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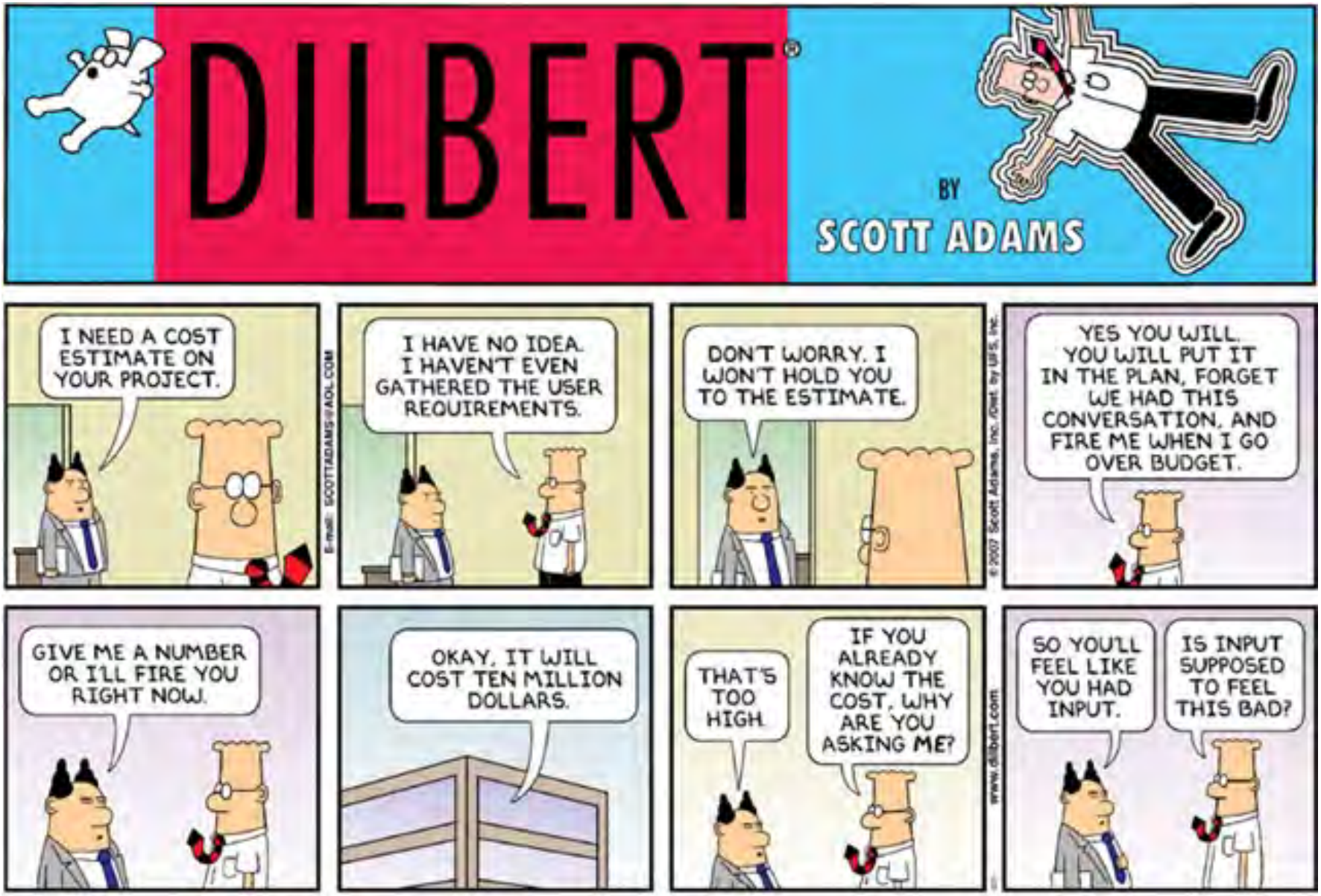
Activity planning and budgets

Image courtesy: Documentary “How Long is a Piece of String”, BBC Horizons 2009-2010 with Alan Davies

What is estimating?

