Budgeting the Project

- A budget is developed in order to obtain the resources needed to accomplish the project's objectives
- It acts as a tool for upper management to monitor and guide the project.

Budget Management

- Managing the budget includes
  - Estimating costs and setting a budget
  - Determining when the budgeted costs should occur
  - Tracking expenditures
  - Managing variances between the budget and the expenditures

Methods of Budgeting

Top-Down Budgeting

- The top-down approach to budgeting is based on the collective judgments and experiences of top and middle managers concerning similar past projects
- Managers estimate the overall project cost by estimating the costs of the major tasks
- The above estimates are then given to the next lower level of managers to split up among the tasks under their control, and so on, until all the work is budgeted.

Advantages

- **Such type of budget focuses on the overall growth of the organization.**
- **It makes departments aware of what the top management expects from them.**
- **It is a quick way of preparing a budget and helps to overcome interdepartmental issues.**
- **Saves time for lower management as well. Rather than preparing the budget from scratch, each department gets a set goal. This saves both time and resources.**
- **Under top-down budgeting, management creates only one budget, rather than allowing the department to create their budget and combine them later. Hence, it is a less tedious approach.**

Disadvantages

- **Since managers are not part of the budget-making process, they may not feel much motivation to ensure their success.**
- **Since senior managers are not much aware of the day-to-day operations of the departments, they may set unrealistic targets. This results in lower-level managers finding it difficult to meet the set numbers.**
- **Such a type of budgeting may often lead to over or under-allocation of resources.**

Bottom-Up Budgeting

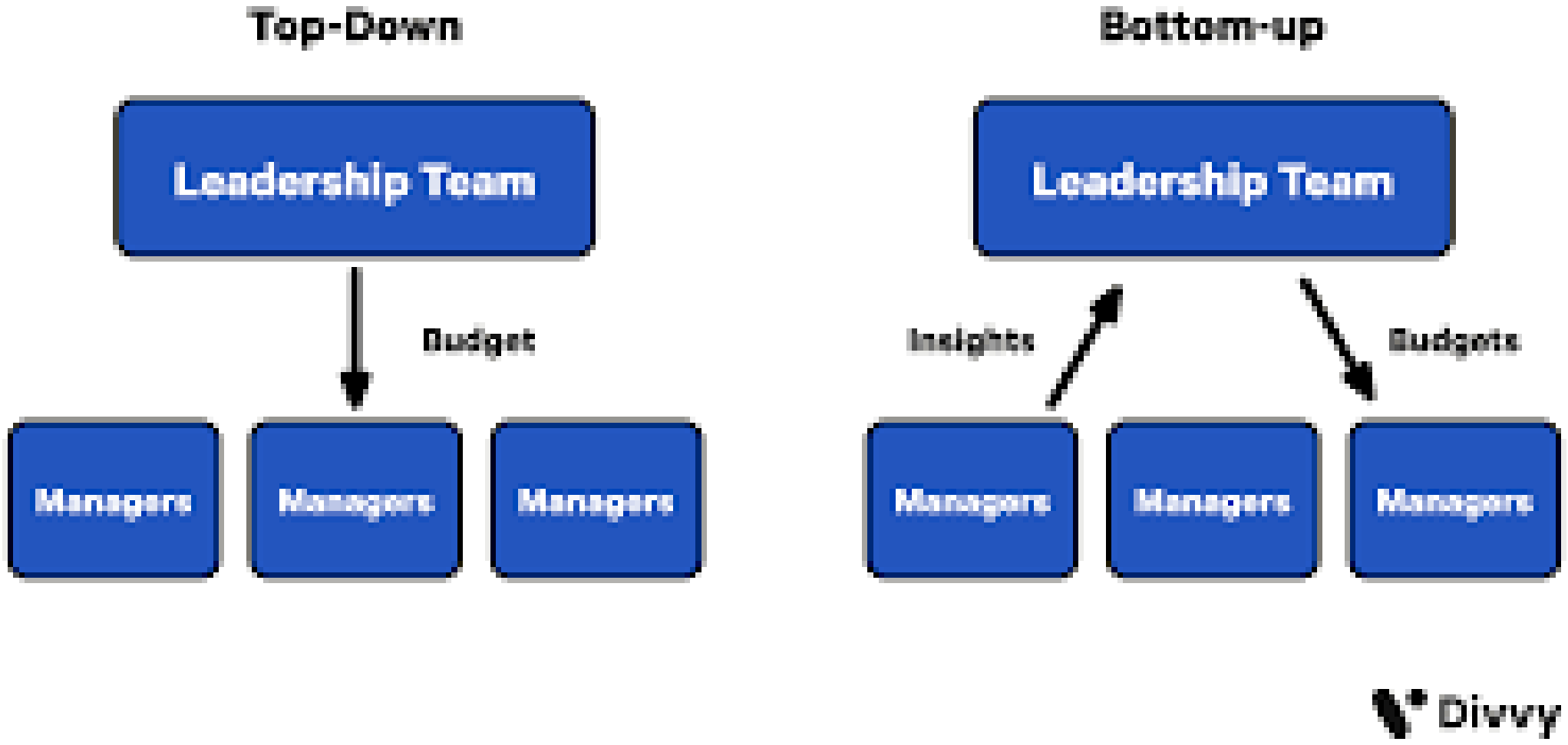
- **WBS identifies the elemental tasks, whose resource requirements are estimated by those responsible for executing them**
- **The resources, such as labor and materials, are then converted to costs and aggregated to different levels of the project.**
- **The PM then adds indirect costs such as general and administrative, a reserve for contingencies and a profit figure to arrive at a final project budget**

