Project Cost Management

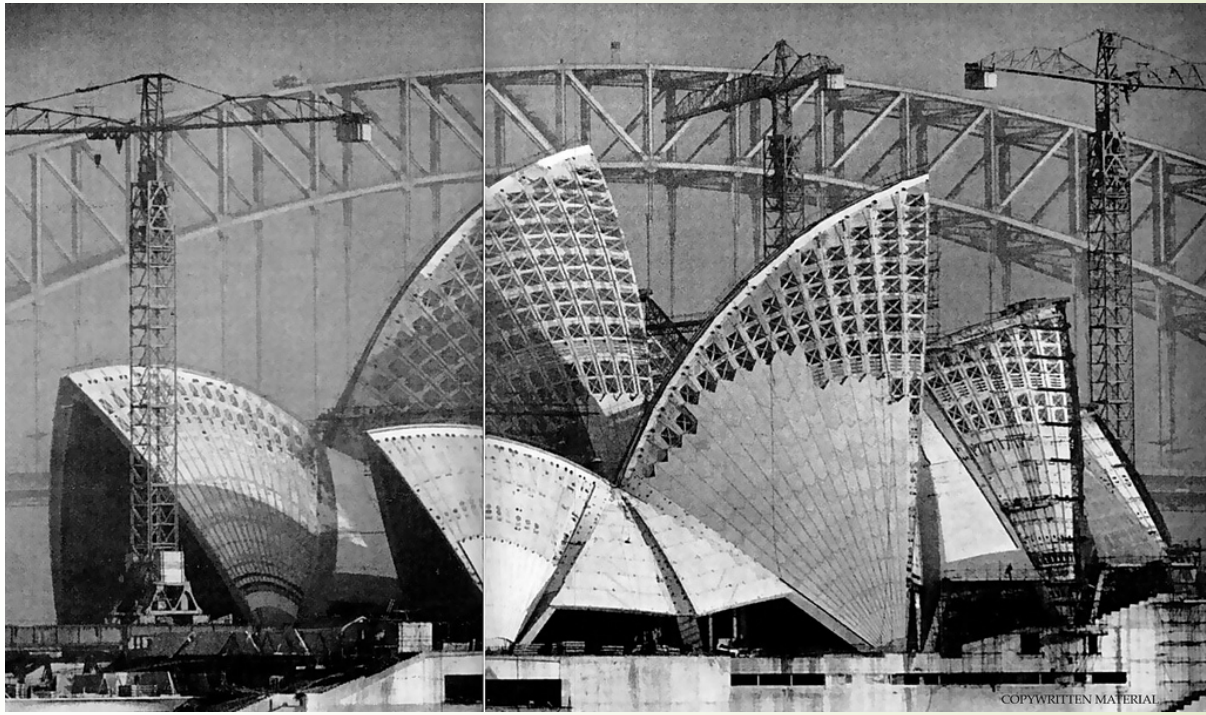
ENGG105

Sydney Opera House Project Cost

- Originally, it was estimated that the construction of the Opera House would cost in the region of **$7 million**.
- The final bill came in at a huge cost of **$102 million** – almost **15 times** what was first predicted!

Underestimating the Construction Time

- 10,000 construction workers were involved in the building of the Sydney Opera House and it was predicted to **take 4 years**.
- It was not until 1973, however, **14 years** after construction began, that the project was completed!

