

# Project Management Professional - PMP

## Chapter 5: Project Cost Management



**Ashraf Abdelazim, PMP**  
RHCE, NCLE, NCLP, MCSE, KLDST, MCSA, CNS  
[ashraf@ashraf.co](mailto:ashraf@ashraf.co)

# This Work Under:



Attribution-Noncommercial-No Derivative Works 3.0 Unported

## You're FREE to:



**to Share** — to copy, distribute and transmit the work

## Under the following conditions:



**Attribution** — You must attribute the work in the manner specified by the author or licensor (but not in any way that suggests that they endorse you or your use of the work).



**Noncommercial** — You may not use this work for commercial purposes.



**No Derivative Works** — You may not alter, transform, or build upon this work.

## With the understanding that:

**Waiver** — Any of the above conditions can be waived if you get permission from the copyright holder.

**Public Domain** — Where the work or any of its elements is in the public domain under applicable law, that status is in no way affected by the license.

**Other Rights** — In no way are any of the following rights affected by the license:

- Your fair dealing or fair use rights, or other applicable copyright exceptions & limitations;
- The author's moral rights;
- Rights other persons may have either in the work itself or in how the work is used, such as publicity or privacy rights.

**Notice** — For any reuse or distribution, you must make clear to others the license terms of this work

# Agenda

- Overview
- Estimate Costs - Planning
- Determine Budget- Planning
- Control Cost - M & C
- Lessons Learned - Q & a

The background of the slide is a solid blue color with a pattern of diagonal lines in various shades of blue, creating a sense of motion and depth. The lines are most prominent on the right side, radiating outwards.

# Overview

# Project Cost Management

## Cost Management Processes:

- The processes involved in estimating, budgeting, and controlling costs so project can be completed within the approved budget.
- Time management estimates times based on activities (the smaller components of work packages).
- Costs practically estimated at higher level than activities and work packages which is **control account**.

| Cost Management  | Process Groups             |
|------------------|----------------------------|
| Estimate Costs   | Planning                   |
| Determine Budget | Planning                   |
| Control Costs    | Monitoring and Controlling |

# Cost Management Plan

## Cost Management Plan:

- Sets out the format and establishes the criteria for planning, structuring, estimating, budgeting, and control project costs.
- Create this plan is an output and part of ***Develop Project Management Plan*** in the integration.
- Plan includes:
  - > Specifications for how estimates should be stated
  - > The level of accuracy needed for estimates
  - > Reporting formats to be used
  - > Rules for measuring cost performance
  - > Whether costs will include direct and indirect cost !
  - > Control thresholds (How costs will be controlled!)

# Cost Concepts

## Life Cycle Costing

- Life Cycle Costing: concept to calculate the whole life cycle costs not the initial costs only (think about maintenance & support).

## Value Analysis (referred as Value Engineering)

- Methodology of find less costly way to do the same work!
- Use systematic techniques to specify the required project functions
- Find alternatives for this functions that less costly but maintain same quality, performance, scope.

## Cost Risk:

- Used only when exam going to cross boundaries between Knowledge Areas

# Cost Types

## Fixed Costs

- Costs that not change as production changes such as rent.

## Variable Costs

- Costs that change as production changes such as cost of materials, transportation, supplies.

## Total Costs:

- Sum of fixed costs and variable costs.

### Direct

- Directly through perform project work
- Materials costs, team wages, team travel, transportations.

### Indirect

- Overhead items or costs incurred for benefit of more than one project
- Taxes, fringe benefits, ..etc



The background is a solid blue color with a pattern of diagonal lines in various shades of blue, creating a sense of motion and depth. The lines are more densely packed on the right side and become more sparse towards the left.

# **Estimate Costs Planning Process**

# Estimate Costs Process - Planning

## Estimate Costs:

- Process of developing an approximation of the monetary resources needed to complete project activities.
- **Bottom-Up Estimating:** detailed estimated for each activity at lowest level, then sum them up till **control account**.



