



The Truth and  
Project Estimates



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Boston Software Process Improvement Network  
November 18, 2003  
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## PROJECT ESTIMATING


Men occasionally stumble over the truth, but most of them pick themselves up and hurry off as if nothing happened..

Winston Churchill




## Agenda

- ◆ What is a good estimate?
- ◆ Estimating Activities
- ◆ Estimating Projects
- ◆ “Defending” your estimates



## What Do We Estimate?



## A Robust Project Estimate Results From:

- ◆ A clear product definition
- ◆ Detailed scope of work
- ◆ Accurate historical results
- ◆ An effective estimating process
- ◆ Adjustments for risk
- ◆ Reasonable stakeholders

### Different Estimates For Different Purposes

- ◆ Project estimates — for high level approximations used to guide early funding decision
- ◆ Activity estimates — for low level predictions used to manage the project

### Activity Estimating

Durrenberger's Declaration

"Exact estimate" is an oxymoron like "airline food" and "temporary tax"

### Estimating Drive Time...

### A Good Activity Estimate

Is a range of likely results:

- ◆ Based on experience
- ◆ Not a guess, not a single price, not a guarantee

### To Estimate Projects:


- ◆ Estimate each activity's effort
  - ◆ In units of labor (like staff-hours or man-hours)
- ◆ Then estimate:
  - ◆ Cost — how much in dollars (if necessary)
  - ◆ Duration — how long in days, weeks etc.

### Activity Estimates Should be Ranges

Expected value =  $(O + ML + P) / 3$

## Why Range Estimates?

- ◆ Clarify team communication by:
  - ◆ Exposing uncertainty inherent in project work
  - ◆ Revealing the likely range of possible results
  - ◆ Conveying a correct sense of approximation
  - ◆ Detailing the asymmetric distribution that often exists (the dragon's tail)
- ◆ Encourage good work agreements and reporting (a range to shoot for)
- ◆ Improve Morale

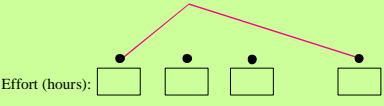


## Exercise: Effort Estimates

1. Individually: (5 minutes)
  - ◆ Select one work-related activity that you personally will soon be working on
  - ◆ Develop a range effort estimate (labor-hours) for the activity
  - ◆ Document any assumptions you use while making the estimate
2. Pair up (2 x 2.5 = 5 minutes)
  - ◆ Explain the variability in your estimate to your partner

## Activity Estimating Worksheet:


- ◆ Your activity:
- ◆ Your assumptions:
- ◆ Your estimate



Effort (hours):

## Watch Out for Dragon Tails

- ◆ Too Short:
  - ◆ If you have a large number of symmetric estimates...
  - ◆ Where is the tail?
  - ◆ Consider the regular risks or
  - ◆ Imagine a "do over"
- ◆ Too Long:
  - ◆ Why is the tail so long?
  - ◆ Considered breaking the activity into smaller pieces



## You Can't Negotiate Cost!

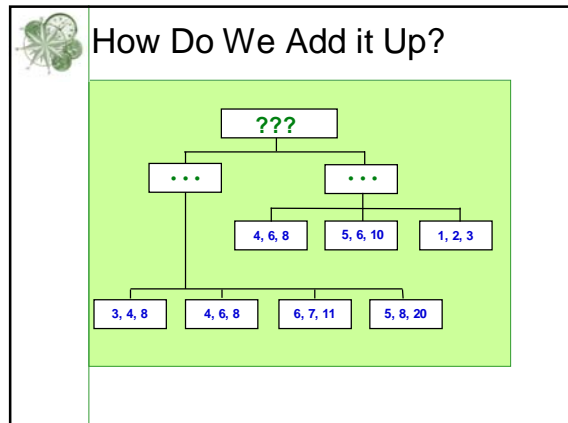
- ◆ If your manager wants to "negotiate" for a lower effort estimate...
- ◆ First, find out why...
- ◆ Then work together and decide to:
  - ◆ Accept higher risk or...
  - ◆ Develop a new strategy
- ◆ But ALWAYS support your estimate!

## Learning From Estimates

- ◆ Because many activities repeat from project to project,
  - ◆ Capture (and archive) the actual effort
  - ◆ Use past actuals when estimating the next project
  - ◆ You will become a better estimator

