Murdoch
UNIVERSITY

IT Project Management

Topic 5

Cost Management

READING

Schwalbe Chapter 7

LEARNING OBJECTIVES

At the end of this topic you should be able to:

- ✓ **Describe** the ***importance*** of project cost management
- ✓ **Explain** basic project cost management *principles*, *concepts*, and *terms*
- ✓ **Discuss** different *types of cost estimates* and methods for preparing them
- ✓ **Apply** some of the *processes* involved in cost budgeting and preparing a cost estimate and budget for an information technology project
- ✓ **Discuss** the *benefits* of Earned Value Management (EVM) and Project Portfolio Management (PPM) to assist in cost control

TODAY'S SESSION IS IN 3 PARTS

INTRODUCTION
(WHAT IS COST MANAGEMENT & WHY IS IT IMPORTANT?)

KEY TERMS & PRINCIPLES

COST MANAGEMENT PROCESS

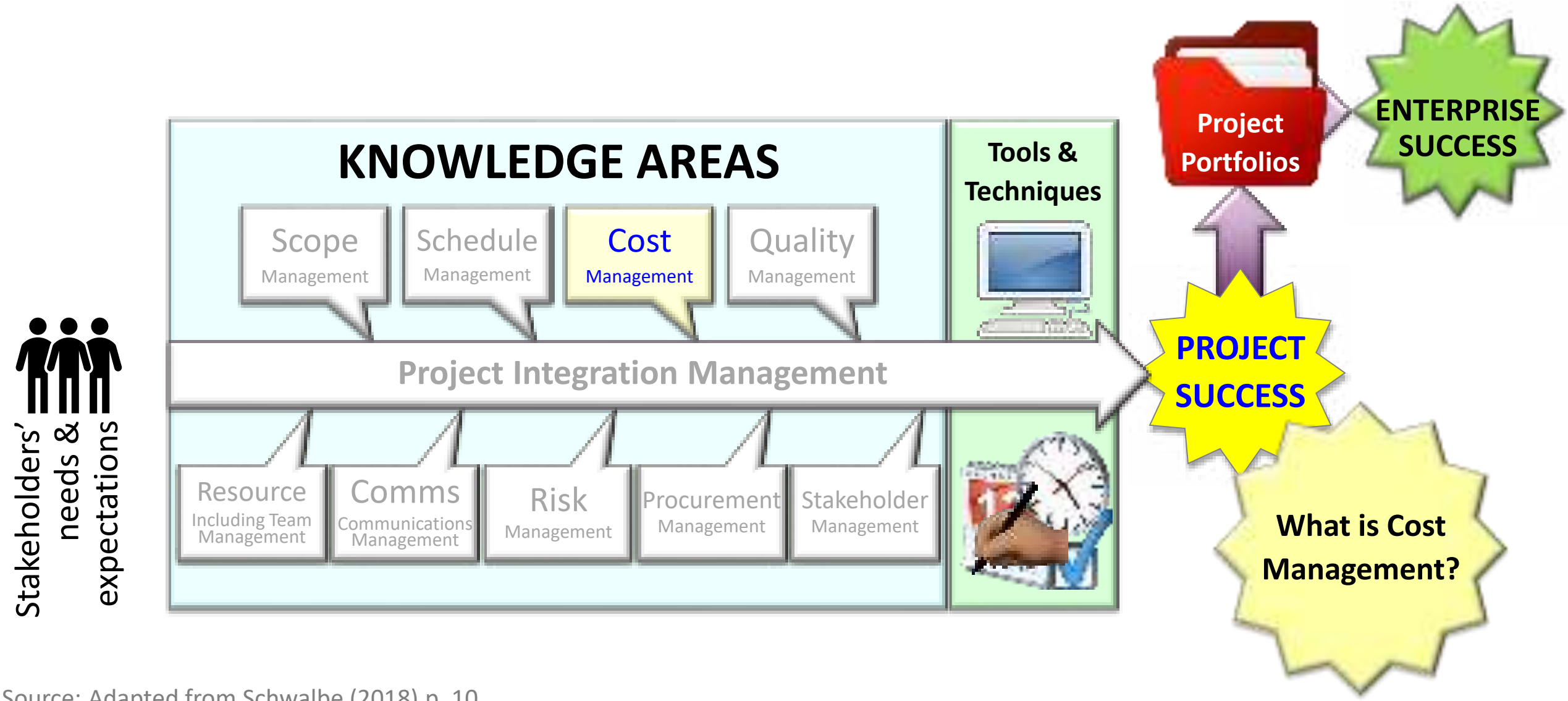
AN INTRODUCTION TO COST MANAGEMENT

INTRODUCTION
(WHAT IS COST MANAGEMENT & WHY IS IT IMPORTANT?)

KEY TERMS & PRINCIPLES

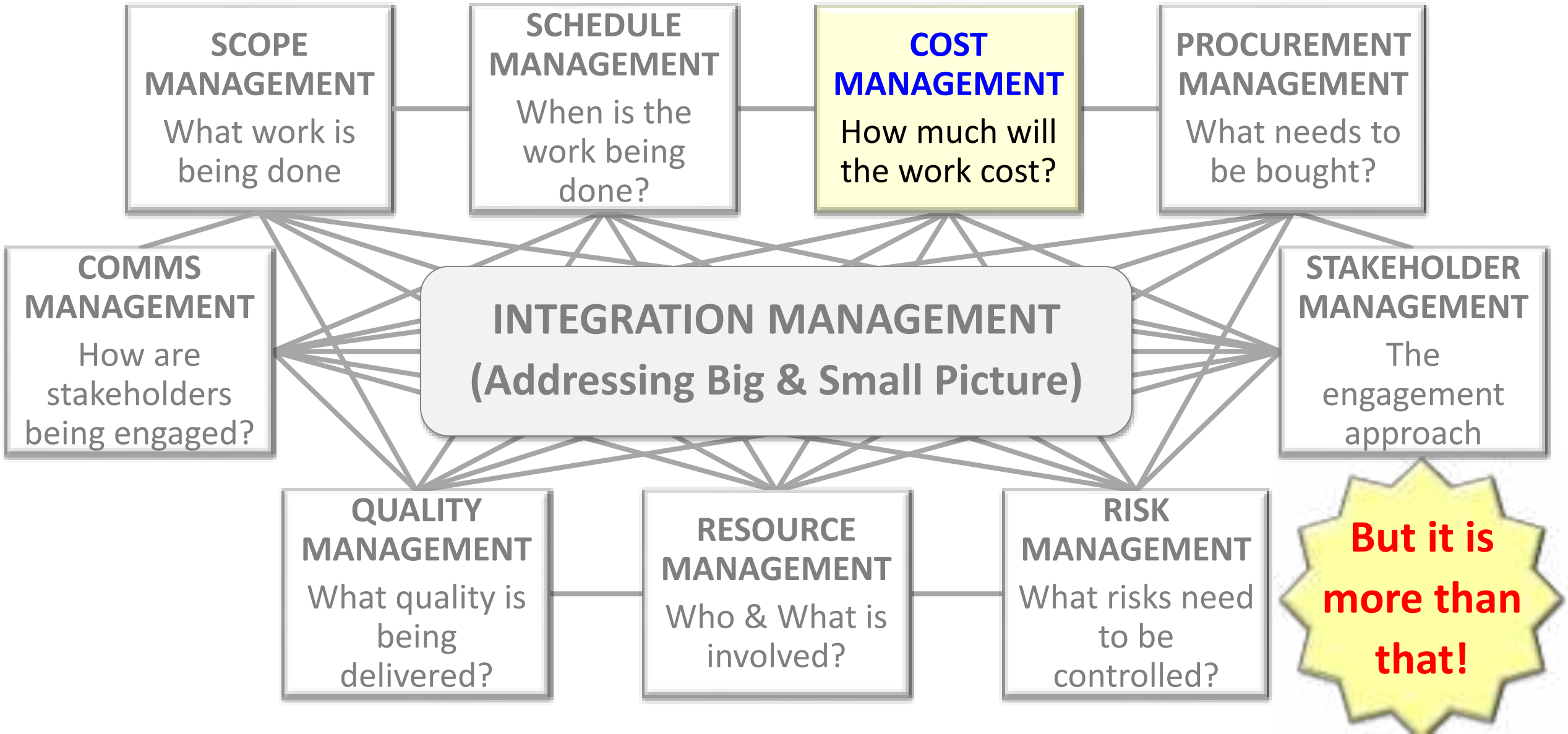
COST MANAGEMENT PROCESS

OVERVIEW - PMBOK APPROACH



Source: Adapted from Schwalbe (2018) p. 10

THE KNOWLEDGE AREAS



WHAT IS COST?

What is Cost Management?

It is…

…*resources (money or other collateral) expended to achieve an objective*

- ✓ Typically this is measured in monetary amounts (time, resources, etc. = $)
- ✓ They can be challenging to estimate through **Cost Management**

Source: Schwalbe, 2018 (Chapter 7)

WHAT IS COST MANAGEMENT?

Why is it so important?

It is…

…*a series of activities for estimating, allocating and controlling costs within a project*

- ✓ Effective cost management allows unique resourcing and funding needs to be identified and managed…
- ✓ So the project can be completed successfully (on-time, and on-budget)

Source: https://mymanagementguide.com/project-cost-management-–-definition-process-and-software/

WHY IS COST MANAGEMENT IMPORTANT?

- ✓ It is very easy to lose money in projects
- ✓ Differences in things like scope, quality, resources and time have a direct impact

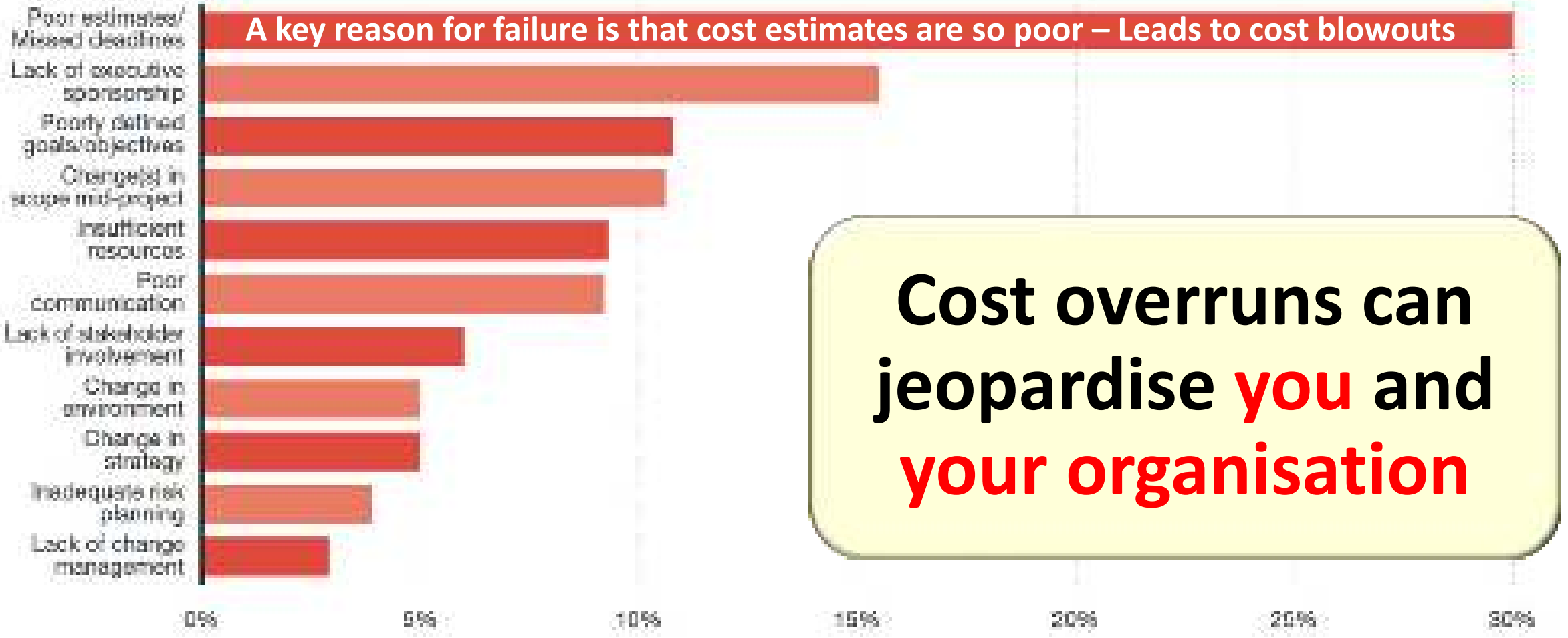
HOW BIG IS THE CHALLENGE?

