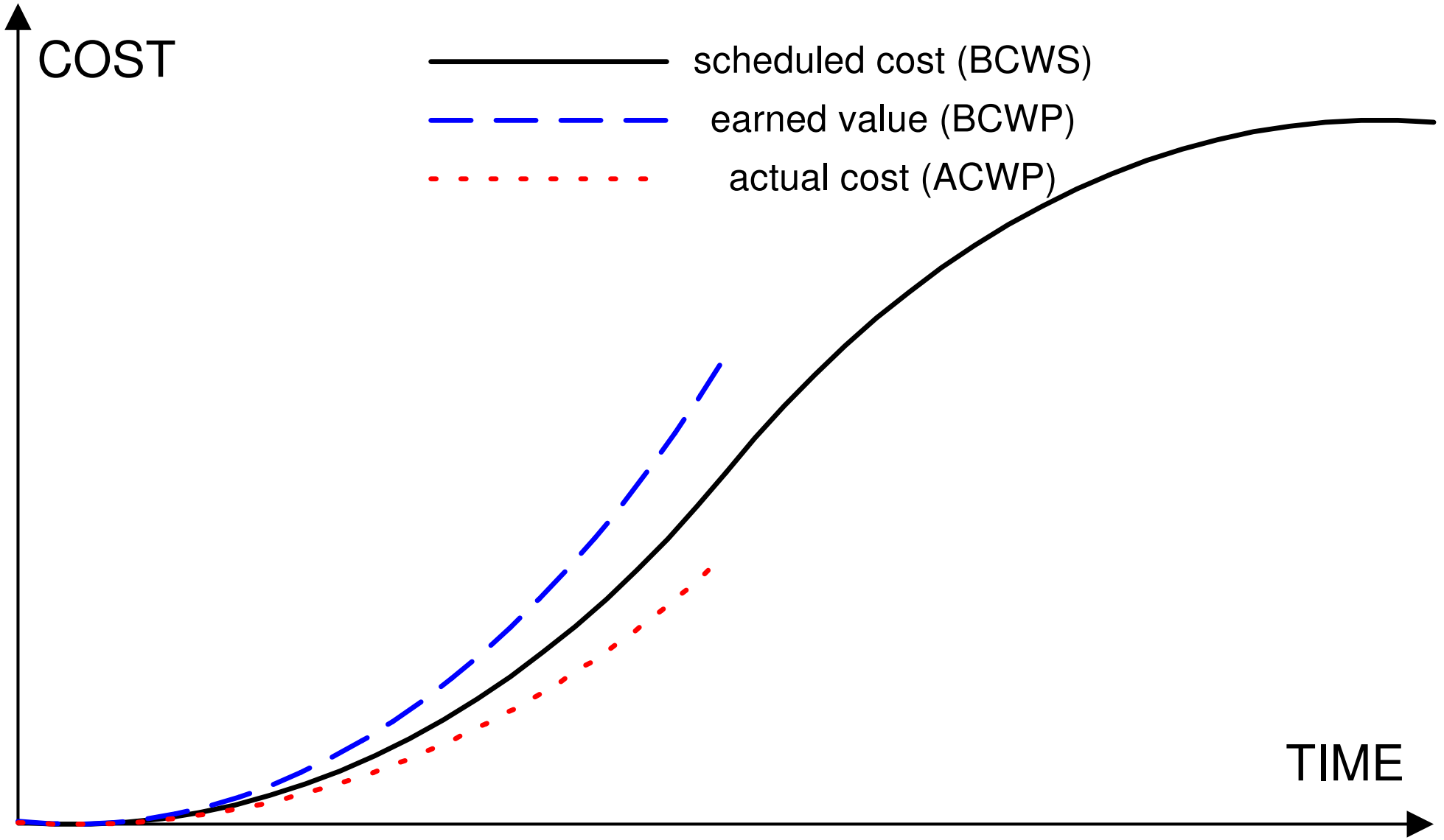
BCWS - budgeted cost for work scheduled
BCWP - budgeted cost for work performed (earned value)
ACWP - actual cost of work performed

