

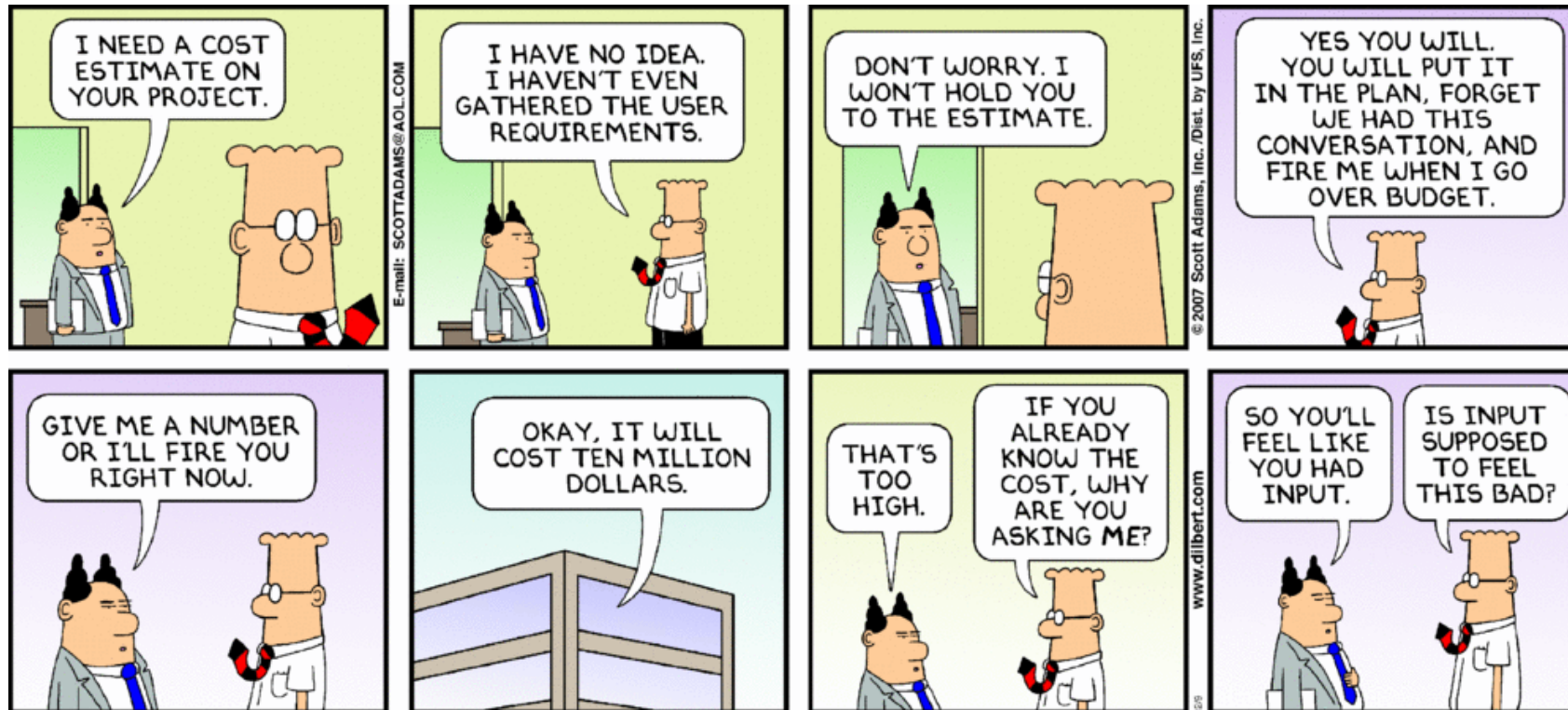
Chapter 10: Estimation



February 20, 2023

What is an Estimate?

- Business views estimates as commitments
- Developers like to view estimates as guesses



A Commitment

- If you commit to getting something done by a certain date, then you simply have to get it done by that date
- Professionals don't make commitments unless they know they can achieve them
 - If you are asked to commit to something that you aren't certain you can do, then you are honor bound to decline
- Commitment is about certainty
 - Others will make plans based on your commitments
 - Missing a commitment is an act of dishonesty only slightly less onerous than an overt lie

An Estimate

- An estimate is a guess
 - no commitment is implied
 - no promise is made
- We make estimates because we do not know how long it will take
- Developers are bad at estimating because we don't understand the true nature of an estimate.
- An Estimate is a distribution

Making an estimate...



