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Demystifying
The Black Art
of Software Estimation

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What is *Estimation* ?

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Estimation is an unbiased, analytical process to predict the duration or cost of a project.

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Dear valued employee,

The client needs **RiskForceIV** before next month or the Death Star will implode.
How long do you think it will take?

PS: We should softcode the architecture in case we need to integrate with their Other System running on Paula Bean's VM.

Love,
The Boss

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We need
RiskForceIV ready
to demo
at a conference in
February.

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We will have something to demo at the conference in February.

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That's a prediction.
It is NOT planning!

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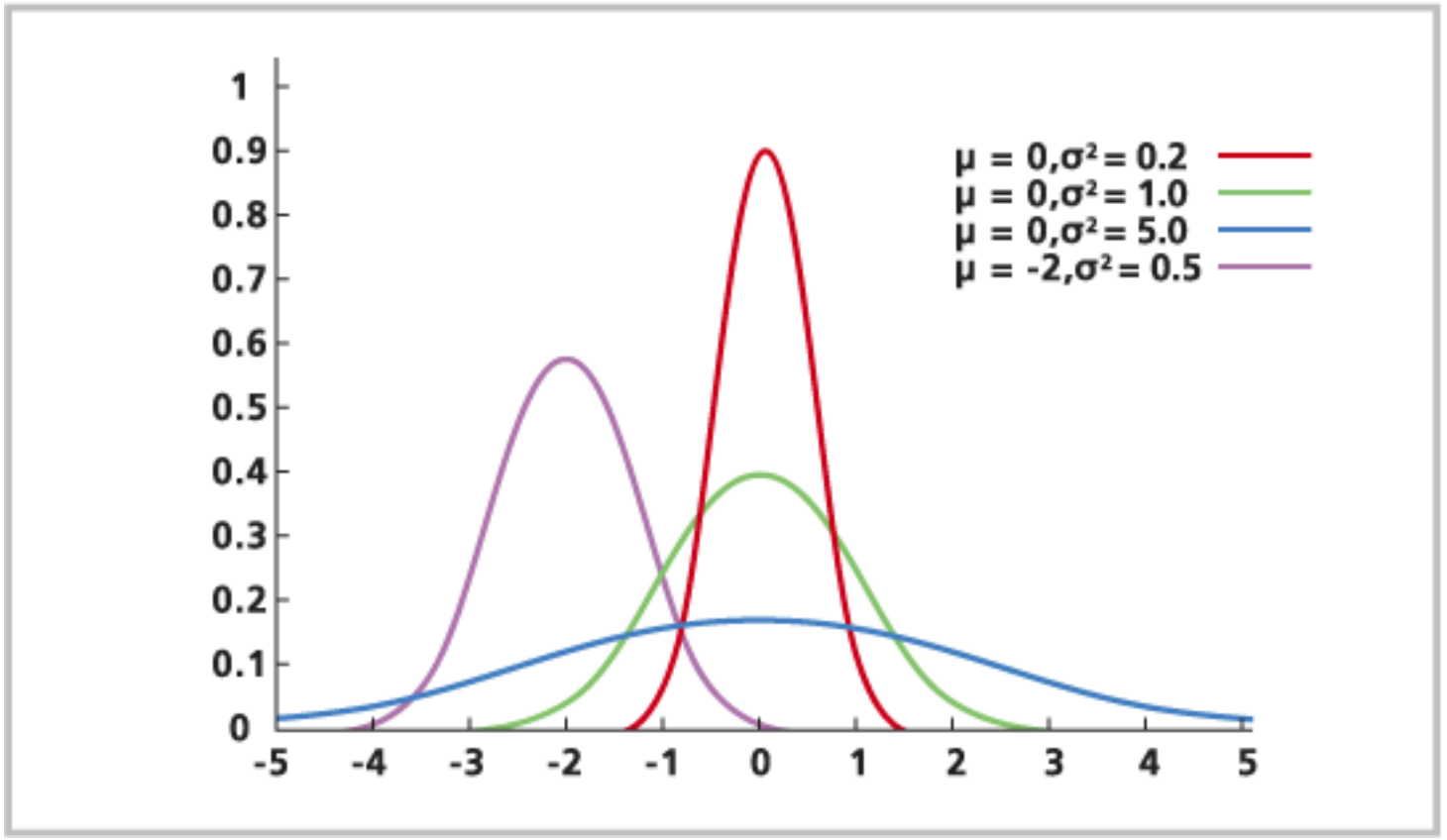
Estimation is not 100% accurate.
All estimates are probabilities.



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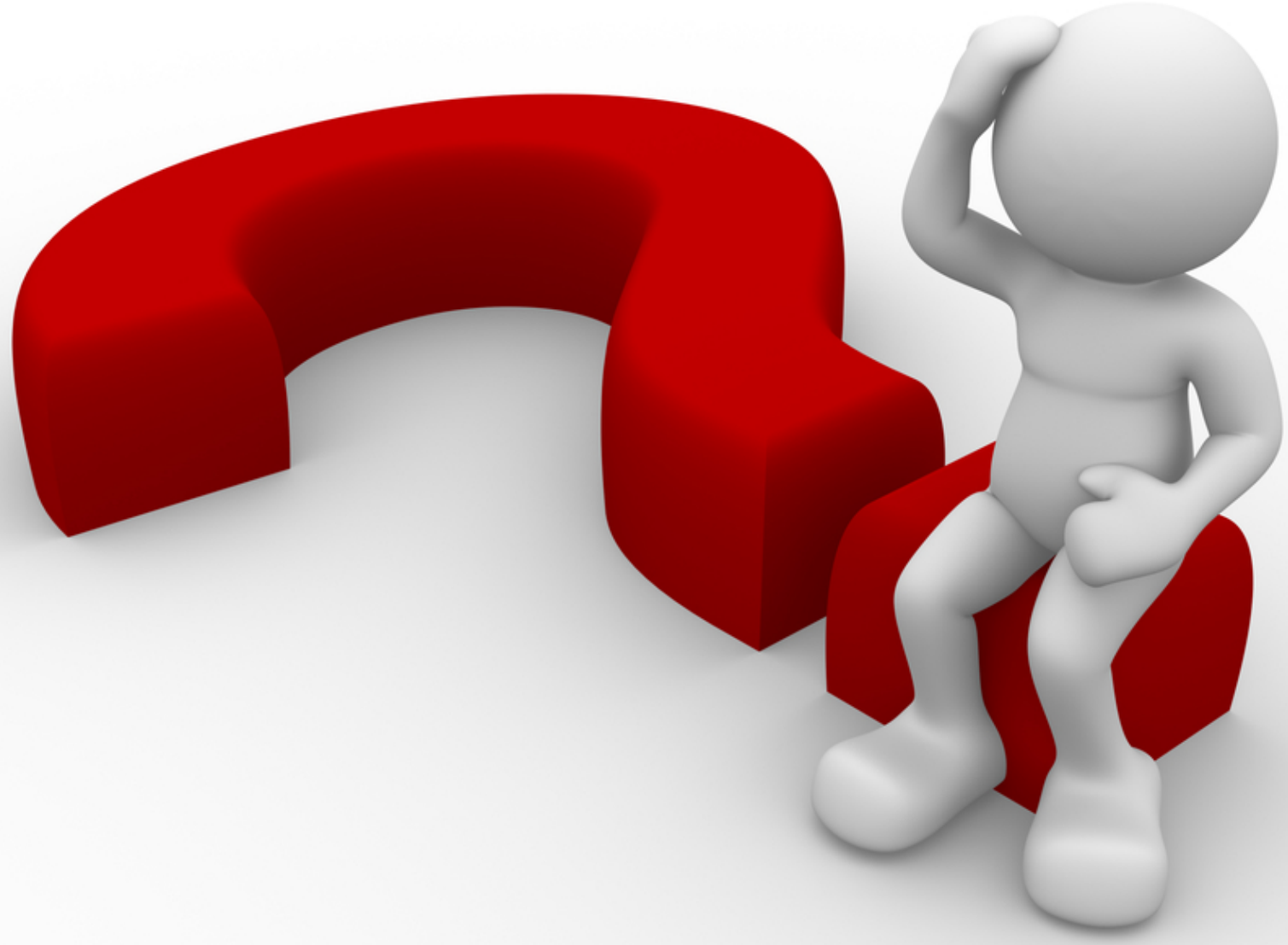