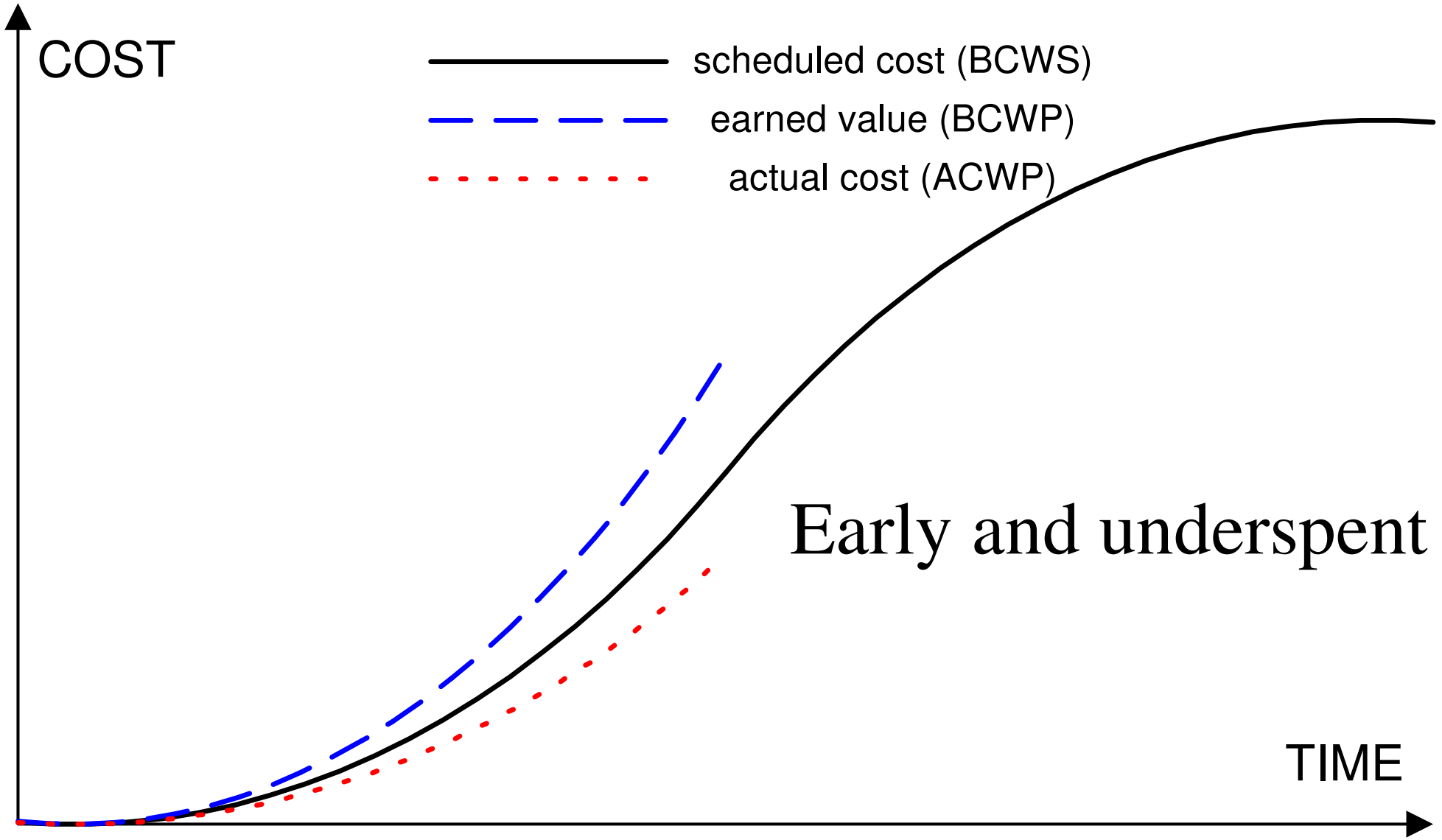
Schedule variance = BCWP - BCWS

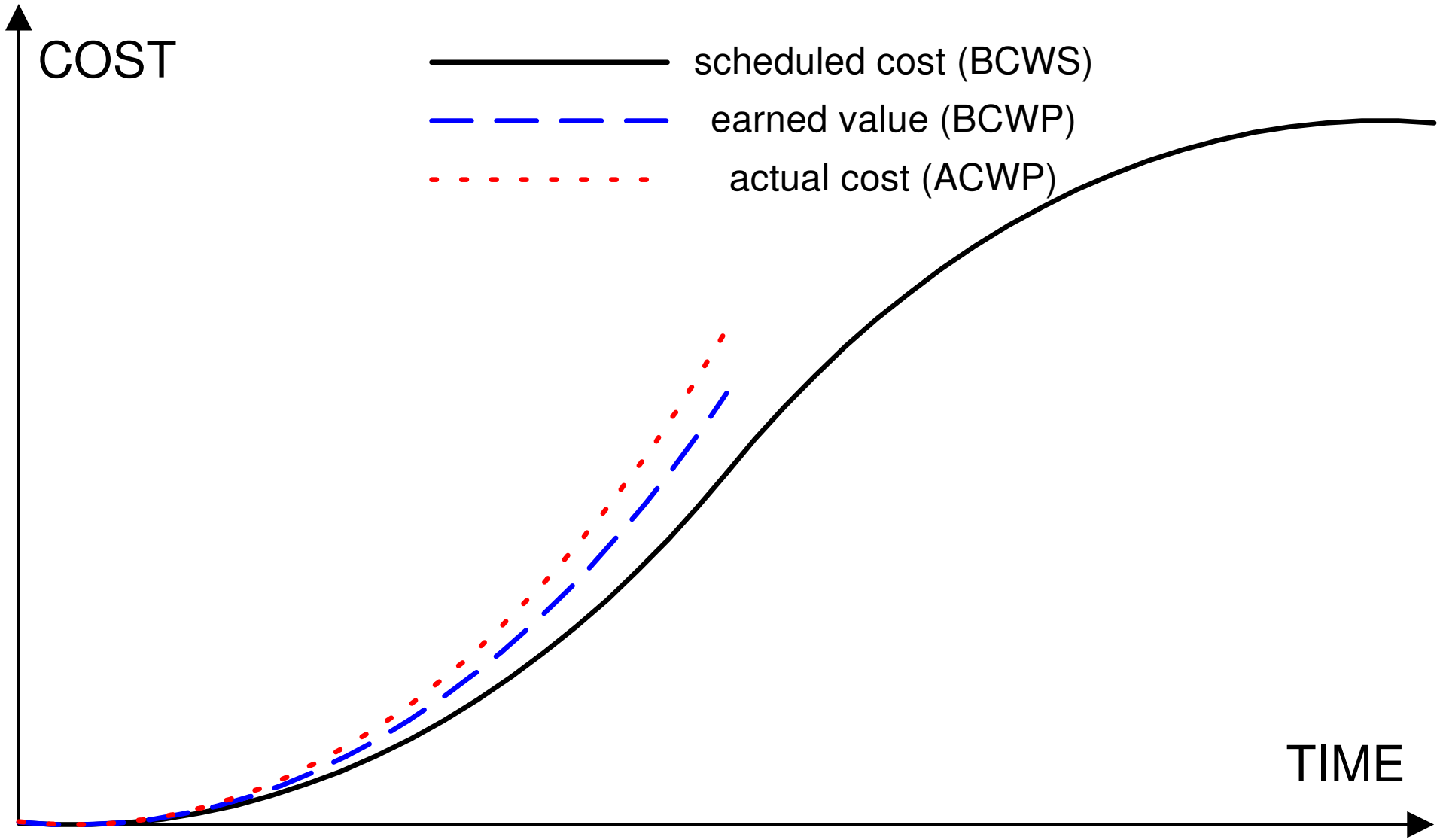
SCHEDULE VARIANCE
If result is negative then project is behind schedule
(i.e. over time planned)
If result is positive then project is ahead of schedule
(i.e. under time planned).