- ✓ On average ICT project cost overrun = 27%
- ✓ In one in six (1/6 - ~16%) ICT projects the cost overrun was **200%**

Sources: https://blog.mavenlink.com/21-shocking-project-management-statistics-that-explain-why-projects-continue-to-fail & https://hbr.org/2003/09/why-good-projects-fail-anyway

HOW BIG IS THE CHALLENGE?

(WHAT CAUSES PROJECT FAILURE)



Cost overruns can jeopardise you and your organisation

Source: http://www.pwc.com/gx/en/industries/capital-projects-infrastructure/publications/correcting-the-course-of-capital_projects.html

KEY TERMS & PRINCIPLES

INTRODUCTION
(WHAT IS COST MANAGEMENT & WHY IS IT IMPORTANT?)

KEY TERMS & PRINCIPLES

COST MANAGEMENT PROCESS

UNDERSTANDING SOME KEY TERMS

- ✓ **Costs** = *resources (money or other collateral) expended to achieve an objective*
  - ➢ ***Fixed costs:*** *Costs that are constant no matter what changes in the situation (e.g. rents for building, etc.)*
  - ➢ ***Variable Costs:*** *Costs that vary in step with business/operational activities*

VARIABLE COSTS

FIXED COSTS

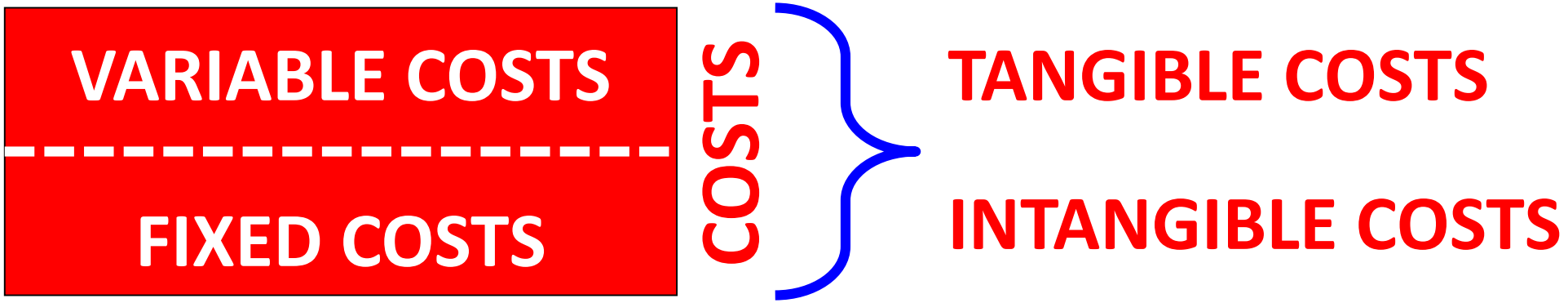
COSTS

Project Managers typically need to focus on variable costs

Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

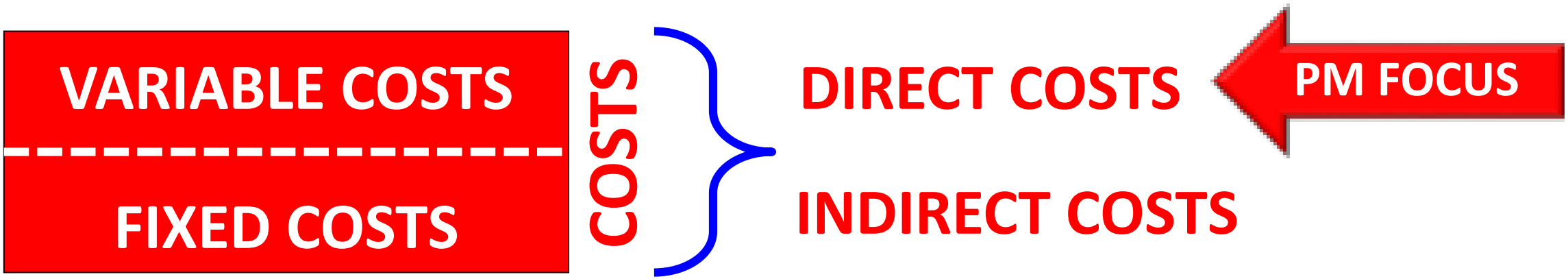
- ✓ **Costs** = *resources (money or other collateral) expended to achieve an objective*
  - ➢ ***Tangible costs:*** *Costs that can be readily measured (e.g. cost of equipment, personnel, etc.)*
  - ➢ ***Intangible Costs:*** *Costs that are difficult to measure in monetary terms (e.g. creating poor morale)*



Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

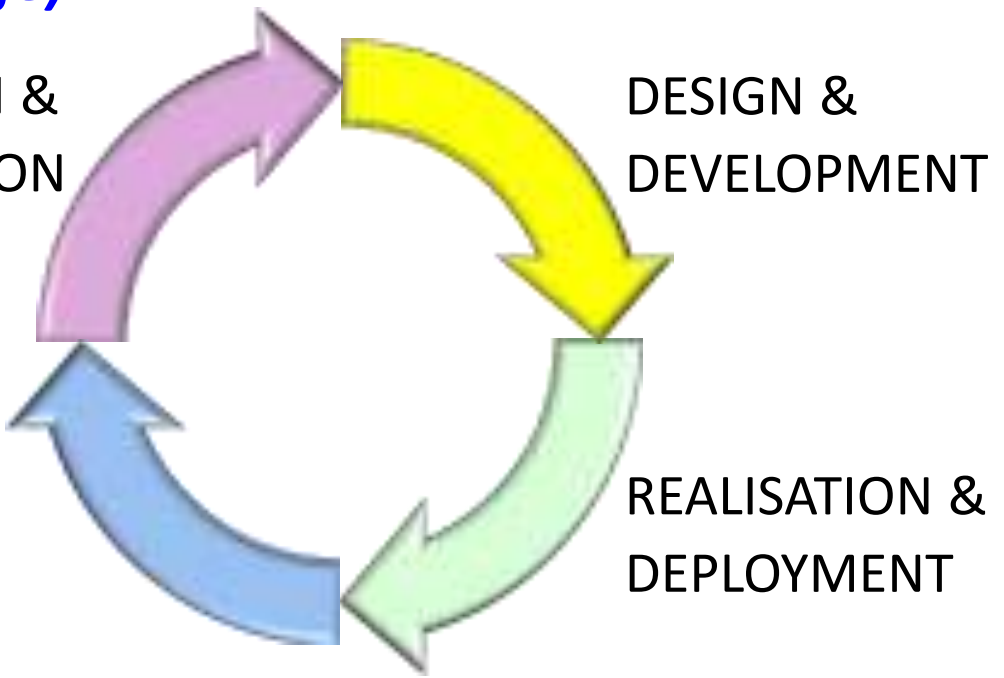
- ✓ **Costs** = *resources (money or other collateral) expended to achieve an objective*
  - ➢ ***Direct costs:*** *Costs that are directly associated with the project (e.g. cost of equipment, personnel, etc.)*
  - ➢ ***Indirect Costs:*** *Costs are not directly related but have a flow on effect to the project (e.g. administration costs)*



Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

- ✓ **Costs** = *resources (money or other collateral) expended to achieve an objective*
  - ➢ ***Life Cycle costs:*** *The* ***Total Cost of Ownership (TCO)*** *for a system* ***(costs over the full system life)***



VARIABLE COSTS

FIXED COSTS

COSTS

Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

- ✓ **Costs** = *resources (money or other collateral) expended to achieve an objective*
  - ➢ ***Opportunity cost:*** *The unrealised loss related to other alternatives/benefits when another option is chosen* **(e.g. if I put an expert onto one project rather than another what do I lose/gain)**

COSTS

- **VARIABLE COSTS**
- **FIXED COSTS**

Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

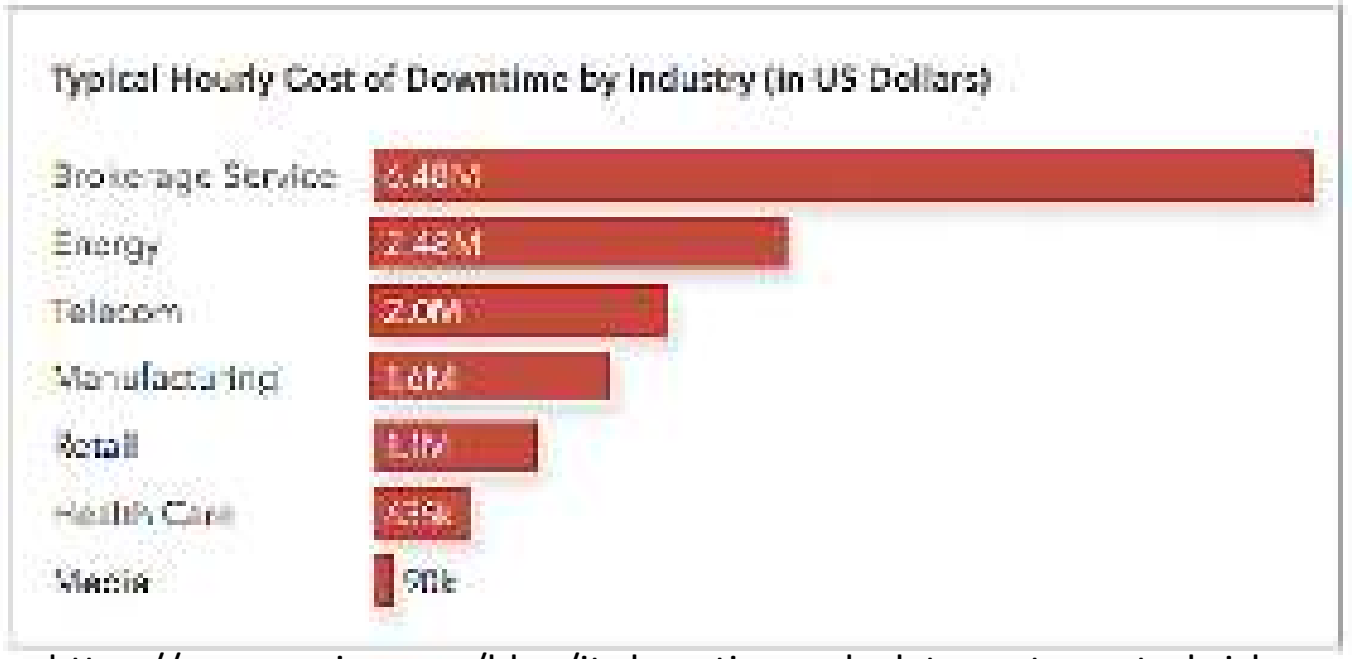
UNDERSTANDING SOME KEY TERMS

- ✓ **Costs** = *resources (money or other collateral) expended to achieve an objective*
  - ➢ ***Downtime costs:*** *The costs associated with loss/impact on businesses due to failure of ICT systems* ***(costs for project & clients)***

