

# The Problem with Estimates

*Project Managers don't have to be caught in a deadly negotiation where the one who mentions a number loses.*

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## **The Problem**

Estimates for Information Technology (IT) projects have caused far more problems than solutions in the 30 years I have been working in the technical arena. Have you ever been asked for an estimate shortly after delivery of a few flimsy paragraphs of imprecise marketing bombast? It is like walking into the gladiator's arena unarmed, and the deadly game is afoot, where the first to mention a number is a lost soul. I find it is not just me -- it is a problem that seems to defy solution for countless companies.

How can this be such a sticky and intractable problem? It involves highly technical concepts, people, language, needs, politics, trade-offs, resources, money ... everything short of lust and murder. AND we ask for these combustible components to be mixed at the very earliest stage of the endeavor when we really couldn't know *less* about the facts or details.

The only thing we *can* be sure of in a point estimate is that it is *wrong*. Yet I see managers and leaders continue to insist the estimate stand as a commitment. This situation does not have to remain a no-win game for Project Managers (PMs).

## **Language**

### **Uncertainty, Estimates, and Commitments**

*Uncertainties* are any number of key aspects of the project that defy clear and unequivocal knowledge. Will there be technical problems? Will the time and cost of development be more or less than assumed? The treatment of uncertainty is best handled by assuming a distribution of probabilities to likely outcomes -- but more on that, in a moment.

*Estimates are not commitments.* The most important discrimination between the two has to do with how uncertainty is treated.

In the case of an *estimate* the role of uncertainty is primary -- the fact that there are important elements that are out of the estimator's sight or control are why the term *estimate* is being used in the first place. An estimate represents an *expectation* that is hopelessly dependent upon resolution of the uncertainties. The responsible estimator talks in terms of distributions of probability and confidence intervals. In the end, *an estimate is an expectation*.

A *commitment* on the other hand, *is a promise*. It is about intent-- intent to deliver, intent to perform. Commitments involve agreements between parties in a way that an estimate does not. They usually come down to discrete points -- a date certain, a total cost, a set of functions delivered.

With commitments there are uncertainties, but they are not defining in the same way as they are with estimates. With estimates, there can be an intent, express or implied, but it is not defining, as it is with a commitment.

The key take-away here is to be careful of your language and ask for what you really want. If you are looking for a commitment, then ask for it by name. Recognize that commitments, as promises between parties, are promises without regard to how the uncertainties roll out.

## Estimates vs Targets

Often stress is introduced into the situation when the estimate fails to satisfy a *target*. Here the *target* is a preconceived or mandated budget or delivery date that a key stakeholder may have even before the discussion around the estimate even takes place. The stakeholder would have the IT estimator accept the target as a commitment, but may or may not have even mentioned the target exists. When this occurs, discussion turns into negotiation -- with winners and losers.

It is very important to keep these two terms clearly separate -- the estimate is generated by an assessment of the problem, while a target can be driven by purely business objectives without any relation to the project at hand.

It is important to accept that each are legitimate in their respective contexts. However unless all parties recognize them as separate and distinct entities, confusion, miscommunication, and strife ensue. When targets and estimates fail to reconcile, ugly and costly political games may result.

## Proba-babel: Objective Functions, Probability Distributions, and Confidence Intervals

If we are to understand an estimate for what it is, we have to talk about probability and statistics. The minimum one should discuss when answering a request for an estimate is to describe the objective function, cite the assumptions used, the risks considered, the probability of the risks manifesting, the estimates of risk impacts, and a probability distribution of the project's completion, measured in dates or dollars.

The **objective function** is the model used for solving the problem -- the formula, to use a math analogy, whose factors represent the attributes that determine the answer.

Monte-Carlo simulation programs are very helpful in that they take specific probability distributions (e.g. Normal, Gaussian, Poisson, etc) and run numerous solutions through the objective function to provide a **probability distribution** of possible outcomes. As you might expect, the answer is not a point, but a spread of possible answers with probabilities of occurrence.

This leads to the third term: **confidence interval**. As an example, lets consider project cost. Take a slice of the probability distribution your estimate provides for total cost. If your slice is large -- say it comprises 90% of the values generated into the probability distribution -- you might suggest that the project cost will be between \$10,000 and \$75,000 with 90% confidence. Maybe that isn't "the number" your key stakeholder seeks. Moving to a 75% confidence interval, you can suggest the project will cost \$60,000 or less. Your second suggestion is *estimated* to occur in 3 out of 4 tries. Both answers are correct, of course, but are clearly different.

So the lesson here is to provide a *discussion* when asked for an estimate, to include:

- Definition of the Problem

- Description of the Objective Function and probability distributions
- Enumeration of Assumptions & Risks
- Delivery of the Range of the Estimate
- Indication of the Confidence Interval

Only then will the estimate be clearly, correctly, and usefully described.

## ***Estimation Challenges***

Estimation is difficult. It is legitimately difficult for several reasons:

1. It occurs initially very early in a project's life, when very little is known
2. It involves complex, interrelated factors which are out of the estimator's control
3. Statistical concepts and tools are essential, but are rarely used or understood by the estimators or stakeholders
4. Stakeholders often just focus on the answers they seek, with little desire to enter into a discussion about the estimate. (This turns discussion into negotiation.)

## ***Best Practice Advice for Estimating***

1. Recognize estimation as a discipline of its own, like Project Management and Business Analysis. Train your estimators and promote their subject matter expertise within the company.
2. Establish and document an approved estimation process. Promulgate and promote the process. Insist that it be followed by all parties.
3. Discriminate between Targets vs Estimates, and Estimates vs Commitments
4. Formulate a Protocol for Presentation of Estimates. Don't tolerate executives treating estimates carelessly or irresponsibly. Create a known, consistent, and effective approach to the presentation and follow it. If a company insists on a point estimate, this protocol can be as basic as an agreement on the confidence interval to be used, and acceptance of the high-end range value as the figure to use for the point estimate.
5. Reduce pressure for unreasonable commitments through use of Step Funding. In this concept, a project never gets funded for any more than is required to move to the next stage gate in the development life cycle. For a given stage, the uncertainties are fewer and more easily managed, so it is easier to provide a commitment. The company does not have as much capital at risk. Implied in this process is the willingness to kill the project if subsequent performance or resolution of uncertainties dictate.
6. Formulate a Protocol when Estimates and Targets Don't Reconcile. Avoid games playing and have a rational process ready for those cases where the Business Targets and project estimates can't align.
7. Educate continuously. Consider delivering or purchasing formal education on the key elements of the estimation process to the parties who need it. I suggest broad topic areas by group, below. Even if your estimators had statistics in college, it is probably a good idea to have a refresher course or seminar every couple of years "just in case" some of the key concepts may have escaped from the conscious mind.

If your company's process and protocol around treatment of estimation and estimation results is not regularly reviewed and promoted, it will be easy to backslide into estimation dysfunction. Conduct familiarization sessions with the key players on a regular basis!

	Estimators	Stakeholders	Management
Statistics	X		
Best Practice Treatment of Uncertainty & Risk	X	X	
Estimation Models	X	X	
Estimation Process	X	X	X
Estimation Results Protocol	X	X	X

Table 1: Recurring Training to Maintain Healthy Estimations