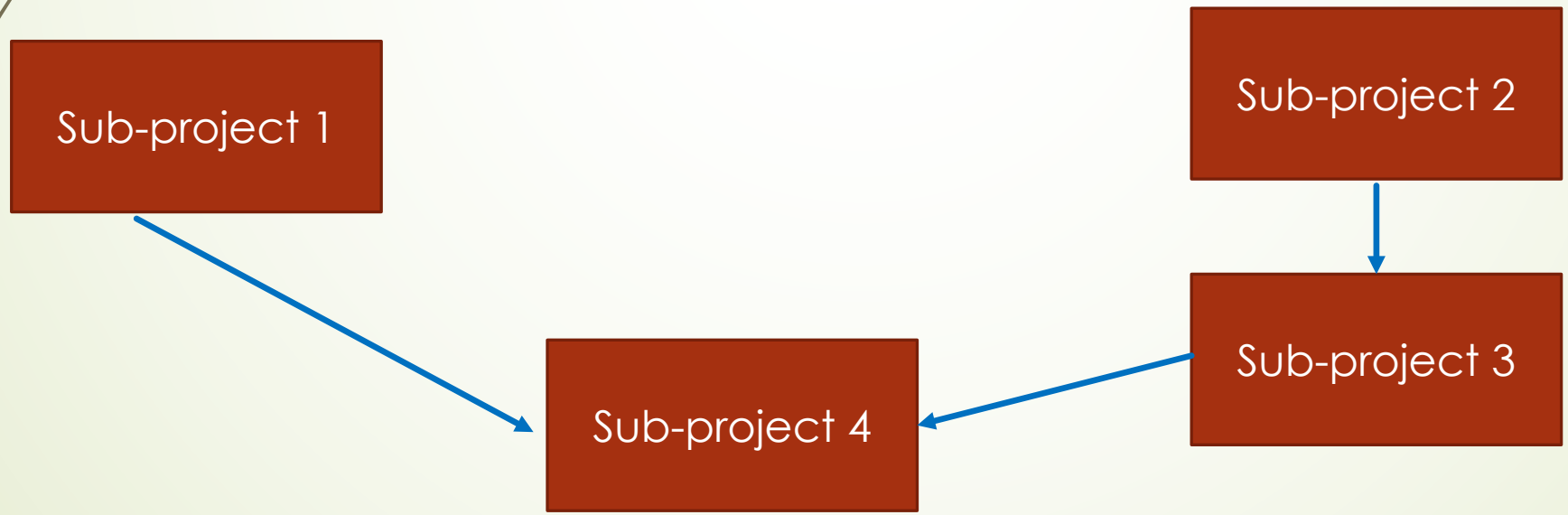


Reason for Estimation Error

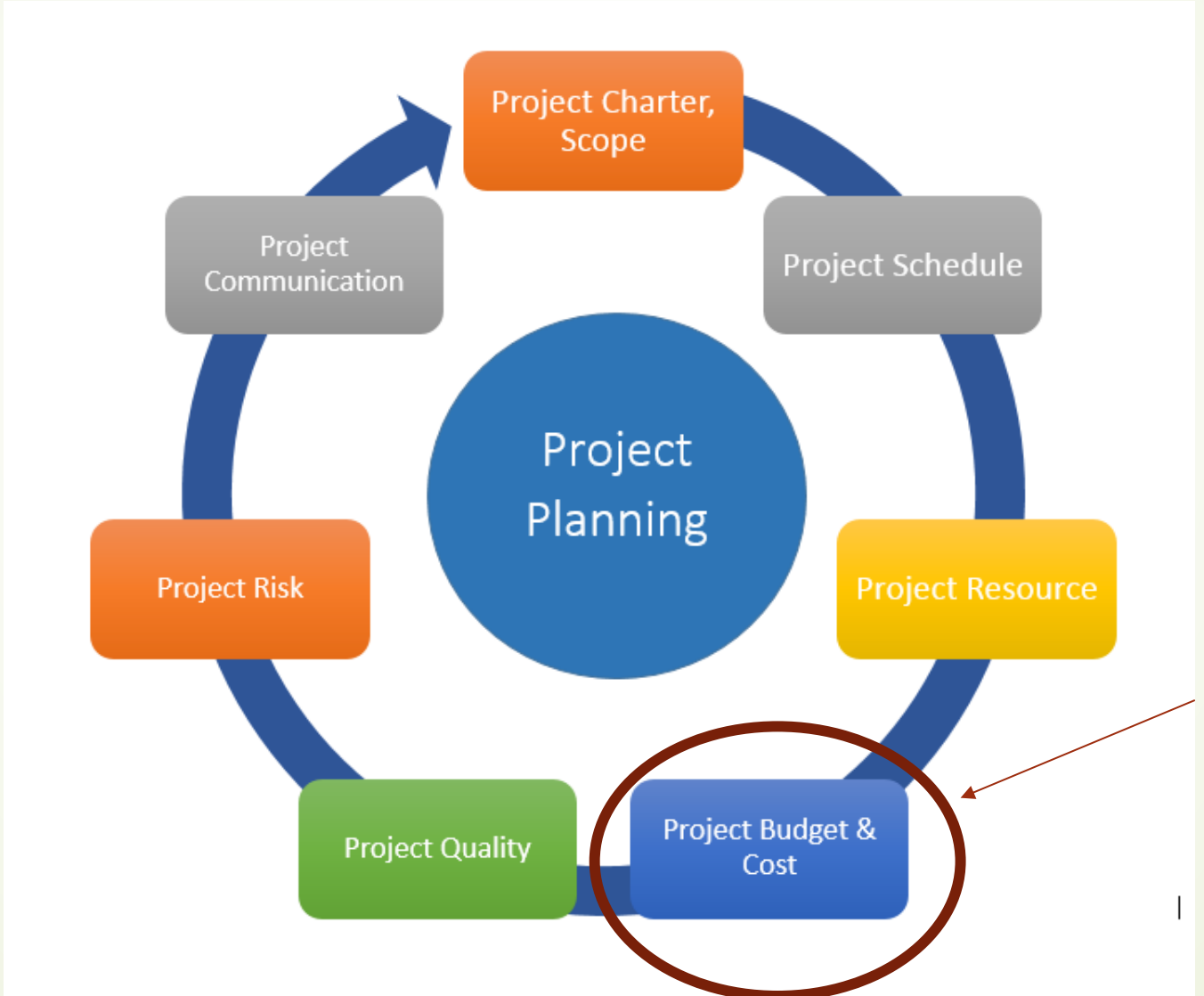
- From the beginning, the project suffered from a **lack of clear goals and objectives, a reasonable schedule, and budget.**
- Time and cost considerations were consistently swept under the table.
- The 1957 competition that launched the project largely ignored these practicalities, allowing the architects unfettered creativity.
- As a result, only the **wow factor of the final product** was considered.
- Furthermore, the design was so **ambitious** that the assessment committee originally dismissed it as too difficult to execute.