Why bother making estimates at all?

Better estimation …


Better planning…

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Lower cost…


Greater chance of project success!

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How do we know if our estimate is good?

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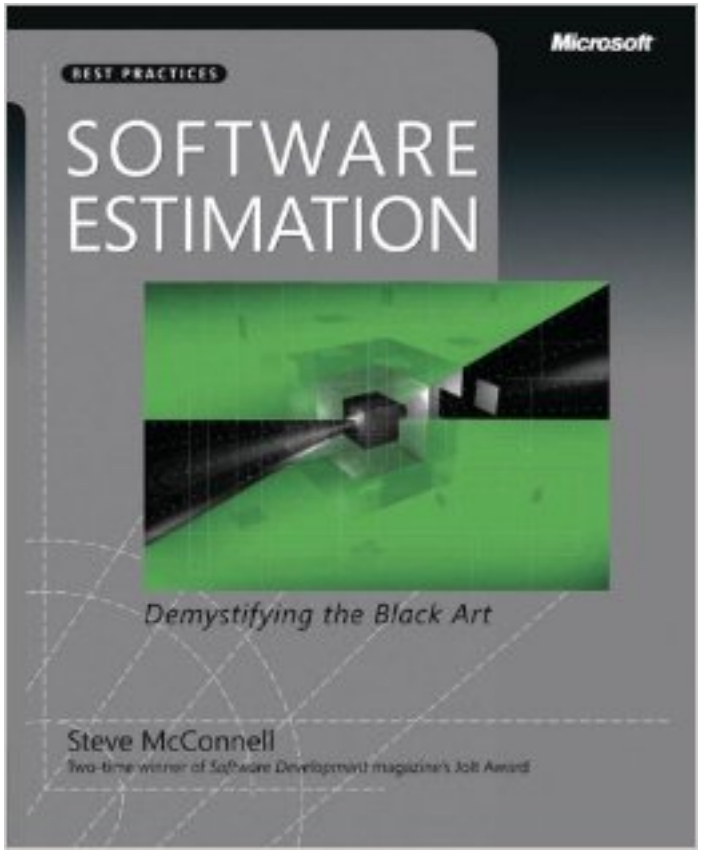

A good estimate should be within 25% of actual results 75% of the time.

Steve McConnell


Let’s have a test !!
e^{ix} = \cos x + i \sin x
e^{a+b} = e^a \cdot e^{b}
(e^a)^b = e^{ab}
\cos x = {e^{ix} + e^{-ix} \over 2}
\sin x = {e^{ix} - e^{-ix} \over 2i}
e^{ix} = \cos x + i \sin x
e^{-ix} = \cos x - i \sin x

For each question, fill in the upper and lower bounds that, in your opinion, give you a 90% chance of including the correct value.

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		Low Estimate	High Estimate
1	Surface temperature of the Sun		
2	Latitude of Shanghai		
3	Area of Asian continent		
4	The year of Alexander the Great's birth		
5	Worldwide box office value for the movie Titanic		
6	Total length of the coastline of the Pacific Ocean		
7	Heaviest blue whale ever recorded		

Answers

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		Value
1	Surface temperature of the Sun	6000° Celsius
2	Latitude of Shanghai	31° North
3	Area of Asian continent	44,390,000 Km2
4	The year of Alexander the Great's birth	356 BC
5	Worldwide box office value for the movie Titanic	USD 1.835 billion
6	Total length of the coastline of the Pacific Ocean	135670 Km
7	Heaviest blue whale ever recorded	170 tones