- Should be based on WBS to improve accuracy
- Should be performed by the person who do the work

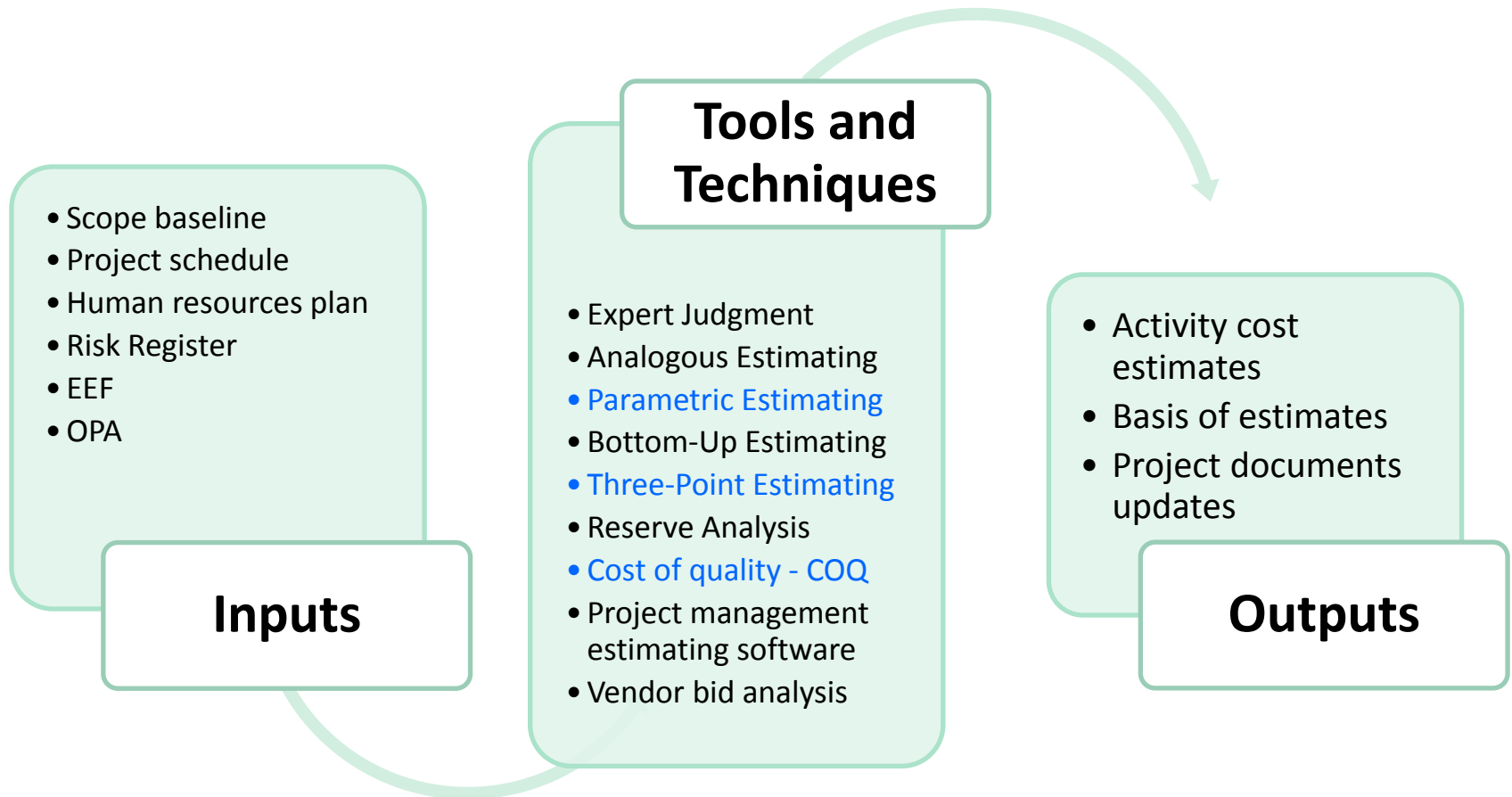


- Baselines shouldn't not changed except for approved changes
- Project Cost must be managed to **Cost baseline**



- Padding is not acceptable project management practice
- Estimates can be decreased by reducing or eliminating risks.

# Estimate Costs Inputs, Tools, Techniques and Outputs



# Estimate Costs Outputs

## Activity Cost Estimates:

- Quantitative assessments of the probable costs required to complete project work.

## Basis of Estimating

- Support documentation provide a clear and complete understanding for estimates:
  - > Basis of estimates and assumptions and how it made
  - > Any known constrains
  - > Level of confidence for the estimate

## Project Documents Updates:

- Updates to many documents including risk register.

