

SOFTWARE ENGINEERING

Spring 2024



WHAT IS ESTIMATION?

- The project manager must set expectations about the time required to complete the software among the stakeholders, the team, and the organization's management.
- expectations should be realistic
- If those expectations are not realistic from the beginning of the project, the stakeholders will not trust the team or the project manager.



PREREQUISITES

- Vision Statement
- Scope
- Requirements



ELEMENTS OF A SOUND ESTIMATE

- To generate a sound estimate, a project manager must have:
 - A work breakdown structure (WBS), or a list of tasks which, if completed, will produce the final product
 - An effort estimate for each task
 - A list of assumptions which were necessary for making the estimate
 - Discussion and Consensus among the project team that the estimate is accurate



ASSUMPTIONS MAKE ESTIMATES MORE ACCURATE

- Team members make *assumptions* about the work to be done in order to deal with incomplete information
 - Any time an estimate must be based on a decision that has not yet been made, team members can **assume the answer** for the sake of the estimate
 - Assumptions **must be written** down so that if they prove to be incorrect and cause the estimate to be inaccurate, everyone understands what happened
 - Assumptions bring the team together very early on in the project so they can make progress on important decisions that will affect development



WIDEBAND DELPHI

- *Wideband Delphi* is a process that a team can use to generate an estimate
 - The project manager chooses an estimation team, and gains consensus among that team on the results
 - Wideband Delphi is a *repeatable* estimation process because it consists of a straightforward set of steps that can be performed the same way each time



WIDEBAND DELPHI ROLES

Estimation Team: PM chooses an estimation team that include reps from all project areas (managers, developers, architect, QA, writers, etc).

- every team member should have stake in plan
- should understand Delphi Process

Moderator: someone who understands Delphi Process *but has no stake in the results*

Observers: selected stakeholders or users.

- encourages trust in the estimation process
- sense of ownership in the results



ENTRY CRITERIA

1. **Vision** and **Scope** documents have been agreed on by stakeholders
2. Kick-off meeting has been scheduled
3. Estimation meeting has been scheduled (1-2 hrs)
4. Moderator chosen (*not* the PM)
5. Agreement on the goal of the estimation session



THE WIDEBAND DELPHI PROCESS

- Step 1: Choose the team
 - The project manager selects the estimation team and a moderator. The team should consist of 3 to 7 project team members.
 - The moderator should be familiar with the Delphi process, but should not have a stake in the outcome of the session if possible.
 - If possible, the project manager should not be the moderator because he should ideally be part of the estimation team.

THE WIDEBAND DELPHI PROCESS

- **Step 2: Kickoff Meeting**
 - The project manager must make sure that each team member understands the Delphi process, has read the vision and scope document and any other documentation, and is familiar with the project background and needs.
 - The team brainstorms and writes down assumptions.
 - The team generates a WBS with 10-20 tasks.
 - The team agrees on a unit of estimation.

INDIVIDUAL PREPARATION

Step 3: Individual Preparation

- each member generates his own initial estimates for all tasks in the WBS
 - identify subtasks may help clarify an estimate
- for each task, the team member writes:
 1. estimate of effort required to complete task
 2. any assumptions needed to make the estimate
- write down any new tasks the were missed during brainstorming session

