Loan and Grant Management Unit

Ministry of Finance

Project Finance Management Course Handbook

Developed under USAID contract by BearingPoint

2004

Project Finance Management Course Handbook

Table of Contents

Session	**Subject**
1.	Introduction
2.	Project Selection
3.	Project Planning
4.	Project Executing
5.	Project Controlling
6.	Project Closing

كراس دورة الادارة المالية للمشروع

جدول المحتويات

الجلسة التدريبية	**الموضوع**
1.	مقدمة
2.	اختيار المشروع .
3.	التخطيط للمشروع .
4.	تنفيذ المشروع .
5.	السيطرة على المشروع .
6.	غلق المشروع .

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Project Finance Management

A Review of Project
Finance Management Fundamentals

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Session 1
Introduction

What is Project Management (defined)?

PMI defines Project Management as:

"the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve pre-determined objectives of scope, quality, time and cost, and participant satisfaction."

IT IS A PROJECT-ORIENTED PROCESS.

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What is a Project?

A temporary endeavor undertaken to create a unique product or service.

It has a beginning and a definite end.

It is directed at achieving a specific result.

It involves the coordinated undertaking of interrelated activities.

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What is a Program?

Is larger in scope than a project.

Often comprises several interrelated projects.

Lasts longer than a project.

Has a much less definite end point in time.

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Traits of a Project

Objectives

Schedules

Complexity

Size and nature of task

Resources

Organizational structure

Integrated information control system

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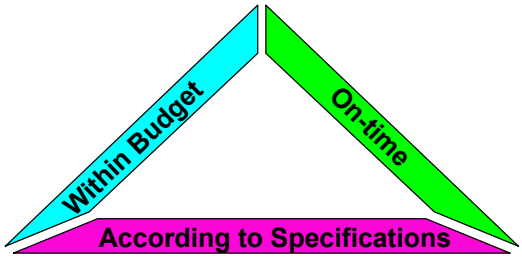
The Triple Constraint: Project Management Success



A baselined balanced between the three key project factors.

Any change to one affects either one or both of the other.

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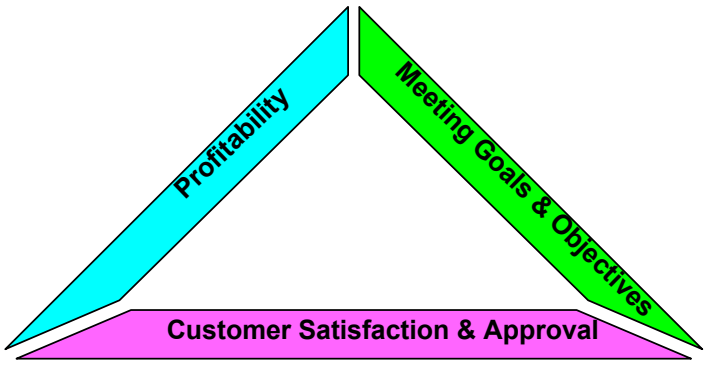
The Triple Constraint: Project Success



The three key overall project factors.

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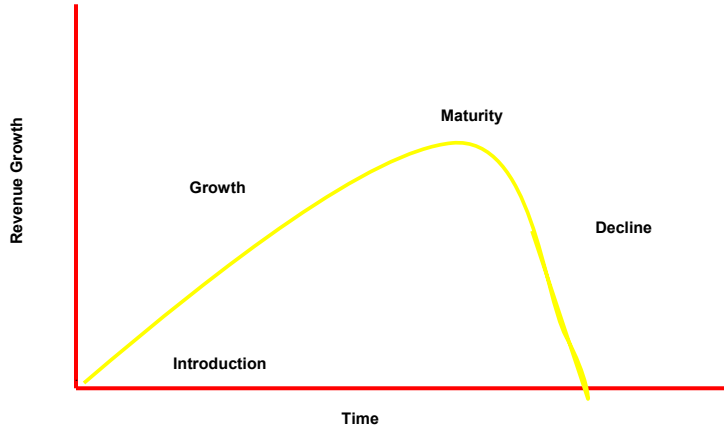
Product Life Cycle



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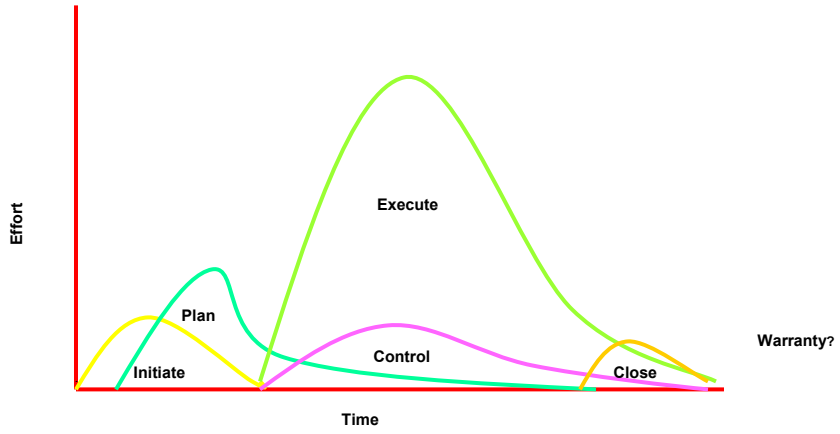
Project Life Cycle



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Capital Management Methods:

The three main areas of Capital Management are:

- Financial Management
- Financial Accounting
- Managerial Accounting

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Financial Management:

This discipline concerns:

- **The theory and practice of business finance**
- **Impacts of long- and short-term uses and sources of funds on the firm's value.**
- **Working capital policy, capital budgeting, financing with debt and equity**
- **Dividend policy, valuation and project finance**
- **Mergers and acquisitions.**

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Financial Accounting:

This discipline concerns:

- **Basic concepts and methods used in financial statements.**
- **Use and preparation of the income statement, balance sheet, and statement of cash flows**
- **Accounting and reporting issues, including revenue and expense recognition, cash, receivables, inventory, marketable securities, long-lived assets, and debt and equity securities.**

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Managerial Accounting:

This discipline concerns:

- **The role of accounting in the decision-making processes of management**
- **Understanding of how accounting influences resource allocation decisions in the organization.**

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Session 2

Project Selection

Project Selection

General Selection Methods

Non-Numeric

- Delphi Method
- Peer Review Boards
- Executive Fiat

Numeric

- Benefit Measurement Methods
- Constrained Optimization
- Poor Man's Hierarchy

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Project selection methods

Benefit Measurement Methods:

- Benefit/Cost Ratio
- Payback period
- Economic Value Added
- Peer review
- Expert Judgment
- Net Present Value (NPV)
- Internal Rate of Return (IRR)

Constrained Optimization Methods:

- Linear/nonlinear programming
- Integer programming
- Dynamic programming
- Multi-objective programming.

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Capital Budgeting

Capital Budgeting

This is the process of identifying the prospective financial benefits of projects under consideration for funding & implementation – it is the project selection decision-making process.

Tools/Techniques:

- Payback period
- NPV & IRR Calculations
- Discounted Cash Flow
- Depreciation schedules
- Tax information
- Cash Flow

Outputs:

- Prospective project cost/profit levels
- Cross-comparison of prospective project B/C Ratios (profit potential)
- Selection of project(s) to implement

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Pay-back Period

Payback Period tells you how long it would take to recover an investment from the returns attributable to that investment.

The example on the next slide illustrates how payback period analysis works. In this example, a company invests $100,000 into a project. After discounting for inflation, the revenue stream for years 1, 2 and 3 is: $10,000, $55,000, and $120,000. Given that interest on the unpaid loan is 10% per annum, the company will pay off its initial investment and all accrued interest around mid-way through Year 3.

Thus, the pay-back period is 2.55 years (assuming an even revenue flow during Year 3.)

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Pay Back Period

Length of Time Needed to Recover the Initial Cost of a $100,000 investment.

Loan+Interest	Revenues	Balance
$ 105,000	$ 10,000	($95,000)
$ 110,250	$ 55,000	($55,250)
$ 115,762.50	$ 120,000	0 (After 5.5 months)

If the revenue flow is realized, the company can payback its investment/loan (with interest) after 2 years and 5.5 months.

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Pay-back Period (Pro and Con)

Advantages of Pay Back Period Analysis

- Quantifies the recovery of investments and accrued interest payments.
- Considers the value of money over time (discount cash flow).
- Provides basic cash flow risk analysis for an investment.
- Allows a portfolio of investment options to be rank order by earliest payback to latest payback.

Disadvantages of Pay Back Period Analysis

- Does not consider revenue streams beyond the payback point.
- Does not consider the pattern of revenue streams (even, periodic, end-of-year, etc…).
- Requires assumptions of cash flow (revenue) streams that may not be accurate.

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Cost of Capital:

This is the cost of money (capital) to a project overtime. There are four basic methods for calculating the cost of capital:

- Future Value (Compound Interest)
- Present Value (Discount Cash Flow)
- Net Present Value
- Internal Rate of Return
- Benefit-Cost Analysis (Benefit-Cost Ratio)

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Future Value

Principal	Interest (5%/yr)	Total
$ 100,000	$ 5,000	$105,000
$ 105,000	$ 5,250	$110,250
$ 110,250	$ 5,512.50	$115,762.50
$ 115,762.50	$ 5,788.125	$121,550.625

- **Total cost - Principal = Total interest paid.**
- **$ 121,550.625 - $ 100,000 = $ 21,550.625**

Thus, the total interest paid by the company is $ 21,550.625 when (if) it pays back its loan after four years.

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Net Present Value

Net Present Value (NPV) analysis looks at the final profit/loss outcome of an investment after considering the time value of money (discount cash flow) based on interest, inflation or any other discount factor.

NPV analysis consists of three levels (See examples on next two slides):

- Calculating the Present Value (costs and revenues) for each time period included in the analysis
- Summing all time period Present Values (costs and revenues) together to obtain the total Present Value.
- Deducting the total Present Value of all costs from the total Present Value of all revenues to determine the Net Present Value (NPV).