Project Flow Diagram

- The project flow diagram shows the prelateship between subject projects and is a necessary foundation for planning time and cost.
- Although it does not include a timescale, it does provide a clear delivery order for the products.
- A simple project flow diagram is shown here.



Different Aspects of Project Plan



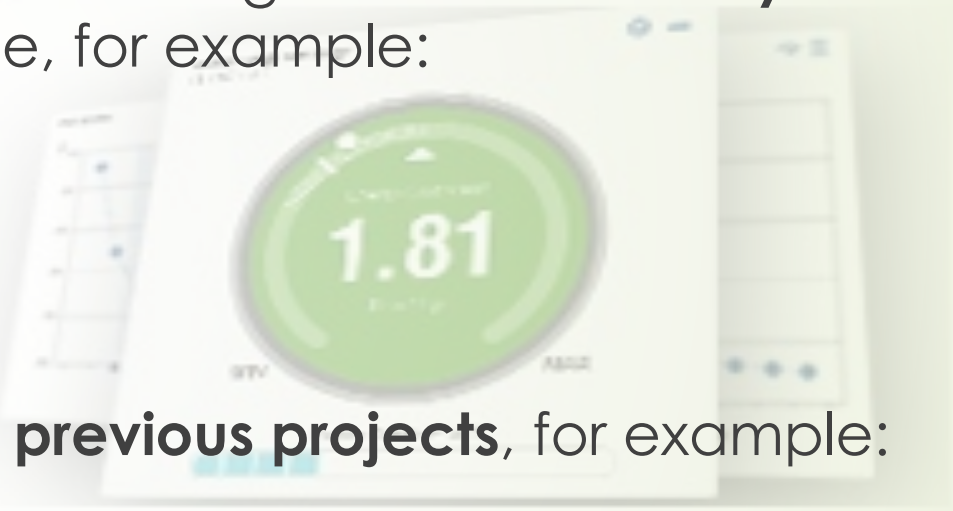
Focus of this lecture

Project Cost Estimation

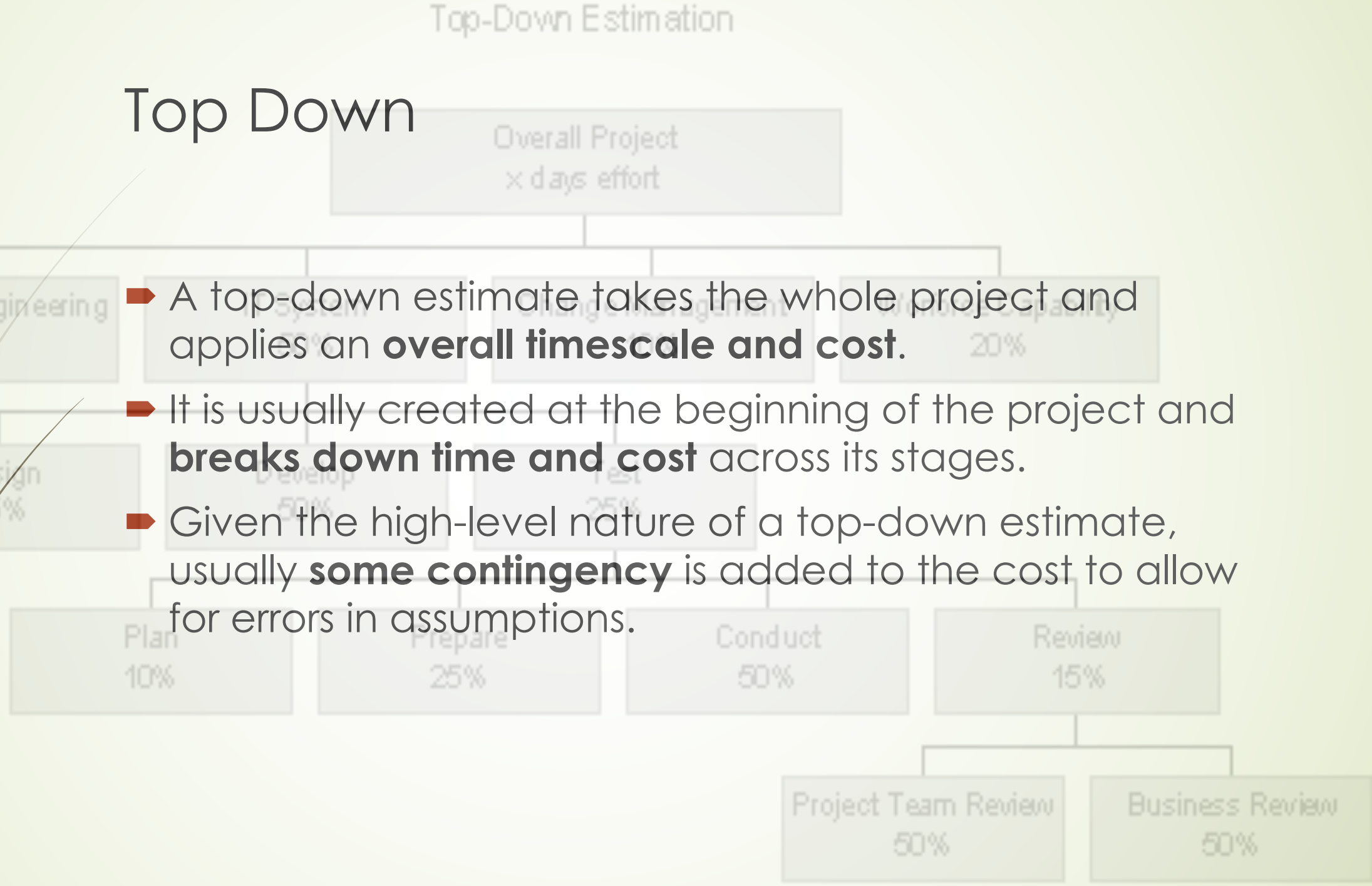
- The project cost estimation is a probability assessment of cost **the time and resources** required for the delivery of your project.
- The estimate depends heavily on your project plan.
- The more detailed the project plan, the easier and more accurate will be the cost estimation.

