Electronics and
Computer Science

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Project Cost Management

COMP6204: Software Project Management and Secure Development

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Overview

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- Project Cost Management
- Contents of a Cost Management Plan
- Estimating Costs
- Cost Estimating Techniques
- Cost Estimating Process
- Project Budget Components
- Cost Baseline, Expenditures, and Funding Requirements

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Objectives

- Discuss the project cost management planning processes
- Create a cost management plan, cost estimate, basis of estimates, cost baseline, and project funding requirements

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Project Cost Management

- Project cost management includes the processes required to ensure that a project team completes a project within an approved budget
- The main planning tasks are planning cost management, estimating costs, and determining the budget
- The main documents produced include a cost management plan, a cost estimate, and a cost performance baseline

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Planning Cost Management

- The purpose of this process is to determine the *policies*, *procedures*, and *documentation* for *planning*, *managing*, *executing*, and *controlling* project *costs*
- The project team holds *meetings*, consults with *experts*, and analyses data to help produce a *cost management* plan, which becomes a component of the project management plan

Why is cost management important?

- Have you ever wondered what happens when a project goes significantly over budget?
  - The consequences can be severe—from strained relationships with clients to financial losses.
- Let's consider an example:
  - A small software development team was tasked with creating a custom application for a client. Midway through, they realised the *project was quickly exceeding the initial budget*.
  - They faced a *common dilemma*: continue as planned and absorb the extra costs or re-evaluate their approach.

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Project cost management – A solution

- By implementing rigorous cost management strategies, the team was able to identify areas where expenses were ballooning.
- They streamlined their project management processes, prioritised essential features, and renegotiated terms with subcontractors.
- This approach not only brought the project back within budget but also improved their working relationship with the client, who appreciated their transparency and commitment to delivering value.
- This scenario highlights how effective cost management can transform a potentially disastrous situation into a success story.

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Cost Planning

- Once the project's schedule has been created, we set out to determine the detailed budget for the project.
  - Although the Project Charter provides the project budget, it is an approximate figure that is expected to have a certain percentage of variance.
- At this stage we carry out a detailed estimation of all the project costs and determine whether this budget fits within the one mentioned in the project charter or not.
- If it does not fit, we either need to increase the budget mentioned in the project charter or reduce the scope.

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How to create a cost management plan

- Cost management is a continuous, fluid process.
- However, there are four main elements or functions that can be found in any cost management plan:
  - Resource planning
  - Cost estimating
  - Cost budgeting
  - Cost control

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Possible Contents of a Cost Management Plan

- Units of measure, such as staff hours or days or a lump sum amount, currency to be used, inflation assumptions, etc.
- Level of *precision* for cost estimates, such as how to round numbers
- Level of accuracy, such as +/-10%
- Organisational procedure links
- Control *thresholds* for monitoring cost performance, such as a percentage deviation from the baseline plan
- Rules of performance measurement, especially if *earned value management* is used
- Reporting formats and frequency for cost reports
- Additional details about cost activities, such as *strategic funding* choices, procedures to account for currency fluctuations, and procedures for recording costs

Resource planning

- This activity is when the cost manager reviews the project's scope and specs to figure out what resources the project will require.
- A resource is anything that helps you complete a project—including tools, money, time, equipment, and even team members.
- For this step, you'll need:
  - Clearly defined project objectives
  - A high-level project roadmap or a work breakdown structure (WBS), depending on the complexity of the project
  - A tentative resource management plan
  - A project scope statement

Estimating Cost of Activities

- The first step towards creating a project budget is by estimating the costs associated with each activity.
  - There can be fixed and variable costs.
  - If any equipment is bought for it or if any setup costs are involved, then these will be the fixed costs for the activity.
  - Any use of materials or human resources would generally entail variable costs.
  - All these costs are then added to get the total costs for the activity
- We generally estimate only the variable costs associated with the project activities.

Activity	Fixed Costs (F)	Variable Costs (V)			Activity Cost (F + V)
		Resource Cost Per Day / Cost Per Item (A)	Number of Days / Number of Items (B)	Total Variable Costs (A x B)	
1	$100	$400	20	$800	$900

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Estimating Costs

- Project teams normally prepare *cost estimates* at various stages of a project, and these estimates should be fine-tuned as time progresses
- It is also important to provide *supporting details* for the estimates, including ground rules and assumptions (sometimes called the basis of estimates)
- A *large percentage* of total project costs are often *labour costs*, so it is important to do a good job estimating labour hours and costs