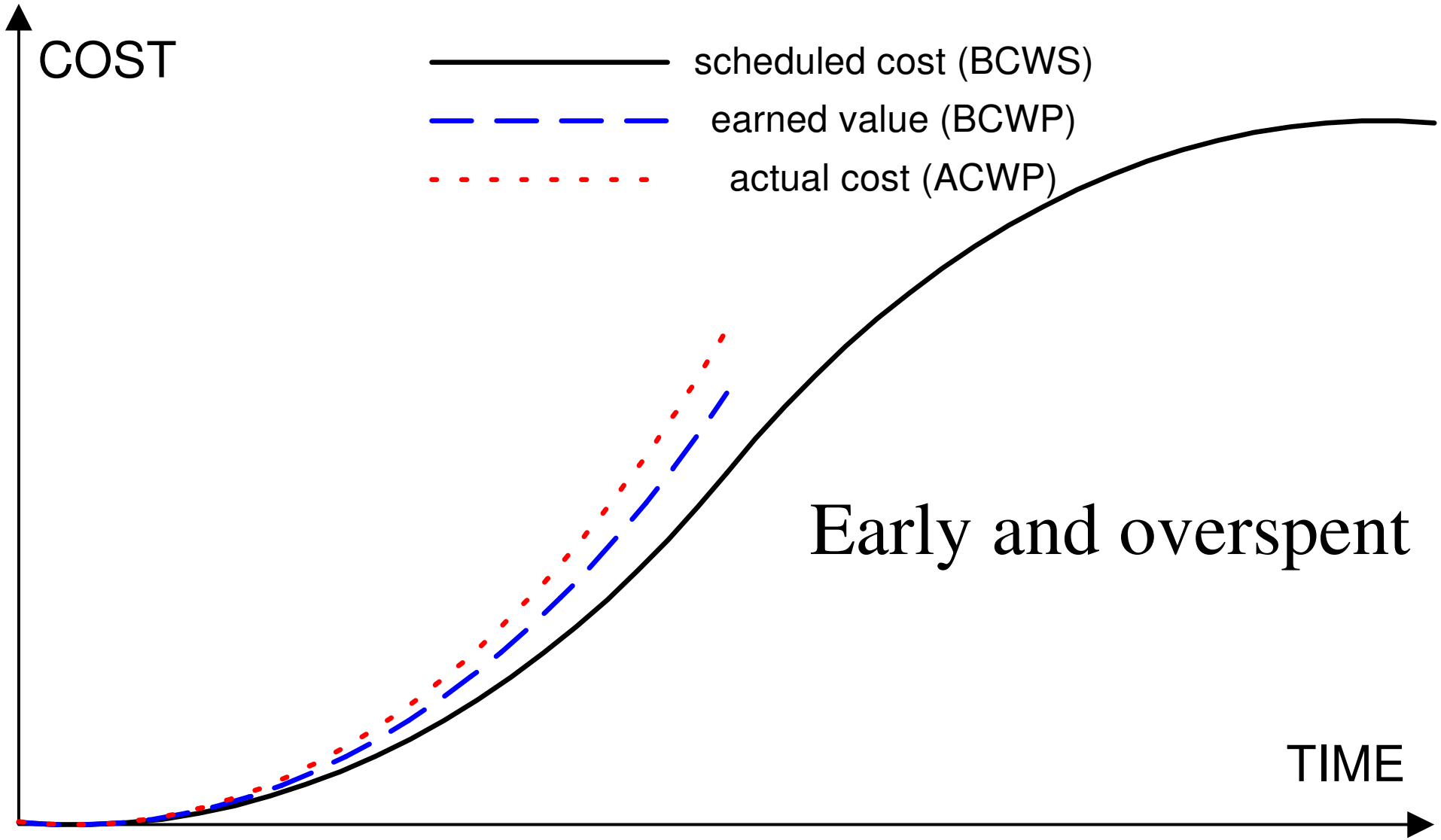

COST
scheduled cost (BCWS)
earned value ((BCWP)
actual cost (ACWP)
TIME