# Estimates Ranges

## Rough Order of Magnitude (ROM) Estimate:

- Estimate made during initiating processes:
- ROM Estimate Ex: estimates are +/- 50% from actual

## Budget Estimate:

- Usually performed during planning processes:
- Budget Estimate Ex: range of -10% to +25% from actual

## Definitive Estimate:

- Performed later during the project
- PMs usually use +/- 10 % from actual or -5% to +10% from actual.

The background of the slide is a solid blue color with a pattern of diagonal lines in various shades of blue, creating a sense of motion and depth. The lines are most prominent on the right side and fade towards the left.

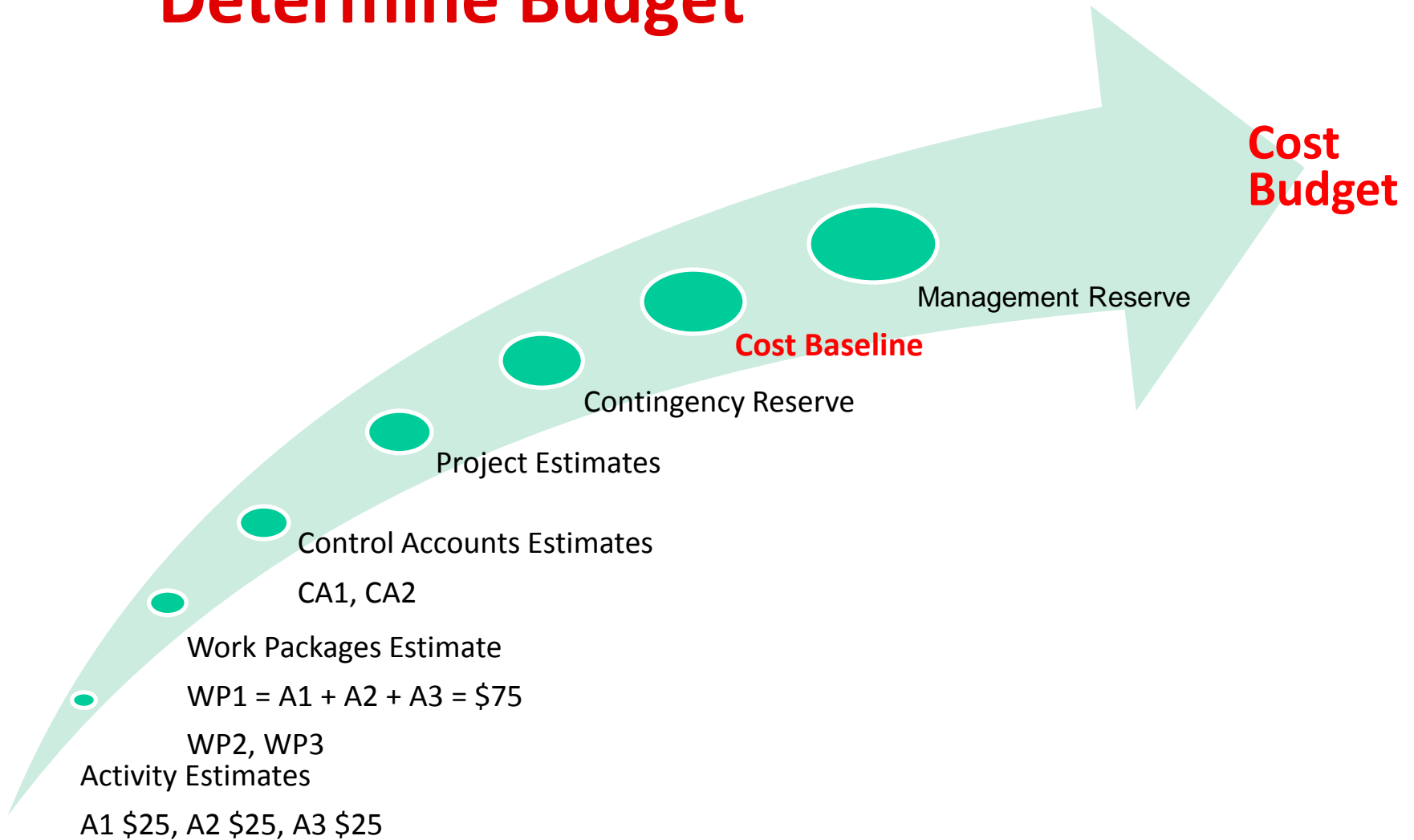