COSTS

VARIABLE COSTS

FIXED COSTS



https://www.cgsinc.com/blog/it-downtime-calculate-costs-control-risks

Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

- ✓ **Costs** = *resources (money or other collateral) expended to achieve an objective*
  - ➢ ***Sunk costs:*** *Money that has already been spent*

Do not chase sunk costs

(e.g. spend more money, just because you have already spent a lot)

COSTS

VARIABLE COSTS

FIXED COSTS

Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

- ✓ **Revenue/Benefits** = *resources (money or other collateral) created due to activities (e.g. a project)*
  - ➢ ***Tangible benefits:*** *Money or other directly measurable benefits to the organisation (e.g. cash from a project)*
  - ➢ ***Intangible benefits:*** *Other non-measurable benefits accrued from activity (e.g. improved morale/experience)*

REVENUE / BENEFITS

COSTS

VARIABLE COSTS

FIXED COSTS

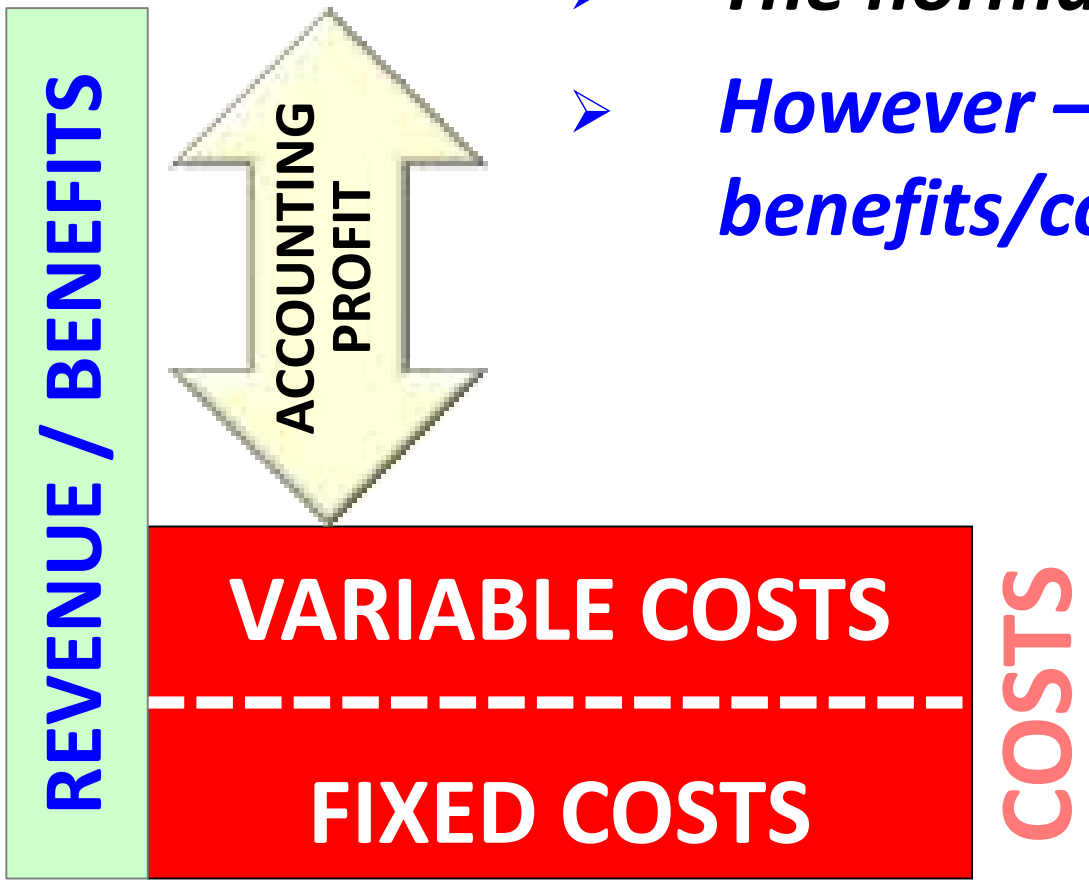
Don't underrate the importance of intangible benefits

Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

Accounting Profit/Loss = *Revenues/Benefits – Costs*

- ***The normal focus is on accounting profit/loss***
- ***However – don't forget about intangible benefits/costs***

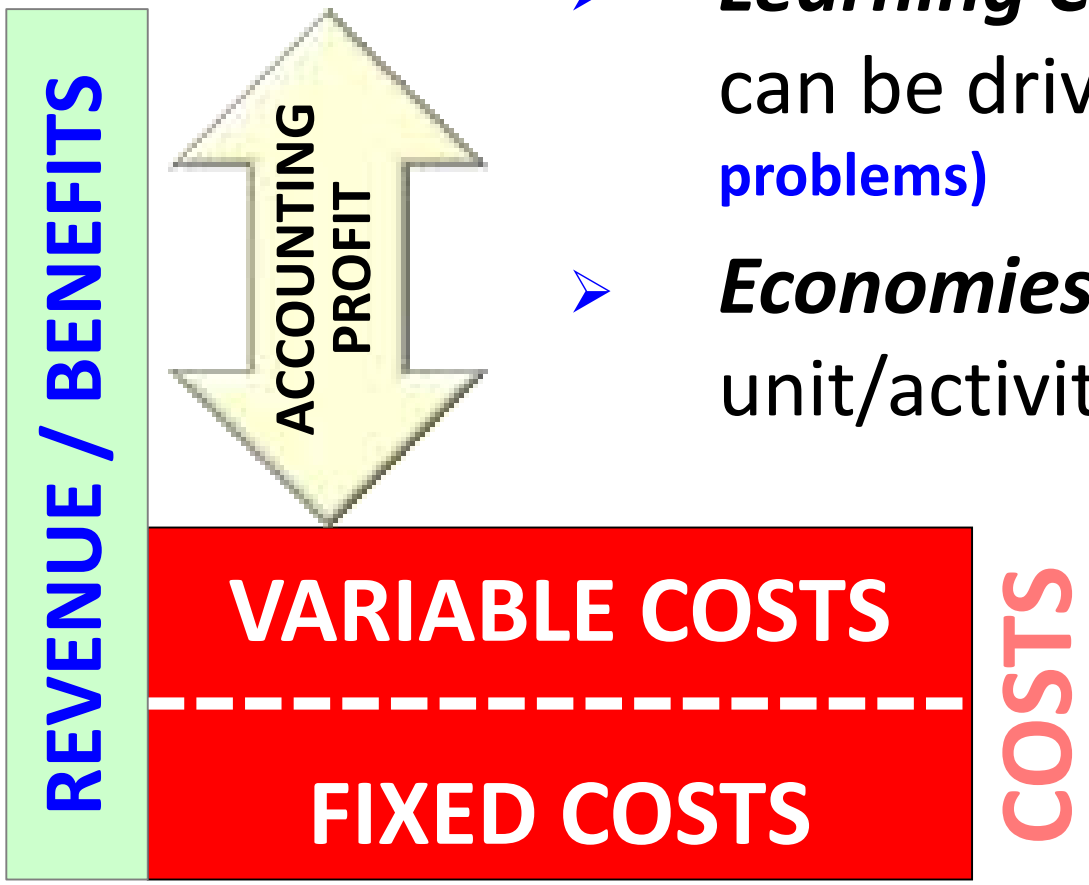


Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

Profit & Loss can be influenced by:

- ***Learning Curve Theory.*** Through experience costs can be driven down **(e.g. streamline systems to avoid problems)**
- ***Economies of Scale.*** When mass producing - the unit/activity costs can be reduced



Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

UNDERSTANDING SOME KEY TERMS

Most projects try to include **Reserves** - spare resources available for:

- ***Contingency.*** To cover specific issues that cannot be clarified when planning **(known unknows)**
- ***Management.*** Covering future non-specific issues that cannot be foreseen **(unknown unknowns)**

Contingency is normally included in the Project Cost Baseline, whereas Management Reserve is not.

Source: Model developed from information in Waud (1986), Carbaugh (2016), Elder-Vass (2016); Turvey (2019); Peirson & Bird (2000)

COST MANAGEMENT PROCESS

INTRODUCTION
(WHAT IS COST MANAGEMENT & WHY IS IT IMPORTANT?)

KEY TERMS & PRINCIPLES

COST MANAGEMENT PROCESS

COST MANAGEMENT PROCESSES

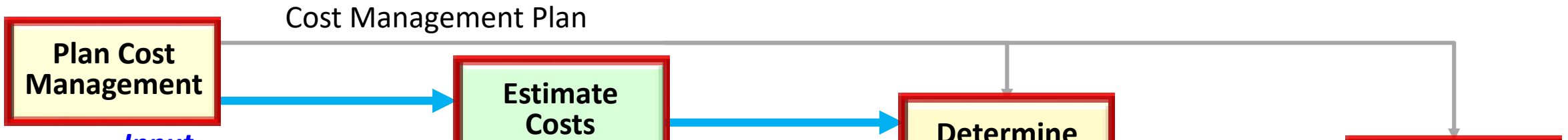
1. **Plan Cost Management.** Determining the policies, procedures, and documentation that will be used for planning, executing, and controlling project cost

2. **Estimate Costs.** Developing an approximation or estimate of the costs of the resources needed to complete a project

3. **Determine Budget.** Allocating the overall cost estimate to individual work items to establish a baseline for measuring performance

4. **Control Cost.** Controlling project budget **(actual vs accrual vs forecast/budgeted)**

RELATIONSHIP BETWEEN THE STEPS?