Cost Estimating Techniques

- Analogous estimates, also called top-down estimates, use the actual cost of a previous, similar project as the basis for estimating the cost of the current project.
  - This technique requires a good deal of expert judgment and is generally less costly than others are, but it can also be less accurate
- Bottom-up estimates involve estimating individual activities and summing them to get a project total.
  - This approach can increase the accuracy of the cost estimate, but it can also be time intensive and, therefore, expensive to develop
- Parametric modeling uses project characteristics (parameters) in a mathematical model to estimate project costs

Cost Estimating Process

- See the detailed steps, ground rules, and assumptions that is used for developing the cost estimate in the following table
  - Also, summary information was documented in a cost model under this table
- Just as projects are unique, so are cost estimates
- Consult with internal and external experts and organisations for assistance

Sample Cost Estimate

what's about non-labor cost?

WBS Categories	Internal Labor	$/hour	Internal $ Total	External Labor	$/hour	External $ Total	Total Labor	Non-labor $	Total Cost
1. Initiating	200	$ 65	$ 13,000			$ -	$ 13,000		$ 13,000
2. Planning	600	$ 60	$ 36,000			$ -	$ 36,000		$ 36,000
3. Executing			$ -			$ -	$ -		$ -
3.1 Course design and development			$ -			$ -	$ -		$ -
3.1.1 Supplier management training	600	$ 60	$ 36,000	600	$ 150	$ 90,000	$ 126,000	$ 100,000	$ 226,000
3.1.2 Negotiating skills training	300	$ 55	$ 16,500	300	$ 150	$ 45,000	$ 61,500	$ 50,000	$ 111,500
3.1.3 Project management training	400	$ 60	$ 24,000	400	$ 150	$ 60,000	$ 84,000	$ 50,000	$ 134,000
3.1.4 Software applications training	400	$ 60	$ 24,000	400	$ 150	$ 60,000	$ 84,000	$ 50,000	$ 134,000
3.2 Course administration	400	$ 55	$ 22,000	300	$ 250	$ 75,000	$ 97,000	$ 80,000	$ 177,000
3.3.Course evaluation	300	$ 55	$ 16,500			$ -	$ 16,500		$ 16,500
3.4 Stakeholder communications	300	$ 55	$ 16,500			$ -	$ 16,500		$ 16,500
4. Monitoring and Controlling	500	$ 55	$ 27,500			$ -	$ 27,500		$ 27,500
5. Closing	200	$ 55	$ 11,000			$ -	$ 11,000		$ 11,000
Subtotal									$ 903,000
Reserves			$ -			$ -	$ -		90,300.0
Total	4,200		243,000	2,000		330,000	573,000	330,000	**$ 993,300**

Assumptions:

Internal labor rates include benefits and overhead. Average hourly rates based on skill levels and departments.

External labor rates are based on historical average; may change as contracts are awarded.

Non-labor costs include purchasing licenses for using training materials, books, DVDs, travel expenses, etc.; may change as contracts are awarded.

Reserves are calculated by taking 10% of the subtotal for the estimate. These contingency reserves are based on known risks.

Cost Budgeting

- Project *cost budgeting* involves allocating the project cost estimate to tasks over time
- The tasks are based on the work breakdown structure for the project
- The main goal of the cost budgeting process is to produce a cost baseline, or time-phased budget, that project managers use to measure and monitor cost performance.
- Coming up with a project budget is a simple addition of all the individual activity estimates.
  - However, there are also some additional items that need to be added to get the final budget.
  - These are two levels of reserves - contingency reserve and management reserve.

Contingency and Management Reserve

- Contingency reserve is kept for known risks on the project.
  - For example, if one of the risks on the project is related to thefts, then some amount will be kept aside to take care of the damage caused by this risk.
- Management reserve is for unknown risks.
  - There are several things that the project manager may not envision within the project.
  - If they do occur, some money needs to be kept aside to handle the damage.
  - This amount is the management reserve.