Advantages

- It is usually very accurate. Individuals in each department are best placed to understand their costs, resources, expenses and requirements.
- It can also provide a boost to morale because when employees are given accountability to set their own budgets, they are often more motivated to work hard to meet company goals. A sense of ownership may be achieved, along with increased job satisfaction.

Disadvantages

- A tendency for department heads to over-budget, to ensure they have enough money for the year.


Top-Down
Leadership Team
Budget
Managers
Managers
Managers
Bottom-up
Leadership Team
Insights
Budgets
Managers
Managers
Managers
Divvy

Cost Estimating

- Most businesses and professions employ experienced estimators who can forecast resource usage
- In many fields, the methods of cost estimation are well documented based on the experience of estimators gathered over many years.
- For example, the cost of a building, or house, is usually estimated by the square feet of floor area multiplied by an appropriate rupee value per square foot and then adjusted for any unusual factors.

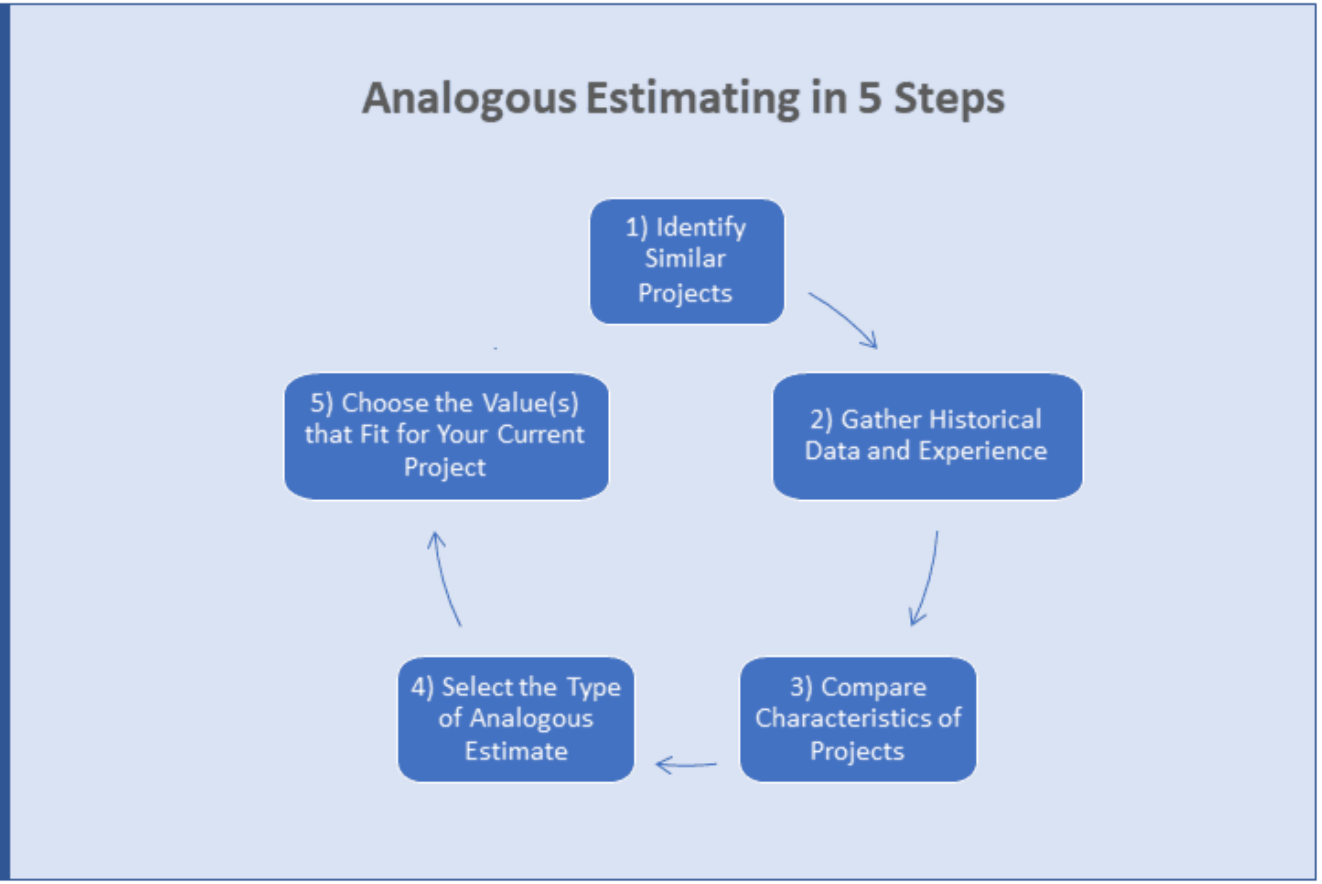
Methods of Estimating

ANALOGOUS ESTIMATING

- Analogous cost estimating uses values, or attributes, of a previous project that are like the current project