Input

- Project Charter
- PMP
- EEF & OPA

Tools & Techniques

- Expert Judgement
- Data Analysis
- Meetings

Outputs

- Cost Management Plan (CMP)

Input

- CMP, Quality MP (QMP)
- Cost Baseline
- Schedule, Resource, Risk, Lessons Learnt
- EEF & OPA

T&T

- Expert Judgement
- Estimation (Analogous, Parametric, Bottom-up, 3-Point, Data Analysis
- Information systems
- Decision making

Outputs

- Cost estimates
- Basis of estimates
- Project Document updates

Input

- PMP, CMP, Resource MP
- Cost Baseline
- Basis of estimates, Cost estimates, Schedule, Risk Register
- EEF & OPA

T&T

- Expert Judgement
- Cost aggregation & Data analysis
- Past info, funding limits

Outputs

- Cost baseline
- Funding requirements
- Project Document updates

Input

- PMP, CMP, Performance
- Cost Baseline
- Lessons learnt
- OPA

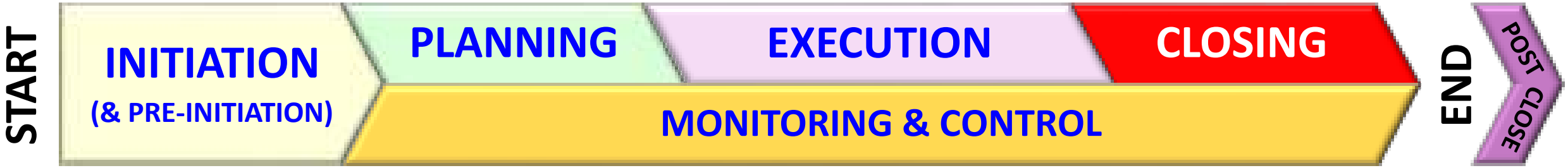
T&T

- Expert Judgement
- Data analysis (e.g. EVM)
- Information systems

Outputs

- Performance info
- Cost forecasts
- Change requests
- Document updates

WHEN DO THESE STEPS GET DONE?



Plan Cost Management — Set the structures/policies in place early

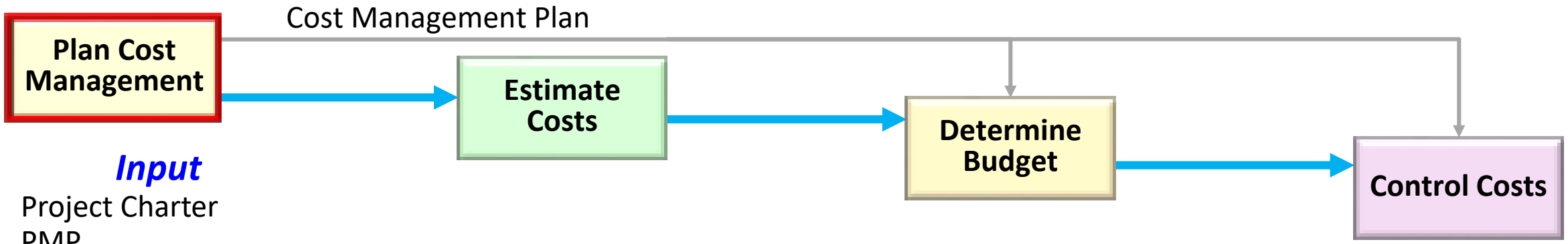
Estimate Costs — Identify likely costs for work packages/resources, etc.

Determine Budget — Aggregate costs & establish baseline

Control Costs — Monitor and proactively manage in relation to the budget and changes

Let's look at the steps in more detail

PLAN COST MANAGEMENT



Input

- Project Charter
- PMP
- EEF & OPA

Tools & Techniques

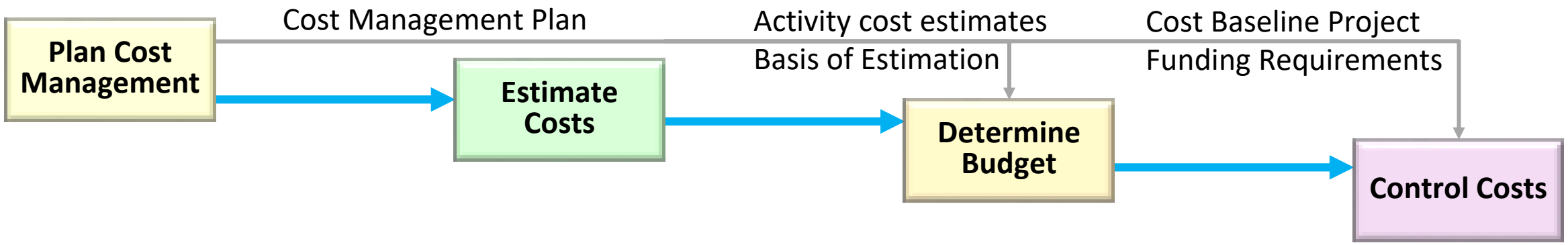
- Expert Judgement
- Data Analysis
- Meetings

Outputs

- Cost Management Plan (CMP)

PLANNING COST MANAGEMENT

- ✓ The project team uses expert judgment, analytical techniques, and meetings to develop the Cost Management Plan
- ✓ The Cost Management Plan lays the groundwork for the following steps



PLANNING COST MANAGEMENT

- ✓ A Cost Management Plan typically includes info on:
  - Levels of accuracy and units of measure
  - Organisational procedures and links
  - Control thresholds
  - Rules of performance measurement
  - Reporting formats
  - Process descriptions

For most organisations this is predominantly boilerplate (follow their rules & formats)

Supported by standard analysis methods, such as…

COMMON ANALYSIS TECHNIQUES

Net Present Value (NPV)

$$NPV = \sum_{t=0}^{n} \frac{Rt}{(1+i)^t}$$

i = Discount rate

N = Number of future cashflows

t = number of periods

Rt = Net cash inflow-outflow during a single period t

Net Present Value		
This is the difference between the PV of the next cash flows from an investment, discounted at the required rate of return and the initial investment outlay. This is done by forecasting the expected net profit from the project and making an adjustment for non-cash flow items.		
NPV	Net Present Value	
Co	Initial Investment (A net cash outflow is expenditure on material, labour and indirect expenses for a project)	$ 1,000,000
Ct1	Net Cash flow generated at time 1 (A net cash inflow is things like receipts from sales of the project, services or physical assets, or in some cases actual savings).	$ 200,000
Ct2	Net Cash flow generated at time 2	$ 600,000
Ct3	Net Cash flow generated at time 3	$ 400,000
n	Life of the project	3
k	Required Rate of Return (Discount Rate)	6%
	NPV = (Ct1/(1+k)^1)+(Ct2/(1+k)^2)+(Ct3/(1+k)^3) - Co	$58,525
Accept the project if the NPV is positive when the project's cash flows are discounted at the required rate of return.		

COMMON ANALYSIS TECHNIQUES

Internal Rate of Return (IRR)

IRR: Present Value in relation to outlays reduced by discount rate = 0

Internal Rate of Return		
IRR is the discount rate that equates the present value of a project's net cash flows with its initial cash outlay, that is the discount rate at which the net present value is zero. The IRR is compared to the required rate of return. If IRR> required rate of return the project could be accepted.		
IRR	Internal Rate of Return	
n	Number of cash inflows	
Co	Initial Cash Outflow (Must be a negative number)	-$ 1,000,000
C1	Cash Inflow 1	$ 200,000
C2	Cash Inflow 2	$ 600,000
C3	Cash Inflow 3	$ 400,000
R	Required Rate of Return (RRR)	8.00%
	IRR=0=(C1/(1+R))+(C2/((1+R)^2))+(C3/((1+R)^3))-Co	8.86%
Conventional projects have a unique rate of return. Multiple or no internal rates of return can occur for non-conventional projects with more than one sign change in the projects series of cash flows. **Under IRR: accept the project if it has a unique IRR > the Required Rate of Return (Discount Rate).**		

COMMON ANALYSIS TECHNIQUES

Return on Investment (ROI)

ROI = (Total Discounted Benefits – Total Discounted Costs) / Discounted Costs

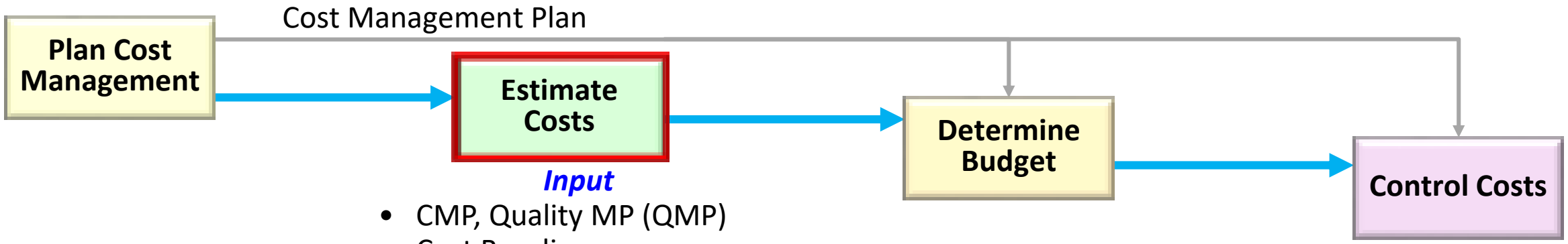
Payback Period (PP)

Payback Period: When Discounted Expenses – Discounted Inflows = 0

Opportunity Cost (OC)

Opportunity Cost = Net Profit/Loss of Selected Alternative –
Net Profit/Loss of Next Best Alternative

ESTIMATE COSTS



Input

- CMP, Quality MP (QMP)
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- Schedule, Resource, Risk, Lessons Learnt
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T&T

- Expert Judgement
- Estimation (Analogous, Parametric, Bottom-up, 3-Point, Data Analysis
- Information systems
- Decision making

Outputs

- Cost estimates
- Basis of estimates
- Project Document updates

WHY DO WE ESTIMATE?

It is necessary for:

- ✓ Working out what resources are needed (e.g. money for expenses) to…
- ✓ … determine expected project costs; and
- ✓ **decide whether the project will be profitable/worthwhile**

Source: Schwalbe, 2018 (Chapter 7)

THIS IS IMPORTANT!