Two Broad Methods of Cost Estimation Techniques

- Methods that are applied **without** taking into account **any historic data** or prior experience, for example:
  - top down and bottom up;
  - Delphi technique;
  - analogous.
- Techniques that **use data from previous projects**, for example:
  - work distribution;
  - standard project/product.



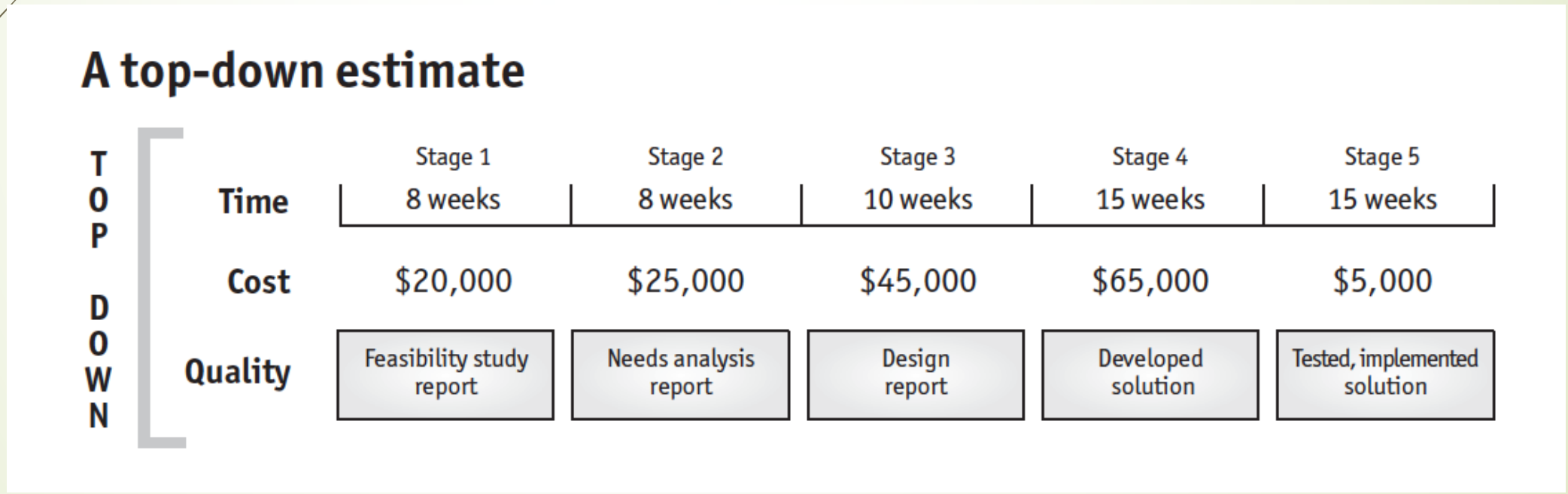
Top Down



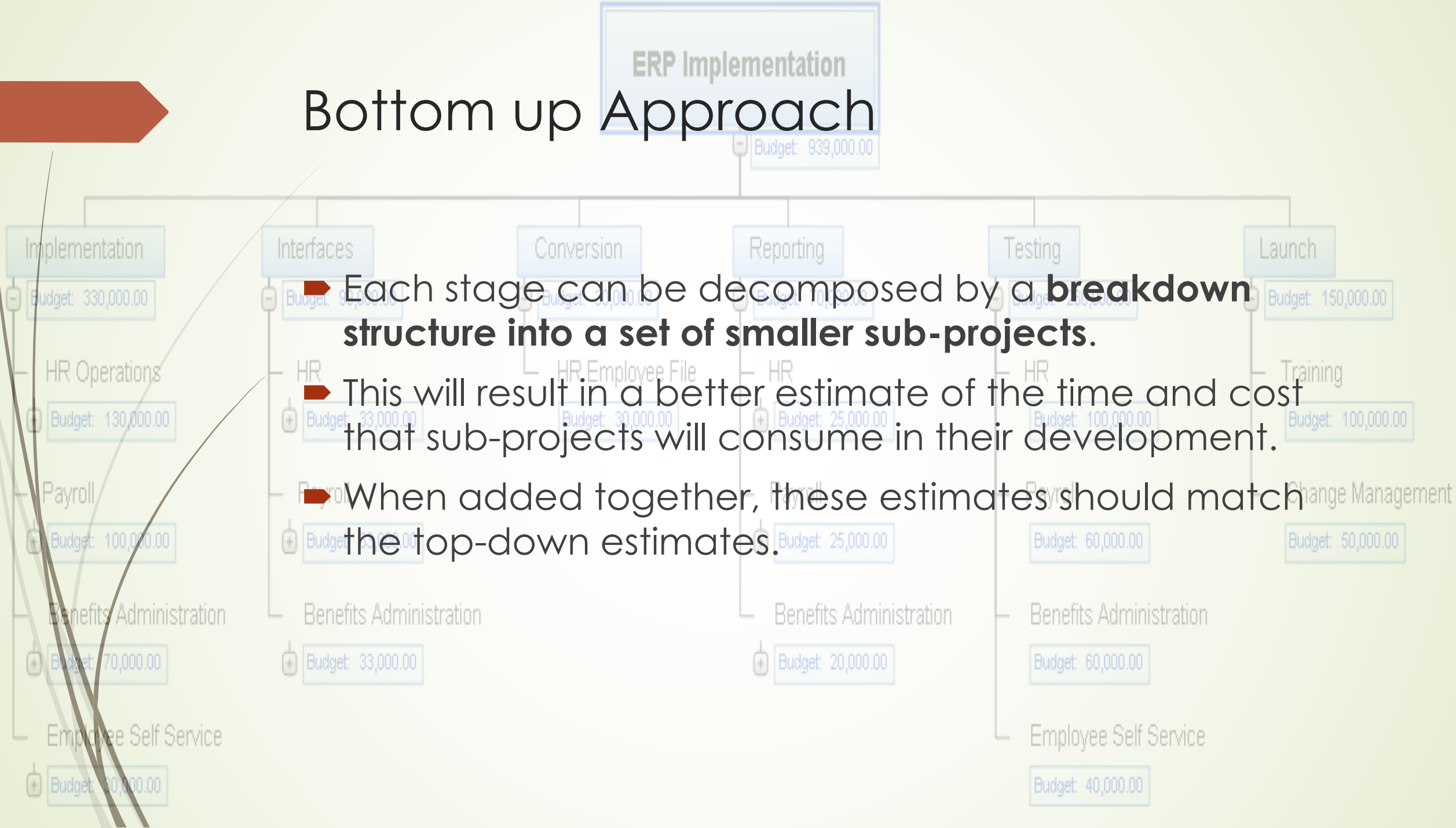
- A top-down estimate takes the whole project and applies an **overall timescale and cost**.
- It is usually created at the beginning of the project and **breaks down time and cost** across its stages.
- Given the high-level nature of a top-down estimate, usually **some contingency** is added to the cost to allow for errors in assumptions.

Top Down Example -Rough

- The example contains expressions of time, cost and quality.

