UGANDA CHRISTIAN UNIVERSITY

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Assignment 1: Describe the Wideband Delphi Estimation Technique.

The **Wideband Delphi** estimation method is a consensus-based technique for estimating effort.

Wideband Delphi estimation process – input &output techniques:

- Team selection
- Kickoff meeting
- Individual preparation
- Estimation session
- Assemble tasks
- Review results

Wideband Delphi process

Input work products:

- Vision and scope document, or other documentation that defines the scope of the work being estimated.

Output work products:

- Work breakdown structure (WBS)
- List of assumptions
- Effort estimates for each of the tasks in the WBS
- Overall better understanding of the project

Entry criteria

- The vision and scope document has been agreed by stakeholders, users, managers, and computer team.
- The kickoff meeting and estimation session have been scheduled (each at least two hours).

- The project manager and the moderator agree on the goal of the identifying the scope of the work to the estimated.

Wideband Delphi techniques process steps:

In this process, a project manager selects a moderator and an estimation team with three to seven members. The Delphi process consists of two meetings run by the moderator. The first meeting is the kickoff meeting, during which the estimation team creates a work breakdown structure (WBS) and discusses assumptions. After the meeting, each team member creates an effort estimate for each task. The second meeting is the estimation session, in which the team revises the estimates as a group and achieves consensus. After the estimation session, the project manager summarizes the results and reviews them with the team, at which point they are ready to be used as the basis for planning the project.

- **Team selection.** The project manager selects the estimation team and a moderator. The team should consist of 3 to 7 project team members. The team should include representatives from every computer science group that will be involved in the development of the work product being estimated.
- **Kickoff meeting.** The moderator prepares the team and leads a discussion to brainstorm assumptions, generate a WBS and decide on the units of estimation.
- **Individual preparation.** After the kickoff meeting, each team member individually generates the initial estimates for each task in the WBS, documenting any changes to the WBS and missing assumptions.
- **Estimation session.** The moderator leads the team through a series of iterative steps to gain consensus on the estimates. At the start of the iteration, the moderator charts the estimates on the whiteboard so the estimators can see

the range of estimates. The team resolves issues and revises estimates without revealing specific numbers. The cycle repeats until either no estimator wants to change his or her estimate or the estimators agree that the range is acceptable.

- **Assemble tasks.** The project manager works with the team to collect the estimates from the team members at the end of the meeting and compiles the final task list, estimates and assumptions.
- **Review results.** The project manager reviews the final task list with the estimation team.

More explanations on Wideband Delphi estimation process

Team selection:

- Picking quality team is important part of generating accurate estimates.
- Teams must be willing to estimate each task honestly, and should be comfortable working with rest of the team.
- Should be knowledge about organization's needs and past computer science or engineering project to make educated estimates.
- Team should include representatives from each area of development team managers, devs, designers, architects, QA analysts, technical writers, etc.
- Moderator should be familiar with the Delphi process, but should not have a stake in the outcome of the session.
- Project manager should moderator role should part of estimation team.
- One or more observers – selected stakeholders, users, and managers should encourage to attend the meeting.

Kickoff meeting

- Teams are given vision, scope & other docs.
- A goal statement for estimation session should be agreed upon by project manager and moderator and distributed to the team before the session.
- Should be no more than a few sentences that describe the scope of the work that is to be estimated.
- Ex: Generate estimates for programming and testing the first phase of Red Rock project
- Moderator leads the meeting
- Meeting consists of these activities:

  Moderator explains the wideband Delphi method to any new estimates.

  If any team has not yet read vision & scope and supporting docs, the moderator reviews it with the team.

  Moderator review's goal of estimation session with team. And checks that team are knowledge to contribute.

  Discusses product being developed & brainstorms assumptions.

  Generates a task list consisting of 10-20 major tasks. There tasks represent the top level of work breakdown structure.

  Agrees on the units of estimation (days, weeks, pages)

- Disagreement among teams could result because of

  Missing requirements, on which programs or tasks are to be included

  Assumptions

Individual preparation

- After the kickoff meeting, the moderator writes down all of the assumptions and tasks that were generated by the team during the kickoff meeting and distributes them.