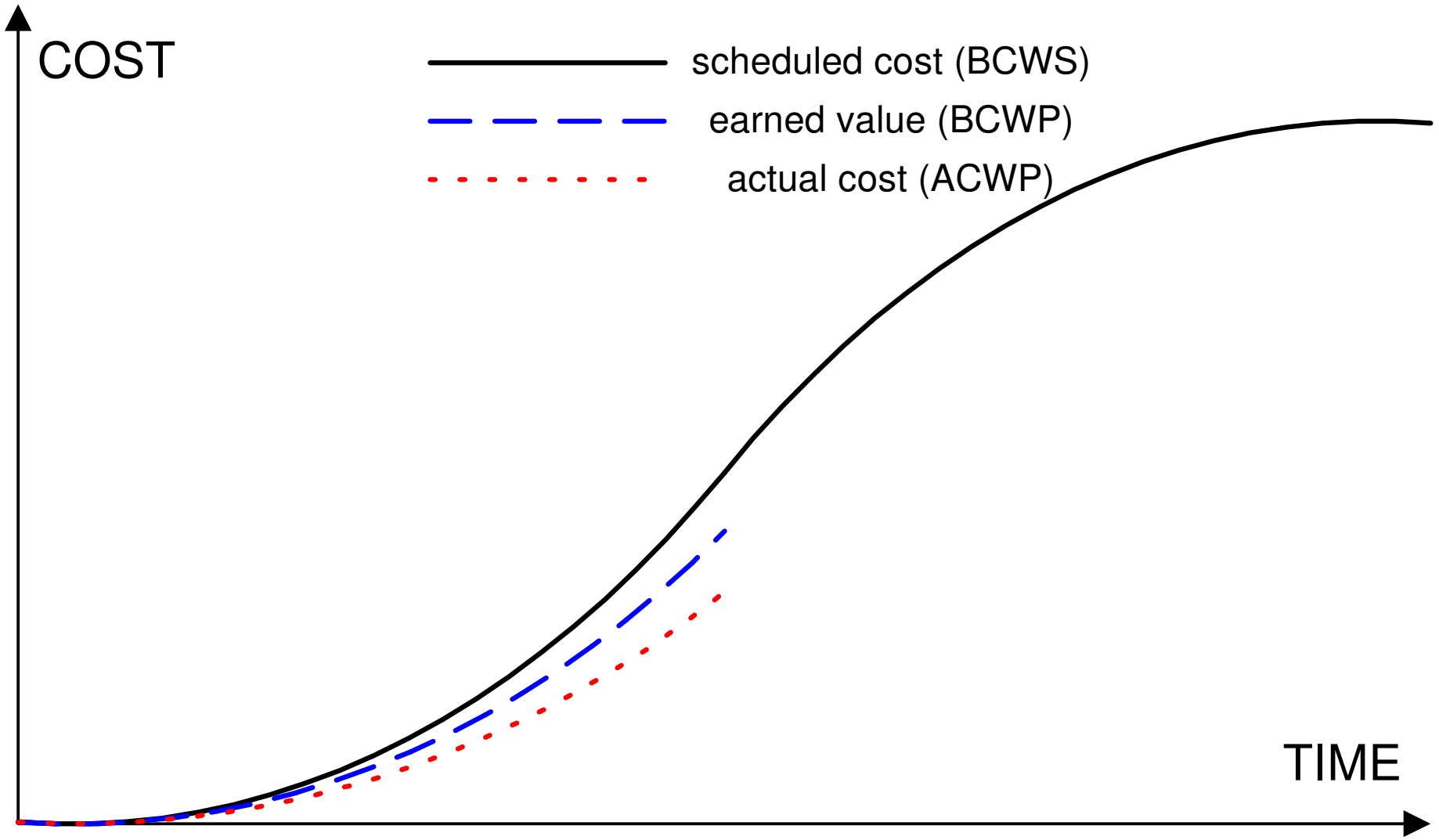

COST
scheduled cost (BCWS)
earned value (BCWP)
actual cost (ACWP)
Late and overspent
TIME