The result of the NPV Analysis is the NPV:

- A positive NPV indicates profitability
- A negative NPV indicates loss
- A NPV of 0.0 indicates break-even.

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Present Value

Present Value:

Vt = Value in prescribed time period

i = Annual interest rate

n = number of time periods

$$PV = \frac{Vt}{(1+i)^n}$$

Present Value Example:

If:

- Time period ^{1} revenues = $10,000
- Time period ^{2} revenues = $10,000
- Annual interest = .1 (10%)

Then:

- Time period ^{1} revenues = $10,000/(1.1)^1 = $10,000/1.1 = PV = $9,090.90
- Time period ^{2} revenues = $10,000/(1.1)^2 = $10,000/1.21 = PV = $8,264.46

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Net Present Value

Net Present Value:

Net Present Value :

$$\Sigma PV - I = NPV$$

Where:

ΣPV = Sum of all present values

I = Capital investment

If,

- Time period ^{1} revenues = $10,000
- Time period ^{2} revenues = $10,000
- Annual interest = .1 (10%)
- Capital investment = $15,000

Then:

- Time period ^{1} PV = $9,090.90
- Time period ^{2} PV = $8,264.46
- Sum PV = $17,355.36
- NPV = $17,355.36 - $15,000 = $2,355.36

Conclusion:

Investment is profitable as the net present value is positive.

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NPV (Pro and Con)

Advantages of NPV Analysis

- Quantifies the potential profit of investments minus accrued interest and any other discount factors (*e.g.,*inflation).
- Considers the value of money over time (discount cash flow).
- Provides data for risk analysis for an investment.
- Allows a portfolio of investment options to be rank order by highest NPV to lowest NPV.

Disadvantages of NPV Analysis

- Requires the use of an interest rate throughout the analysis.
- Requires the organization concerned to decide on an interest rate.
- Requires assumptions of cash flow (revenue) streams that may not be accurate.
- Does not consider depreciation or the book value of an investment option's assets.

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Internal Rate of Return

Internal Rate of Return (IRR) analysis compares the expected future revenues (discount cash flows) of an investment in relation to its cost. Specifically, it measures the expected annual growth or decline of an investment over the period of the analysis.

The result of the IRR Analysis is the IRR (See example on the next page):

- A positive IRR indicates profitability
- A negative IRR indicates loss
- An IRR of 0.0 indicates break-even.

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IRR Example

Project (Investment) Option	Year 0	Year 1	IRR
Project A	($100,000)	$130,000	30%
Project B	($200,000)	$240,000	20%

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IRR Analysis (Pro and Con)

Advantages of IRR Analysis

- Quantifies the growth or decline in the profitability of investments overtime.
- Considers the value of money over time (discount cash flow) provided this is used in the revenue streams analyzed.
- Provides data for risk analysis for an investment.
- Allows a portfolio of investment options to be rank order by highest to lowest internal rate of return.

Disadvantages of IRR Analysis

- Is dimensionless as the IRR (by itself) does not relate to actual monetary figures.
- Does not consider the pattern of revenue streams (even, periodic, end-of-year, etc…).
- Only indicates the general direction of an investment over time (positive, negative or neutral).
- Requires assumptions of cash flow (revenue) streams that may not be accurate.

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IRR *versus* NPV

If:

- **the cost of capital is 10% per year.**

Project Options	Year 0	Year 1	IRR	NPV
A	($100,000)	$130,000	30%	$18,181.81
B	($200,000)	$240,000	20%	$18,181.81

Then:

- **Differential cash flow (Project B NPV – Project A NPV) is zero.**
- **If the overall IRR > the cost of capital choose the larger project: Project B.**
- **If the overall NPV > 0 choose the larger project: Project B.**

Thus: Choose Project B over Project A.

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Benefit-Cost Analysis

Benefit-Cost Analysis is a method of determining the overall attractiveness of an investment option.

There are two basic types of B/C Analysis (See examples on next two slides):

- **Basic analysis** which considers overall benefits in relation to overall costs
- **Advanced analysis** which considers the net present value and the initial investment in relation to initial investment costs

The result of the B/C Analysis is the B/C Ratio:

- A positive ratio indicates profitability
- A negative ratio indicates loss
- A ratio of 1.0 indicates break-even.

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Benefit-Cost Analysis (Basic)

Formula:

$$\frac{\text{Potential Benefits}}{\text{Expected Costs}} = \text{Benefit/Cost Ratio}$$

If potential revenue is $1 million and expected costs are $500,000, then:

$$\frac{\$1{,}000{,}000}{\$500{,}000} = 2.0 \text{ Benefit/Cost Ratio}$$

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Benefit-Cost Analysis (Advanced)

Formula:

$$\frac{\text{Investment + NPV}}{\text{Investment}} = \text{Benefit/Cost Ratio}$$

If the net present value is $1 million and the investment is $500,000, then:

$$\frac{\$500{,}000 + \$1{,}000{,}000}{\$500{,}000} = 3.0 \text{ Benefit/Cost Ratio}$$

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B/C Analysis (Pro and Con)

Advantages of B/C Analysis

- Quantifies the overall ratio of benefits to costs of an investments overtime.
- Can consider the value of money over time (discount cash flow).
- Provides data for risk analysis for an investment.
- Allows a portfolio of investment options to be rank order by highest to lowest Benefit-Cost Ratio.

Disadvantages of B/C Analysis

- Is dimensionless as the B/C Ratio (by itself) does not relate to actual monetary figures.
- Does not consider other analysis such as investment payback and revenue direction (increasing, declining, constant)
- Only indicates the overall monetary benefits and costs of an investment over time (positive, negative or neutral).
- Requires assumptions of future benefits and costs that may not be accurate.

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Capital Rationing

Capital Rationing

This is the process of selecting the best projects with the highest overall net present value without exceeding the available budget.

Assumes projects are mutually exclusive.

Tools/Techniques:

- Capital Budgeting calculations
- NPV & IRR Calculations
- Benefit-Cost Ratio
- Risk Analysis

Outputs:

- Project cost levels
- Cross-comparison of project budgets
- Selection of project(s) to implement

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Project Options

Project Options	Potential Revenues	Expected Costs	B/C Ratio
A	$12.25 million	$3.5 million	3.5
B	$11.375 million	$6.5 million	1.75
C	$4.5 million	$1.5 million	3.0
D	$13.75 million	$5.5 million	2.5

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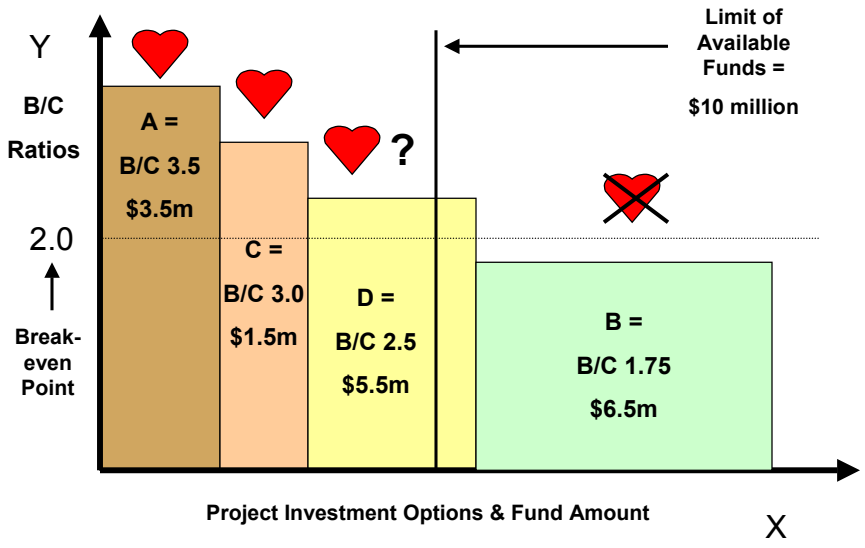
Project Selection Decision



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Decision Trees

There are two types of Decision (Logic) Trees:

- **Probability Trees**
- **Decision (Expected Monetary Value Trees) that consider Decisions Point and Chance Events.**

Build the tree from left to right - not mandatory.

Put the probabilities of the states of nature on all the branches thus producing the probability tree.

All up all the conditional payoffs to complete the tree.

The sum of all probabilities at the end of each branch of the tree must equal 1.0.

