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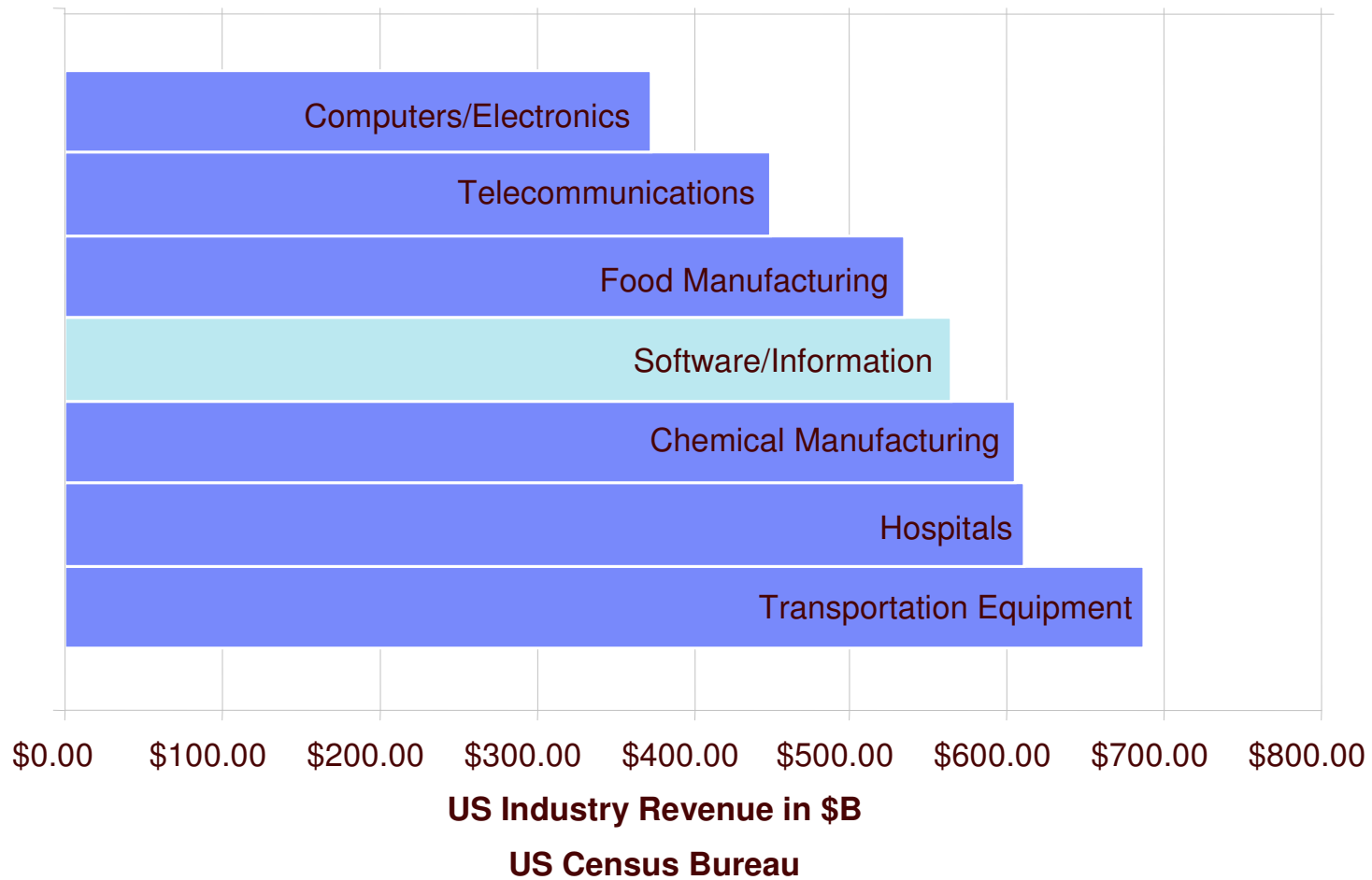
Risk and Relevance