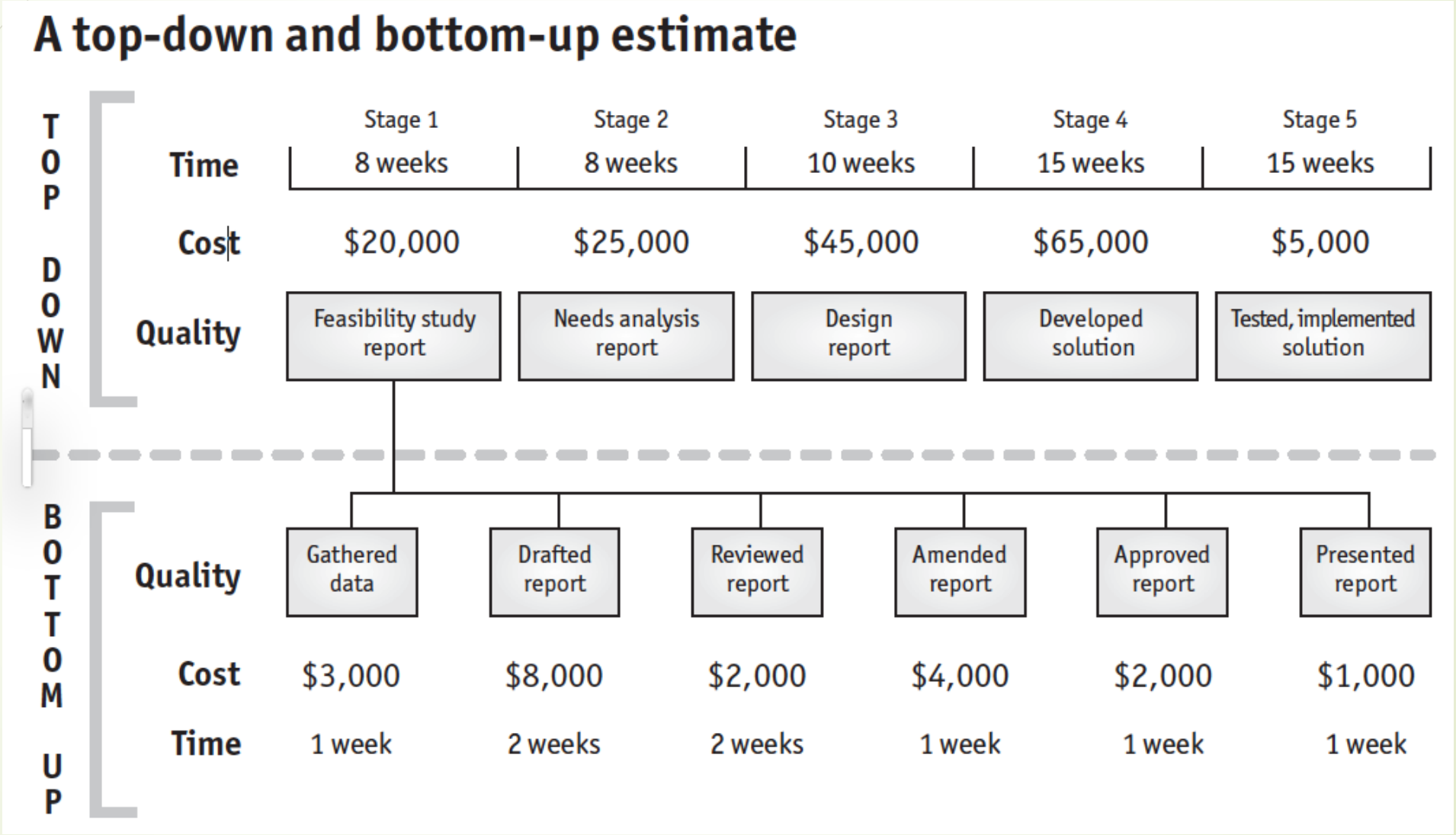


Bottom up Approach



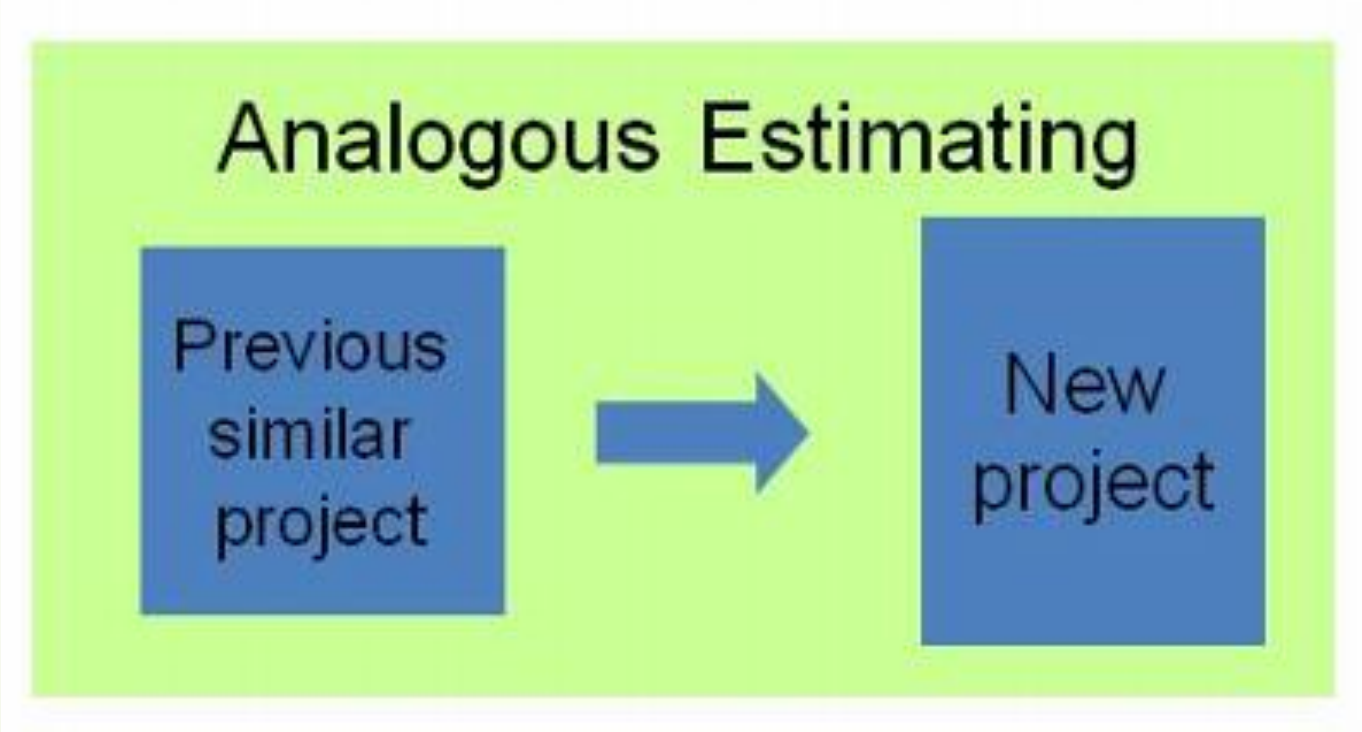
- Each stage can be decomposed by a **breakdown structure into a set of smaller sub-projects**.
- This will result in a better estimate of the time and cost that sub-projects will consume in their development.
- When added together, these estimates should match the top-down estimates.