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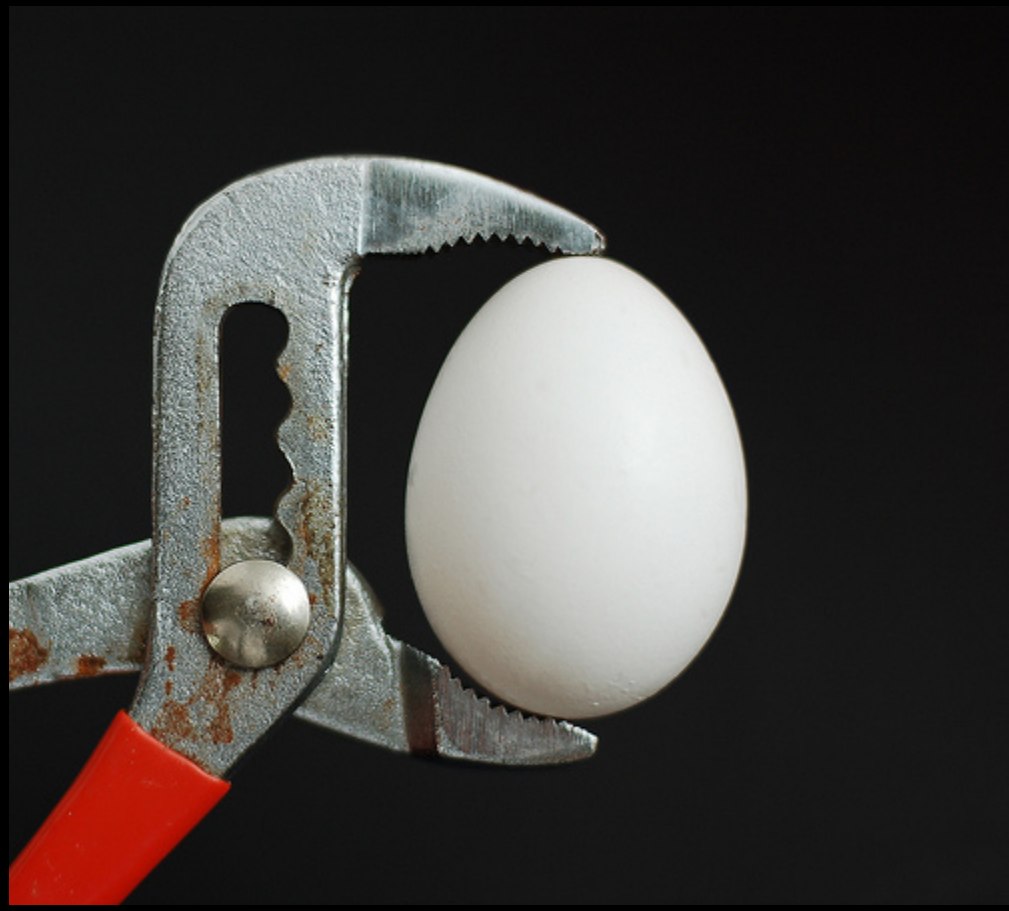
How did you do?

Where did the pressure to narrow your ranges come from?



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They came from within..

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Narrow ranges != greater accuracy

Make your ranges as wide as they need to be

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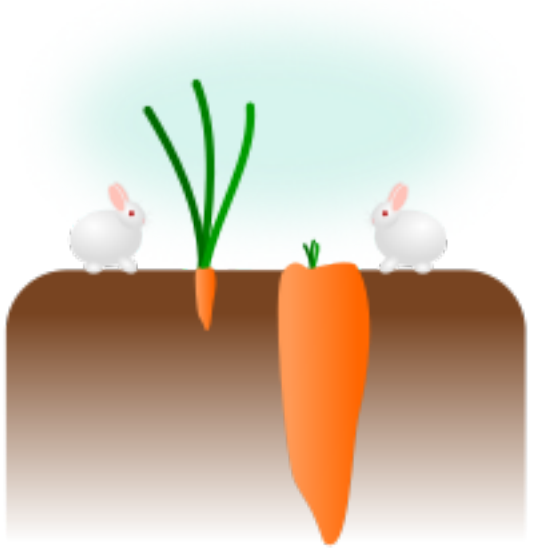
Over

estimate

Under



Work expands to fill the time available for its completion - Cyril Northcote Parkinson

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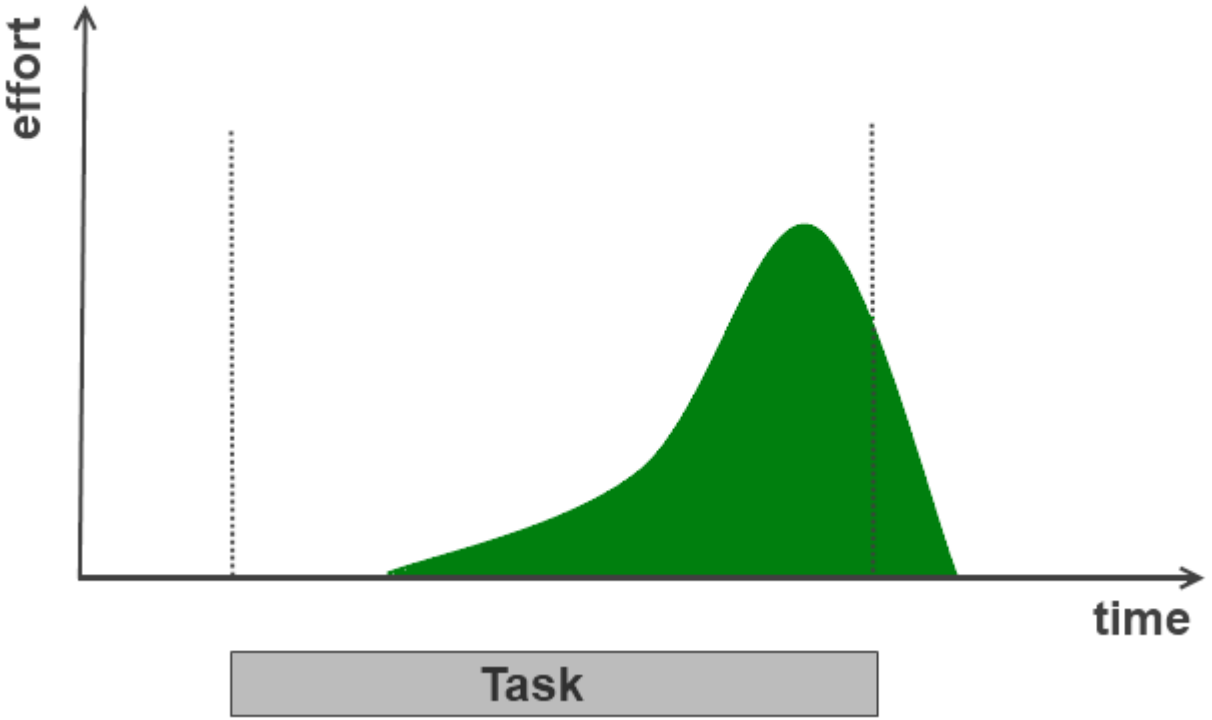
Goldratt's Student Syndrome



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Underestimating will make them fearful, increasing their rate of work.

The empire will soon be mine.

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Underestimating leads to project plan destruction

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More bugs..

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Bad team health

More time in status meetings to discuss slippage

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Control the effects of overestimation using project planning and status visibility

Not by buffering your estimates

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What's the source of uncertainty in our estimates?