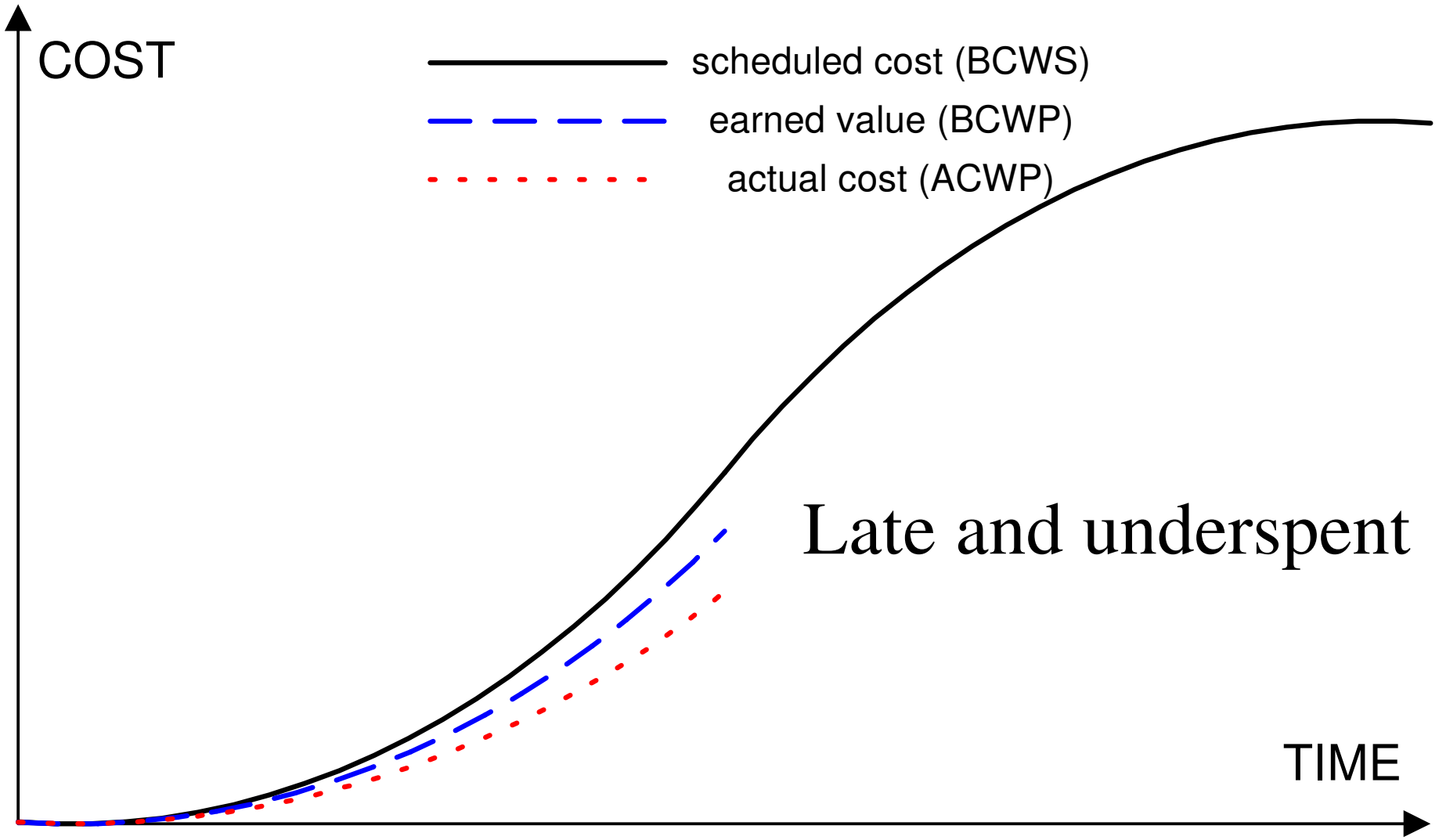

COST
scheduled cost (BCWS)
earned value (BCWP)
actual cost (ACWP)
TIME

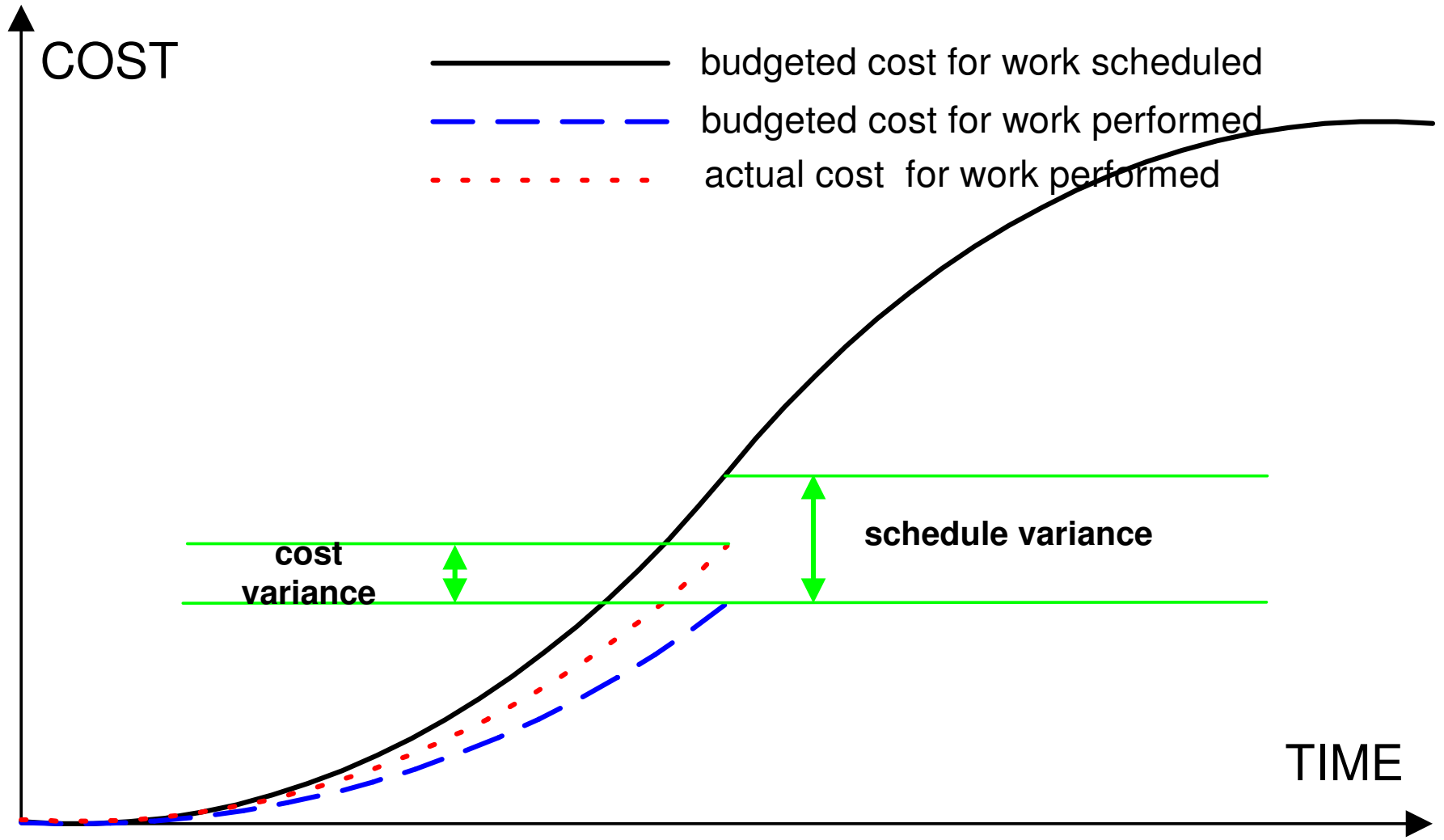

COST
scheduled cost (BCWS)
earned value (BCWP)
actual cost (ACWP)
Early and underspent
TIME


COST
scheduled cost (BCWS)
earned value (BCWP)
actual cost (ACWP)
TIME


COST
scheduled cost (BCWS)
earned value (BCWP)
actual cost (ACWP)
Early and overspent
TIME