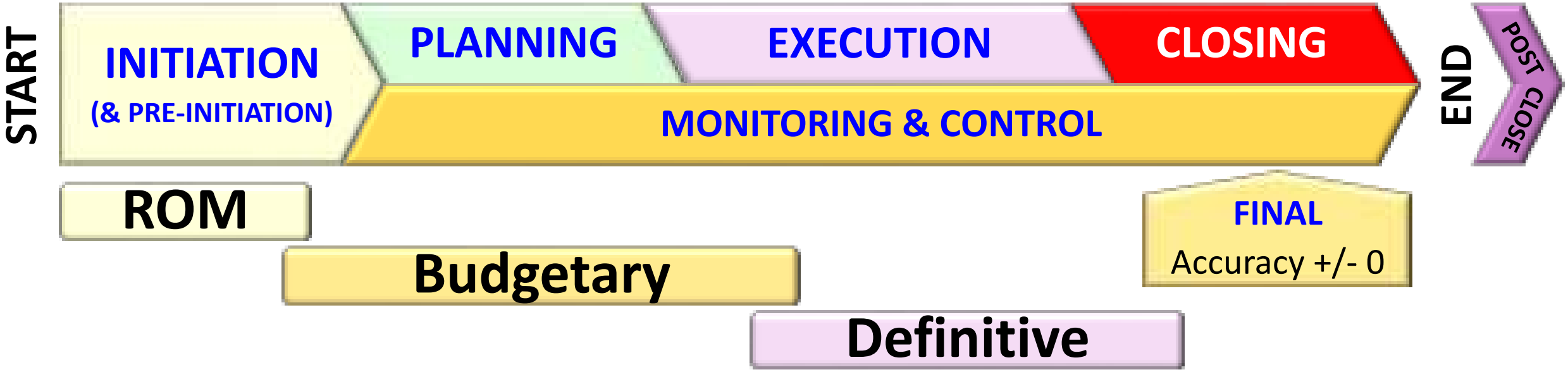
Project managers **must take cost estimates seriously** if they want to complete projects within budget constraints

It's **important to know the types of cost** estimates, how to prepare cost estimates, and typical problems associated with IT cost estimates

Let's begin with the types

TYPES OF COST ESTIMATES

Type of Estimate	When is it done?	Why is it done?	Level of Accuracy
Rough order of Magnitude (ROM)	Early in the project life-cycle	Estimates for selection decisions (e.g. Charter)	-25% to + 75% (Relatively Low accuracy)
Budgetary	Late in the Planning Phase	Provide relatively accurate figures (best guess)	-10% to +25% (Moderate to high accuracy)
Definitive	During Execution (often late in this process)	Uses previous expenses to tighten up final costs	-5% to +10% (High level of accuracy)

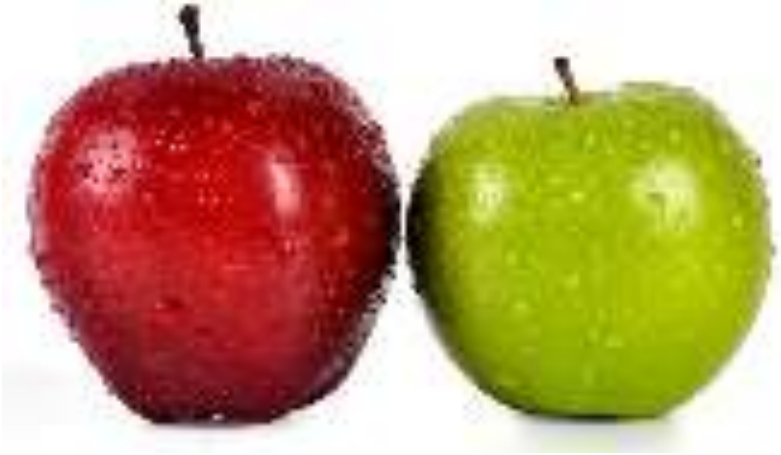


Sources: https://edward-designer.com/web/estimates-rom-vs-definitive-for-pmp-exam/ & https://www.projectengineer.net/the-rough-order-of-magnitude-estimate/ & https://projectmanagers.org/management/estimation/accurate-estimates-project-management/

TECHNIQUES FOR ESTIMATION

There are a range of techniques used - including:

- ✓ **Analogous** **(Top Down Estimates)**
  - Use cost information from previous projects
  - Can provide useful insights **(but only if good records are kept)**
  - **Be careful** – small differences can have major cost implications



TECHNIQUES FOR ESTIMATION

There are a range of techniques used - including:

- ✓ **Bottom up estimates**
  - Identify likely costs for individual Work Packages (WP)
  - Aggregate these into a common estimate
  - **Be careful** – can include duplication of effort, but it is commonly used

TECHNIQUES FOR ESTIMATION

There are a range of techniques used - including:

- ✓ **Bottom up estimates**
  - This also often includes vendor analysis
  - Developed through discussions, simple quotes, RFTs, RFQs, etc
  - **Be careful** – must be contractually binding for vendors

TECHNIQUES FOR ESTIMATION

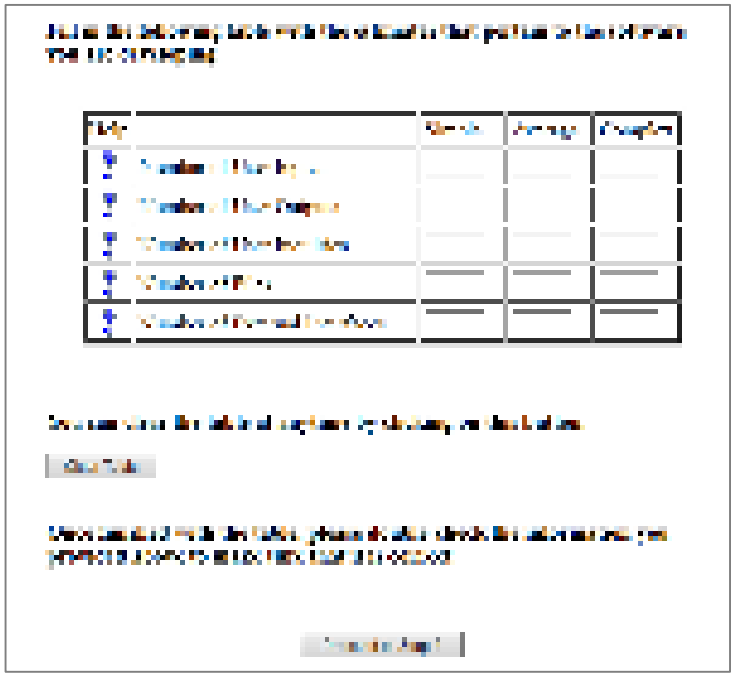
There are a range of techniques used - including:

- ✓ **Parametric modelling**
  - There are a range of different parametric models
  - Examples include Function Points (FP), Source Lines of Code (SLOC) and the Constructive Cost Model (COCOMO)

FUNCTION POINTS

A method for measuring software size (based on what the software will do for end users)

- ✓ Aligned to key ISO standards (COSMIC, FISMA, IFPUG, Mark-II & Nesma)
- ✓ Based on outputs, enquiries, inputs, internal files and external interfaces **(assessed for complexity)**
- ✓ **Be careful** – sometimes masks algorithmic complexity
- ✓ An example calculator can be found at: http://groups.umd.umich.edu/cis/course.des/cis375/projects/fp99/table.html



SOURCE LINES OF CODE (SLOC)

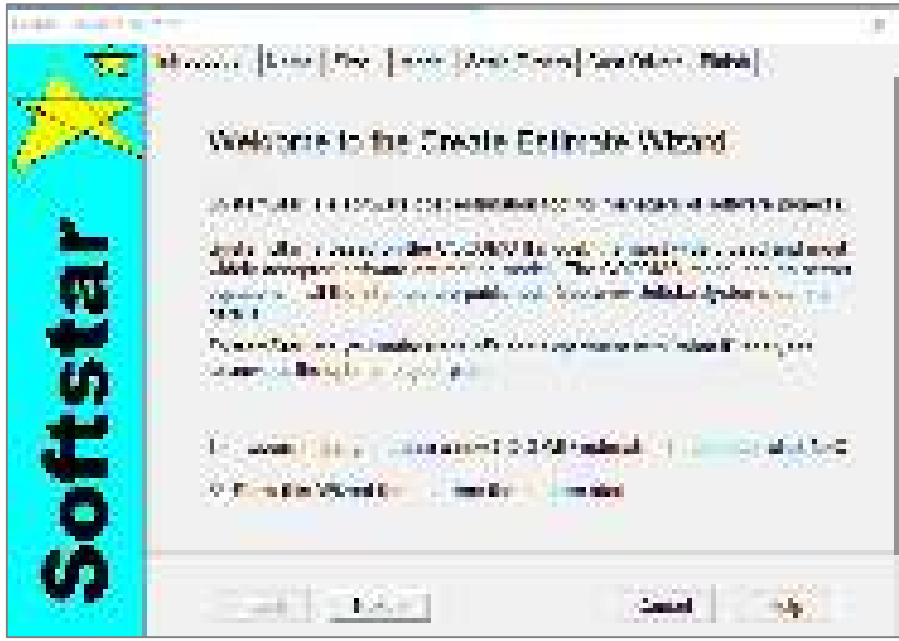
Helps to identify the number of lines of code required (based on expected size of code base)

- ✓ Rationalises physical lines of code, comments & logical lines of code
- ✓ Language and environment specific (e.g. can be quite different for different languages & object orientation)
- ✓ Lots of calculators available **(pick one that aligns to the language/environment you are using)**
- ✓ **Be careful** – this can be badly affected by unknown unknowns **(needs expert analysis)**

AN OVERVIEW OF COCOMO

Developed for estimating software development

- ✓ **COCOMO accounts for:**
  - SLOC – Source Lines of Code
  - PREC – Precedentedness **(done before?)**
  - FLEX – Development Flexibility
  - RESL – Architecture Risk Resolution
  - TEAM – Team Cohesion
  - PMAT – Process Maturity
  - Cost Drivers



Have a play with it

- ✓ You can download a Demo at this URL: http://www.softstarsystems.com/demo.htm

TECHNIQUES FOR ESTIMATION

Whichever approach you apply:

- ✓ Implement mixed methods as appropriate
- ✓ Use previous examples as benchmarks **(make sure that you are assessing Apples & Apples)**
- ✓ Leverage computerised tools **(Excel, MS Project, Parametric Calculators)**
- ✓ Remember the GIGO Concept (Garbage-in-Garbage-out) – so be careful with analysis/assumptions
- ✓ **Make sure you draw on expert advice**
- ✓ Apply weighting using techniques like PERT (Three Point Analysis)

USING PERT FOR ESTIMATION

Best Case
(Most optimistic)

Likely Case
(Most likely?)