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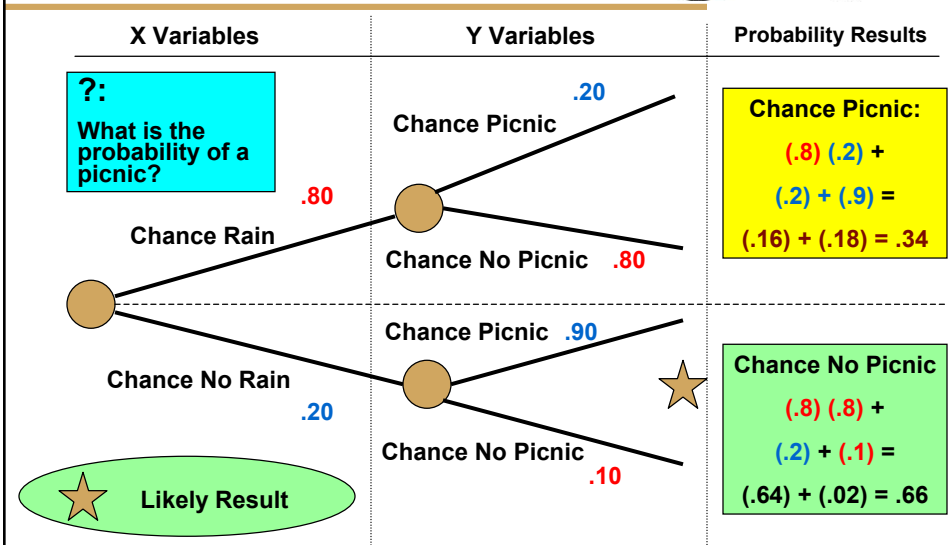
Probability Tree



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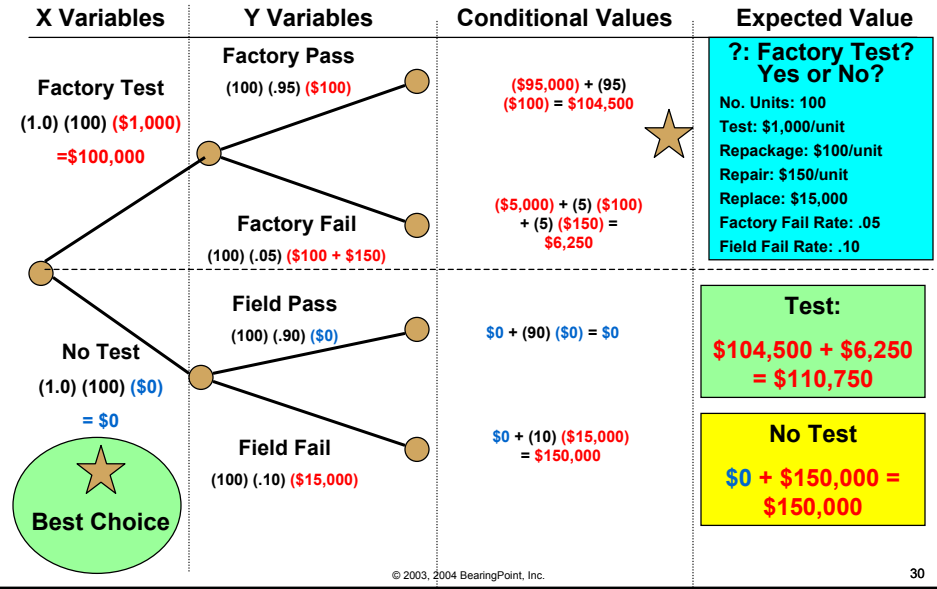
Expected Value Tree (Costs)



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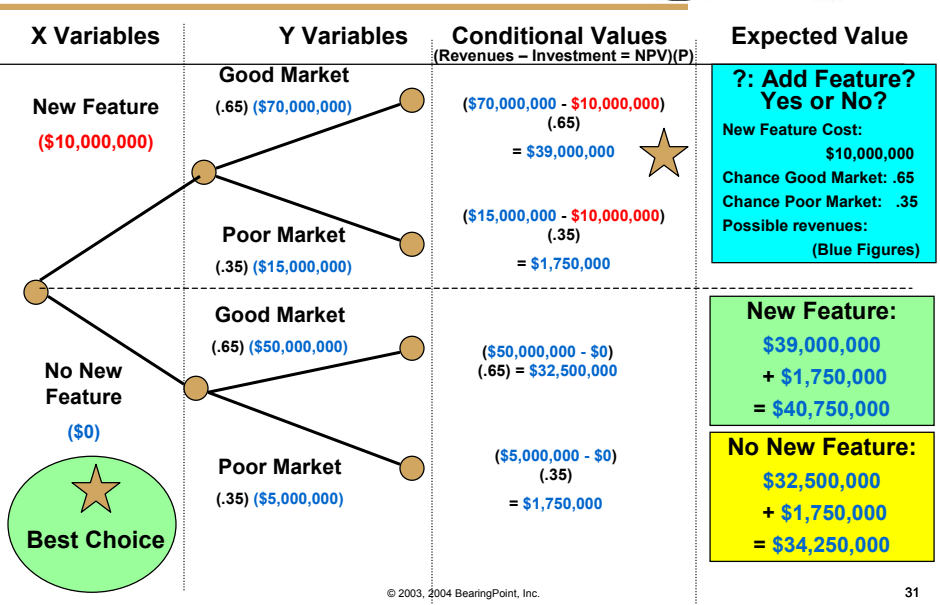
Expected Value Tree (Profits)



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EMV Exercise

An organization wants to know if it should conduct 100 percent testing of its radar equipment device at the factory before shipping them for use in the field – or to test them in the field after installation. Given the following information, develop a decision tree to determine the costs of conducting tests by two alternative methods on a production run of 500 radar units. Use your analysis to make a recommendation on what the company should do:

Historical failure rate on testing: 4 percent

Cost to test each unit in the factory before shipment: $10,000

Cost to reassemble each unit passed after factory test: $2,000

Cost to repair and reassemble each failed unit after factory test: $23,000

Cost to repair and reinstall each failed unit in the field: $350,000

Number of units to test at factory or in field: 500 units.

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Session 3

Project Planning

Cost Management

Cost Accounts

A **Chart of Accounts** refers to the unique identifiers used for an organization's budget line items.

A **Code of Accounts** refers to the unique identifiers used for the elements of the Work Breakdown Structure.

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Cost Types

Direct Costs refer to those costs of the project that are directly linked to the project itself.

Indirect Costs refer to those costs that are a part of the organization's overall operations – independent of the project being implemented.

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Estimating Tools

Analogous

- Comparing work to similar projects. (Easy but at risk from bad data)

Parametric

- Industry models, rules of thumb, theory models (SEER® or Price®)

Bottom-Up

- Starts with WBS work packages and adds up the pieces.

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Cost Estimates

Order of Magnitude (WBS 0-level)

- Range from -25% to +75%

Budgetary Estimate (Summary Task level)

- Range from -10% to +25%

Definitive Estimate (Work Package level)

- Range from -5% to +10%

Statistically, a point estimate will likely be wrong (always the probability of being more or less.)

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Cost Estimating Methods:

There are five types of cost estimating methods:

- Analogous estimating/top-down estimating
- Parametric estimating
- Bottom-up estimating
- Life-Cycle estimating
- 'Rolling Wave' budgeting
- Computerized tools

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Analogous Estimating:

This is a method of estimating the life-cycle costs of a project. It is reliable if the following conditions must be met:

When previous projects are similar in fact – not just appearance.

When the individuals making the estimates have the needed expertise.

In addition, the following is true about analogous estimates:

- **It supports top-down cost estimating.**
- **It is a form of expert judgement.**
- **It is used when there is a limited amount of detailed project information available.**
- **Finally, this is usually done during the initiating and planning phases of a project.**

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Bottom-Up Estimating:

This is the method of estimating and then summarizing the cost of individual work packages to get a project total.

There are two types:

- **Budget estimates**
- **Definitive estimates**

The accuracy of these estimates is enhanced with smaller work items. The reason for this is that the people who do the work tend to produce more accurate estimates.

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Parametric Modeling:

This is a cost estimating model that uses project characteristics in a mathematical model to predict project costs. These are accurate when the following elements are present in the model:

- **When the historical information is accurate.**
- **When the parameters are readily quantifiable.**
- **When the model works for both and large and small projects.**

Example: PERT Estimates

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Life-Cycle Cost Estimating

This cost estimating method looks at all of the costs associated with a product or project from beginning to end. The four specific stages are:

- **Development Costs**
- **Production Costs**
- **Operating/Maintenance Costs**
- **Disposal Costs**

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Rolling Wave Budgeting

This is a combined 'Top-Down' and 'Bottom-Up' approach.

An 'Order of Magnitude' estimate is made at the beginning of the project.

A detailed 'Bottom-Up' estimate is made in phases (3-6 months) throughout the Project Life Cycle.

A final top-down budget is made at the end of the project.

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Cost Estimating Exercise

Resource Inputs

- Laborers (100 people x $10 hour x 1,000 hours)
- Foreman (5 people x $100 hour x 200 hours)
- Masons (25 people x $50 hour x 500 hours)
- Carpenters (50 people x $50 hour x 400 hours)
- Drivers (10 people x $40 hour x 300 hours)
- Supplies($1,000,000 lump sum)
- Equipment ($500,000 lump sum for various items)

Fringe Benefits is 15% of labor inputs

Administrative Overhead is 10% of all Inputs and Benefits

What is the total cost of this project?

What are the loading rates? Labor? S & E? Overall?

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Risk Analysis

Risk Management Goals

To recognize project risks

To develop strategies that will reduce the risk events

To take steps to avoid risk events entirely

Good Project Management is Good Risk Management and vice versa

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Risk Management Classes (types)

There are three (3) classes or types of risks:

- **Known-knowns = a certain outcome**
- **Known-unknowns = a risk as a probability can be assigned to the risk event**
- **Unknown-unknowns = an uncertainty as no probability can be assigned to the risk event**

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Risk Categories

There are two categories of Risk:

Business risks: Possibility of a gain/loss.

Pure/insurable risks: Only possibility is for loss.

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Risk Attributes/Dimensions

Risk Attributes:

Risk Event

Risk Probability

Amount at Stake

Risk Event Status – probability x Amount at stake

Risk Dimensions:

Quality - most important to the customer

Cost

Schedule

Procurement

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Risk Sources/Descriptions

Risk sources are:

- Changes in requirements
- Design errors & omissions
- Poorly defined/understood roles & responsibilities
- Poor estimates
- Insufficiently trained staff

All Risk descriptions should include:

- Probability of occurrence
- Range of possible outcomes
- Expected Timing
- Anticipated frequency

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Risk/Uncertainty in the PLC

Risk & Uncertainty Within the Project Life Cycle

	Initiating	Planning	Executing	Controlling	Close-out
Risk			High		High
Uncertainty	High	Decreasing	Decreasing	Decreasing	Lowest
Amount at Stake	Lowest	Increasing	Increasing	Increasing	Highest

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Estimating Risks

Inaccurate/inapplicable data.

Inaccurate historical data

Incomplete stakeholder analysis.

Unclear SOWs.

Haste and/or inexperience.

Invalid assumptions/constraints.

Lapsed vendor quotations.

Customer mistakes/oversights.