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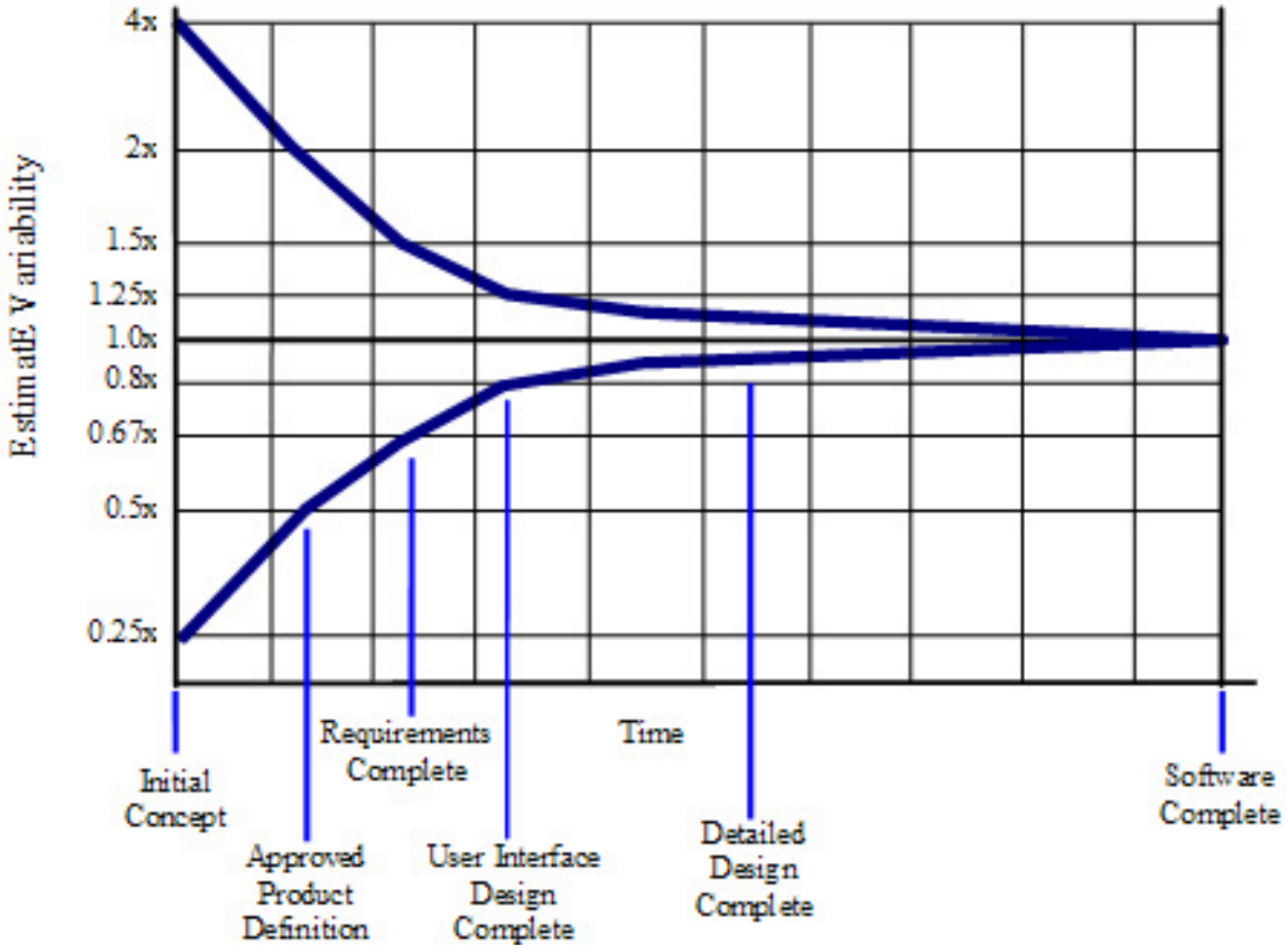
Cone of uncertainty