Bottom up Approach - Example



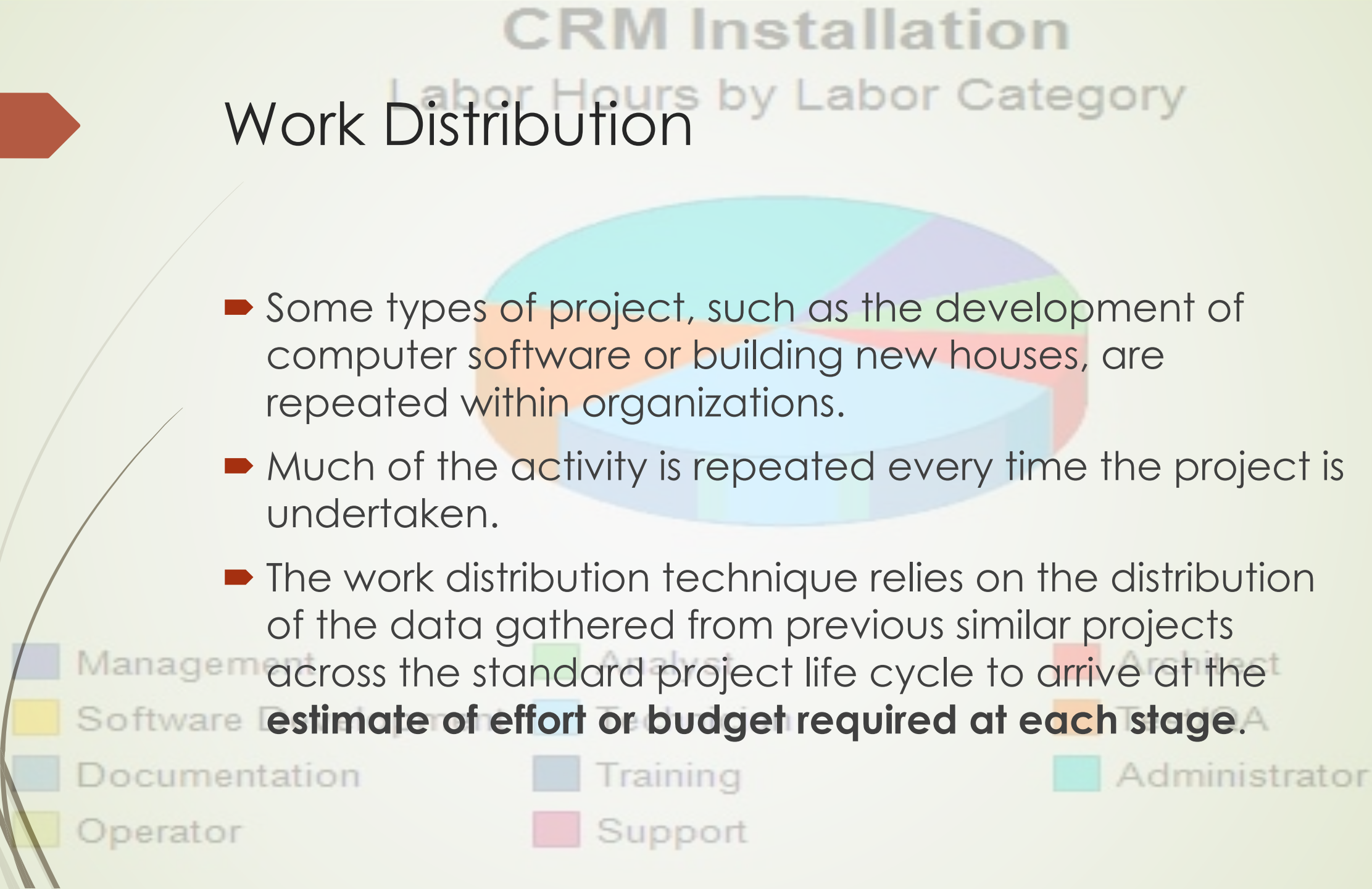
Analogous Method

- Comparing the project, or aspects of it, with something similar is one way in which estimates can be developed.