- Values and attributes of the projects may include but are not limited to: scope, cost, budget, duration, and measures of scale (e.g., size, weight).
- Comparison of these project values, or attributes, becomes the basis for estimating the same parameter or measurement for the current project

5-Step Guide to **Analogous Estimating**

- Selection of Similar Projects
- Processing of Historical Data
- Compilation of the Estimate(s)



PARAMETRIC ESTIMATING

- Parametric estimating uses a statistical relationship between relevant historical data and other variables (e.g., square footage in construction) to calculate a cost estimate for project work.
- This technique can produce higher levels of accuracy depending on the sophistication and underlying data built into the model
- Parametric cost estimates can be applied to a total project or to segments of a project

According to PMI's Practice Standard, there are 2 types of results

- **Deterministic and**
- **Probabilistic estimates.**

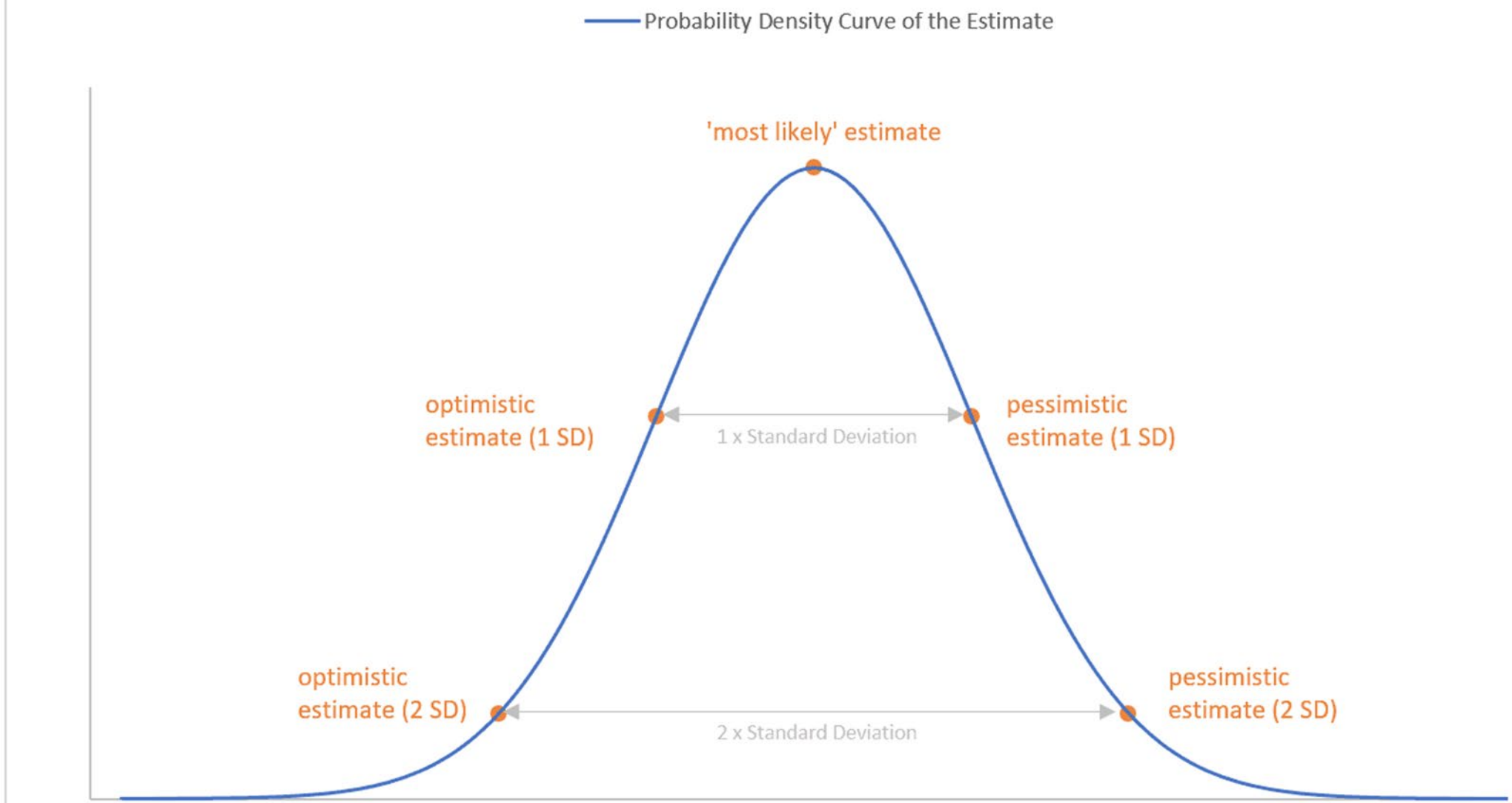
The deterministic result type of the parametric estimation is a single number for the amount of cost or time needed, calculated based on parametric scaling. It is sometimes manually adjusted to account for differences between the current and historic projects (e.g. different levels of experience of the teams) or to add a contingency reserve..