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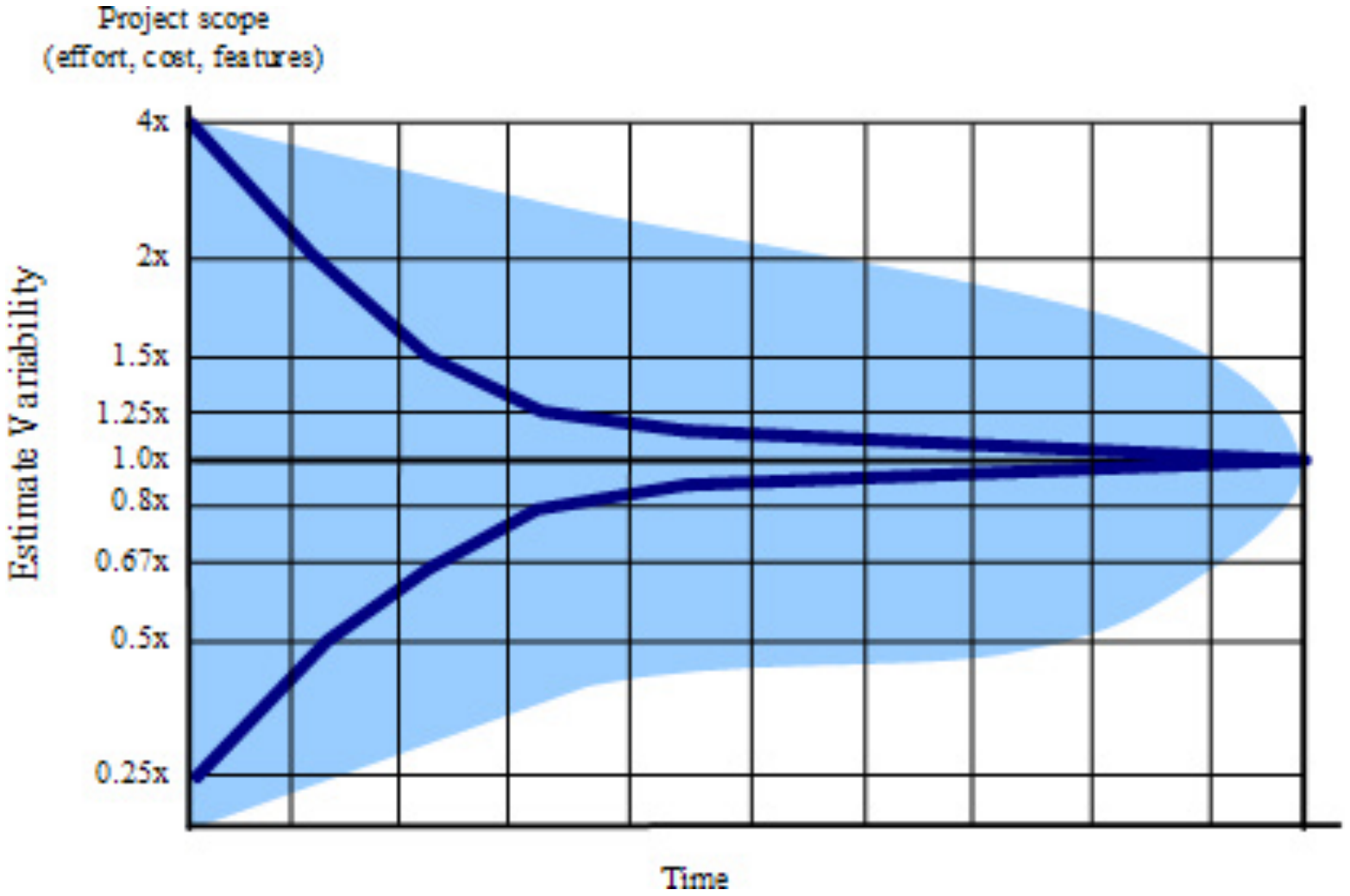
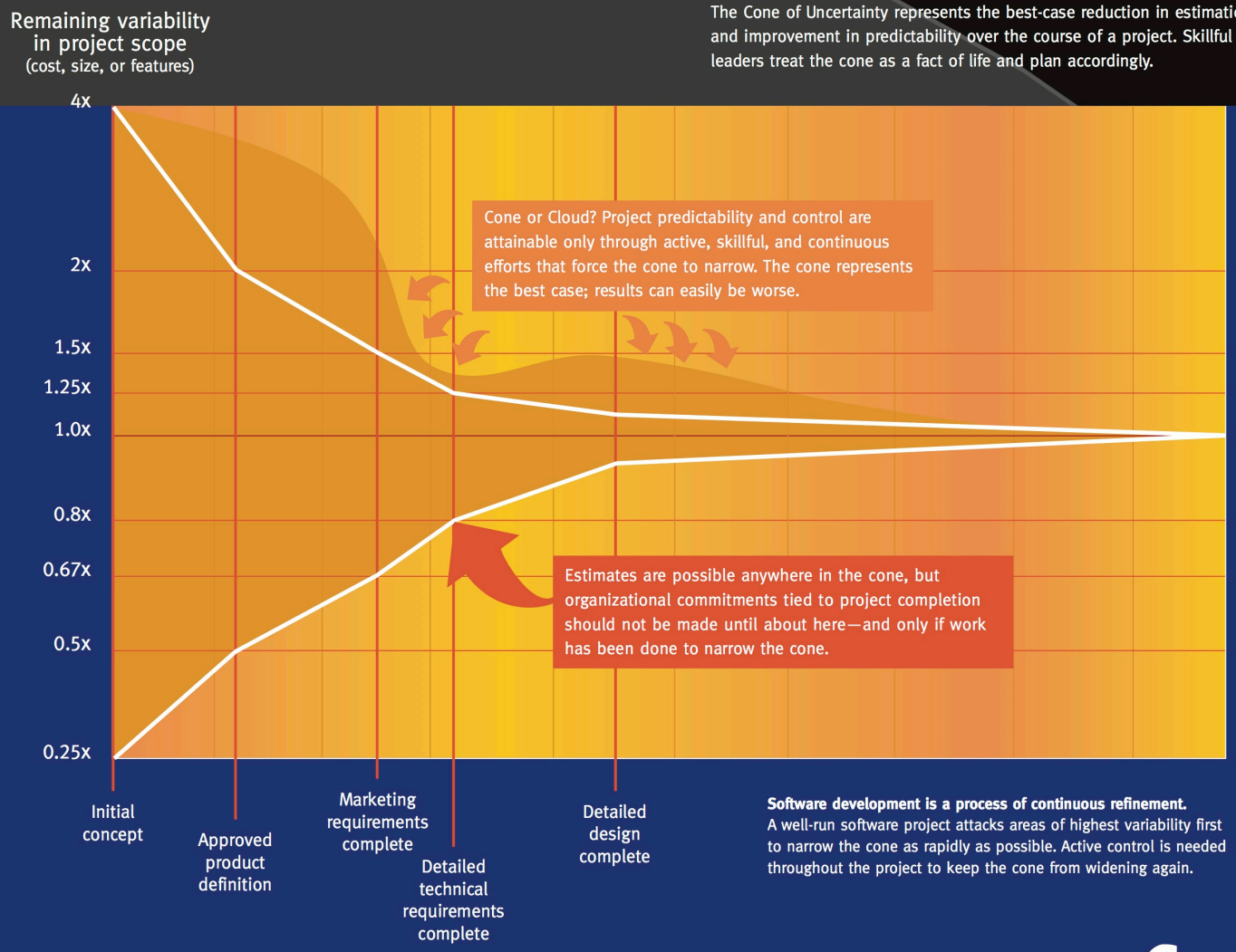
Cone of uncertainty



Cone of Uncertainty:

All software projects are subject to inherent errors in early estimates. The Cone of Uncertainty represents the best-case reduction in estimation error and improvement in predictability over the course of a project. Skillful project leaders treat the cone as a fact of life and plan accordingly.



Software development is a process of continuous refinement. A well-run software project attacks areas of highest variability first to narrow the cone as rapidly as possible. Active control is needed throughout the project to keep the cone from widening again.

For additional copies of this poster, please e-mail **coneposteroffer@construx.com** with the subject "Cone of Uncertainty Poster." Be sure to include your name, company name and mailing address.

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The cone doesn't narrow
Itself

You have to force it to narrow by reducing variability

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Unstable requirements are the worst offender