# **Determine Budget Planning Process**

# Determine Budget

## Determine Budget

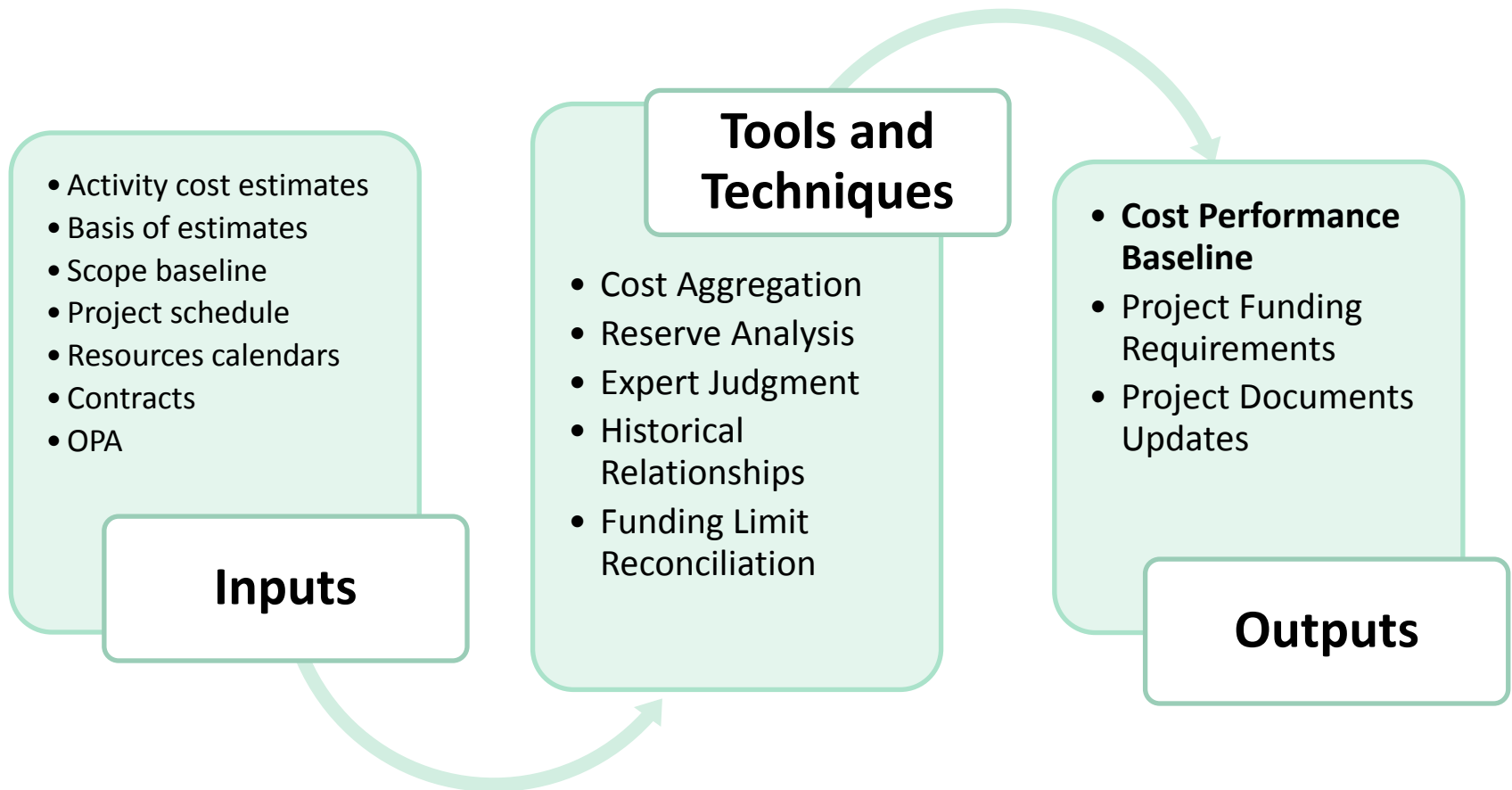
- Process of **aggregating** the **estimated costs** of individual activities or work packages to establish an **authorized cost baseline**.
- Budget cannot be completed without risk management activities to calculate management and contingency reserves.
- Management Reserve = Product/Cost Budget – Cost Baseline
- Cost Budget = Cost Baselines (inc. Conting. Res) + Mgmt Reserve
- Budget created by “**Cost Aggregation**” that includes:
  - > Determine activity costs including costs of risk contingencies
  - > Rolled up to work packages
  - > Rolled up to control accounts
  - > Finally rolled up to project costs