The team independently generates a set of *preparation results*, that contains

  - estimate for each of the tasks,
  - any additional tasks that should be included in the WBS but that the team missed during the kickoff meeting.
  - any assumptions that the team made in order to create the estimates
  - any effort related to project overhead (status meetings, reports, vacations, etc) should not be taken into account. Should be added be to the project overhead tasks section.
  - Potential delays, (like certain tasks can't start until after specific dates) not be taken into account. Should be added to the calendar waiting time section.

- Each estimate should be made in terms of effort, not calendar time.

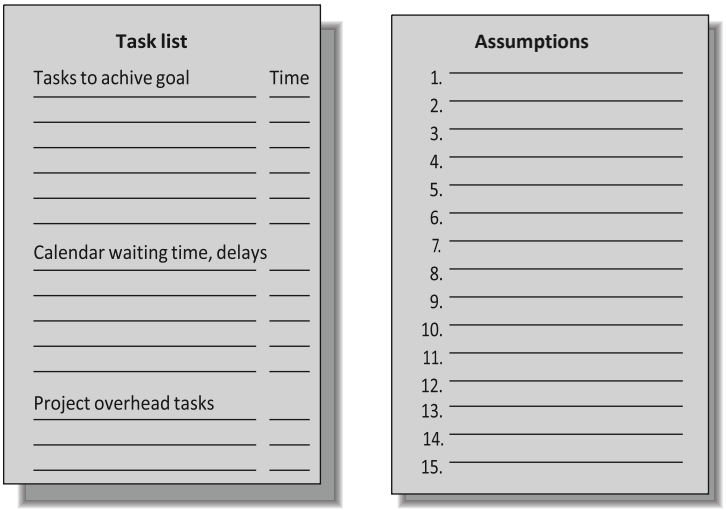

FIGURE 3-1 • Individual preparation results

Estimation Form

Name	Mike			Date 4/3/2004			Estimation form 1/1
Goal statement: To estimate the time to develop prototype for customers A & B							Units: days
Category: ☑ goal tasks ☑ quality tasks ☐ waiting time ☐ project overhead							
WBS# or priority	Task name	Est.	Delta 1	Delta 2	Delta 3	Delta 4	Total	Assumptions
1	Interview customers (A+B)	3	+2	+1				Needs off-site fr
2	Develop requirements docs	6	+5	-2	+1			Start from scratc
3	Inspect requirements docs	1	+2	+2	-2			Team of 4 BSAs
4	Do rework	1	+4					
5	Prototype design	20	-3	1	-2			Includes DB
6	Test design	5	+3					20% scrap rew
	Delta		+7	+5	-3			
	Total	36	49	54	51			

Estimation session

- Meeting consists of these activities
    - Moderator collects all estimate forms.
    - Estimate are tabulated on whiteboard by plotting the totals on a line
    - Estimators read out clarifications & changes to task list written on estimation form. New or changed tasks, discovered assumptions, or questions are raised specific estimate times are not discussed.
    - Team resolves issues or disagreements. Since individual estimate times are not discussed, these disagreements are usually about the tasks themselves, and are often resolved by adding assumptions.
    - Estimators revise their individual estimates by filling in Delta column on their form.

Assemble tasks

- Project manager works with moderator to gather all results from individual preparation and estimation session.
- Project manger removes redundancies and resolves remaining estimate differences to generate a final task list, with effort estimates
- The assumptions are summarized and added to list.
- The vision doc and other docs are updated with assumptions.
- Project manager should create spreadsheet that lists final estimate that each person came up with. The spreadsheet should indicate the best case and worst-case scenarios,

- Any task with an especially wide discrepancy should be marked for further discussion
- Final task list should be in same form at as individual preparation results.

Review results

- Once results are ready project manager calls a final meeting to review the estimation results with the team.
    - Goal of meeting is to determine whether the results of the session are sufficient for further planning.

Assignment 2:

Describe two other effective estimation techniques for software projects.

There are many types of project estimation techniques however I will mention two of them along with their explanations:

Here are as follows two other effectives estimation techniques for software project

Top-down estimate

In top-down estimating, the initial project budget or time estimates come from the opinions of experienced managers and sometimes outside experts. Management can also predict actual costs and duration using similar past projects. These numbers can be tweaked to account for particular characteristics or aspects of the current project.

The cost accuracy depends on how closely the new project mirrors the previous similar project that the estimate is based on, or the previous experience of senior managers involved in the project estimates. When using top-down estimating for project planning, you will expect detailed bottom-up estimates, based on the costs of each work package, to replace the initial top-down estimates as time passes.