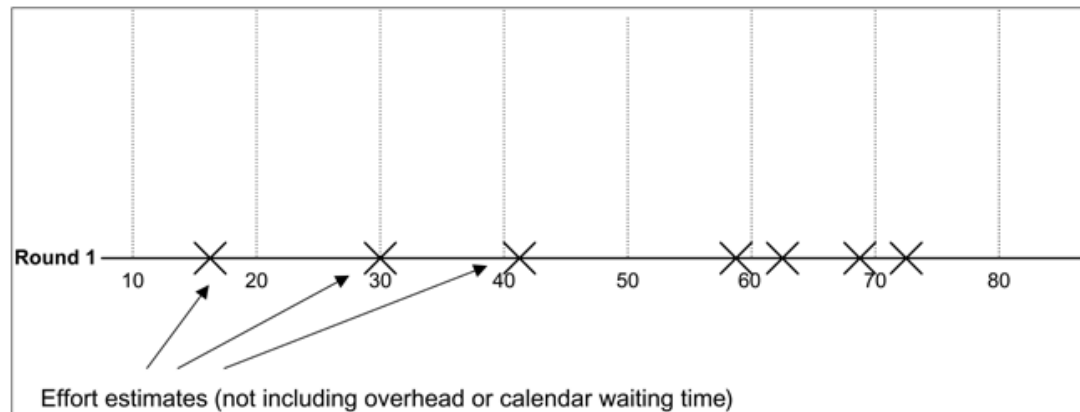


THE WIDEBAND DELPHI PROCESS

- **Step 4: Estimation Session**
 - During the estimation session, the team comes to a consensus on the effort required for each task in the WBS.
 - Each team member fills out an estimation form which contains his estimates.
 - The rest of the estimation session is divided into rounds during which each estimation team member revises her estimates based on a group discussion. Individual numbers are not discussed.

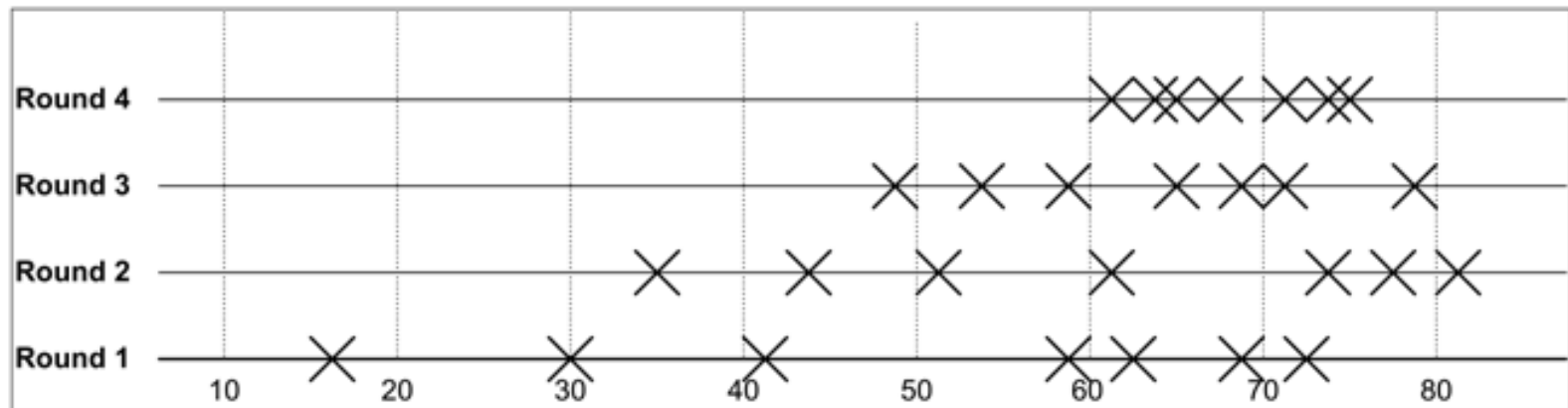
THE WIDEBAND DELPHI PROCESS

- Step 4: Estimation Session (continued)
 - The moderator collects the estimation forms and plots the sum of the effort from each form on a line:



THE WIDEBAND DELPHI PROCESS

- Step 4: Estimation Session (continued)
 - The team resolves any issues or disagreements that are brought up.
 - Individual estimate times are not discussed. These disagreements are usually about the tasks themselves. Disagreements are often resolved by adding assumptions.
 - The estimators all revise their individual estimates. The moderator updates the plot with the new total:



WIDEBAND DELPHI ESTIMATION

Step 4: Estimation Session (loop)

- moderator leads the team through several rounds of estimates to gain consensus on estimates.

Exit Criteria

- The estimation session continues until the estimates converge or the team is unwilling to revise estimates.
- Process also ends if time limit (2 hours) has elapsed.



THE WIDEBAND DELPHI PROCESS

- Step 5: 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.
- Step 6: Review Results
 - The project manager reviews the final task list with the estimation team.