# Determine Budget





# Sequence Activities Inputs, Tools, Techniques and Outputs



# Determine Budget Outputs

## Cost Performance Baseline:

- Authorized time-phased budget at completion (BAC) used to measure, monitor and control overall cost performance of project

## Project Funding Requirements:

- Total funding requirements and periodic funding requirements are derived from the cost baseline
- Occurs in incremental amounts that are not continuous.

## Product Documents Updates:

- Updates to many documents as Risk Register, Cost estimates and Project Schedule.

**Control Costs**

**Monitoring and Controlling Process**

# Control Costs

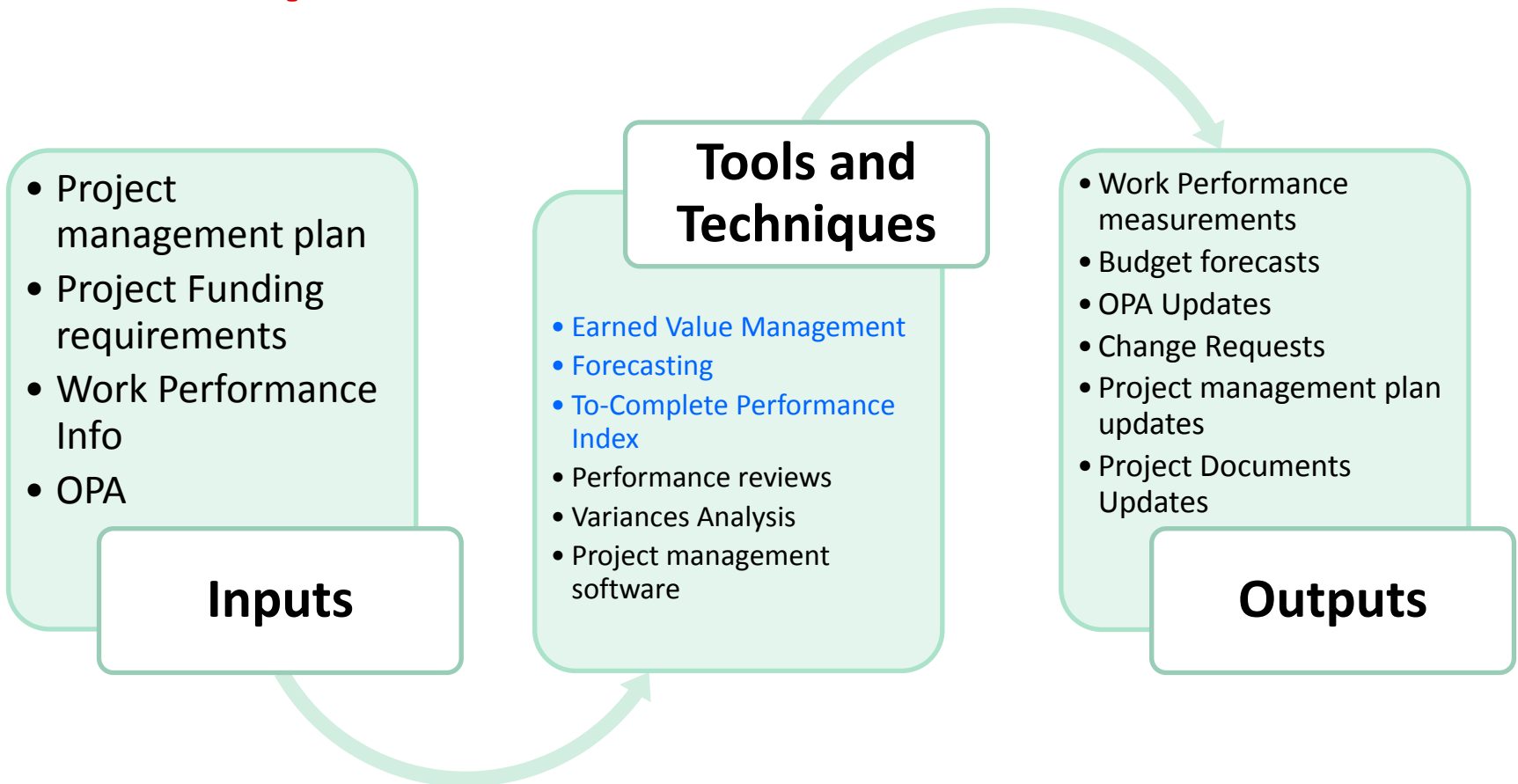
## Control Costs:

- Process of monitoring the status of the project to update the project budget and managing changes to the cost baseline.
- Control costs includes:
  - > Follow cost management plan
  - > Influence the factors that cause costs changes
  - > Ensuring all change requests are acted in a timely manner and manage them
  - > Monitor cost performance to isolate and understand variances from baseline
  - > Ensure cost expenditure doesn't exceed the authorized funding.
  - > Monitor work performance against fund expended.
  - > Inform stakeholders of all approved changes and associated costs



- Control in exam means Measure and Measure and Measure
- Earned Value: minimum 12 questions, around 6 with no calculations

# Control Costs Inputs, Tools, Techniques & Outputs



# Control Costs Tools and Techniques

## Progress Reporting:

- Estimated percentage of complete for each work package or activity, if work cannot be measure, this will be guessing rules:
  - > 50/50 Rule: Activity completed 50%, get credit for last 50% when completed
  - > 20/80 Rule: Activity completed 20%, get credit for last 80% when completed
  - > 0/100 Rule: Activity get credit only when get completed

## Forecasting:

- Forecast estimates for cost, budget and schedule:
  - > **Budget At Completion (BAC):** total budget estimated for the project
  - > **Estimate At Completion (EAC):** estimated cost during the project at completion
  - > **Estimate To Completion (ETC):** estimated cost to complete the remaining work

# Control Costs Tools and Techniques – Cont'd

## Earned Value Management:

- Measure performance against scope, schedule and cost baselines
- **Performance Measurement Baseline** is the combination of the three baselines through this technique
- Results of EV indicate potential deviation from baselines
- It can be used also to forecast future performance and completion dates and costs
  - > **Planned Value (PV):** Authorized budget assigned to work to be accomplished
  - > **Actual Value (AC):** total cost actually incurred in accomplish work
  - > **Earned Value (EV):** estimated cost of work performed (budget cost of work)
  - > **Schedule Variance (SV):** Schedule performance measurement on a project
  - > **Cost variance (CV):** Cost performance measurement on a project
  - > **Schedule Performance Index (SPI):** measure of progress achieved vs. Planned
  - > **Cost Performance Index (CPI):** measure of progress achieved vs. planned

# Control Costs Tools and Techniques – Cont'd

## Earned Value Management:

– Various forms used for performance measurement against baselines

| What to measure:              | Formula  |
|-------------------------------|--|
| Cost Variance                 | $CV = EV - AC$   |
| Schedule Variance             | $SV = EV - PV$   |
| Cost Performance Index        | $CPI = EV / AC$  |
| Schedule Performance Index    | $SPI = EV / PV$  |
| Estimate At Completion        | $EAC = BAC / CPI$ or $EAC = ETC + AC$  |
| Schedule At Completion        | $SAC = Plan / SPI$   |
| Estimate To Completion        | $ETC = EAC - AC$   |
| Variance at Completion        | $VAC = BAC - EAC$  |
| To-Complete Performance Index | $TCPI = ( BAC - EV ) / ( BAC - AC )$<br>$TCPI = ( BAC - EV ) / ( EAC - AC )$ |

**PV:** Planned Value

**EV:** Earned Value

**AC:** Actual Cost

**SV:** Schedule Variance

**CV:** Cost Variance

**BAC:** Budget At Completion



# Control Costs Tools and Techniques – Cont'd

## Earned Value Management:

– Formulas Results Indicators

| Formula                              | Interpretation   |
|--------------------------------------|--|
| $CV = EV - AC$                       | Negative over budget,<br>Positive under budget                               |
| $SV = EV - PV$                       | Negative behind schedule<br>Positive ahead of schedule                       |
| $CPI = EV / AC$                      | > 1 under budget<br>< 1 over budget  |
| $SPI = EV / PV$                      | > 1 ahead of schedule<br>< 1 behind schedule                                 |
| TCPI – To Complete Performance Index | In order to stay within budget, what rate we must meet the remaining work ?! |