The process of forecasting or approximating the time and cost of completing project deliverables

The task of balancing expectations of stakeholders and need for control while the project is implemented



Some reasons for estimating

- To support good decisions
- To schedule work
- To determine how long the project should take and its cost
- To determine whether the project is worth doing
- To develop cash flow needs
- To determine how well the project is progressing
- To develop time-phased budgets and establish the project baseline

Factors influencing the quality of estimates

Estimating guidelines

- Have people familiar with the tasks make the estimate
- Encourage accountability and responsibility
- Use several people to make the estimate
- Use consistent time units in estimating task times
- Treat each task as independent, don’t aggregate
- Base estimates on normal conditions, efficient methods, and a normal level of resources
  - Do not make allowances for contingencies
  - Adding a risk assessment helps avoid surprises to stakeholders

Types of estimates

Top-down (macro)

- Analogy/previous experience
- group consensus
- mathematical relationships

Bottom-up (micro)

- estimates of elements of the work breakdown structure

Conditions for selecting estimating method

Top-down estimates	Bottom-up estimations
Strategic decision making	Cost and time important
High uncertainty	Fixed-price contract
Internal, small project	Customer wants details
Unstable scope	

Top-down approaches

Consensus methods

Ratio methods

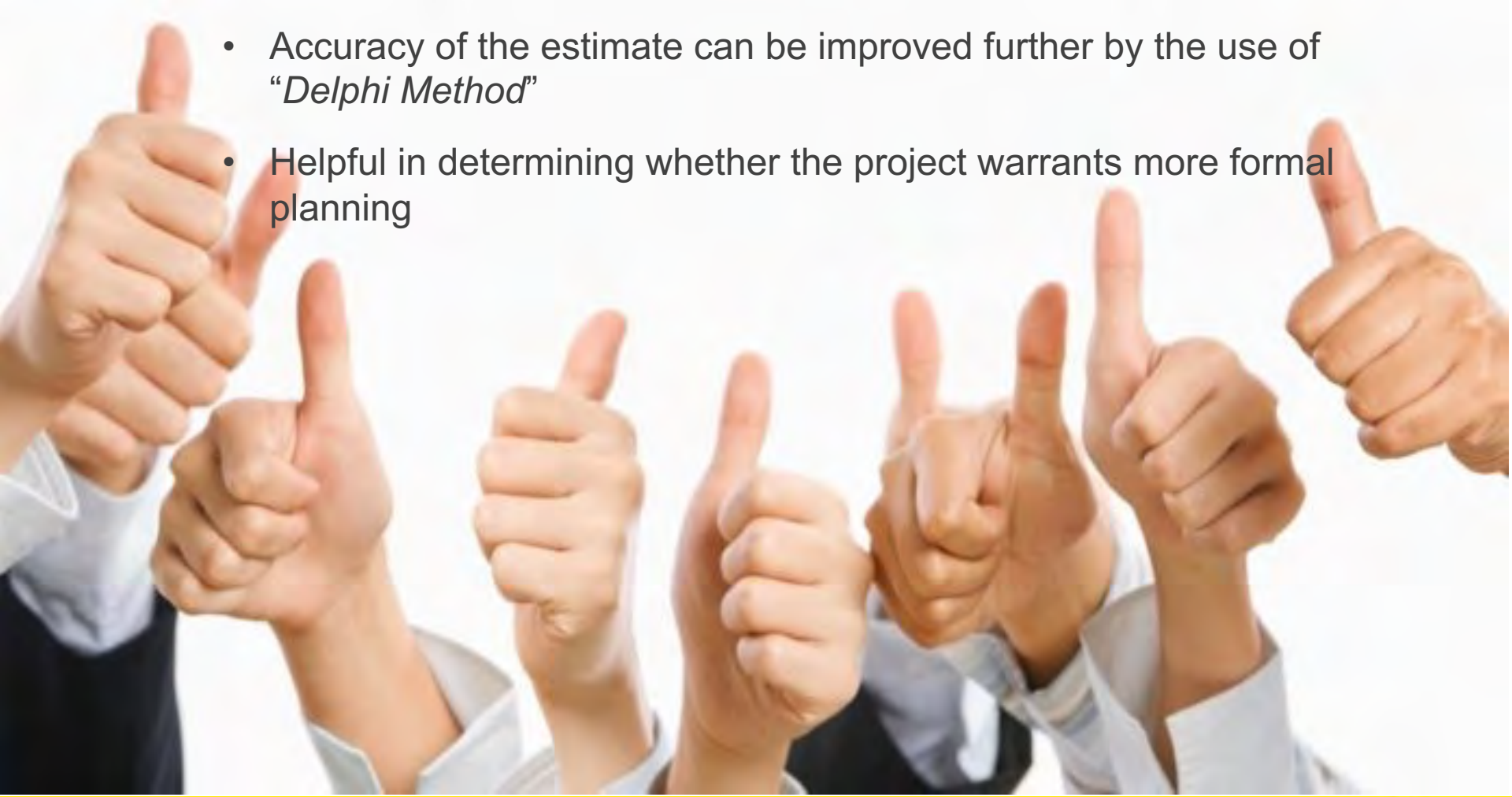
Apportionment methods

Function point methods for software and system projects

Learning curves

Consensus method

- Typically involves a meeting where experts discuss, argue and reach a decision as to their "*best guess*" estimate
- Accuracy of the estimate can be improved further by the use of "*Delphi Method*"
- Helpful in determining whether the project warrants more formal planning