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Qualitative Risk Analysis

(Assessing the likelihood and impact of identified risks)

Key Qualitative Risk Analysis tools include:

- Risk probability/impact rating matrix
- Delphi Method
- Cause and Effect Diagram
- Strengths-Weaknesses-Opportunities-Threats (SWOT) Analysis

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Risk Impact Matrix

PROBABILITY			
	High Probability **Low Impact**	**High Probability** **Medium Impact**	**High Probability** **High Impact**
	Medium Probability **Low Impact**	**Medium Probability** **Medium Impact**	**Medium Probability** **High Impact**
	Low Probability **Low Impact**	**Low Probability** **Medium Impact**	**Low Probability** **High Impact** **(Catastrophic)**

I M P A C T

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Quantitative Risk Analysis

(Analyzing the numerical probability of each risk & its consequence plus overall risk)

Key Quantitative Risk Tools include:

- Histograms with Standard Deviation
- PERT Analysis
- Z-Table Analysis
- Monte Carlo Analysis
- Decision Trees
  - Probability
  - Expected Value

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Risk Response Strategies/Tools

Strategies:

- Avoidance
- Reduction
- Acceptance (Retention)
- Risk Deflection (Transfer)

Tools to use:

- Insurance
- Warrantees
- Guarantees
- Performance Bonds
- Payment Bonds
- Sub-contractors

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Management Reserve *versus* Contingency Funds

Management Reserve:

Controlled by Sponsor or Senior Management

Set aside for unknown unknowns (uncertainties).

Contingency Funds:

Controlled by Project Manager

Set aside for known unknowns (risks).

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Risk Estimating Tools

Standard Deviation

- Quick and Dirty approach

PERT

- Three-point estimate

Z-Value

- Estimating probability for a specific outcome

Monte Carlo

- Gaming scenarios

Expected Value

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Expected Time/Cost

Beta Distribution

$$\frac{a + 4b + c}{6}$$

$$SD = \frac{c - a}{6}$$

Triangular Distribution

$$\frac{a + b + c}{3}$$

$$SD = \frac{c - a}{5}$$

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Z-Value Calculation

Z-Value:

Desired Time – Critical (Expected) Time

Standard Deviation for E.T. Critical Path

Critical Path Standard Deviation:

Square Root of Sum of Critical Path Tasks Variances

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Calculating Cost and Schedule Probability

Use the following formula:

$$\frac{\text{Desired Outcome (Critical Path)} - \text{Expected Outcome (Critical Path)}}{\text{Expected Outcome Standard Deviation (Critical Path)}}$$

Look up Z value on Z table and multiply by 100 to determine the probability.

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Risk Analysis protocol

1. **Collect Relevant Historical Data**
2. **Organize Historical Data by type (*e.g.,* cost, time, resource)**
3. **Determine: mean, mode, median, range**
4. **Calculate all individual standard deviations**
5. **Calculate all individual variances (this is the standard deviation squared)**
6. **Sum all individual variances to get the critical path variance (use only critical path tasks)**
7. **Calculate the critical path standard deviation by obtaining the square root of the critical path variance**
8. **Decide on your Desired Time**
9. **Calculate the z-value and look-up on the Z-table**
10. **If negative, subtract from 1 to get actual value.**
11. **Multiply by 100 to get probability of success**

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Risk/Uncertainty in the PLC

Risk & Uncertainty Within the Project Life Cycle					
	Initiating	Planning	Executing	Controlling	Close-out
Risk			High		High
Uncertainty	High	Decreasing	Decreasing	Decreasing	Lowest
Amount at Stake	Lowest	Increasing	Increasing	Increasing	Highest

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Session 4

Project Executing

Capital Management Methods:

The three main areas of Capital Management are:

- Financial Management
- Financial Accounting
- Managerial Accounting

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Project Financial Execution

The financial execution of a project includes a number of disciplines:

- **Financial management**
- **Financial accounting**
- **Managerial accounting**
- **Bookkeeping**

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Financial Management:

The scope of this discipline is vast. However, during actual project execution, it is largely confined to:

- **Working capital policy, capital budgeting, financing with debt and equity**
- **Dividend payment policy**
- **The processing and closure of invoices for resources used by the project.**

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Financial Accounting:

During actual project execution the use of this discipline largely consists of:

- **Producing financial reports and statements.**
- **Preparing periodic income statements, balance sheets, and statements of cash flows**
- **Accounting for and reporting on:**
  - **Revenue and expense recognition**
  - **Cash**
  - **Receivables**
  - **Inventory**
  - **Marketable securities**
  - **Long-lived assets, and**
  - **Debt and equity securities.**

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Managerial Accounting:

During actual project execution the use of this discipline largely consists of:

- **Advising project and/or organization senior management on the role of accounting in the decision-making processes of management**
- **Helping project and organization senior management to make sound resource allocation decisions related to project execution.**

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Loan Payments (Compound Interest)

Principal	Interest (5%/yr)	Total
$ 100,000	$ 5,000	$105,000
$ 105,000	$ 5,250	$110,250
$ 110,250	$ 5,512.50	$115,762.50
$ 115,762.50	$ 5,788.125	$121,550.625

- Total cost - Principal = Total interest paid.
- $ 121,550.625 - $ 100,000 = $ 21,550.625
- Thus, the total interest paid by the company is $ 21,550.625 when (if) it pays back its loan after four years.

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Finance Management Tools

Some of the financial tools used most commonly during project execution are those related to:

- Future Value (Compounded interest of borrowed project funds
- Payback period on project costs
- Depreciation of capital assets used in the project

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Pay Back Period

Loan+Interest	Revenues	Balance
$ 105,000	$ 10,000	($95,000)
$ 110,250	$ 55,000	($55,250)
$ 115,762.50	$ 120,000	0 (After 5.5 months)

If the revenue flow is realized, the company can payback its investment/loan (with interest) after 2 years and 5.5 months.

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Depreciation

Depreciation Definition

Depreciation is the charge to current operation that systematically distributes the cost of a capital asset less residual value over the estimated life cycle of that asset.

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Depreciation Methods

Straight line depreciation

Double-declining balances

Sum of year's digits

Units of activity

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Straight Line Depreciation

Straight-line Depreciation:

$$\frac{\text{Asset Value When Purchased – Salvage Value}}{\text{Total Number of Depreciation Periods}}$$

$ 50,000 - $ 5,000 / 5 years = $ 45,000 depreciation value

$ 45,000 / 5 years = $ 9,000 per year in Depreciation.

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Straight line Depreciation

Year No.	Net Book Value Year Start	Remaining Depreciation at Year Start	Yearly Depreciation Amount	Net Book Value Year End	Accrued Depreciation at Year End
1.	$50,000 (Acquisition Cost)	$45,000	$9,000	$41,000	$9,000
2.	$41,000	$36,000	$9,000	$32,000	$18,000
3.	$32,000	$27,000	$9,000	$23,000	$27,000
4.	$23,000	$18,000	$9,000	$14,000	$36,000
5.	$14,000	$9,000	$9,000	$5,000	$45,000

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Double-Declining Balance

Year No.	Net Book Value Year Start	Yearly Depreciation Rate	Yearly Depreciation Amount	Net Book Value Year End	Accrued Depreciation at Year End
1.	$50,000 (Acquisition Cost)	40%	$20,000	$30,000	$20,000
2.	$30,000	40%	$12,000	$18,000	$32,000
3.	$18,000	40%	$7,200	$10,800	$39,200
4.	$10,800	40%	$4,400	$6,400	$43,600
5.	$6,400	21%	$1,400	$5,000	$45,000

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Sum of Year's Digits

Year No.	Acquisition Cost (minus Salvage value)	Remaining Life in Years	Fraction = x/15	Depreciation Charge for the year = Salvage (Fraction)
1.	$ 45,000	5	(5/15) or (.33)	$45,000 (.33) = $15,000
2.	$ 45,000	4	(4/15) or (.26)	$45,000 (.26) = $12,000
3.	$ 45,000	3	(3/15) or (.20)	$45,000 (.20) = $9,000
4.	$ 45,000	2	(2/15) or (.13)	$45,000 (.13) = 6,000
5.	$ 45,000	1	(1/15) or (.06)	$45,000 (.06) = 3,000

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Units of Activity

Calculate depreciation rate on the use of the vehicle, (*e.g.* $45,000/100,000 miles $.45 per mile).

Calculate total mileage in a year to determine the actual annual depreciation for that tax year.

Example:

If in Year 1 the vehicle is driven 10,000 miles, the depreciation amount for that year is $4,500 or (10,000) ($.45).

