

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.



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.



STEP 3: INDIVIDUAL PREPARATION

Each team member independently generates a set of preparation results.

For each task, the team member writes down an estimate for the effort required to complete the task, and any additional assumptions he needed to make in order to generate the estimate.

Wideband Delphi Estimation Sheet						
Project: <Project Name>				Estimation Units: Person Hours		
Estimation Team Member: <Name>				Date: <MM-DD-YY>		
Task	Initial Estimate	Change 1	Change 2	Change 3	Change 4	Final
Task1	n_1					
Task2	n_2					
Task3	n_3					
Task4	n_4					
Task5	n_5					
Task6	n_6					
Task7	n_7					
Task8	n_8					
Net Change						
Total	$\sum n_i$					



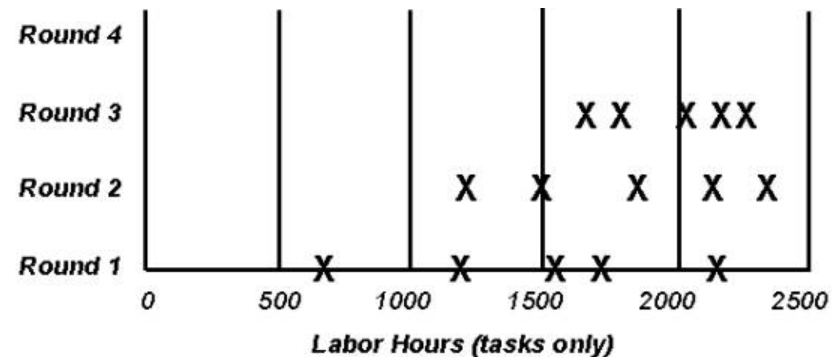
ESTIMATION FORM FOR EVERY PERSON

Name <i>Mike</i>		Date <i>4/3/2004</i>				Estimation form <i>1/1</i>		
Goal statement <i>To estimate the time to develop prototype for customers A & B</i>								Units <i>days</i>
Category		<input checked="" type="checkbox"/> goal tasks <input checked="" type="checkbox"/> quality tasks <input type="checkbox"/> waiting time <input type="checkbox"/> project overhead						
WBS# or priority	Task name	Est.	Delta 1	Delta 2	Delta 3	Delta 4	Total	Assumptions
<i>1</i>	<i>Interview customers (A+B)</i>	<i>3</i>	<i>+2</i>	<i>+1</i>				<i>Needs off-site trip</i>
<i>2</i>	<i>Develop requirements docs</i>	<i>6</i>	<i>+5</i>	<i>-2</i>	<i>+1</i>			<i>Start from scratch</i>
<i>3</i>	<i>Inspect requirements docs</i>	<i>1</i>	<i>+2</i>	<i>+2</i>	<i>-2</i>			<i>Team of 4 BSAs</i>
<i>4</i>	<i>Do rework</i>	<i>1</i>	<i>+4</i>					
<i>5</i>	<i>Prototype design</i>	<i>20</i>	<i>-3</i>	<i>4</i>	<i>-2</i>			<i>Includes DB</i>
<i>6</i>	<i>Test design</i>	<i>5</i>	<i>+3</i>					<i>20% exists now</i>
	Delta		<i>+3</i>	<i>+5</i>	<i>-3</i>			
	Total	<i>36</i>	<i>49</i>	<i>54</i>	<i>51</i>			

STEP 4: ESTIMATION SESSION

The moderator calls the Estimation team for the Estimation meeting. If any of the Estimation team members respond saying that the estimates are not ready, the moderator gives more time and resends the Meeting Invite.

The moderator begins the estimation meeting by collecting and charting the participants' individual estimates. Each participant's total project estimate is shown as an X on the "Round 1" line. The initial estimates probably will cover a frighteningly large range.



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.



SUMMARIZED RESULT OF ESTIMATION

Goal statement <u>To estimate the time to develop prototype for customers A & B</u>										
Estimators		<u>Mike, Quentin, Jill, Sophie</u>							Units	<u>days</u>
Shaded items must be discussed										
WBS# or priority	Task name	M.	Q.	J.	S.	Best-case	Worst-case	Avg.-hi & lo	Notes	
1	Interview customers (A+B)	6	4	3	3	3	6	3.5		
2	Develop requirements docs	5	10	2	5	2	10	5	Discrepancy between Q. and J.	
3	Inspect requirements docs	7	5	6	5	5	7	5.5		
4	Do rework	8	7	9	7	7	9	7.5		
5	Prototype design	28	23	31	25	23	31	26.5		
6	Test design	9	7	6	6	6	9	6.5		
	Total	63	56	57	51	46	72	54.5		