Here are some of the advantages of using a top-down estimate for software project.

Advantages of the top-down approach

- **Useful for initial decision-making by the project manager**

As mentioned above that the project management body provides the initial estimated cost and duration in top-down decision-making. It forms a broad estimate of the time and cost of the final deliverable. Having this information quickly available makes pivotal decision-making easier during the early stages of the project, especially when the details are still minimal.

- **Estimates are flexible**

The top-down approach uses ballpark estimates of time and costs for the project. These estimates are derived from various sources, such as the project accounts from similar projects completed in the past or opinions from outside experts. However, as the project progresses, the estimates are adjusted as more details become available. This makes the planning more realistic and attainable.

- **Takes less time and effort**

Because the top-down estimating technique focuses more on estimating the overall costs and duration of the project rather than its components, this technique generally takes less time and effort. This is useful when making initial decisions in the project when all the project specifics are not yet defined.

Uses more holistic data

The top-down approach to estimating uses data from previous projects and/or products to generate a time and cost estimate. This means that all risks, whether unforeseen or not, are taken into consideration. Other than that, top-down estimating also considers any scope creep that might happen during the project's duration.

The use of historical data in estimation relatively reduces any risk of overlooked tasks or costs in the project, making the estimates larger than those derived from other methods.

Disadvantages of the top-down approach

However, the top-down approach is not always applicable to every project you will have. Here are some disadvantages of top-down estimating.

- It depends heavily on reliable data sources: if the historical data you are using is out of date or out of context, your top-down estimate could be way off.
- It is usually limited to senior managers and stakeholders in the organization. Resources may experience a loss of planning control in the project, compared to a bottom-up estimate which involves the entire company.

bottom-up estimating

Bottom-up estimating is a technique that helps determine the overall cost and timeline of a project. It works by gathering all the details of a project at the most minute level. It provides a better, more accurate forecast than other project planning methods because it allows managers to see every available element of the project before it even begins.

Advantages and Disadvantages of Bottom-Up Estimating techniques

Advantages

Bottom-up estimates can be very accurate. This is because team members are estimating the piece of work, they are responsible for. As they typically have the most knowledge of their work package, their estimates tend to be much more accurate than top-down estimates.

Estimation errors can balance out across the components of a project. If the time or cost of one work package has been underestimated, for instance, this could be offset by an overestimation of another work package. Such errors might therefore not necessarily impact the budget baseline at the project level.

Bottom-up estimating can be used in conjunction with other estimation techniques, e.g., the activity duration could be obtained through parametric or analogous estimating.

Disadvantages

The bottom-up estimation process itself requires a lot more resources than other techniques such as analogous estimating (top-down estimation).

The project must have been broken down to the work package and activities level for you to apply bottom-up estimating technique.

The overhead and integration efforts that may occur in addition to the work defined in the activities are often ignored. For large and complex projects, these aspects cannot be ignored and should be factored in.

The cost estimation is based on the duration estimate. Both rely on the estimated resource requirements. Thus, an estimation error there would lead to inaccurate time and cost estimates as well.

In practice, bottom-up estimates can be prone to the bias or the interests of the estimators. While this applies to all types of estimates (to some extent), it may be less manageable in bottom-up estimating. This is because these estimations are usually done by many different estimators, i.e., those responsible for a work package.

Conclusion

Estimating project details is a huge factor in project planning. Time and cost estimates will heavily affect the quality of work your teammates will produce and the quality of the project itself. This is why project estimating techniques exist to ensure that all aspects of the project are realistic and reasonable.

Having the right software for your team can make a huge difference to the time it takes to prepare a cost estimate. Whether you are looking for a detailed bottom-up approach, or a top-down ballpark figure, being able to view the costs and resource breakdown for each of your past and ongoing projects is a valuable asset.

Resources

https://www.stellman-greene.comaspm/content/blogcat

Applied software project management site

https://en.wikipedia.org/wiki/Wideband_delphi

https://pmvidya.com/blog/bottom-up-estimating/#Advantages_and_Disadvantages_of_Bottom-Up_Estimating

https://www.runn.io/blog/top-down-estimating#:~:text=Top%2Ddown%20estimating%20happens%20when,figure%20for%20the%20total%20cost.