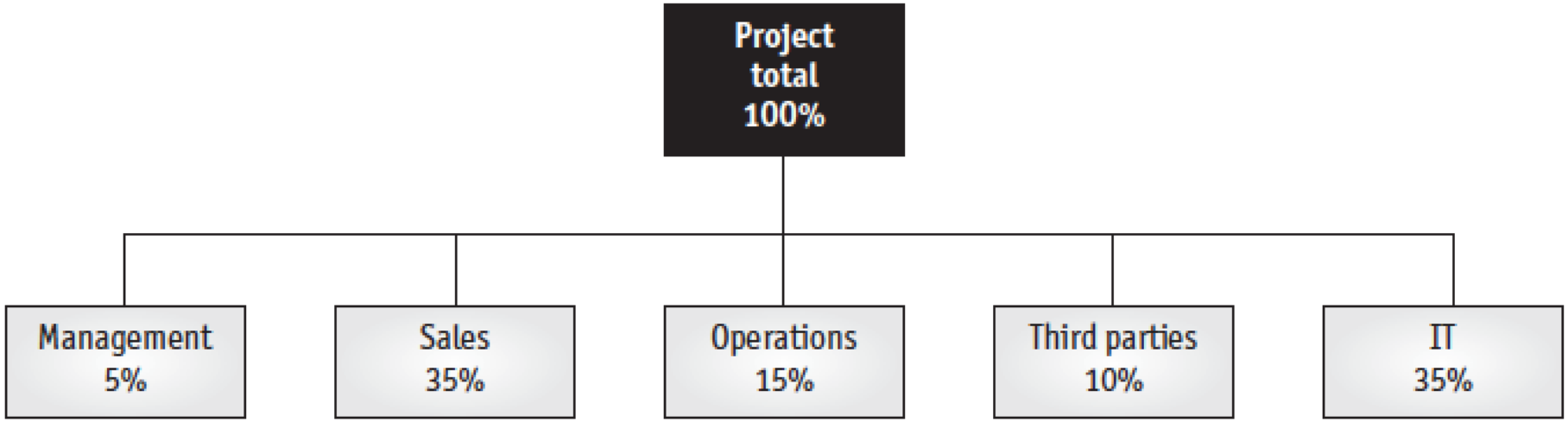
Work Distribution

- Some types of project, such as the development of computer software or building new houses, are repeated within organizations.
- Much of the activity is repeated every time the project is undertaken.
- The work distribution technique relies on the distribution of the data gathered from previous similar projects across the standard project life cycle to arrive at the **estimate of effort or budget required at each stage**.



Example of Work Distribution

Spreading the proportions spent on projects across different types of resource



Standard Project/Product

- The standard project technique also depends on data from previous projects.
- In this approach, a table applying two measures of the project is designed to estimate the effort or cost of the project.

Standard project/product technique

Size \ Complexity	Low	Medium	High
Small	1	2	4
Medium	3	5	9
Large	5	10	15

Example – Standard Project/Product

- Let's assume a department is responsible for moving people's desks and computer equipment to a new location.
  - Small <10 users to move, 10<medium<19 and large>20.
  - Low complexity: moving on the same floor,
  - Medium: moving to a different floor
  - High: moving to another building.

Standard project/product technique

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Other Cost Estimation Methods

- **Parametric modeling**: Uses project characteristics (parameters) in a mathematical model to estimate project costs.
- **Computerized tools**: Tools, such as spreadsheets and project management software are deployed to facilitate effective cost estimation.

Estimating Sheet

- The duration and costs of development for each product must be estimated.
- This is usually done using an estimating sheet containing most of the information.
- Cost are in person days not monetary.

Product	*Tasks*	*Resources*	*Cost*	*Assumptions*
Product 1	Develop	PR	0.8	PR took this long on previous project
	Review	ST/MW	0.5/0.5	Constrained to half-day as slot for teleconference is already booked
	Amend	PR	0.25	PR took this long on previous project
	Approve	PSG	0.1	Assuming PSG will approve via e-mail

Product 2	Develop	AK	0.5	Based on 0.1 per item x 4 items, plus contingency of 0.1
	Review	PR/MW	0.1/0.1	Estimate based on MW experience
	Amend	AK	0.25	Based on need to rework half original
	Approve	PSG	0.1	Assuming PSG will approve via e-mail
Product 3	Develop	PR	0.8	PR took this long on previous project
	Review	ST/MW	0.5/0.5	Constrained to half-day as slot for teleconference is already booked
	Amend	PR	0.25	Assuming quarter of product to be reworked, plus contingency
	Approve	PSG	0.1	Assuming PSG will approve via e-mail
Product 4	Develop	AK	0.8	AK estimate based on experience
		Train fare	$100	Costs to visit trade show
	Review	ST/MW	0.25/0.25	ST estimate based on experience
	Amend	AK	0.25	Assuming quarter of product to be reworked, plus contingency
	Approve	PSG	0.1	Assuming PSG will approve via e-mail

Gantt Chart Based on Estimating Sheet