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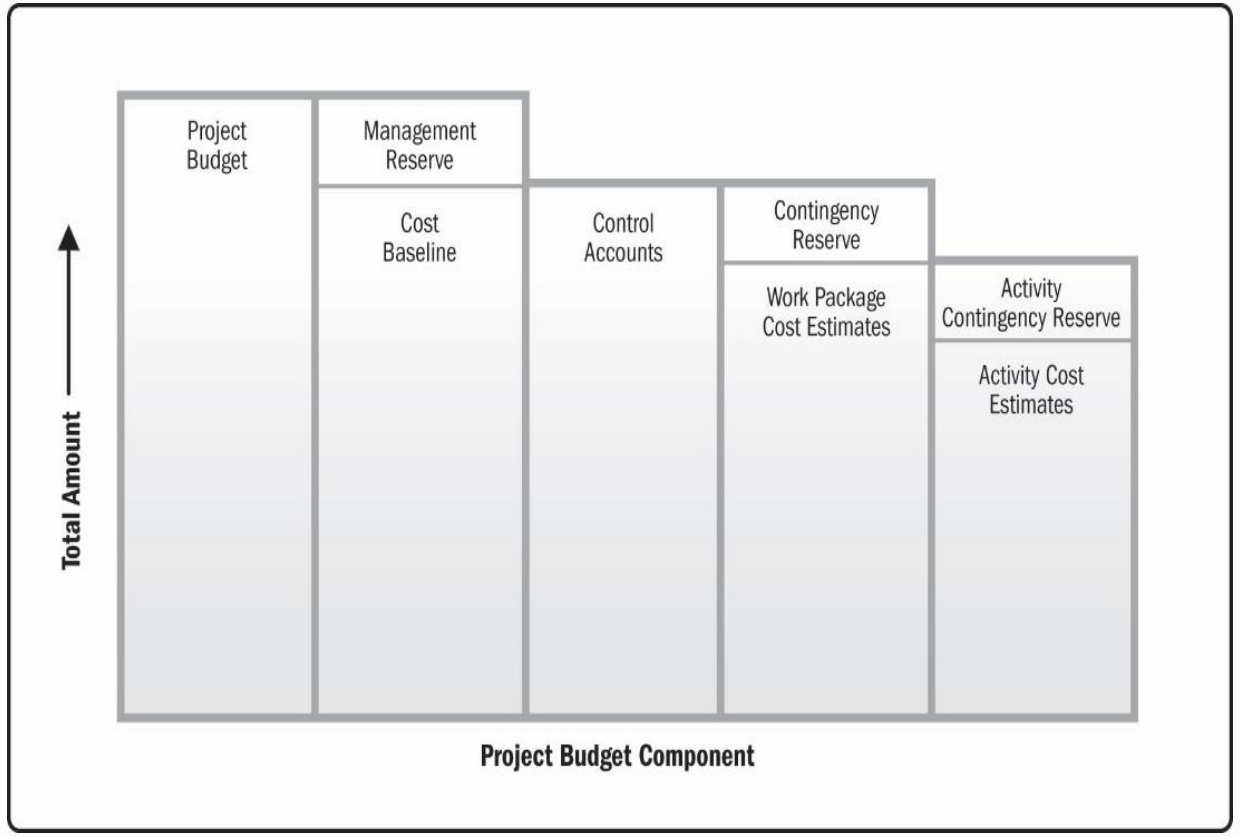
Project Budget Components