Probabilistic Estimates

This result type is not producing a single estimate but a range of estimates based on the probability of different cost and duration amounts. This is often presented in the form of a probability density curve as shown in the below chart.

Probabilistic Parametric Estimate

(Normally Distrubuted Probability Density Curve as an Example)



THREE-POINT ESTIMATING

- The accuracy of single-point cost estimates may be improved by considering estimation uncertainty and risk and using three estimates to define an approximate range for an activity's cost
- Most likely (Cm). The cost of the activity, based on realistic effort assessment for the required work and any predicted expenses
- Optimistic (Co). The cost based on analysis of the best-case scenario for the activity
- Pessimistic (Cp). The cost based on analysis of the worst-case scenario for the activity

Triangular distribution. $C_E = (Co + Cm + Cp) / 3$

Beta distribution. $C_E = (Co + 4\ Cm + Cp) / 6$

Pros and Cons

Pros	Cons
The parametric estimation technique can be very accurate when it comes to estimating cost and time.	Parametric estimating can be time-consuming and costly. Obtaining the historic data and building a model requires some efforts and resources.
It is therefore easier to get stakeholders' support and approval of budgets determined this way.	The required availability of historic data and the expected scalability are further constraints for the use of this technique.
Once the model is established, it can be reused for other similar project and the quality of data becomes better with every additional project.	It can often only be used for some parts of a project while others need to be estimated with different techniques.
	Relying on the data may not be appropriate if certain factors differ between the current and previous projects.
	The quality of the historic data may also be an area of concern in some cases.
	Parametric estimating has the inherent risk of providing a false sense of accuracy if models are inaccurate or data from other projects prove not to apply to the current project.

BOTTOM-UP ESTIMATING

- Bottom-up estimating is a method of estimating a component of work
- The detailed cost is then summarized or “rolled up” to higher levels for subsequent reporting and tracking purposes.