Worst Case
(Most pessimistic)

- ✓ PERT uses **probabilistic cost estimates** - Duration estimates based on using:
  - optimistic
  - most likely, and
  - pessimistic estimates

  of activity costs

This uses the 3 Point Estimate Technique

APPLYING THE PERT FORMULA

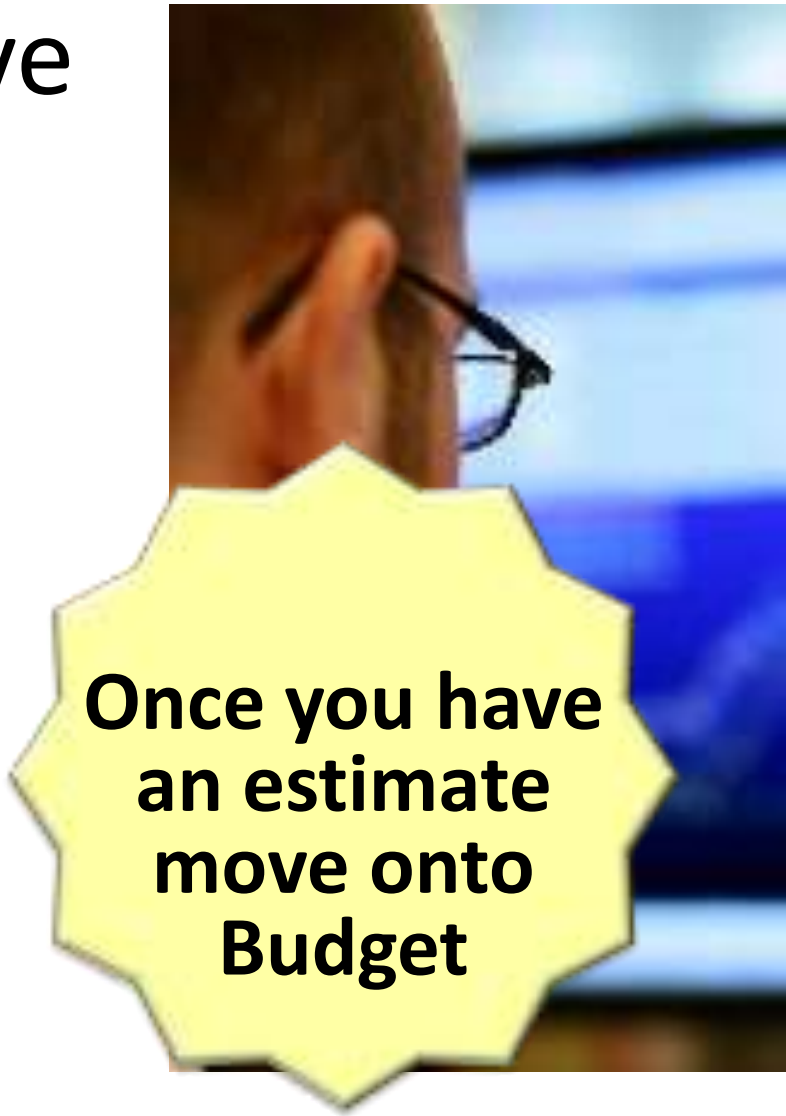
$$\text{Weighted Average Cost} = \frac{\text{Most optimistic Cost} + 4 \times \text{Most Likely Cost} + \text{Most Pessimistic Cost}}{6}$$

Example Weighted Average Cost

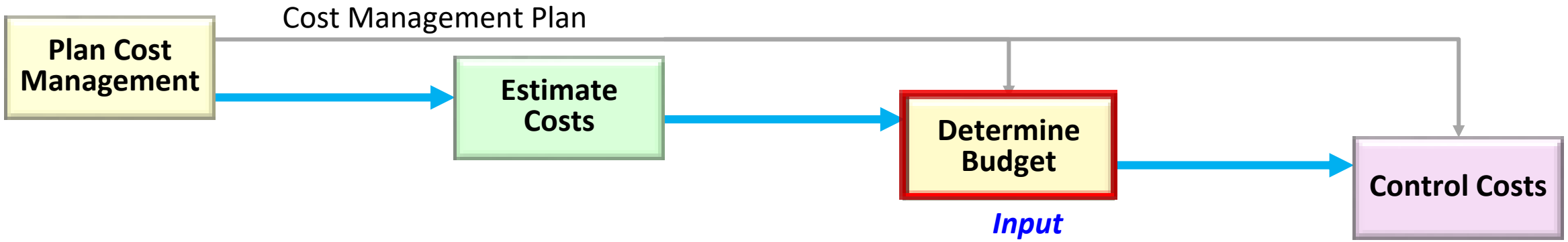
$$\frac{\underset{\text{Optimistic}}{\text{Most}} + 4 \times \underset{\text{Likely}}{\text{Most}} + \underset{\text{Pessimistic}}{\text{Most}}}{6} = \frac{\$9K + 4 \times \$14K + \$17K}{6} = \$13.6K$$

TECHNIQUES FOR ESTIMATION

- ✓ And you will typically add Reserve for Contingency/Management
- ✓ Base this on:
  - ➢ Organisational Standards
  - ➢ Risk profile (aligned to Risk Management)
  - ➢ Advice from field experts



DETERMINE BUDGET



Input

- PMP, CMP, Resource MP
- Cost Baseline
- Basis of estimates, Cost estimates, Schedule, Risk Register
- EEF & OPA

T&T

- Expert Judgement
- Cost aggregation & Data analysis
- Past info, funding limits

Outputs

- Cost baseline
- Funding requirements
- Project Document updates

DETERMINE BUDGET

- ✓ **Aggregate the Estimates (Typically Bottom-Up)**
  - Link Work Packages into Elements (e.g. hardware, software, development, etc.)
  - Link Elements into Workstreams/Deliverables
- ✓ This creates a **cost baseline**:
  - Aggregated budgetary estimates (as close as possible to correct, & containing reserves)
  - It must be time phased (so cashflow issues can be determined)
  - It must include clear assumption information (these must be associated with the PMP & Risk Management Plan)

AN EXAMPLE COST BASELINE

WBS Item	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1. Project Management																
1.1 Project Manager	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.2 Project Office	$15,322	$20,722	$20,585	$20,208	$46,615	$25,243	$20,851	$20,507	$20,285	$20,137	$20,476	$25,006	$16,035	$15,180	$20,712	$4,850
1.3 Contractors																
1.3.1 StreamTech					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.3.2 DevSol					$81,327	$26,340	$28,221	$55,208	$56,011	$28,847	$28,152	$25,854	$26,231	$21,635	$22,704	$24,156
1.3.3 [illegible]							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.3.4 Datacentre									$3,200	$4,150	$4,500	$3,200	$6,200	$10,000	$10,500	$10,000
2. Hardware																
2.1 Test Environment																
2.2.1 Servers				$145,000												
2.2.2 Firewalls				$5,400												
2.2.3 [illegible]				[illegible]												
2.2.4 Client Hardware				$11,230												
2.2 Node Equipment																
2.2.1 Servers						[illegible]				[illegible]				[illegible]		
2.2.2 Firewalls						$8,400				$8,400				$8,400		
2.2.3 [illegible]						[illegible]				[illegible]				[illegible]		
3. Software																
3.1 IDE/Test Environment				$3,500												
3.2 [illegible]					[illegible]					[illegible]				[illegible]		
4. Testing																
4.1 System Testing									$40,220		$28,300		$47,670			
4.2 Acceptance Testing									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
5. Training				$3,000	$12,000	$6,000										
6. Marketing							$36,000	$36,000	$36,000	$36,000	$36,000	$36,000	$36,000	$36,000	$36,000	$36,000
7. Contingency/Reserves ([illegible])	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Totals	$25,379	$41,724	$44,790	$253,902	$310,342	$267,042	$210,410	$225,073	$207,157	$448,730	$221,450	$128,228	$328,315	$365,637	$160,797	$120,524

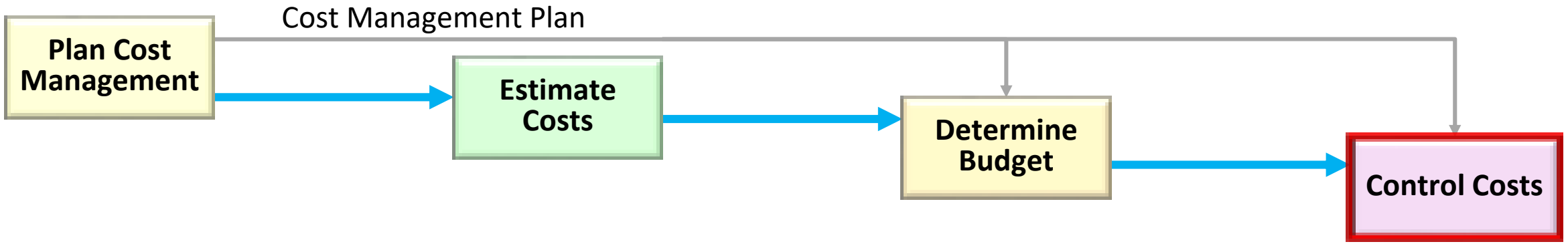
DETERMINE BUDGET

- ✓ **It must then go through an approval process**
  - ➢ Each organisation has its own approach
  - ➢ You may be expected to justify each line item/cost and assumption
- ✓ You will typically not be able to do the project until authorisation is granted **(so it is important to get this right early)**

DETERMINE BUDGET

- **The budget must then be kept up to date:**
  - As new information is available
  - Reflective of actuals/accruals as they arise
- This is then used for Cost Controls