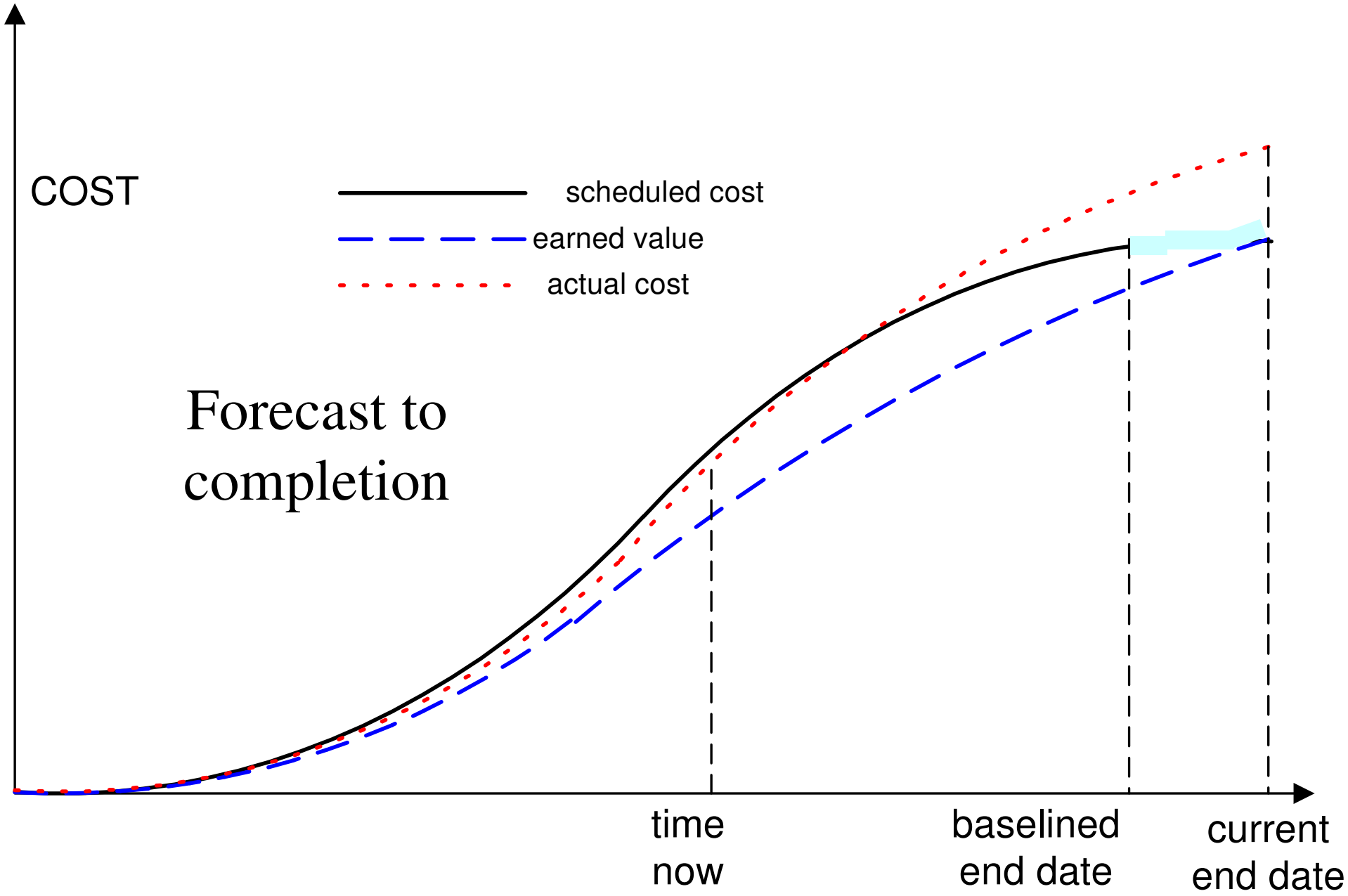

COST
scheduled cost (BCWS)
earned value (BCWP)
actual cost (ACWP)
TIME


COST
scheduled cost (BCWS)
earned value (BCWP)
actual cost (ACWP)
Late and underspent
TIME


COST
budgeted cost for work scheduled
budgeted cost for work performed
actual cost for work performed
cost variance
schedule variance
TIME

Techniques for calculating EV

- Completed units
- Milestones
- Percentage complete
- 0/100, 50/50, etc
- Apportioned effort
- Level of effort.


COST
scheduled cost
earned value
actual cost
Forecast to completion
time now
baselined end date
current end date

Forecasting

Cost performance index

CPI= BCWP/ACWP

CPI measures the productivity of the project. If less than 1, the project is spending more than it is earning.

Forecasting

Schedule performance index
SPI= BCWP/BCWS

SPI compares the rate of progress. If less than 1, the project is behind schedule.