Ratio method

- Also known as “parametric method”
- Usually use ratios or surrogates to estimate project times or costs
- Often obtain initial estimates based on prior experience

Example

The cost of building a house in a particular suburb is $150 per square metre.

If a house of 1,000 square metres is to be built, how much would it approximately cost?

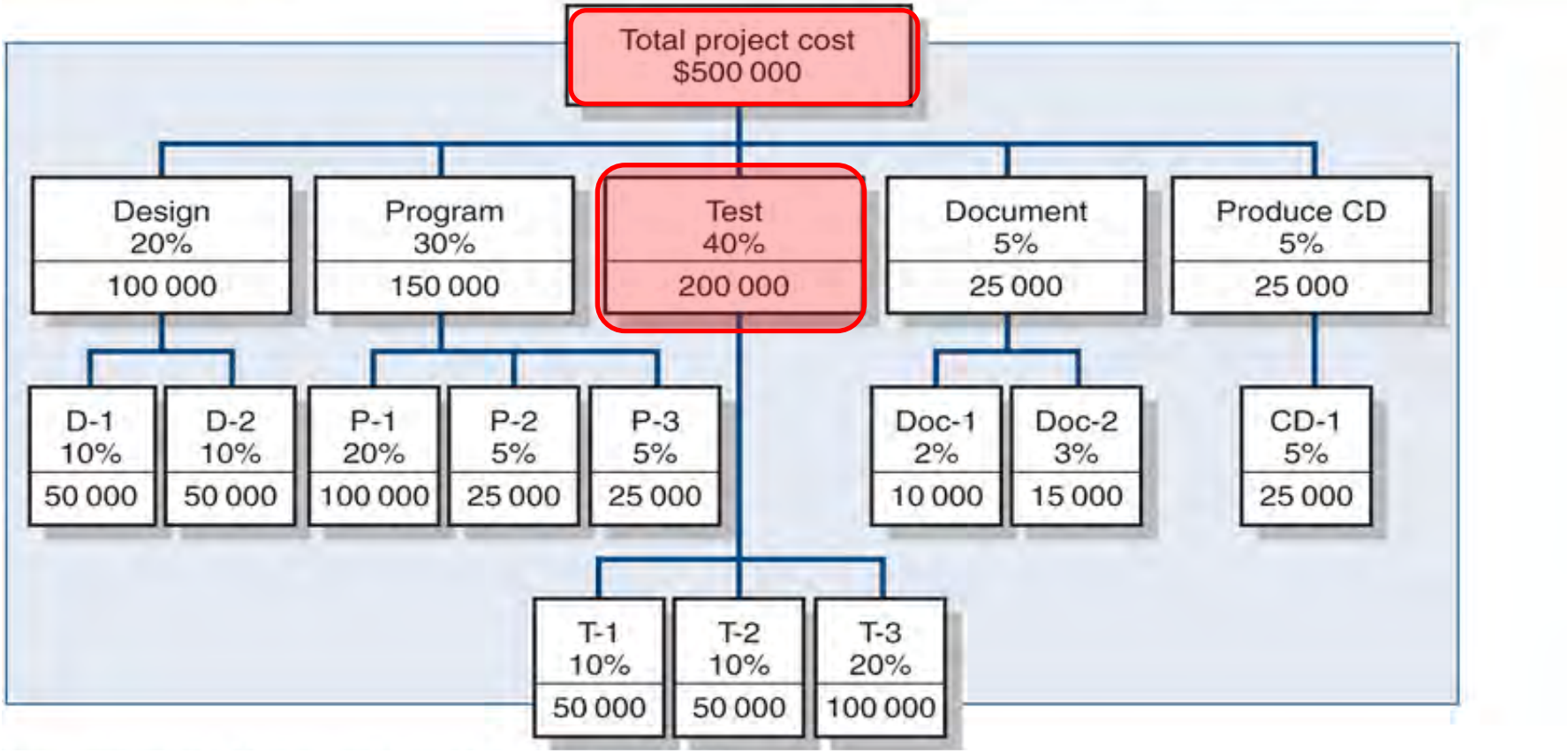
Estimated cost is: $150 x 1,000 = $150,000