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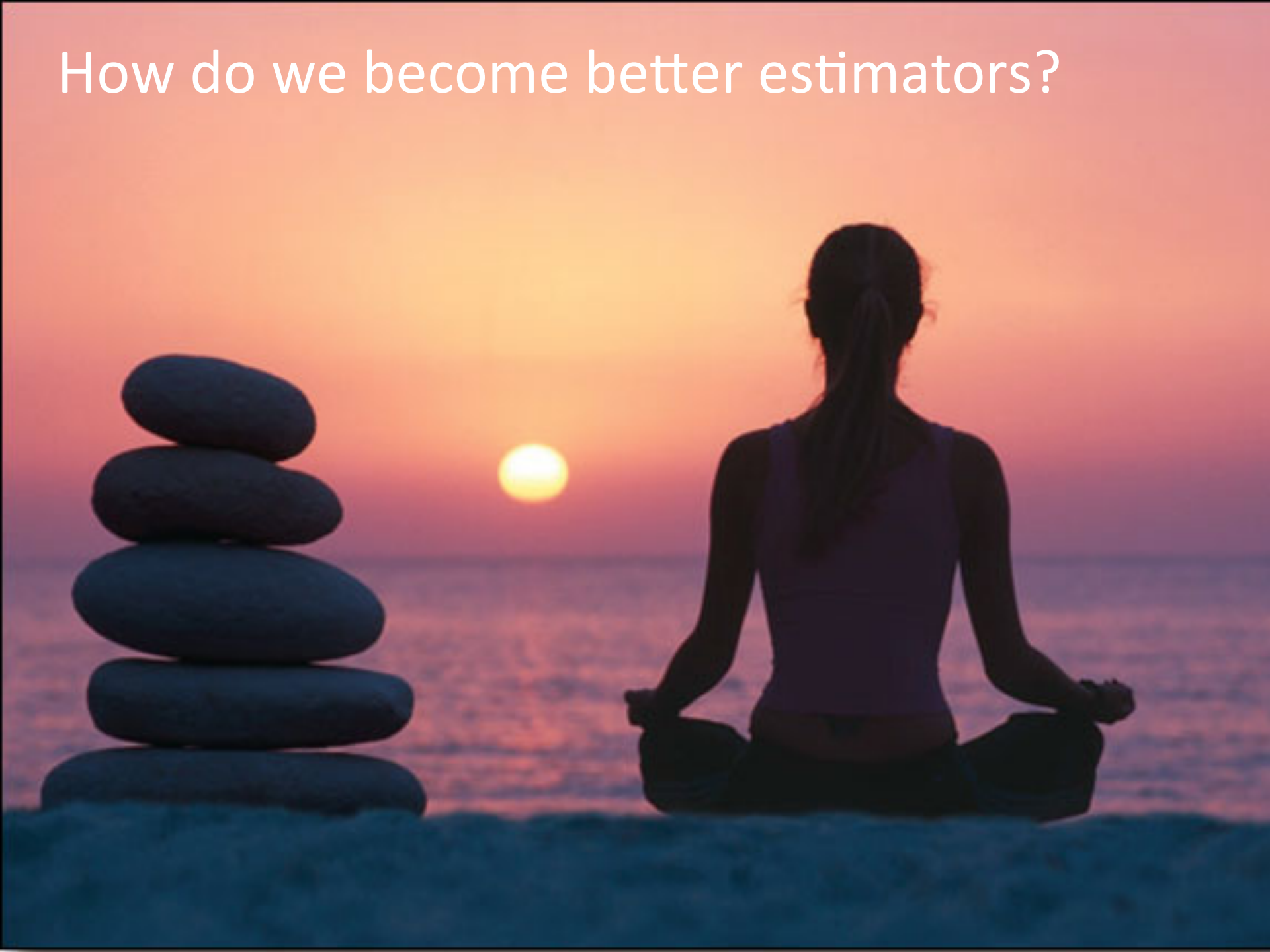
Optimism is BAD

How do we become better estimators?



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Don’t give off the cuff estimates

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Precision is not accuracy

The project will not take 193,235 hours

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Make tasks more granular

2 days max per task

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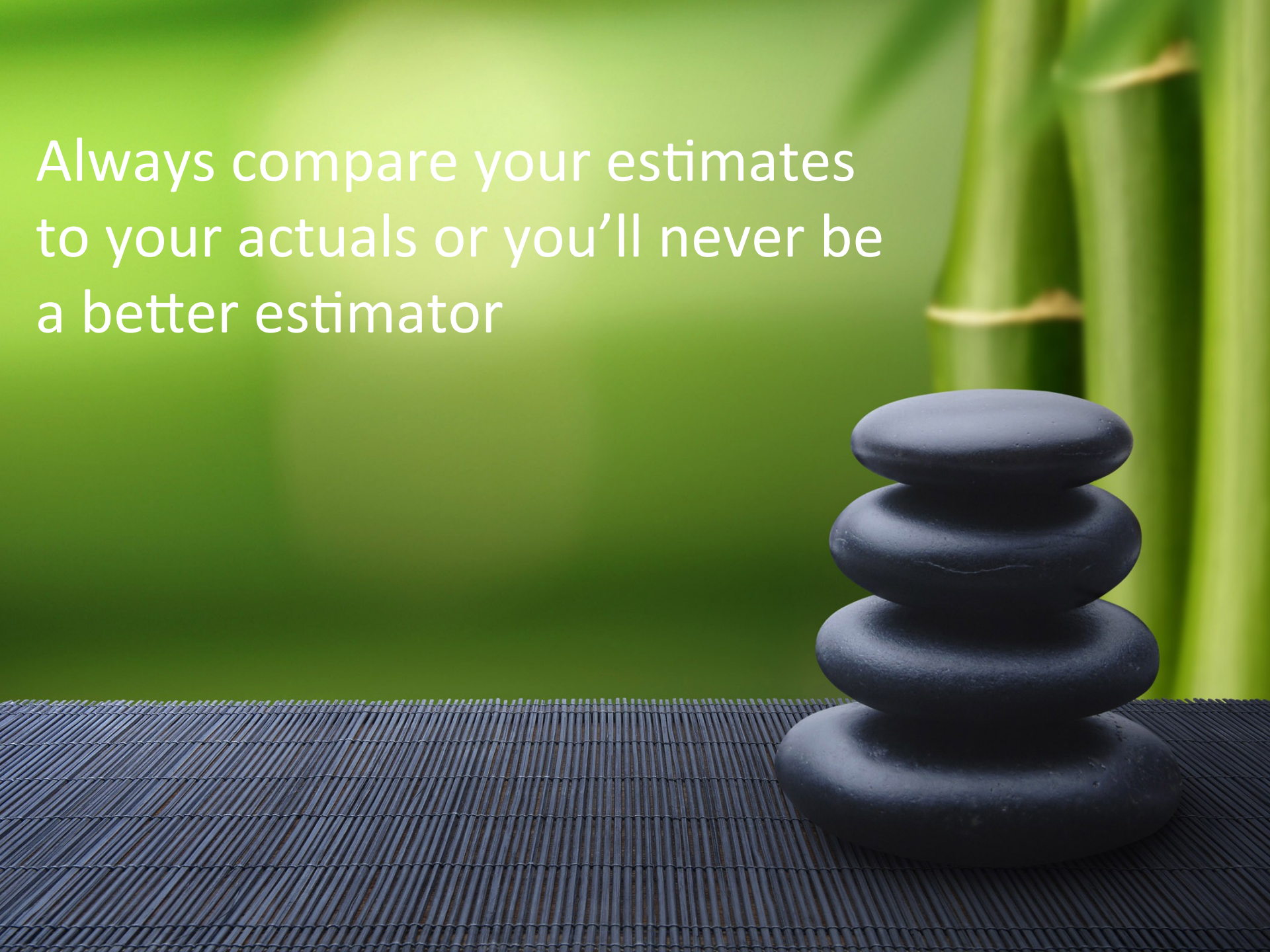
Use ranges not single points with best case and worst case estimates

Feature	Best Case	Worst Case
Feature A	1.25	2.3
Feature B	2.1	3.2
Feature C	1.25	2.25
Feature D	2	3.25
Feature E	0.5	1.25
TOTAL	7.1	12.25

Use the **PERT** formula to get the effort in the Expected Case

Expected case =
[Best Case + 4(MostLikelyCase) + WorstCase] / 6

Always compare your estimates to your actuals or you'll never be a better estimator



LET’S ESTIMATE!