Forecasting completion cost

Budget at Completion (BAC)

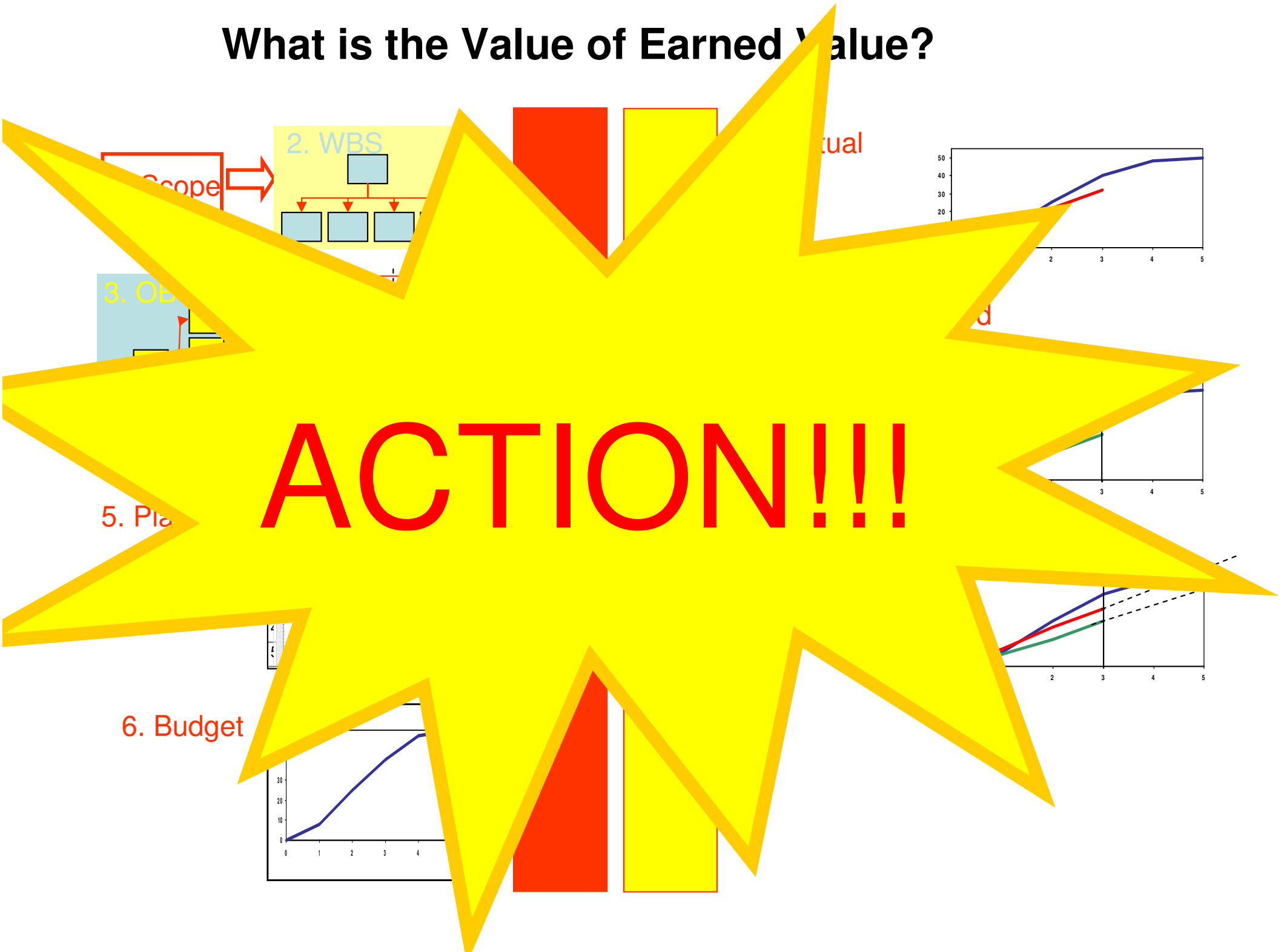
- An extrapolation of performance to date
- Performance to date (CPI) = BCWP/ACWP
- Budgeted cost for remaining work =
  budget at completion (BAC) - BCWP
- Estimate to complete (ETC) = (BAC-BCWP)/CPI
- Estimated cost at completion (EAC) = ACWP+ETC.

Forecasting completion duration

Estimate at Completion (EAC)

- An extrapolation of performance to date
- Performance to date (SPI) = BCWP/BCWS
- Estimate time for remaining work =
  Original Duration (OD) – Actual time expended (ATE)
- Estimate to complete (ETC) = (OD-ATE)/SPI
- Estimated at completion (EAC) = ATE+ETC.

What is the Value of Earned Value?



Performance Indices

COST PERFORMANCE INDEX

$$CPI = \frac{BCWP}{ACWP} = \text{COST "EFFICIENCY" INDEX}$$

SCHEDULE PERFORMANCE INDEX

$$SPI = \frac{BCWP}{BCWS} = \text{SCHEDULE "EFFICIENCY" INDEX}$$

TO-COMPLETE PERFORMANCE INDEX

$$TCPI_{EAC} = \frac{BAC-BCWP}{EAC-ACWP} = \text{VERIFICATION INDEX}$$

Forecasting completion. (based on variance calculation)

-some cost overspends are unlikely to be repeated

-those repeated may be reduced using experience gained

-some cost savings may be made to balance overspend

Summary

Earned value analysis identifies trends and signs of trouble, so that management action can be taken to identify and address the root cause of any variances.