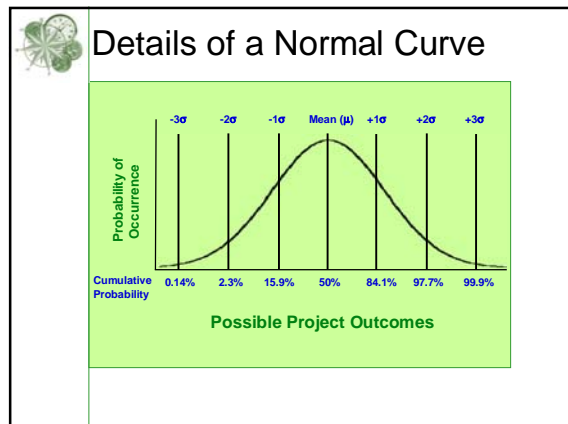
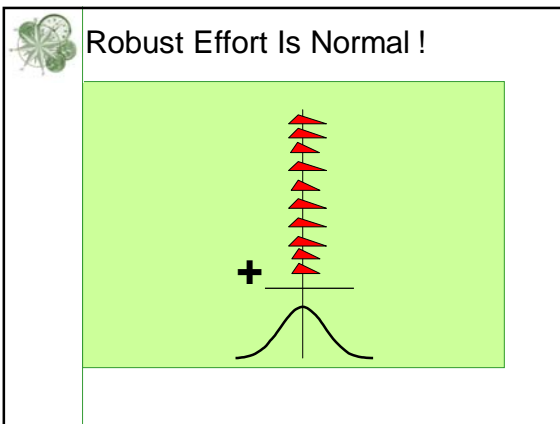
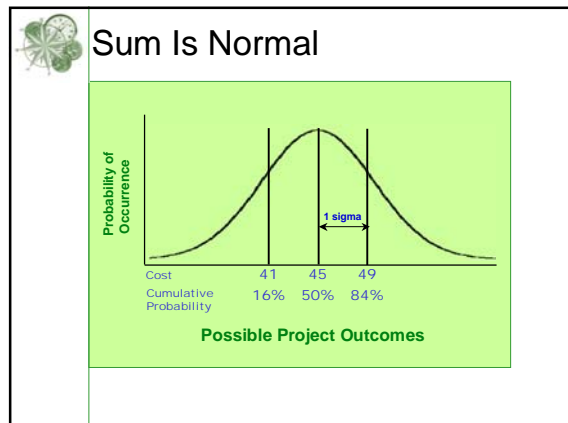
### Generate Better Estimates

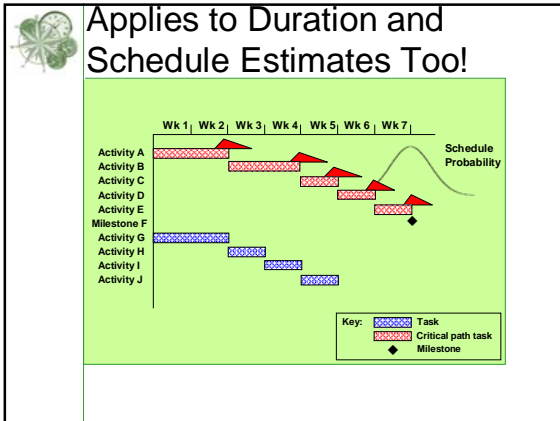
- ◆ Break work into smaller pieces
- ◆ Estimate each piece with a range of values
- ◆ Use historical performance as a starting point



### Summing Ranges: Worksheet

Estimate	Mean	Sigma	Variance
4, 6, 8	6	.8	.64
5, 6, 10	7	1	1
1, 2, 3	2	.4	.16
3, 4, 8	5	1	1
4, 6, 8	6	.8	.64
6, 7, 11	8	1	1
5, 8, 20	11	3	9
<del>26, 25</del>	45	≈ 4 ←	√13.44





### Project Estimates

The terrible thing about the quest for truth is that you find it.

Remy de Gourmont

- ### Project Estimating Techniques
- ◆ Bottom-up — sum individual activity estimates (previously illustrated)
  - ◆ Analogous — use the actual [factored] cost of previous, similar projects (also called top-down estimating)
  - ◆ Parametric — use measurable project or product characteristics (cost of the design phase, square feet of space, lines-of-code, weight of satellite, etc.) in a mathematical model

- ### Estimating Cautions
- ◆ **Analogy:**
    - ◆ Requires a good analogy
  - ◆ **Parametric**
    - ◆ Limited to specific project/product types
    - ◆ Require lots of historical data
  - ◆ **Analogy and Parametric:**
    - ◆ Require accurate historical data
    - ◆ Must be coupled with experience

- ### Estimating Project Cost Is Not Pricing!
- ◆ If your customer wants to “negotiate” the cost (labor) estimate, how should you respond?

- ### Stakeholder Expectations...
- ◆ What do you tell your stakeholders?
  - ◆ **Internal projects (“funny money”)**
    - ◆ Discuss the range and the probabilities
    - ◆ Show them the picture
  - ◆ **External projects**
    - ◆ This is your cost estimate
    - ◆ Use it to inform your bid/quote/price



## Managing with the Normal

- ◆ Commit to  $+1\sigma$  or  $+2\sigma$  (depending on your risk tolerance)
- ◆ Manage the project to the mean (50%) cost estimate
- ◆ Caution:
  - ◆ If you manage to  $+1\sigma$  you'll likely go over
  - ◆ If you manage to  $-1\sigma$  you could go over  $+1\sigma$  !



## YOUR QUESTIONS?

When you have eliminated the impossible, whatever remains, however improbable, must be the truth.

- Sherlock Holmes  
(Sir Arthur Conan Doyle)



## Thanks For Your Time

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