CONTROL COSTS



Input

- PMP, CMP, Performance
- Cost Baseline
- Lessons learnt
- OPA

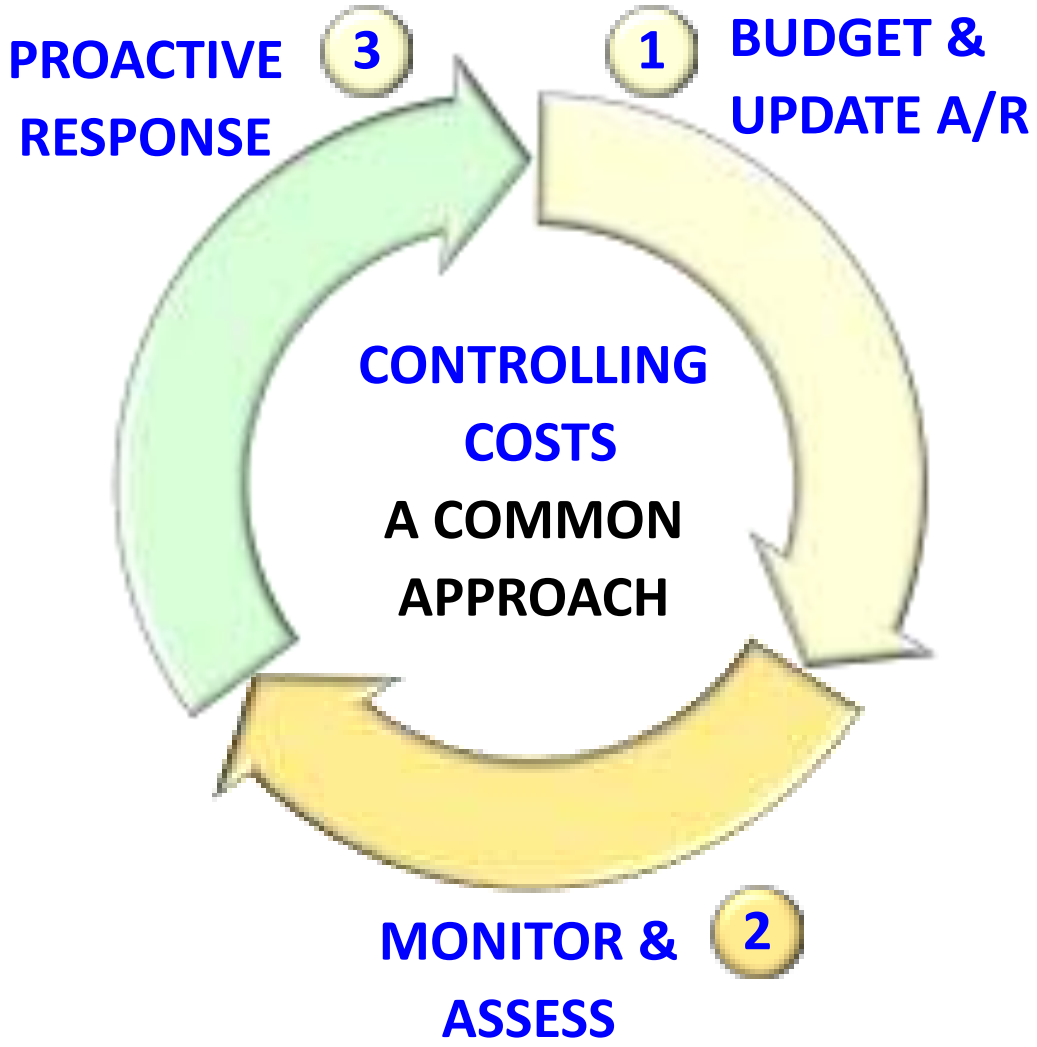
T&T

- Expert Judgement
- Data analysis (e.g. EVM)
- Information systems

Outputs

- Performance info
- Cost forecasts
- Change requests
- Document updates

CONTROL COSTS

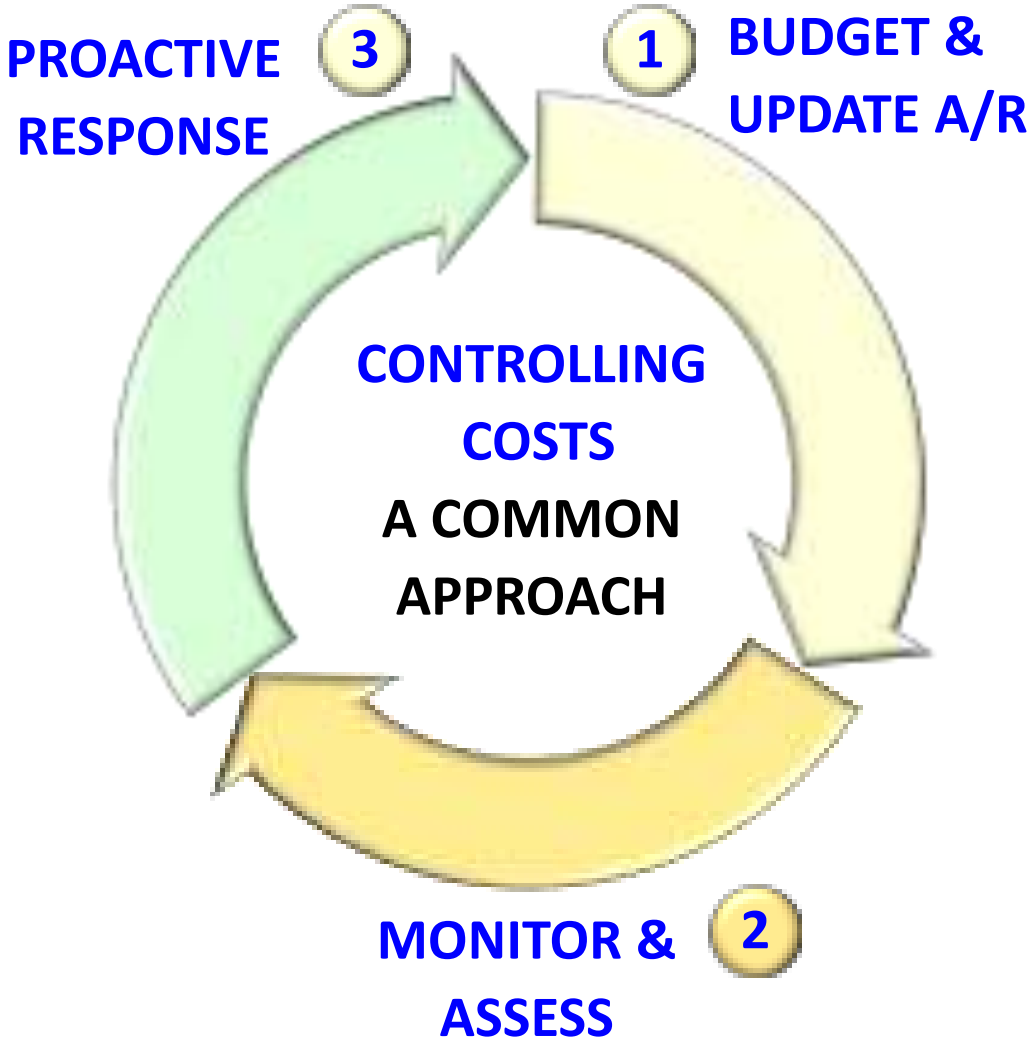


Managed through an iterative process

1. **Budget & Update as required.** Start with the baseline, but update this as a result of the next two steps
2. **Monitor & Assess.** Capture outflows/inflows and progress. Assess these against the budget and schedule
3. **Proactive Response.** Identify differences from budget and schedule and take proactive steps as needed

Continue the cycle **(This must be conducted consistently throughout the project)**

CONTROL COSTS

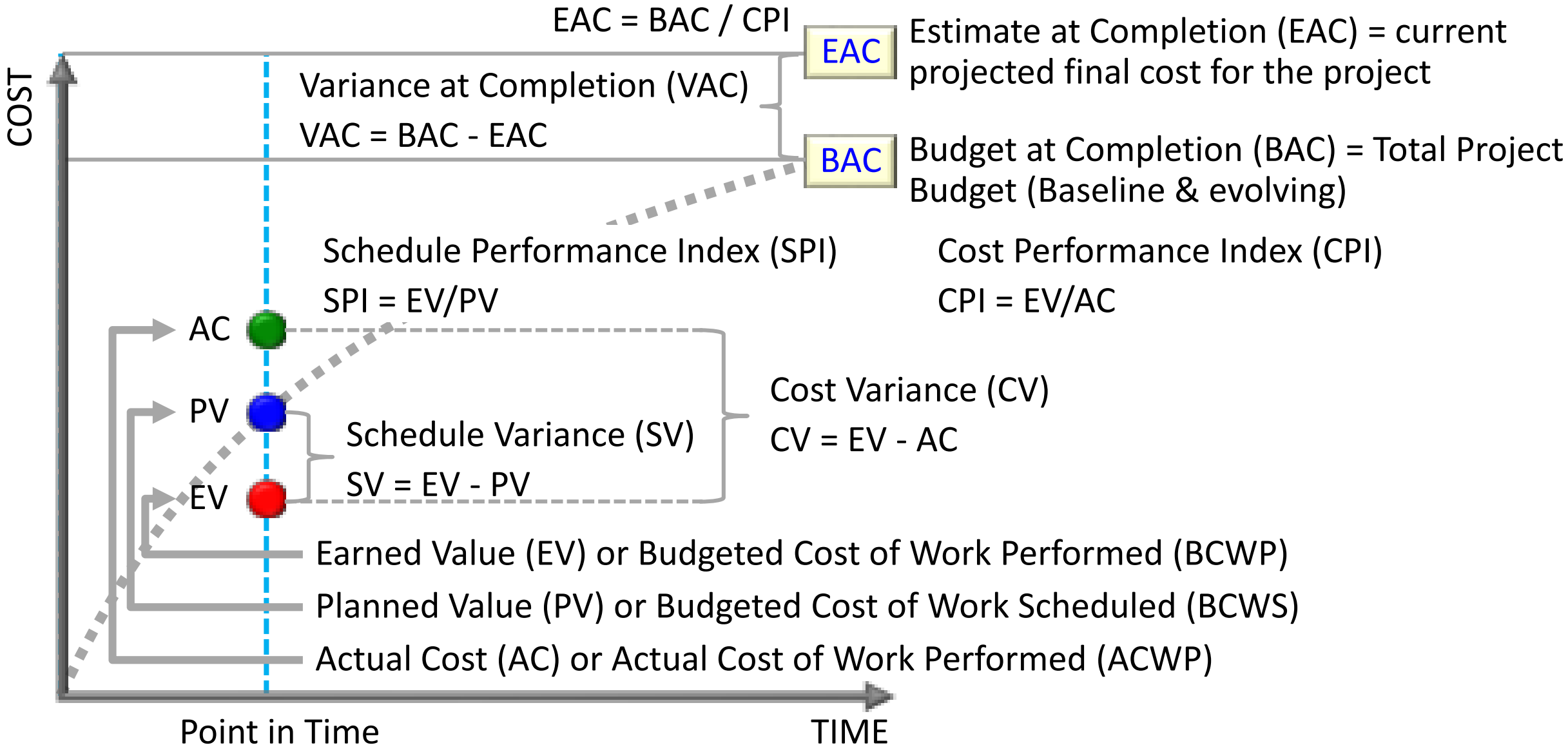


There are many methods available to manage this:

- ✓ Facilitated by Project Management software (e.g. MS Project, MS Excel)
- ✓ Different organisations use different assessment models (you will need to use theirs)
- ✓ A common approach entails Earned Value Management (EVM)

We'll introduce EVM here

UNDERSTANDING EVM KEY TERMS



KEY EVM FORMULAS

EARNED VALUE MANAGEMENT FORMULAS

BC	Budgeted Cost	This is the budgeted cost of an activity	
AC (ACWP)	Actual Cost (Actual Cost of Work Performed)	This is the actual cost incurred on the work performed during a specific time period [illegible]	Actual costs incurred [illegible]
PV (BCWS)	Planned Value (Budgeted Cost of Work Scheduled)	This reflects the budget assigned to scheduled work (includes budget multiplied by the percentage that should have been completed)	PV = BC x Percent that should have been completed by the EVM date
EV (BCWP)	Earned Value (Budgeted Cost of Work Performed)	This is a measure of the work performed expressed in terms of the budget authorized for that work	EV = BC x % of the work that has actually been completed to date [illegible]
CV	Cost Variance	This reflects the Earned Value minus the actual costs. (If this is negative, the work has cost more than planned)	CV = EV - AC
SV	Schedule Variance	This is the Earned Value (EV) minus the Planned Value (PV). (If the result is negative, it has taken longer to do the work than planned. [illegible])	SV = EV - PV
CPI	Cost Performance Index	This is the ratio between Earned Value (EV) and Actual Costs (AC), which is used to estimate the projected cost of completing the project. (If equal to 1, the planned and actual costs are equal, so you are on budget. If < 1 then the Project is over budget. If > 1 the project is under budget)	CPI = EV / AC
SPI	Schedule Performance Index	This is the ratio between Earned Value (EV) and Planned Value (PV) and it is used to estimate the time required to complete the project. (If equal to 1 the project is on schedule. If < 1 then the project is behind schedule. If > 1 the project is ahead of schedule.)	SPI = EV / PV
RP	Rate of Performance	This is the ratio between the Actual Completed Work and the planned percentage of Work that should have been completed.	RP = [illegible]
BAC	Budget at Completion	This reflects the total budget for completion of the project as determined in the planning phase [illegible]	
EAC	Estimate at Completion	This reflects an estimated cost of completing the project based on performance to date	EAC = BAC / CPI
VAC	Variance at Completion	This reflects the difference between the Estimate and the Budget (If > 0, you are under budget. [illegible])	VAC = BAC - EAC
TCPI	To Complete Performance Index	This provides a measure of the cost performance that must be achieved with the remaining resources to meet the BAC or EAC	BAC: TCPI=(BAC-EV)/(BAC-AC) EAC: TCPI=(BAC-EV)/(EAC-AC)