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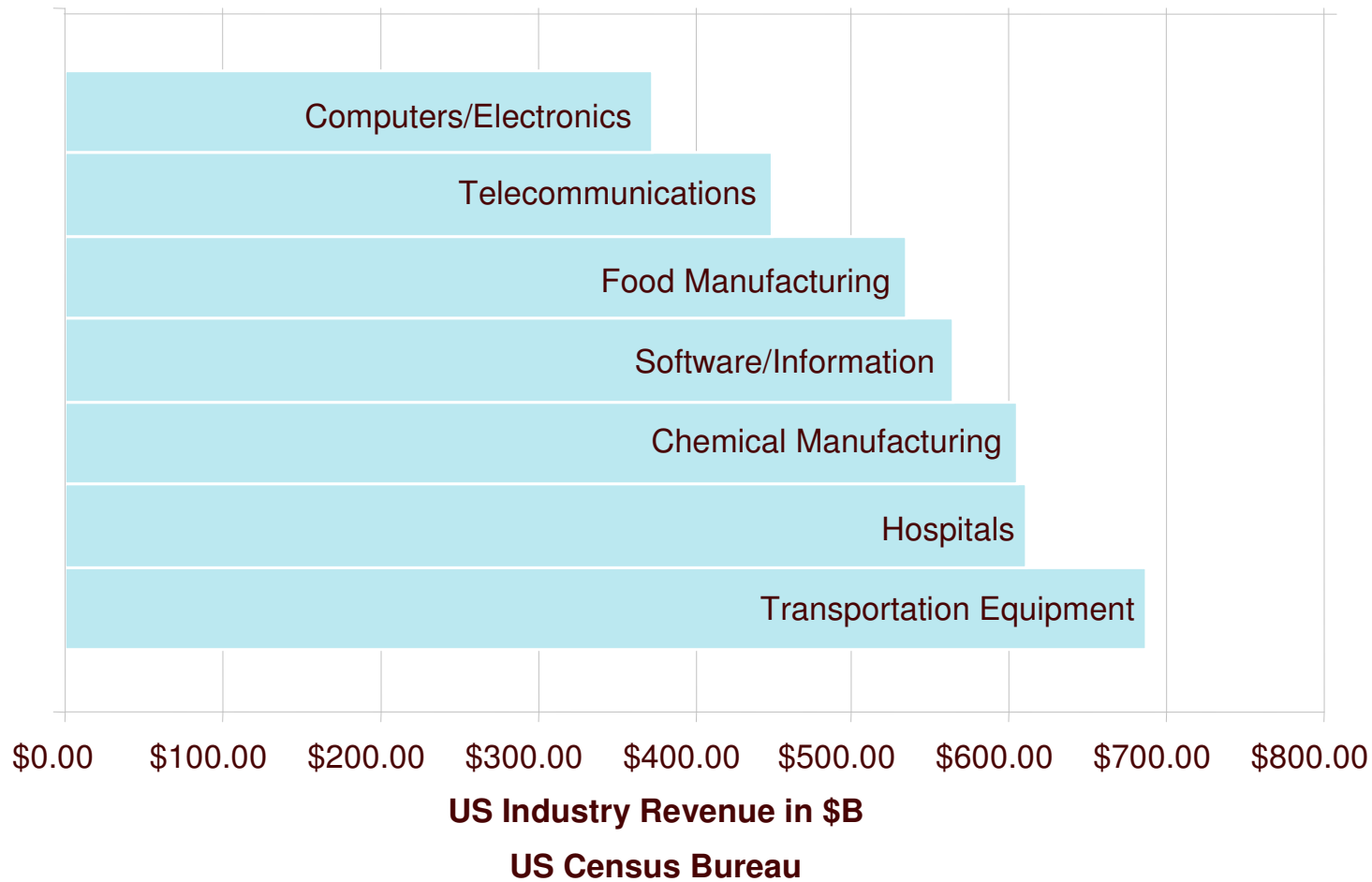
Rational. software