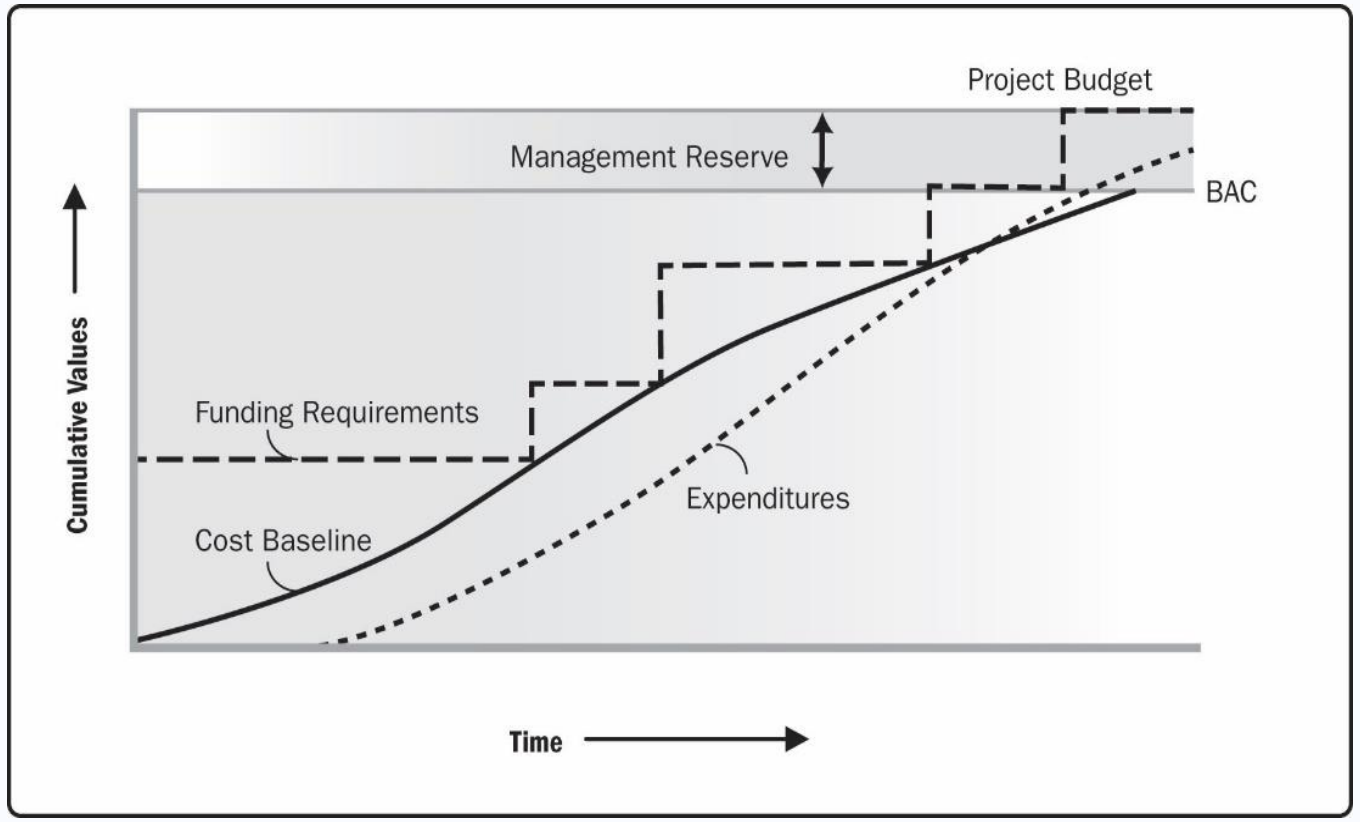
- Cost estimates from the various activities along with any contingency reserves associated with them create the work package cost estimates.
- The work package cost estimates plus any contingency reserves associated with them create the control accounts.
- The summation of all control accounts equals the cost baseline.
- Management reserve plus the cost baseline equals the project budget.

Source: Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition* (2017).

Cost Budgeting – An Example

Activity	Fixed Costs (F)	Variable Costs (V)			Total Cost (F+V)
		Resource Cost Per Day/Cost Per Item (A)	Number of Days/ Number of Items (B)	Total Variable Costs (A × B)	
1	$1,000	$100	10	$1,000	$2,000
2	—	$400	15	$6,000	$6,000
3	—	$250	10	$2,500	$2,500
4	$20,000	—	20	—	$20,000
Total Direct Costs					$30,500
Indirect Costs (10% of Direct Costs)					$3,050
Project Costs (Direct + Indirect Costs)					$33,550
Contingency Reserve (10% of Project Costs)					$3,355
Cost Baseline (Project Costs + Contingency Reserve)					**$36,905**
Management Reserve (2% of Cost Baseline)					$3,690
Cost Budget (Cost Baseline + Management Reserve)					**$40,595**

Cost Baseline, Expenditures, and Funding Requirements



Source: Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition* (2017).

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Cost Baseline – Some notes

- The cost baseline is often represented as an S-curve.
- Notice the uneven, step-like pattern for the funding requirements.
  - This is due to the fact that many projects are funded in incremental amounts that may not be equally distributed.

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Perform cost control

- Cost control involves comparing the differences between your cost baseline and actual costs and adjusting keep the project within budget.
- You can perform cost control repeatedly throughout the project to monitor and reduce spending or increase the budget as needed.
- Use your predetermined control thresholds to determine when it's necessary to resolve any issues.
- This is part monitoring and control process and will come back to this topic in future lectures.

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Common Cost Management problems and how to avoid them

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Budget is too small.	Make sure your budget is realistic at project start.
Cost estimates are inaccurate.	Gather as much real pricing data as possible from authoritative sources.
Teams request unplanned resources.	Talk directly with teams during the resource planning stage, and enforce budget limits once the project begins.
Project is behind schedule, which will increase costs if not corrected.	Communicate clearly with team leads and project managers, and make sure all stakeholders understand that delays will increase costs.
Client keeps adding requests and features to project specs, which drives up costs.	Provide the client with a specific process for submitting change orders, and include a step for cost re-estimation.