Apportionment method

- Is an extension of the Ratio method
- Is used when projects closely follow past projects in features and costs
- Useful for projects that are relatively standard, but have some small variation or customisation

Example

Figure 5.1 APPORTIONMENT METHOD OF ALLOCATING PROJECT COSTS USING THE WORK BREAKDOWN STRUCTURE



Function point method

- Is often used for software and systems projects
- Uses weighted macro variables called “function points”
- A function point is a unit of measurement to express the amount of business functionality an information system provides to a user. Function points are used to measure software size.

Example

TABLE 5.2 Simplified basic function point count process for a prospective project or deliverable

	Complexity weighting			
Element	**Low**	**Average**	**High**	**Total**
Number of *inputs*	_____ × 2 +	_____ × 3 +	_____ × 4	= _____
Number of *outputs*	_____ × 3 +	_____ × 6 +	_____ × 9	= _____
Number of *inquiries*	_____ × 2 +	_____ × 4 +	_____ × 6	= _____
Number of *files*	_____ × 5 +	_____ × 8 +	_____ × 12	= _____
Number of *interfaces*	_____ × 5 +	_____ × 10 +	_____ × 15	= _____

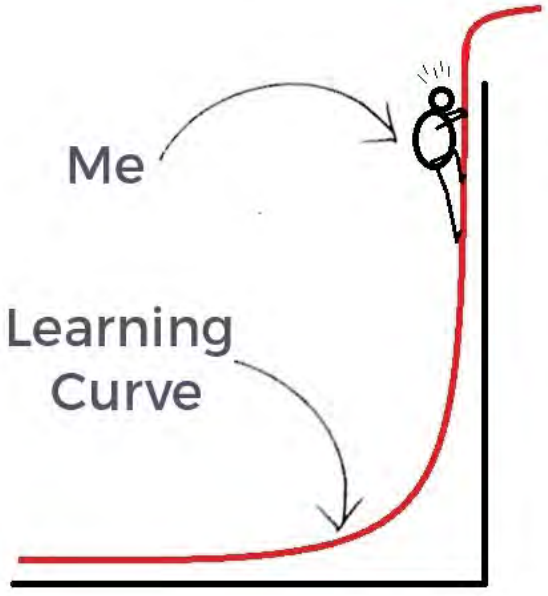
TABLE 5.3 Example: Function point count method

Software project 13: Patient admitting and billing			
15	Inputs	Rated complexity as low	(2)
5	Outputs	Rated complexity as average	(6)
10	Inquiries	Rated complexity as average	(4)
30	Files	Rated complexity as high	(12)
20	Interfaces	Rated complexity as average	(10)

Application of complexity factor					
Element	**Count**	**Low**	**Average**	**High**	**Total**
Inputs	15	× 2			= 30
Outputs	5		× 6		= 30
Inquiries	10		× 4		= 40
Files	30			× 12	= 360
Interfaces	20		× 10		= 200
				Total	660

Learning curves

- Also known as the “improvement curve”, “experience curve” and “industrial progress curve”
- Useful for tasks which are repeated several times
- Based on the principle that in general, the time to perform a task improves with repetition.
- Each time the output quantity doubles, the unit labour hours are reduced at a constant rate
- Most applicable to projects that are ***labour*** intensive.



Bottom-up approaches

Template methods

Parametric procedures applied to specific tasks

Range estimating

Template methods

If the project is similar to past projects the cost and time estimates from these past projects can be used as a starting point for the new project.

Differences are noted and estimates adjusted

Enables development of a budget in a very short time

Parametric procedures applied to specific tasks

Similar to the ratio and apportion methods from top-down estimation

This method begins with ratio at the lowest possible level of a WBS (work package)

Example

An IT workstation conversion project requires 30 computers to be upgraded.

From past experience, one person could convert 5 computers per day.

If there are 2 technicians available, how long will it will take to complete the project?

Answer is 3 days!