Mike: "What is your estimate for completing the Frazzle task?"

Peter: "Three days."



Making an estimate...

- Is Peter really going to be done in three days? It's possible, but how likely is it?
 - The answer to that is: We have no idea.
- What did Peter mean, and what has Mike learned?
 - If Mike comes back in three days, should he be surprised if Peter is not done?
 - Why would he be? Peter has not made a commitment.
 - Peter has not told him how likely three days is versus four days or five days.

What would have happened if Mike had asked Peter how likely his estimate of three days was?



Mike: "How likely is it that you'll be done in three days?"

Peter: "Pretty likely."

Mike: "Can you put a number on it?"

Peter: "Fifty or sixty percent."

Mike: "So there's a good chance that it'll take you four days."





Peter: "Yes, in fact it might even take me five or six, though I doubt it."

Mike: "How much do you doubt it?"

Peter: "Oh, I don't know ... I'm ninety-five percent certain I'll be done before six days have passed."

Mike: "You mean it might be seven days?"

Peter: "Well, only if everything goes wrong. Heck, if everything goes wrong, it could take me ten or even eleven days. But it's not very likely that so much will go wrong."



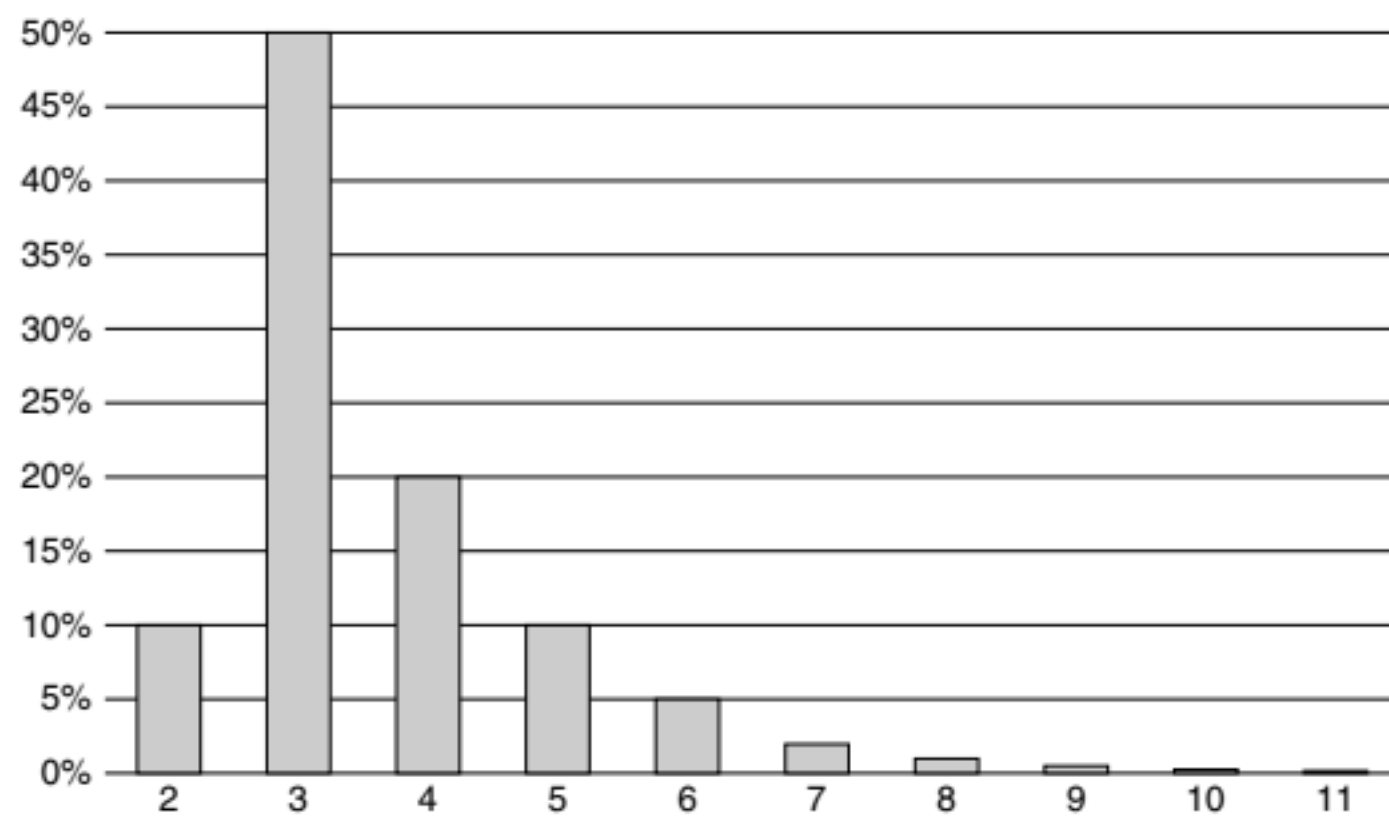


Figure 10-1 Probability distribution

To minimize the uncertainty Mike will ask Peter for a commitment...



Mike: "Peter, can you give me a hard date when you'll be done?"

Peter: "No, Mike. Like I said, it'll probably be done in three, maybe four, days."

Mike: "Can we say four then?"

Peter: "No, it could be five or six."

So far, everyone is behaving fairly. Mike has asked for a commitment and Peter has carefully declined to give him one.

Mike: "OK, Peter, but can you try to make it no more than six days?"



How professionals handle commitment....

- Professionals draw a clear distinction between estimates and commitments.
- They do not commit unless they know for certain they will succeed.
- They are careful not to make any implied commitments.
- They communicate the probability distribution of their estimates as clearly as possible, so that managers can make appropriate plans.

PERT

- Provides a very simple, but very effective way to convert estimates into probability distributions suitable for managers.