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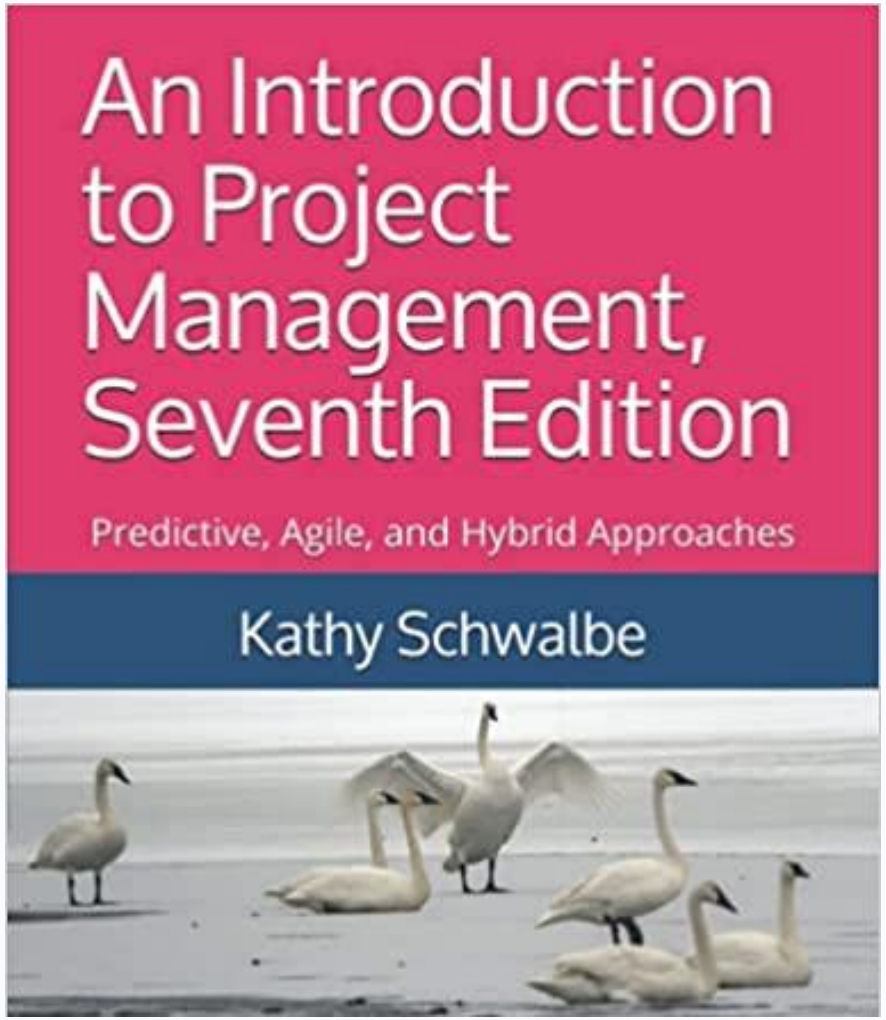
Reference

- Chapter 5: Planning Projects, Part 2 (Schedule and Cost Management)



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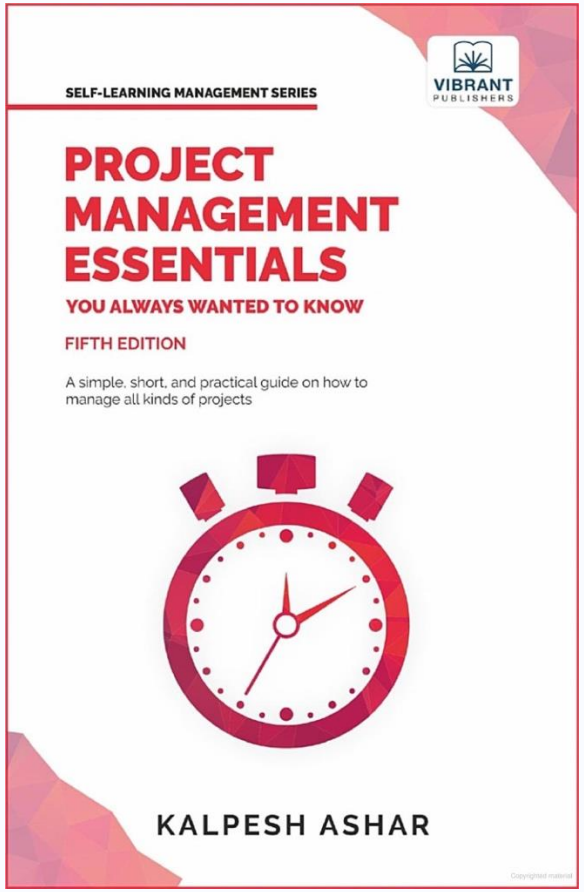
Reference

- Chapter 4 of:
  Project Management Essentials You Always Wanted To Know, 5ed



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YOUR QUESTIONS