Range estimating

- Instead of using a point estimate (e.g. 5 days)
- Range estimating usually use three estimates
  - Low/Average/High;
  - Pessimistic/Most likely/Optimistic
- Work best when the work packages have significant uncertainty associated with time and cost

Example

Figure 5.2 RANGE ESTIMATING TEMPLATE

	A	B	C	D	E	F	G	H
1	Project number: 18				Project Manager: Dawn O'Connor			
2	Project description. New Organic Wine Launch				Date: 2/17/2xxx			
3		Organic Wine Launch Project						
4		Range Estimates						
5								
6	WBS	Description	Low	Average	High	Range	Risk	
7	ID		Estimate	Estimate	Estimate		Level	
8			Days	Days	Days	Days		
9								
10	102	Approval	1	1	3	2	low	
11	103	Design packaging	4	7	12	8	medium	
12	104	ID potential customers	14	21	35	21	high	
13	105	Design bottle logo	5	7	10	5	low	
14	106	Contract kiosk space		10	15	7	medium	
15	107	Construct kiosk	4	4	8	4	medium	
16	108	Design fair brochure	6	7	12	6	high	
17	109	Trade journal advertising	10	12	15	5	medium	
18	110	Production test	10	14	20	10	high	
19	111	Produce to inventory	5	5	10	5	high	
20	112	Business card scanner hookup	1	2	3	2	low	
21	113	Video hook up	2	2	4	2	medium	
22	114	Event rehearsal	2	2	5	3	high	

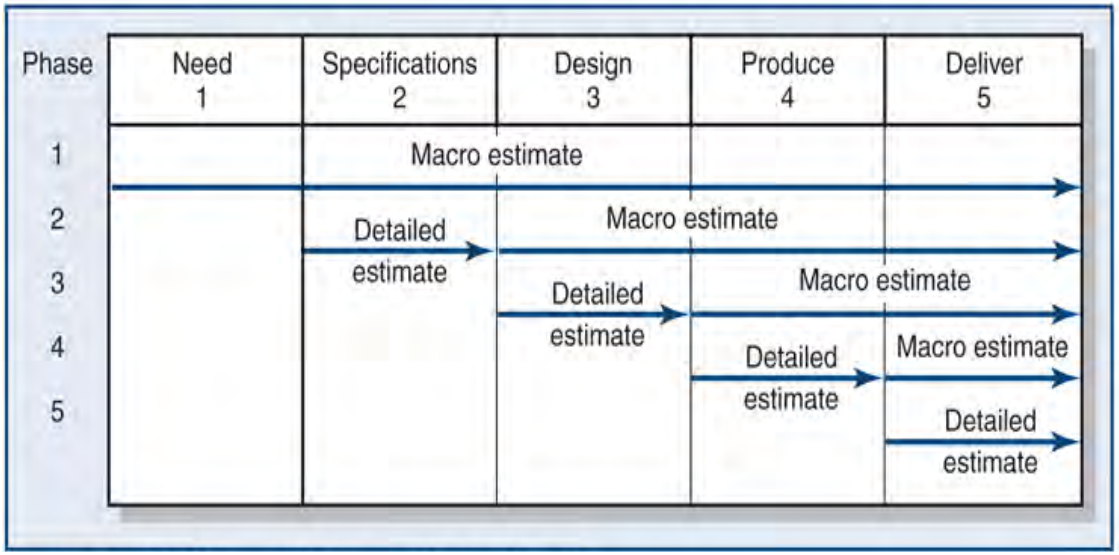
Top-down and bottom-up comparison

Top-Down Estimates	Bottom-Up Estimates
Intended Use Feasibility/conceptual phase Rough time/cost estimate Fund requirements Resource capacity planning	**Intended Use** Budgeting Scheduling Resource requirements Fund timing
Preparation Cost 1/10 to 3/10 of a percent of total project cost	**Preparation Cost** 3/10 of a percent to 1.0 percent of total project cost
Accuracy Minus 20%, to plus 60%	**Accuracy** Minus 10%, to plus 30%
Method Consensus Ratio Apportion Function point Learning curves	**Method** Template Parametric WBS packages Range estimates