- Trivariate Analysis:
 - O: Optimistic Estimate: This number is wildly optimistic. You could only get the task done this quickly if absolutely everything went right.
 - N: Nominal Estimate. This is the estimate with the greatest chance of success.
 - P: Pessimistic Estimate. This number is wildly pessimistic. It should include everything except natural disasters and other catastrophes.

Given these three estimates, we can describe the probability distribution as follows:

- $$\mu = \frac{O + 4N + P}{6}$$

Calculating Mike's expected duration

- $M = (1 + 4(3) + 12)/6 = 4.2$ days
- Standard Deviation: the standard deviation of the probability distribution for the task. It is a measure of how uncertain the task is.

$$\sigma = \frac{P - O}{6}$$

- For Peter this number is $(12 - 1)/6$, or about 1.8 days.
- Given Peter's estimate of $4.2/1.8$, Mike understands that this task will likely be done within five days but might also take 6, or even 9, days to complete.

Estimating Tasks

- Wideband Delphi
 - A team of people assemble, discuss a task, estimate the task, and iterate the discussion and estimation until they reach agreement.
- Flying Fingers
 - Tasks are discussed one at a time.
 - For each task there is discussion about what the task involves, what might confound or complicate it, and how it might be implemented.
 - Then the participants put their hands below the table and raise 0 to 5 fingers based on how long they think the task will take.
 - The moderator counts 1-2-3, and all the participants show their hands at once.
 - The scale of the estimate is decided on at the beginning of the meeting.

Estimating Tasks Cont.

- Planning Poker
 - Each member of the estimation team, deal a hand of cards with different numbers on them.
 - The numbers 0 through 5 work fine, and make this system logically equivalent to flying fingers.
 - Pick a task and discuss it. At some point the moderator asks everyone to pick a card.
 - The members of the team pull out a card that matches their estimate and hold it up with the back facing outward so that no one else can see the value of the card.
 - Then the moderator tells everyone to show their cards.
 - Some folks have gone so far as to use cards based on a Fibonacci series.

Estimating Tasks Cont.