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The problem

- Build a web-based Phonebook application
- Functional requirements
  - Store & retrieve general person info (name, birthday, company)
  - Define types of contacts (mobile, fixed line, address, email)
  - Relate persons
  - Authenticate and authorize users

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How much effort?

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Did you include ….

- Specifying the requirements
- Design
- Plan
- Test
- Configuration Mgmt
- Deployment

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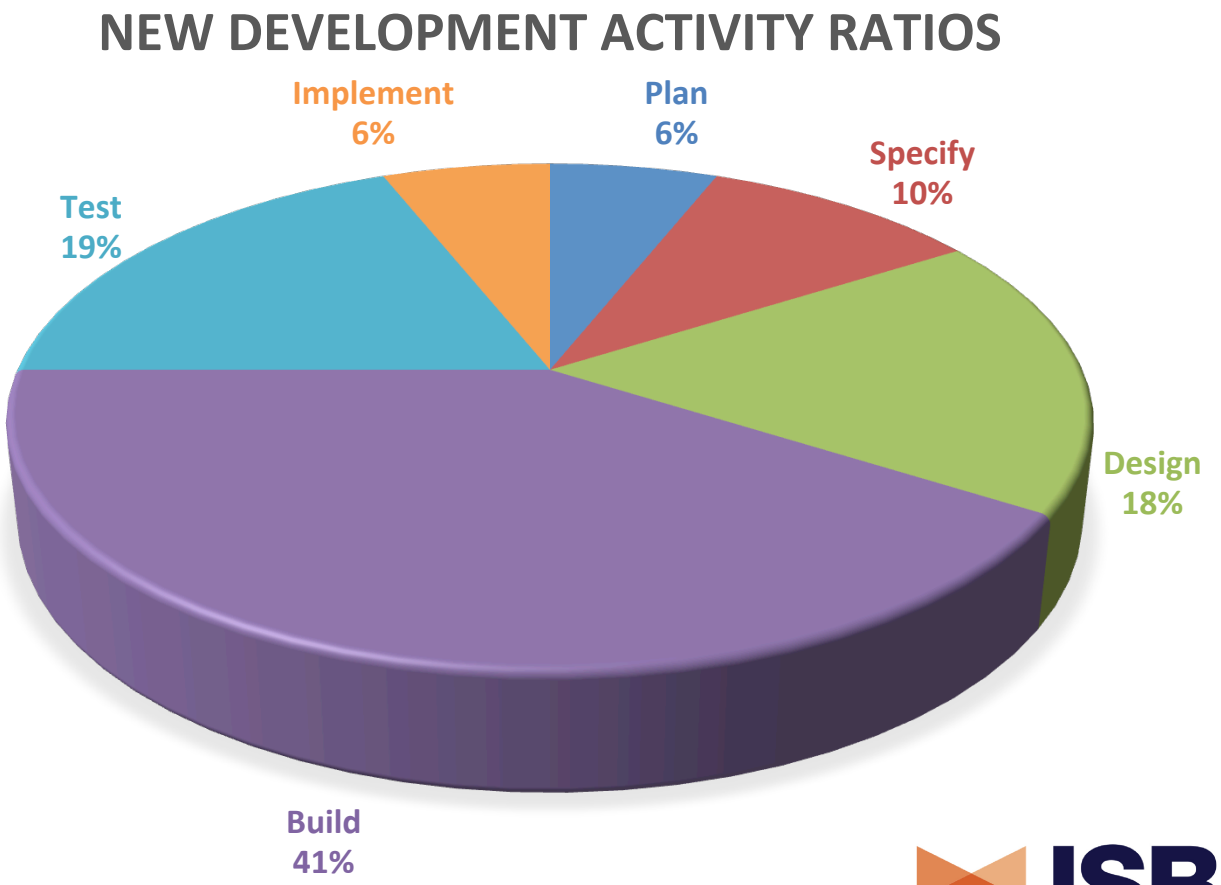
New Development Activity Ratios



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Analogy Estimation

	Total	Plan	Specify	Design	Build	Test	Implement
	17,08	1,03	1,7	3,08	7	3,24	1,03
Search screen	7,32	0,44	0,73	1,32	3	1,39	0,44
Add person screen	4,88	0,29	0,49	0,88	2	0,93	0,29
Add contact screen	2,44	0,15	0,24	0,44	1	0,46	0,15
Add contact type screen	2,44	0,15	0,24	0,44	1	0,46	0,15

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A more „scientific" approach

- A **function point** is a unit of measurement to express the amount of business functionality an information system (as a product) provides to a user. Function points measure software size.
- The cost of a **FP** is calculated from past projects (productivity rate)

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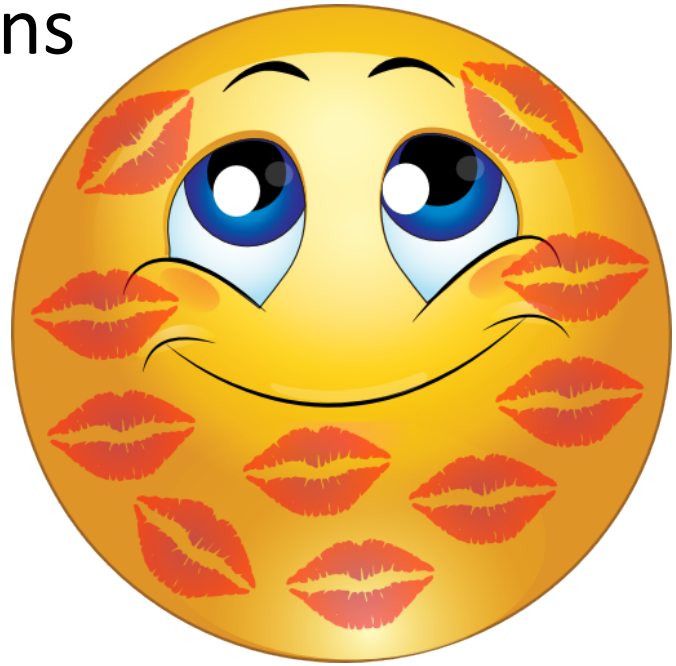
KISS Quick Software Size Estimation Technique