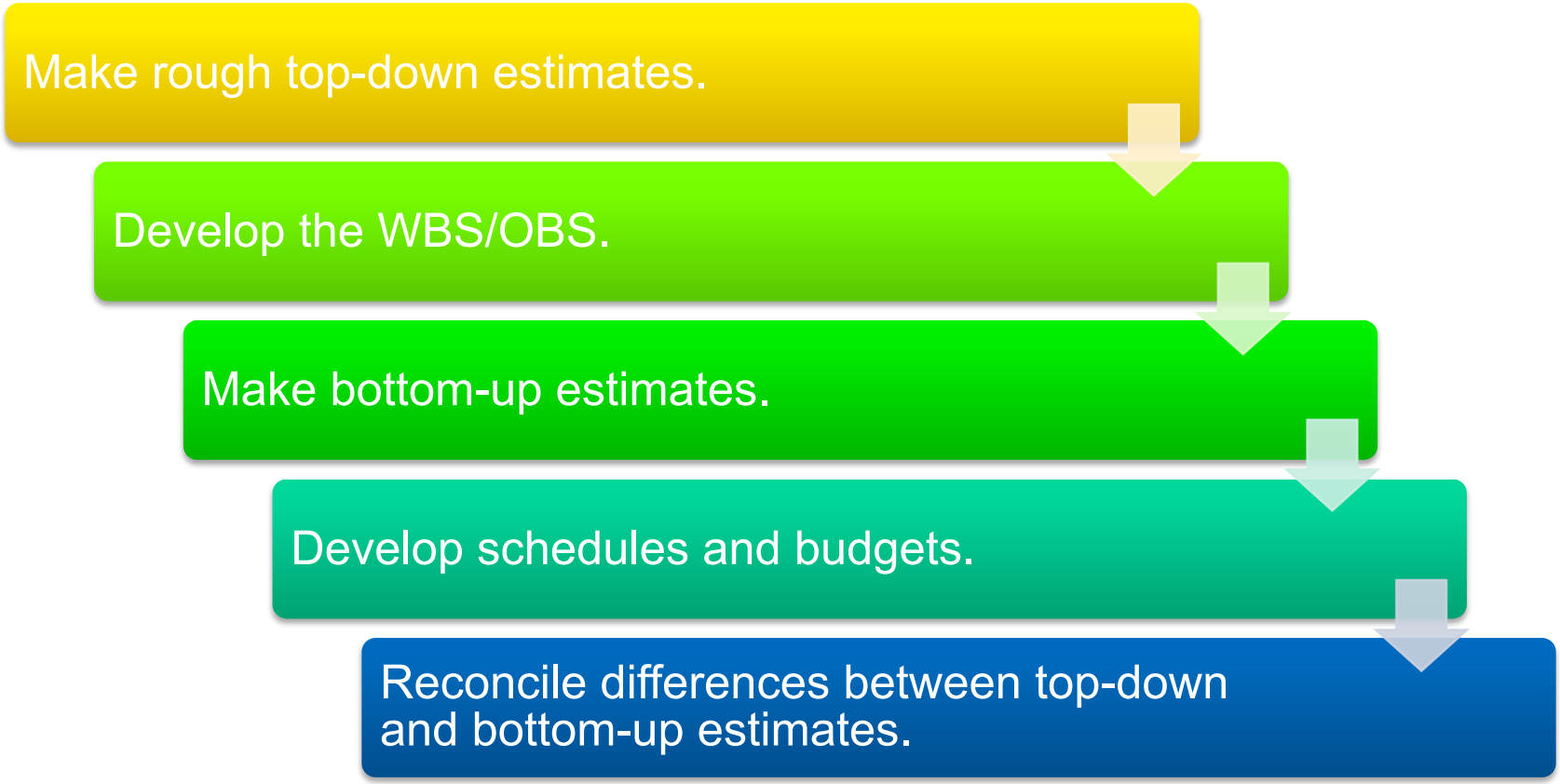
A hybrid: phase estimating

- Uses a two-estimate system over the life of the project
  - A detailed (micro) estimate is developed for the immediate phase
  - A macro estimate is made for the remaining phases of the project

Figure 5.3 PHASE ESTIMATING OVER PROJECT LIFE CYCLE



Estimating projects: preferred approach



Refining and improving estimates

Adjusting estimates

- Time and cost estimates of specific activities are adjusted as the risks, resources and situation particulars become more clearly defined.

Reasons for adjusting estimates

- Interaction costs are hidden in estimates
- Normal conditions do not always apply
- Things go wrong on projects
- Changes in project scope and plans
- Overly optimistic
- Strategic misrepresentation

Types of costs

Direct costs

- Costs that are clearly chargeable to a specific work package
- E.g. labour, materials, equipment and other

Direct (project) overhead costs

- Costs incurred that are directly tied to an identifiable project deliverable or work package
- E.g. salary, rents, supplies, specialised machinery

Indirect (general and administrative) overhead costs

- Organisation costs indirectly linked to a specific package that are apportioned to the project

Three views of cost

Figure 5.6 THREE VIEWS OF COST