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Session 5

Project Controlling

Project Controlling

Basic Project Controlling Methods

- Plan-Do-Check-Act Cycle
- Earned Value Analysis
- Audits
  - Financial
  - Project

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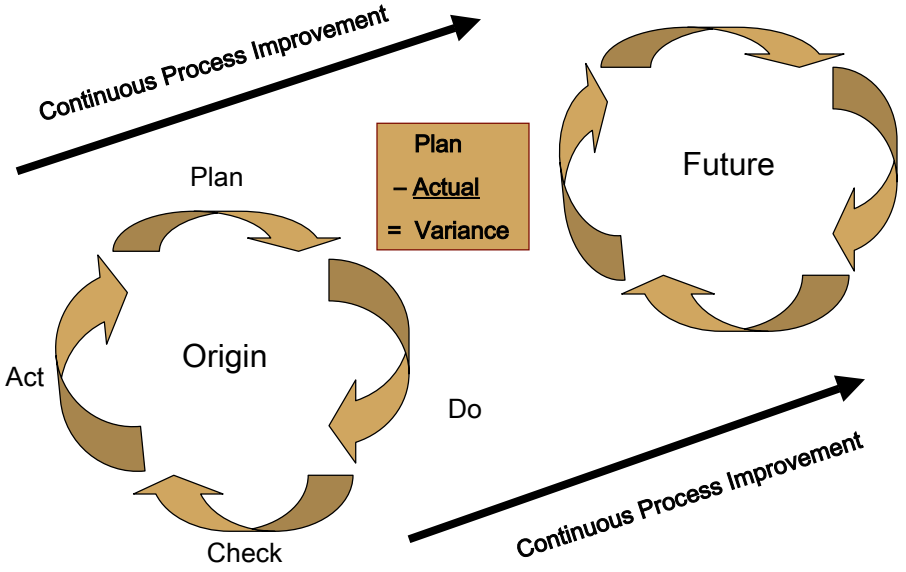
Plan-Do-Check-Act Cycle

P-D-C-A Cycle Principles



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Performance Reporting and Earned Value Analysis

EVA Origins and Functions

- **Developed by accountants in the 1950's**
- **Uses monetary units to evaluate project performance by:**
  - measuring 'triple constraint' project performance: *e.g.,* cost, schedule and technical performance
  - enabling time analysis of project performance: past, present and potential future (extrapolative)
  - quantifying technical completion of work in process (*i.e.,* earned value)
  - assessing current and forecast future cost estimates and variances
  - assessing current and forecast future schedule estimates and variances

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Work Completion Rules:

These are the three rules for crediting the completion of work for earned value computation. These are:

- **Zero/100 – entire activity must be completed before reported**
- **20/80 – 20% of the activity can be reported as completed as soon as execution begins**
- **50/50 - 50% of the activity can be reported as completed as soon as execution begins**

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All Earned Value Equations

BCWP = Earned Value

BCWS = Schedule Performance Measurement Baseline

BAC = Sum of all BCWS allocated to the project or the project Cost Performance Measurement Baseline.

CV = BCWP – ACWP

CV% = CV/BCWP

SV = BCWP – BCWS

SV% = SV/BCWS

CPI = BCWP/ACWP

SPI = BCWP/BCWS

EAC = BAC/CPI

ETC = EAC – ACWP

VAC = BAC – EAC

%VAC = VAC/BAC

.

$$\text{Cum. CPI} = \frac{\Sigma \text{BCWP}}{\Sigma \text{ACWP}}$$

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Earned Value Analysis protocol

1. Review Planned (BCWS) Costs
2. Study WBS for work completed or in-progress
3. Determine your work completion rule
4. Determine amount of WBS work completed as of reporting date
5. Calculate Earned Value (BCWP)
6. Calculate SV (BCWP – BCWS)
7. Tabulate Actual Costs (ACWS)
8. Calculate CV (BCWP – ACWP)
9. Calculate: CPI, SPI, EAC, ETC, VAC, %VAC
10. Interpret meaning of EV Results
11. Discuss remedial action (if in trouble) – *e.g.*. Crashing, fast-tracking.

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Principles Of Earned Value - Four Basic Variables

BAC - Budget At Completion

BCWS - Budgeted Cost of Work Scheduled

BCWP - Budgeted Cost of Work Performed (Earned Value)

ACWP - Actual Cost of Work Performed

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Principles Of Earned Value - Four Basic Variables Definitions

Budget at completion - total value associated with the project or sub-project. Forecasted total costs at completion.

Budgeted cost of work scheduled - sum of the budgets for work scheduled (including in-process work) , plus the appropriate portion of the budgets for level of effort for the relevant time period.

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Principles Of Earned Value - Four Basic Variables Definitions

Budgeted cost of work performed (Earned Value) - sum of the budgets for work completed (including in-process work) , plus the appropriate portion of the budgets for level of effort for the relevant time period.

Actual cost of work performed - total costs actually incurred (direct and indirect) in accomplishing work within the relevant time period.

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Budget at Completion (BAC)

		Planned		Actual		Report Date:Start Day 1		
Task	**BAC**	**Start**	**Finish**	**Start**	**Finish**	**BCWS**	**BCWP**	**ACWP**
1.1.1	10.0	7	10					
1.1.2.	5.0	10	13					
1.1.3.	1.0	13	16					
1.1.4.	1.0	11	13					
1.2.1.	15.0	1	7					
1.2.2	1.0	7	13					
1.2.3.	1.0	13	16					
1.3	**37**	**16**	**25**					
1.3.1	2.0	16	17					
1.4	**11**	**25**	**28**					
	$85K*					0.0	0.0	0.0

***Includes all of Tasks 1.3 & 1.4**

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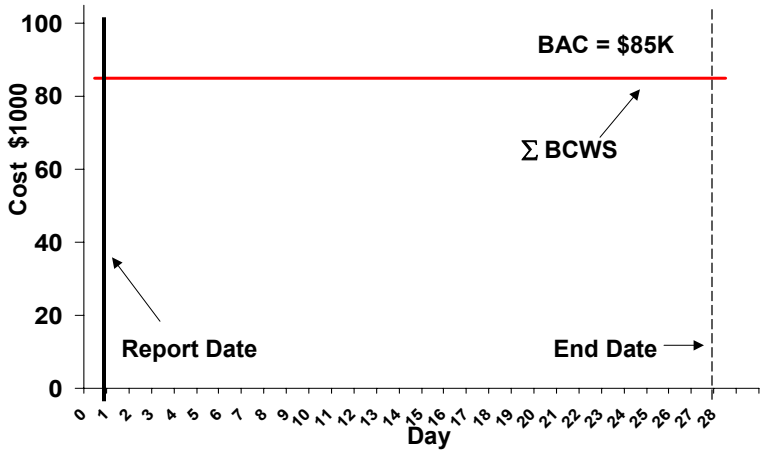
Budget at Complete (BAC)



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Budgeted Cost of Work Scheduled (BCWS)

		Planned		Actual		Report Date: End Day 25		
Task	**BAC**	**Start**	**Finish**	**Start**	**Finish**	**BCWS**	**BCWP**	**ACWP**
1.1.1	10.0	7	10	7	10	10.0		
1.1.2	5.0	10	13	10	13	5.0		
1.1.3	4.0	13	16	13	16	4.0		
1.1.4	1.0	11	13	11	13	1.0		
1.2.1	15.0	1	7	1	7	15.0		
1.2.2	1.0	7	13	7	13	1.0		
1.2.3	1.0	13	16	13	16	1.0		
1.3	**37**	**16**	**25**	**16**		**37**		
1.3.1	2.0	16	17	16	17	2.0		
1.4	**11**	25	28					
	$85K*					**$74K**	$0.0	$0.0

***Includes all of Tasks 1.3 & 1.4**

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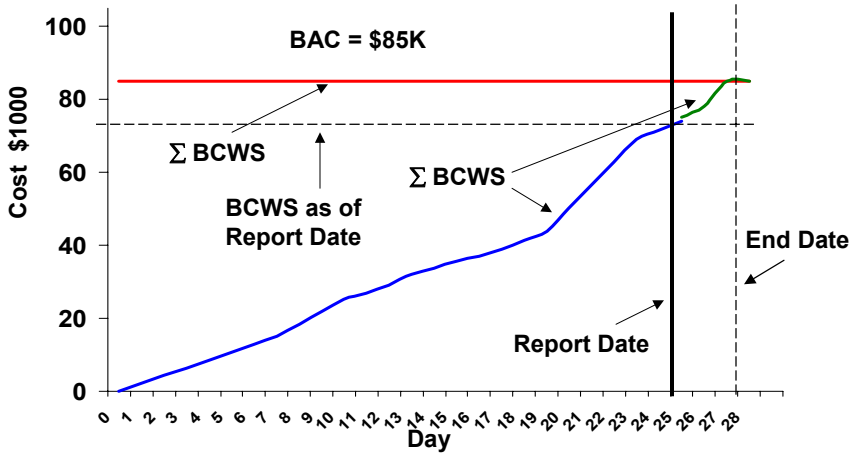
Budgeted Cost of Work Scheduled (BCWS)



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Budgeted Cost of Work Performed (BCWP)

		Planned		Actual		Report Date: End Day 25		
Task	**BAC**	**Start**	**Finish**	**Start**	**Finish**	**BCWS**	**BCWP**	**ACWP**
1.1.1	10.0	7	10	7	10	10.0	10.0	
1.1.2	5.0	10	13	10	13	5.0	5.0	
1.1.3	4.0	13	16	13	16	4.0	4.0	
1.1.4	1.0	11	13	11	13	1.0	1.0	
1.2.1	15.0	1	7	1	7	15.0	15.0	
1.2.2	1.0	7	13	7	13	1.0	1.0	
1.2.3	1.0	13	16	13	16	1.0	1.0	
1.3	**37**	**16**	**25**	**16**		**37**	**22**	
1.3.1	2.0	16	17	16	17	2.0	2.0	
1.4	**11**	25	28					
	$85K*					**$74K**	**$59K**	$0.0

***Includes all of Tasks 1.3 & 1.4**

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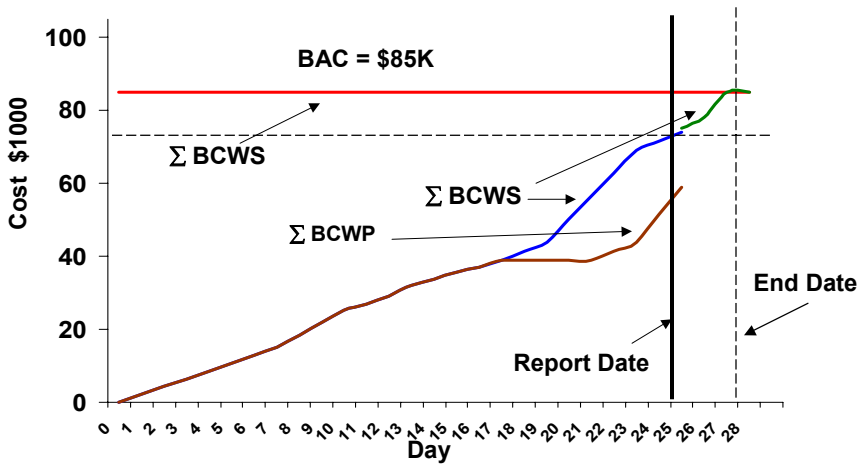
Budgeted Cost of Work Performed (BCWP)