PROCESS WITH PROJECT PORTFOLIO

PROJECT PORTFOLIO MANAGEMENT

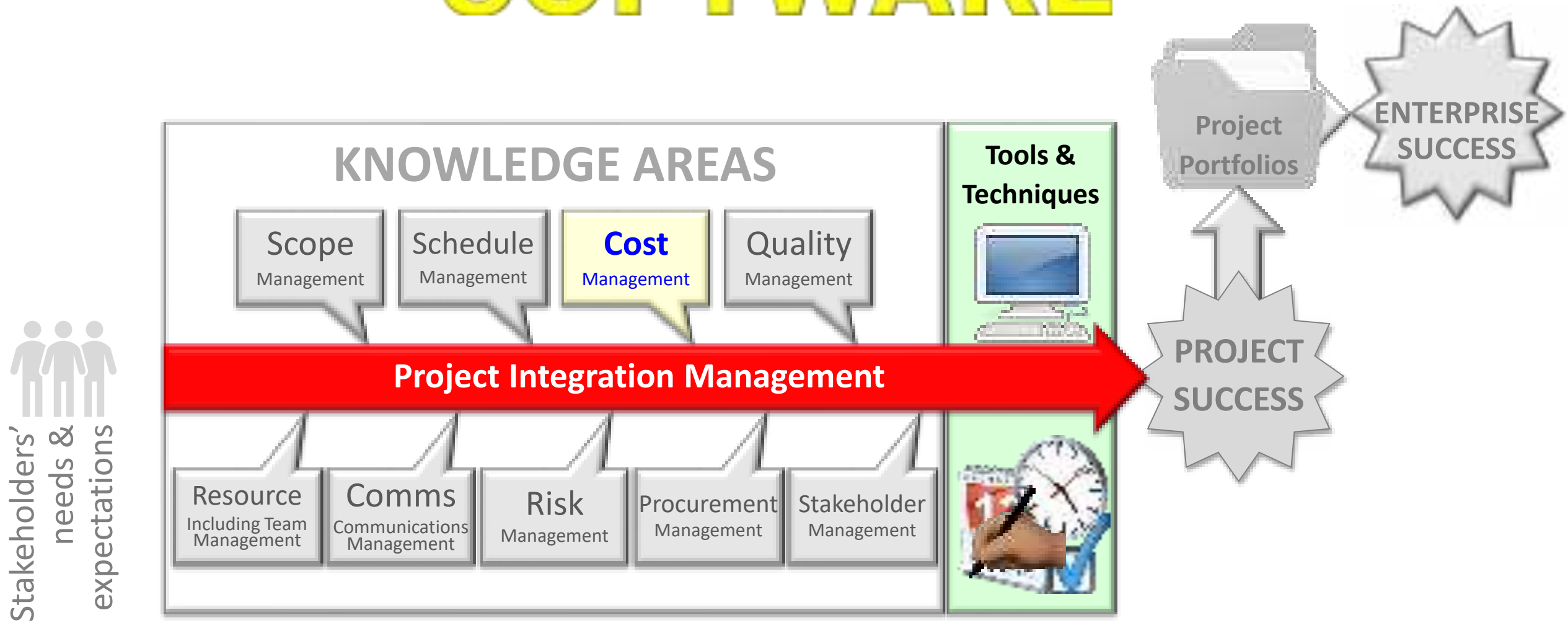
- ✓ Many organisations use portfolio management (linking associated projects in a portfolio)
- ✓ There are 5 levels of this type of integration:
  1. Put all the projects in one database
  2. Prioritise the projects in the database
  3. Divide the projects into linked budgets based on type of investment
  4. Automate the repository
  5. Apply modern portfolio theory, including risk-return tools that map project risk on a curve

BENEFITS OF PORTFOLIO MANAGEMENT

- ✓ Can deliver significant savings **(~25% in some cases)**
- ✓ Can support better load sharing across projects
- ✓ Can generate economies of scale
- ✓ Can reduce the effects of indirect costs
- ✓ Can improve proactive project management
- ✓ Can reduce friction due to resource management

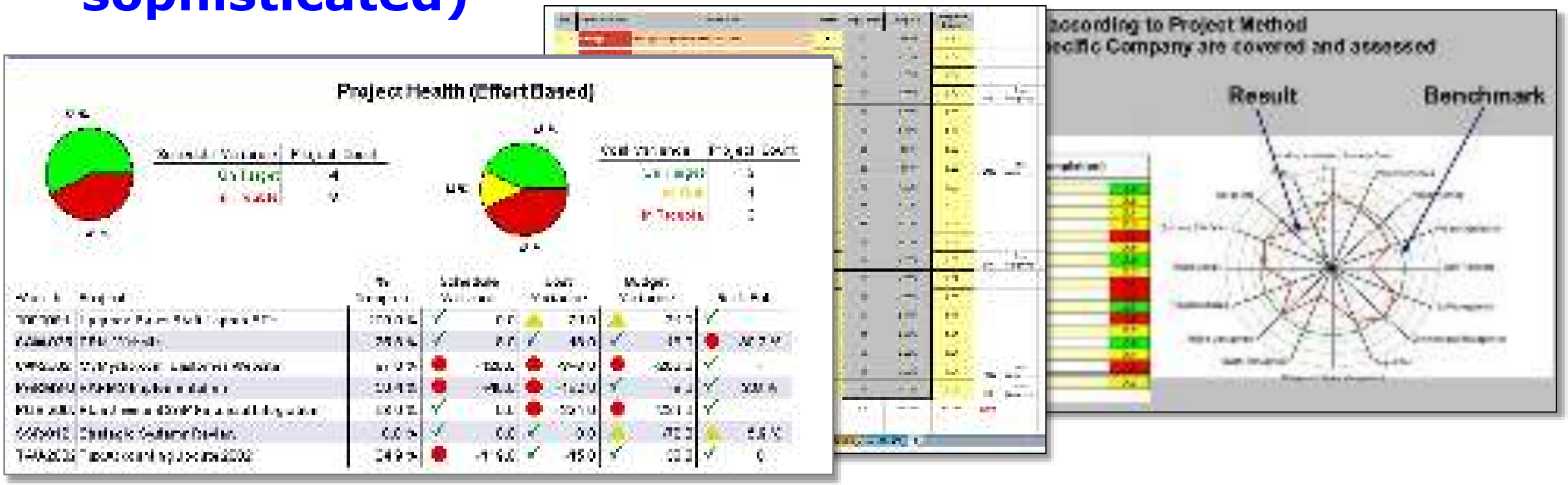
But this only works if there is a good Portfolio Manager, with the right tools, and clear lines of communication/authority

SOFTWARE


KNOWLEDGE AREAS
Scope Management
Schedule Management
Cost Management
Quality Management
Tools & Techniques
Project Integration Management
Resource Including Team Management
Comms Communications Management
Risk Management
Procurement Management
Stakeholder Management
Project Portfolios
ENTERPRISE SUCCESS
PROJECT SUCCESS
Stakeholders' needs & expectations

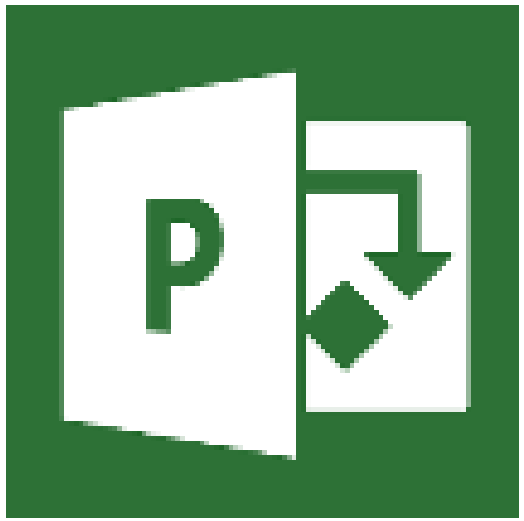
SOFTWARE FOR COST MANAGEMENT

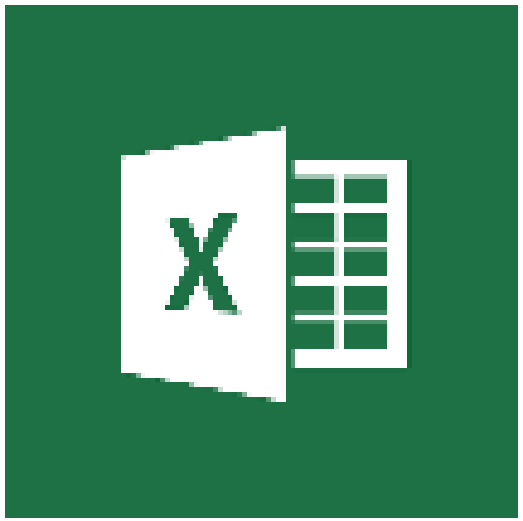
- ✓ There are many products on the market for managing cost management **(many are very sophisticated)**



SOFTWARE FOR COST MANAGEMENT

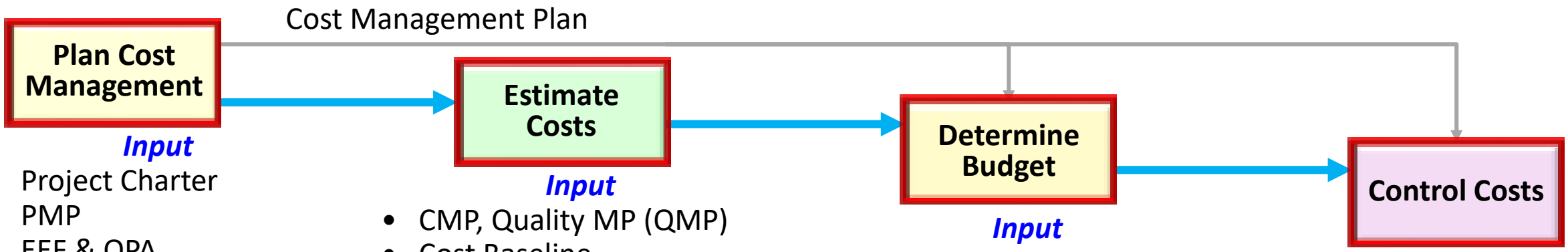
- ✓ The most commonly used are MS Excel & MS Project **(You need to develop your skills with these)**





TOPIC SUMMARY

SUMMARY OF THE KEY STEPS?



Input

- Project Charter
- PMP
- EEF & OPA

Tools & Techniques

- Expert Judgement
- Data Analysis
- Meetings

Outputs

- Cost Management Plan (CMP)

Input

- CMP, Quality MP (QMP)
- Cost Baseline
- Schedule, Resource, Risk, Lessons Learnt
- EEF & OPA

T&T

- Expert Judgement
- Estimation (Analogous, Parametric, Bottom-up, 3-Point, Data Analysis
- Information systems
- Decision making

Outputs

- Cost estimates
- Basis of estimates
- Project Document updates

Input

- PMP, CMP, Resource MP
- Cost Baseline
- Basis of estimates, Cost estimates, Schedule, Risk Register
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ANY
QUESTIONS