- (Keep It Simple Stupid)
- Generates a function point size of a system, based on 28 simple questions



		FiSMA FP	Count
	Total	**85,1**	
1	Number of starting icons	1,00	1
2	Number of login and logout screens	1,80	2
3	Number of different menus	1,80	1
4	Number of parameter selection lists (drop-down lists)	1,00	1
5	Number of inquiry screens (db retrieving, on screen)	3,40	2
6	Number of browsing lists screens (occurences of same type data)	2,30	1
7	Number of screens for starting report generation	3,40	
8	Number of 3-func (create, update and delete) screens	16,80	3
9	Number of 2-func (create and/or update and/or delete) screens	11,20	
10	Number of 1-func (create or update or delete) screens	5,60	
11	Number of output forms (fixed layout)	4,90	
12	Number of reports	6,50	1
13	Number of text messages or e-mails	3,00	
14	Number of monitor screen outputs	6,50	
15	Number of messages sent to other applications	3,60	
16	Number of messages received from other applications	5,50	
17	Number of signals sent to device	1,40	
18	Number of signals received from a device	2,00	
19	Number of batch records sent to another application	3,60	
20	Number of batch records received from other applications	5,50	
21	Number of entity types	3,90	3
22	Number of other logical record types	3,90	
23	Number of independent calculation routines	5,10	
24	Number of independent calculation routines	5,10	
25	Number of independent formatting routines	5,10	
26	Number of independent database cleaning routines	5,10	
27	Number of independent security routines	5,10	
28	Number of other independent algorithmic routines	5,10	

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Effort calculation

- Functional size (FS): 85,1 FiSMA FP
- New development
- Java
- Multitier
- Team size: 1 to 4
- Project Delivery Rate (PDR): (3,95 +2+1,85+1,8) /4 = 2,4 h / FP
- Project Effort = FS x PDR = **25,53 MD**

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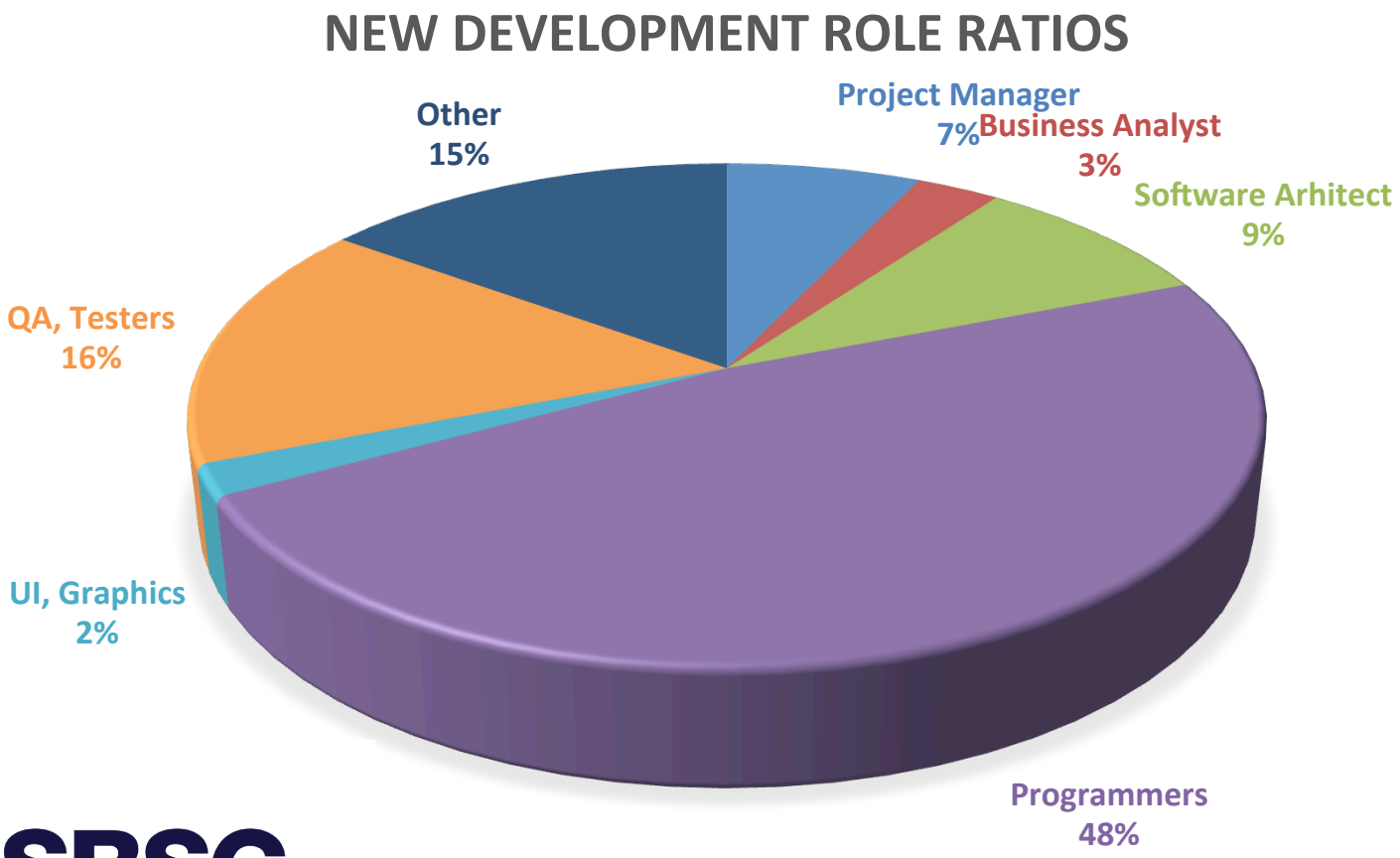
What about roles?



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References

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TOOLS

COCOMO II - http://sunset.usc.edu/csse/research/COCOMOII/cocomo_main.html)
Construx Estimate 2.0 - http://www.construx.com/Resources/Construx_Estimate/
Statistics (ISBSG) - http://www.isbsg.org/

BOOKS

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Questions & Answers