# Control Costs Tools and Techniques – Cont'd

## Earned Value Management :



- If it's a variance: the formula is EV minus something
- If it's an index: the formula is EV divided by something

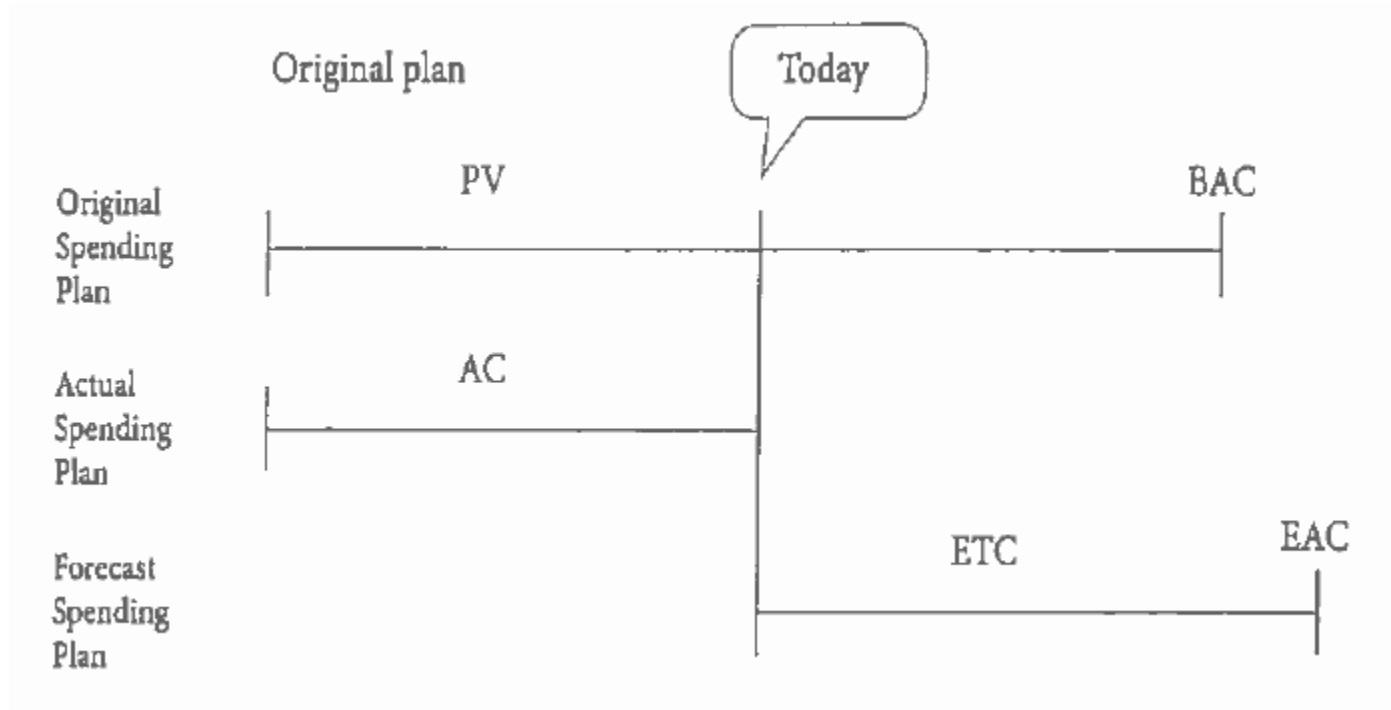


- If formula related to cost, use AC
- If formula related to schedule, use PV



- Negative is always bad, positive is always good
- Greater than one is always good, less than one is always bad

# YOU MUST REMEMBER:



Copied from Rita's Book

# EVM Examples:

Solve Examples on EVM  
AS MUCH AS YOU CAN  
It will help a lot in the exam

# Lesson Learned

## Practice Exam Questions

**Ashraf Abdelazim, PMP**  
RHCE, NCLE, NCLP, KLDST, MCSE, MCSA, CNS  
[ashraf@ashraf.co](mailto:ashraf@ashraf.co)

*Thank You ..*

*Q & A*

**Ashraf Abdelazim, PMP**

RHCE, NCLE, NCLP, MCSE, KLDST, MCSA, CNS

[ashraf@ashraf.co](mailto:ashraf@ashraf.co)