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Actual Cost of Work Performed (ACWP)

		Planned		Actual		Report Date: End Day 25		
Task	BAC	Start	Finish	Start	Finish	BCWS	BCWP	ACWP
1.1.1	10.0	7	10	7	10	10.0	10.0	10.0
1.1.2	5.0	10	13	10	13	5.0	5.0	5.0
1.1.3	4.0	13	16	13	16	4.0	4.0	4.0
1.1.4	1.0	11	13	11	13	1.0	1.0	1.0
1.2.1	15.0	1	7	1	7	15.0	15.0	10.0
1.2.2	1.0	7	13	7	13	1.0	1.0	1.0
1.2.3	1.0	13	16	13	16	1.0	1.0	2.0
1.3	**37**	**16**	**25**	**16**		**37**	**22**	**13**
1.3.1	2.0	16	17	16	17	2.0	2.0	2.0
1.4	**11**	25	28					
	$85K*					**$74K**	**$59K**	**$46K**

***Includes all of Tasks 1.3 & 1.4**

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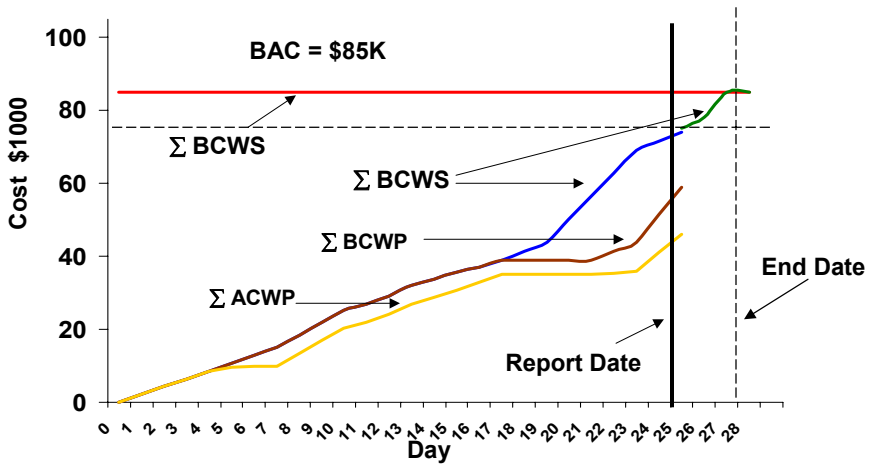
Actual Cost of Work Performed (ACWP)



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Earned Value Analysis Variance Calculations

SV — Schedule Variance

SV% — Schedule Variance Percentage

CV — Cost Variance

CV% — Cost Variance Percentage

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Schedule Variance (SV)

SV = BCWP - BCWS

The difference between the value of the work completed (*completed - BCWP)* and the value of the work that should have been completed (*scheduled - BCWS*) as of the report date

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Schedule Variance (SV)

SV — The monetary variance in the schedule

The formula is:

SV = BCWP - BCWS

Using our previous example, we can calculate that the project is $15K behind schedule as follows:

$59K - $74K = ($15K)

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Schedule Variance (SV)

Report at end of Day 25

Task	BAC	Start	Finish	Start	Finish	BCWS	BCWP	ACWP	SV	CV	SPI	CPI
1.1	**20**	**7**	**16**	**7**	**16**	**20**	**20**	**20**	**0.0**			
1.2	**17**	**1**	**16**	**1**	**16**	**17**	**17**	**13**	**0.0**			
1.2.1	15.0	1	7	1	7	15.0	15.0	10.0	0.0			
1.2.2	1.0	7	13	7	13	1.0	1.0	1.0	0.0			
1.2.3	1.0	13	16	13	16	1.0	1.0	2.0	0.0			
1.3	**37**	**16**	**25**	**16**		**37**	**22**	**13**	**($15K)**			
1.3.1	2.0	16	17	16	17	2.0	2.0	2.0	0.0			
1.3.2	5.0	17	19	21	23	5.0	5.0	1.0	0.0			
1.3.3	25.0	19	23	23		25.0	15.0	10.0	(10.0)			
1.3.4	5.0	23	25			5.0			(5.0)			
1.4	**11**	**25**	**28**									
	$85K*					**$74K***	**$59K***	**$46K***	**($15K*)**			

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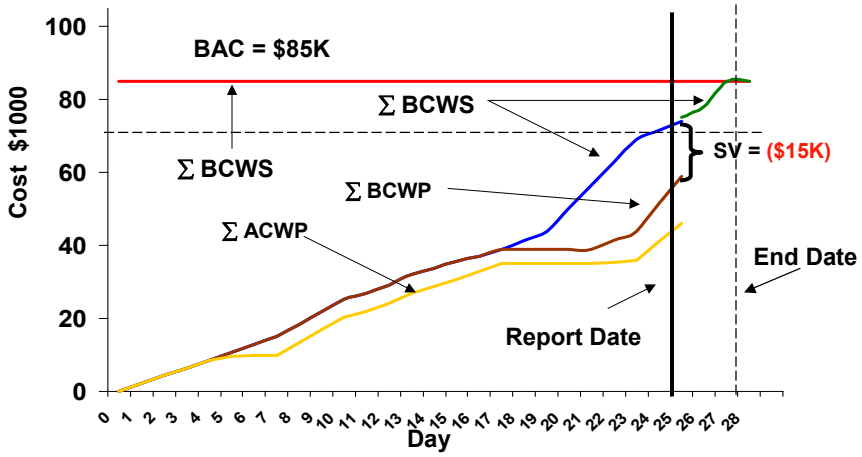
Schedule Variance (SV)



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Schedule Variance Percentage (SV%)

SV% — The % variance in the schedule

The formula is:

SV% = SV/BCWS

Using our previous example, we can calculate that the project is 20% behind schedule as follows:

(15) / 74 = (20%)

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Schedule Variance Percentage (SV%)

Given:

- **SV% = (20%) and**
- **Project Elapse Time = 25 Days**

We can calculate the project is 5 working days behind schedule

- **25 Days x (20%) = (5) days =**
- **5 days x (1) = 1 work week**

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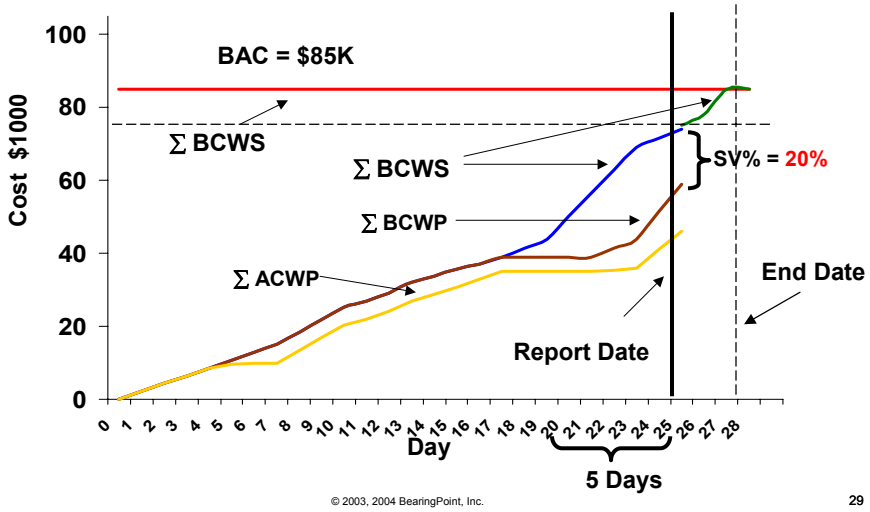
Schedule Variance Percentage (SV%)



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Cost Variance (CV)

CV = BCWP - ACWP

The difference between the value of the work completed (*completed BCWP*) and the costs incurred performing the work (*ACWP*)

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Cost Variance (CV)

CV — The monetary variance in the liquidated budget

The formula is:

CV = BCWP - ACWP

Using our previous example, we can calculate that the project is $13K under budget as follows:

$59K - $46K = $13K

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Cost Variance (CV)

Report at end of Day 25

Task	BAC	Start	Finish	Start	Finish	BCWS	BCWP	ACWP	SV	CV	SPI	CPI
1.1	**20**	**7**	**16**	**7**	**16**	**20**	**20**	**20**	**0.0**	**0.0**		
1.2	**17**	**1**	**16**	**1**	**16**	**17**	**17**	**13**	**0.0**	**4.0**		
1.2.1	15.0	1	7	1	7	15.0	15.0	10.0	0.0	5.0		
1.2.2	1.0	7	13	7	13	1.0	1.0	1.0	0.0	0.0		
1.2.3	1.0	13	16	13	16	1.0	1.0	2.0	0.0	(1.0)		
1.3	**37**	**16**	**25**	**16**		**37**	**22**	**13**	**($15K)**	**9.0**		
1.3.1	2.0	16	17	16	17	2.0	2.0	2.0	0.0	0.0		
1.3.2	5.0	17	19	21	23	5.0	5.0	1.0	0.0	4.0		
1.3.3	25.0	19	23	23		25.0	15.0	10.0	(10.0)	5.0		
1.3.4	5.0	23	25			5.0			(5.0)			
1.4	**11**	**25**	**28**									
	$85K*					**$74K***	**$59K***	**$46K***	**($15K*)**	**$13K***		