Improving Cost Estimate

USING FORMS

RESOURCES NEEDED

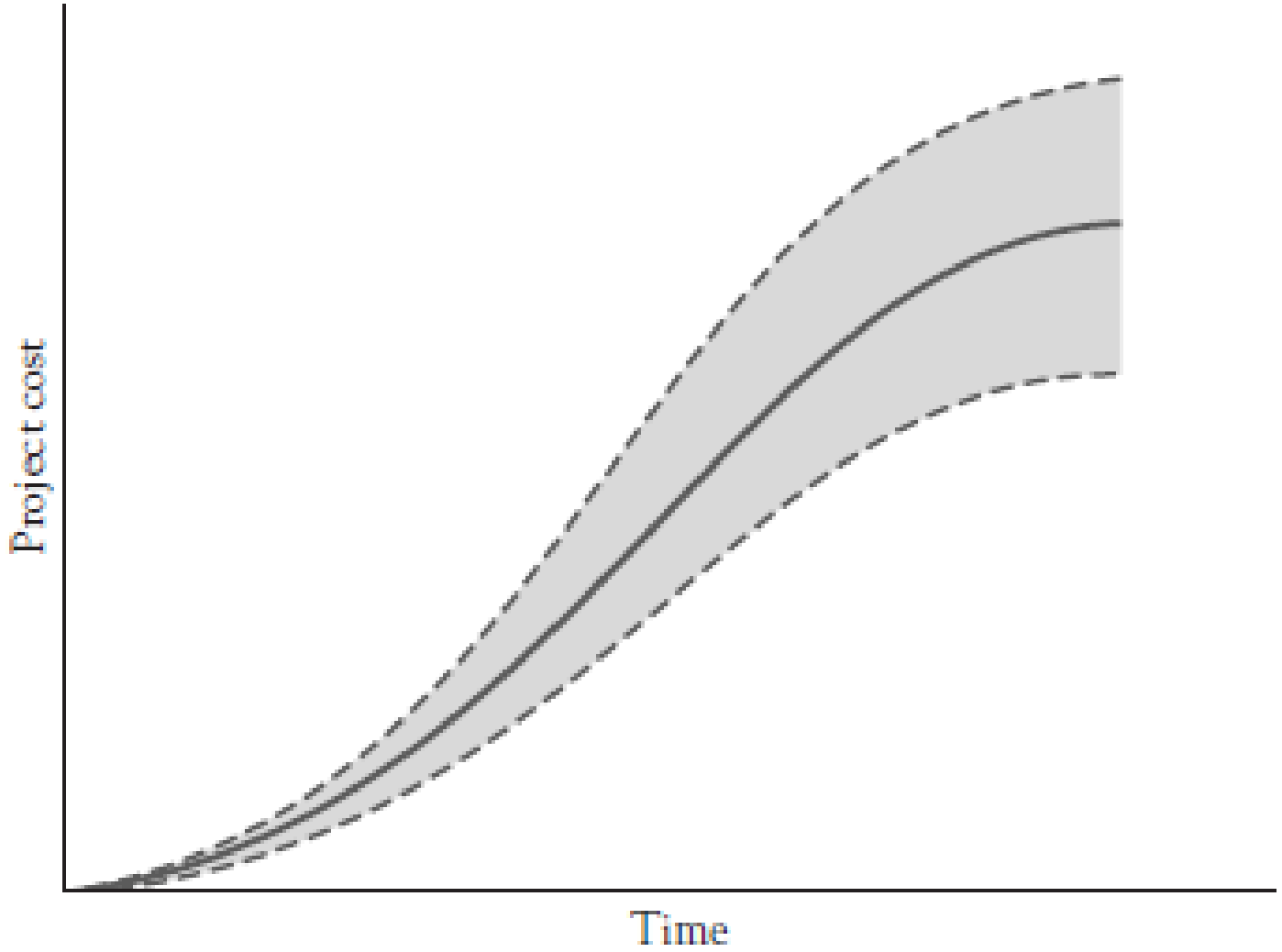
Resources	Person to Contact	How Many/ Much Needed	When Needed	Check (✓) If Available
People:				
Managers, Supervisors				
Professional & Technical				
Nontechnical				
Money				
Materials:				
Facilities				
Equipment				
Tools				
Power				
Space				
Special Services:				
Research & Test				
Typing/clerical				
Reproduction				
Others				

Learning Curves

- In general, it has been found that unit performance improves by a fixed percent each time the total production quantity doubles
- Each time the output doubles, the worker hours per unit decrease by a fixed percentage of their previous value
- This percentage is called the learning rate, and typical values run between 70 and 95 percent
- The higher values are for more mechanical tasks, while the lower values are for more mental tasks
- Mathematically, this relationship we just described follows a negative exponential function. Using this function, the time required to produce the n^{th} unit can be calculated as

$$T_n = T_1 n^r$$

BUDGET UNCERTAINTY AND PROJECT RISK MANAGEMENT


Project cost
Time

The reasons for cost uncertainty in the project

- Prices may escalate,
- Different resources may be required
- The project may take a different amount of time than we expected