- Affinity Estimation

- All the tasks are written onto cards, without any estimates showing.
- The estimation team stands around a table or a wall with the cards spread out randomly.
- The team members do not talk, they simply start sorting the cards relative to one another.
- Tasks that take longer are moved to the right. Smaller tasks move to the left.
- Any team member can move any card at any time, even if it has already been moved by another member.
- Any card moved more than a certain times is set aside for discussion.
- Draw lines between the cards that represent bucket sizes.

Estimating Tasks Cont.

- Trivariate Estimates
 - We want three estimates so that we can create a probability distribution.
 - The optimistic and pessimistic values for each task can be generated very quickly using any of the wideband delphi variants.
 - For example, if you are using planning poker, you simply ask the team to hold up the cards for their pessimistic estimate and then take the highest.
 - You do the same for the optimistic estimate and take the lowest.

The Law of Large Numbers

- If you break up a large task into many smaller tasks and estimate them independently, the sum of the estimates of the small tasks will be more accurate than a single estimate of the larger task.
- The reason for this increase in accuracy is that the errors in the small tasks tend to integrate out.
- Errors in estimates tend toward underestimation and not overestimation, so the integration is hardly perfect.

Chapter 10: Key Points

- Professional software developers know how to provide the business with practical estimates that the business can use for planning purposes.
 - They do not make promises that they can't keep, and they don't make commitments that they aren't sure they can meet.
- When professionals make commitments, they provide hard numbers, and then they make those numbers.
- In most cases professionals do not make such commitments. Rather, they provide probabilistic estimates that describe the expected completion time and the likely variance.
- Professional developers work with the other members of their team to achieve consensus on the estimates that are given to management.

Professional Tip of the Day #1

- If you can take the day of your birthday off
 - Avoid the potential celebration
 - Avoid the awkward happy birthdays
 - Take a day for yourself
 - Or just don't tell anyone it is your birthday





Professional Tip of the Day #2

- Tips for negotiating a salary:
 - Do research on what others with the same job title make
 - Let the employer mention the salary
 - Bring benefits into the equation
 - Ask about growth and bonus potential
 - Know what you want and why your worth it
 - If you don't get offered a higher salary, Can I negotiate other things?
 - Take into consideration benefits such as 401K matching and insurance
 - Finalize with a written agreement





Do Your Research

-  Know what the market pays:
 - - Use resources like Glassdoor, Levels.fyi, LinkedIn Salary, and Blind.
 - - Compare offers at different companies.
-  Consider total compensation:
 - - Salary isn't everything—stock options, bonuses, and benefits matter.





The Right Way to Start the Conversation

-  Let the employer make the first offer:
 - - Ask: "What range are you considering for this role?"
-  If pressured to provide a number:
 - - Give a researched range: "I've seen offers between \$100K–\$120K."
 - - Flip the question: "What is the budget for this position?"




Bring Benefits Into the Equation

-  Negotiate beyond base salary:
 - - Stock options (RSUs, ESOs, ESPPs)
 - - Signing bonuses
 - - 401(k) matching & retirement benefits
 - - Remote work flexibility
 - - Professional development funds
-  Ask about career growth: "Can we discuss promotion timelines?"



Know Your Worth & How to Justify It



-  Prepare your case:
 - - Highlight key achievements: "I led a feature that improved efficiency by 30%."
 - - Show long-term value: "My cloud computing skills can help scale infrastructure."
 - - Mention competing offers professionally.



What If They Won't Increase the Salary?






- Negotiate other perks:
 - - Higher signing bonus
 - - More stock options or equity
 - - Flexible work hours or remote work
 - - Company-paid certifications or conference travel
- Ask for a review timeline: "Can we revisit compensation in 6 months?"

Always Finalize in Writing

-  Get everything in writing before accepting:
 - - Confirm salary, bonuses, stock options, benefits, and review periods.
 - - Clarify vesting schedules for stock compensation.
-  Red flag: If a company refuses to provide a written offer, walk away.



Key Takeaways

-  Research salary & benefits before negotiating.
-  Let the employer reveal their offer first.
-  Highlight your value & ask about career growth.
-  Negotiate more than just salary—think about total compensation.
-  Get the final agreement in writing.