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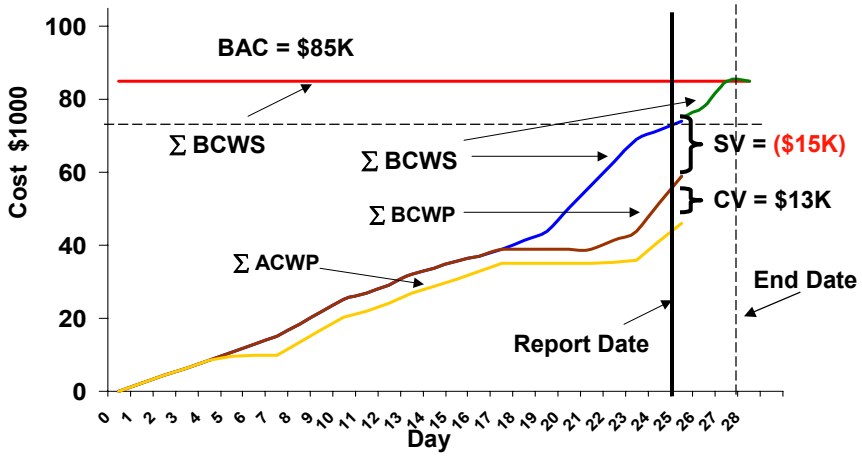
Cost Variance (CV)



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Cost Variance Percentage (CV%)

CV% — The % variance in the budget

The formula is:

CV% = CV/BCWP

Using our previous example, we can calculate that the project is 22% under budget as follows:

13 / 59 = (22%)

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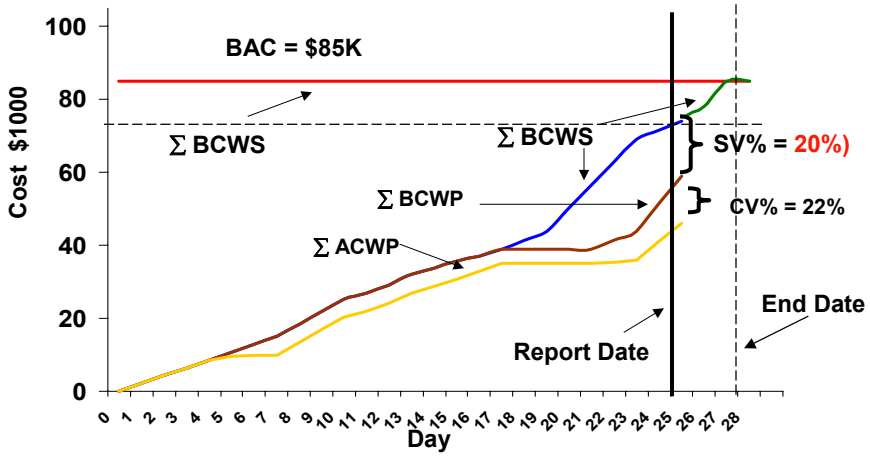
Cost Variance Percentage (CV%)



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Earned Value Results

MEANING OF EARNED VALUE RESULTS ON PROJECT DELIVERY			
Equation	+ (Positive)	Zero (0)	- (Negative)
SV (+0-)	Ahead schedule	On Time	Behind Schedule
SV% (+0-)	Ahead schedule	On Time	Behind Schedule
CV (+0-)	Under Budget	On budget	Over Budget
CV% (+0-)	Under Budget	On budget	Over Budget

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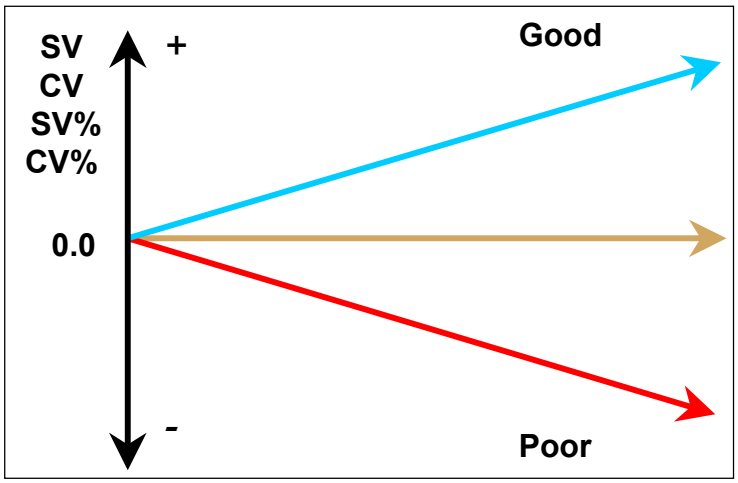
Schedule & Costs Variance - Results Interpretation



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Advanced EVA Calculations

SPI — Schedule Performance Index

CPI — Cost Performance Index

EAC — Estimate at Completion

VAC — Variance at Completion

ETC — Estimate to Complete

%VAC — Percentage Variance at Completion

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Schedule Performance Index (SPI)

The ratio of work completed in relation to the work scheduled

The formula is:

SPI = BCWP/BCWS

Using our previous example, we can calculate that the project schedule performance (as of the reporting date) is only 79% of the schedule baseline:

59 / 74 = (79%)

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Schedule Performance Index (SPI)

Report at end of Day 25

Task	BAC	Start	Finish	Start	Finish	BCWS	BCWP	ACWP	SV	CV	SPI	CPI
1.1	**20**	**7**	**16**	**7**	**16**	**20**	**20**	**20**	**0.0**	**0.0**	**1.00**	
1.2	**17**	**1**	**16**	**1**	**16**	**17**	**17**	**13**	**0.0**	**4.0**	**1.00**	
1.2.1	15.0	1	7	1	7	15.0	15.0	10.0	0.0	5.0	1.00	
1.2.2	1.0	7	13	7	13	1.0	1.0	1.0	0.0	0.0	1.00	
1.2.3	1.0	13	16	13	16	1.0	1.0	2.0	0.0	(1.0)	1.00	
1.3	**37**	**16**	**25**	**16**		**37**	**22**	**13**	**($15K)**	**9.0**	**(.59)**	
1.3.1	2.0	16	17	16	17	2.0	2.0	2.0	0.0	0.0	1.00	
1.3.2	5.0	17	19	21	23	5.0	5.0	1.0	0.0	4.0	1.00	
1.3.3	25.0	19	23	23		25.0	15.0	10.0	(10.0)	5.0	**(.60)**	
1.3.4	5.0	23	25			5.0			(5.0)			
1.4	**11**	**25**	**28**									
	$85K					**$74K**	**$59K**	**$46K**	**($15K)**	**$13K**	**(0.79)**	

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Cost Performance Index (CPI)

The ratio of the work completed in relation to the cost of the work performed

The formula is:

CPI = BCWP/ACWP

Using our previous example, we can calculate that the project budget performance (as of the reporting date) is 28% better than the cost baseline:

59 / 46 = 1.28 or 28%

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Cost Performance Index (CPI)

Report at end of Day 25

Task	BAC	Start	Finish	Start	Finish	BCWS	BCWP	ACWP	SV	CV	SPI	CPI
1.1	**20**	**7**	**16**	**7**	**16**	**20**	**20**	**20**	**0.0**	**0.0**	**1.00**	**1.00**
1.2	**17**	**1**	**16**	**1**	**16**	**17**	**17**	**13**	**0.0**	**4.0**	**1.00**	**1.30**
1.2.1	15.0	1	7	1	7	15.0	15.0	10.0	0.0	5.0	1.00	1.50
1.2.2	1.0	7	13	7	13	1.0	1.0	1.0	0.0	0.0	1.00	1.00
1.2.3	1.0	13	16	13	16	1.0	1.0	2.0	0.0	(1.0)	1.00	(.50)
1.3	**37**	**16**	**25**	**16**		**37**	**22**	**13**	**($15K)**	**9.0**	**(.59)**	**1.69**
1.3.1	2.0	16	17	16	17	2.0	2.0	2.0	0.0	0.0	1.00	1.00
1.3.2	5.0	17	19	21	23	5.0	5.0	1.0	0.0	4.0	1.00	5.00
1.3.3	25.0	19	23	23		25.0	15.0	10.0	(10.0)	5.0	**(.60)**	1.50
1.3.4	5.0	23	25			5.0			(5.0)			
1.4	**11**	**25**	**28**									
	$85K					**$74K**	**$59K**	**$46K**	**($15K)**	**$13K**	**(0.79)**	**1.28**

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Estimate at Completion (EAC)

The estimated final BAC based on the cost performance as of the reporting date

There are four (4) formulas:

1. EAC = BAC/CPI
2. EAC = ACWP + ETC
3. EAC = ACWP + remaining BAC/CPI
4. EAC = ACWP + remaining BAC

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Estimate at Completion (EAC)

The estimated final BAC based on the cost performance as of the reporting date for each of these formulas is as follows:

1. EAC = BAC/CPI or **$85K/1.28 = $ 66,406.25**
2. EAC = ACWP + ETC or **$46K + $20,406.25 = $66,406.25**
3. EAC = ACWP + remaining BAC/CPI or **$46K + $26K/1.28 = $46K + $20,312.50 = $66,312.50**
4. EAC = ACWP + remaining BAC or **$46K + $26K = $72K**

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Variance at Completion (VAC)

The difference between the revised project BAC and the original BAC

The formula is:

VAC = BAC - EAC

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VAC - Variance at Completion

The difference between the revised project costs and the original budget for the project.

VAC = BAC - EAC

Using our previous example, we can calculate the Variance-at-Complete as follows:

VAC = $85,000 - $66,406.25 = $18,593.75

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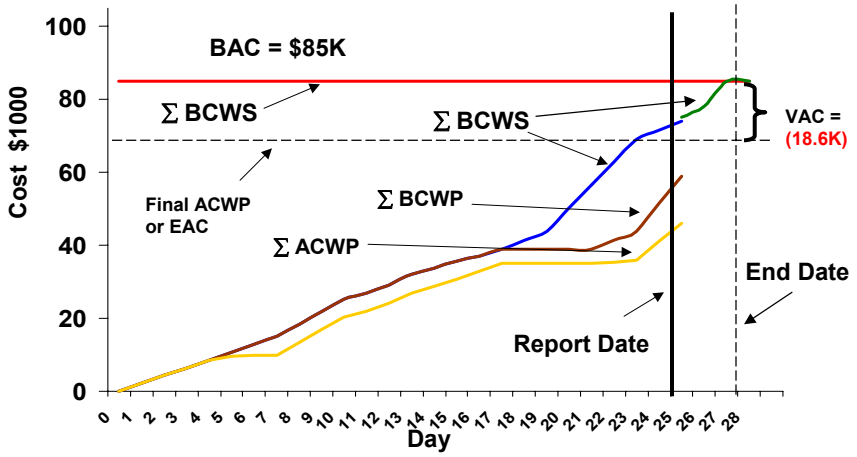
Variance at Complete (VAC)



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Estimate to Complete (ETC)

The estimated cost of the work that remains to be completed as of the reporting date

The formula is:

$$ETC = EAC - ACWP$$

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Estimate to Complete (ETC)

The estimated cost of the work remaining to be completed

ETC = EAC - ACWP or,

ETC = $66,406.25 - $46,000 = $20,406.25

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Percentage Variance at Complete (%VAC)

The % variance between the original BAC and the final BAC

The formula is:

%VAC = VAC/BAC

% VAC = $18,593.75 / $85,000 = 13%

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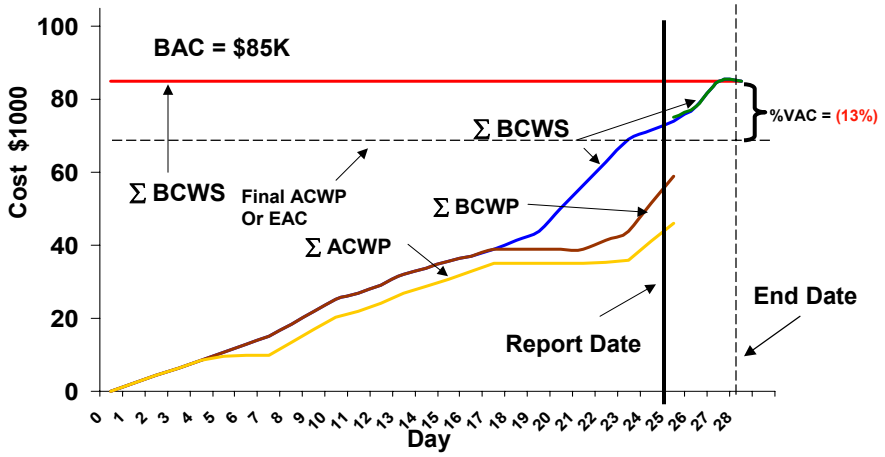
Percentage Variance at Complete (%VAC)



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Earned Value Results

MEANING OF EARNED VALUE RESULTS ON PROJECT DELIVERY			
Equation	>1	= 1	<1
SPI (>=<1)	Ahead schedule	On Time	Behind Schedule
CPI (>=<1)	Under Budget	On budget	Over Budget

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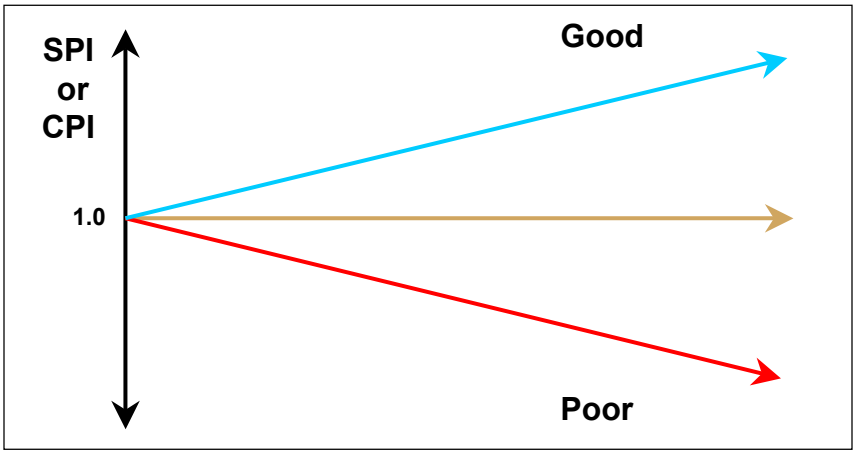
CPI / SPI Trends
Results Interpretation



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Overall EVA Project Results

	Worst	Poor	Fair	Good	Best
Cost Variance	Negative	Positive	Zero	Negative	Positive
Schedule Variance	Negative	Negative	Zero	Positive	Positive

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Auditing

Definition

A project audit is a major vehicle for evaluation of a project.

It is a more or less formal inquiry into any aspect of the project.

It can focus on any aspect of the project that senior management wishes.

(Meredith and Mantel Page 567)

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Audit Types

- **Financial Audits:**
  - Examines management of finances, supplies, equipment, legal compliance
- **Project Audits**
  - Examines management of costs, schedule, quality, resources, customer relations, project goals and objectives

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Purposes

Identify problems (*e.g.,* poor management, fraud) earlier

Clarify performance, cost and time relations.

Improve project performance

Locate opportunities for technological advances

Evaluate quality of project management

Reduce costs

Accelerate achievement of results

Identify mistakes, rectify and avoid same in the future

Provide information to the client (customer)

Reconfirm an organization's interest in the project

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Steps involved in an Audit

1. **Assemble team of experienced experts**
2. **Familiarize team with project requirements**
3. **Conduct audit on site**
4. **Debrief management**
5. **Produce written report per template**
6. **Distribute report to PM and his team**
7. **Follow-up to assess impact of audit**

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Timing and Value of Audits

Project Stage

1. Initiation
2. Feasibility study
3. Planning
4. Master Schedule
5. Data Evaluation
6. Implementation
7. Post project

Value

1. Significant if project is ≤25% complete
2. Technical audit useful
3. Measurement standards useful
4. Less useful as plan finished
5. Marginal as team defensive
6. Useful depending on project methodology import
7. Useful if findings good for future projects

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Audit Report Content

Introduction – project description, objectives.

Current status – Budget, Cost, Schedule, Progress, Quality, Risk.

Future Project Status – Auditor's conclusions. (Do not rewrite to project document).

Critical Management Issues – time/cost/quality tradeoffs.

Risk Analysis – review major risks related to time/cost/quality

Limitations & Assumption – limits on accuracy and validity of the report.

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Session 6

Project Closing

Project Closure

There are two main categories of Project Closure:

- **Project Termination – this is when the project ends before the actual completion of the work it was intended to deliver to the customer.**
- **Project Completion – this is when the project ends after the actual completion of the work it was intended to deliver to the customer.**

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Project Termination

Project Termination

There are a number of reasons why projects can be terminated before completing the work requested by the customer. Some of the more common reasons include:

- **Loss of customer project champion**
- **Change in customer needs and wants**
- **Loss of business/economic justification to continue project investment**
- **Change in customer ability to pay for the project**
- **Change in the scope of the project requiring creation of a new project**
- **Amalgamation with other projects to improve economy, efficiency and efficacy**
- **Insurmountable challenges (*e.g.,* technical, legal, operational) making realization of the original project difficult, if not, impossible to achieve.**

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Sunk Costs

Sunk Costs & Project Termination

A frequent reason for terminating a project early – *i.e.,* before completing the stated work – is the lack of any business or economic justification for continuing to invest in the project.

Essentially, this scenario occurs when the estimated future benefit-cost ratio fall below the required Return on Investment (ROI) threshold of the project customer.

The following slides discuss early termination of a project for business reasons by discussing the concept of sunk costs.

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Sunk Costs

Sunk Costs refer to those actual costs already incurred by a company. These represent liquidated funds.

The financial accounting and management rule is that Sunk Costs are not considered when evaluating the profitability of a business investment or operation.

When considering whether to begin, continue or end investment in a project, Sunk Costs (*e.g.,* Actual Cost of Work Performed) are not considered. Only anticipated future costs are considered.

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Project continuation *versus* Early termination

If:

- **The B/C ratio threshold for acceptable projects is 2.0**

Project Options	Year 0 B/C Ratio	Year 1 ACWP	Year 2* ETC	Year 2* Revenues
A	2.5	$100,000	$200,000	$350,000
B	3.0	$500,000	$200,000	$600,000

Then:

- **What is the current Benefit-Cost Ratio for each project?**
- **Which project should be continued?**
- **Which project should be terminated?**
- **Which project decision may need Senior Management consent?**

* Expected

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Project Completion

Project Completion

Project completion occurs when the work contracted for delivery to the customer is finished and handed over.

This is the desired end state for all projects.

Sometimes, the original scope of work can change during the course of project execution. The change can be in one of two directions:

- Increase in scope of work (Re-scoped)
- Decrease in scope of work (De-scoped)

Any de- or re-scoped projects must include changes to the legal contract and project document to ensure legal compliance once customer handover takes place.

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Legal Project Closing

The following slides depict what should take place during project closure (both actual completion and early termination).

All completed and terminated projects should include a post mortem project review to ensure important project data and lessons are documented, analyzed, archived and shared with key project stakeholders.

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Administrative Closing

Key actions during the administrative closure of a project:

- Collect all project data
- Collect all project documents
- Ensure all project staff properly administered
- Ensure all project facilities, furnishings, equipment, and supplies to be disposed of or handed over.
- Ensure steps taken to cover – at least – initial operating and maintenance costs of the project deliverable(s)
- Prepare for and hold a Post-project Review
- Identify and document all lessons learned
- Circulate project lessons learned to key project stakeholders.

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Contract Closing

Key actions during contract closing:

- Ensure all deliverables have been completed
- Use a punch list to ensure all contract clauses, audits, by-laws have been adhered to
- Ensure all terminal project documentation and paper work is handled properly
- Ensure legal departure of all project staff, facilities, furnishings, equipment, and supplies
- Obtain formal written sub-contractor approval and clearance of all pending issues and payments.
- Obtain formal written customer approval and acceptance of project deliverable(s).

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