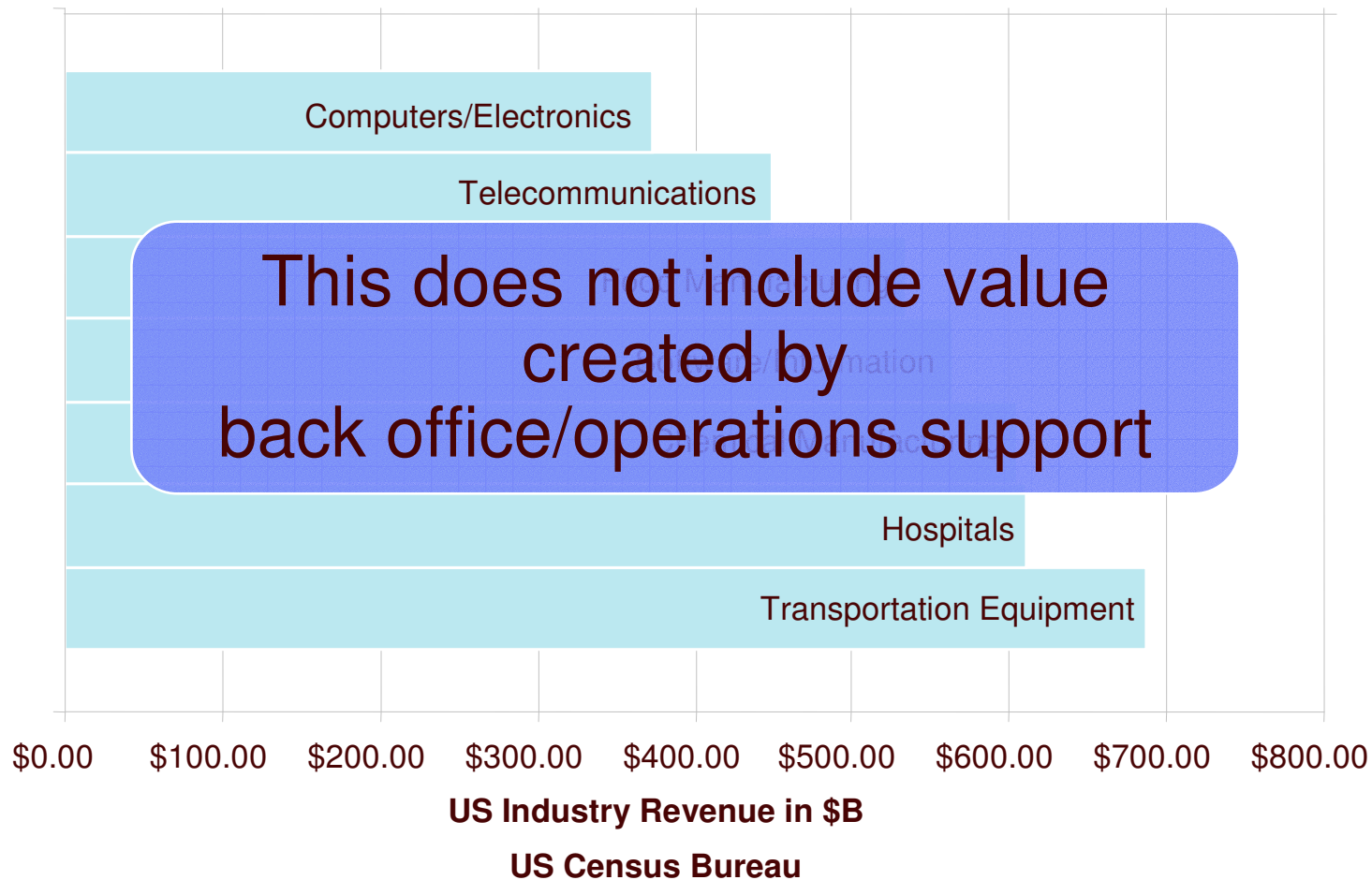
Value is being created by software/IT



Software provides huge value for all the other industries



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The concern is we are not creating value efficiently

- For example, in a *European Services Strategy Unit 2007* report studied 105 outsourced public sector ICT projects with significant cost overruns, delays and terminations, total value of contracts is £29.5 billion
- Results
 - ▶ Cost overruns totaled £9.0 billion
 - ▶ 57% of contracts experienced cost overruns
 - ▶ The average percentage cost overrun is 30.5%
 - ▶ 33% of contracts suffered major delays
 - ▶ 30% of contracts were terminated
 - ▶ 12.5% of Strategic Service Delivery Partnerships have failed

*How much value was delivered
by all the successful efforts?*



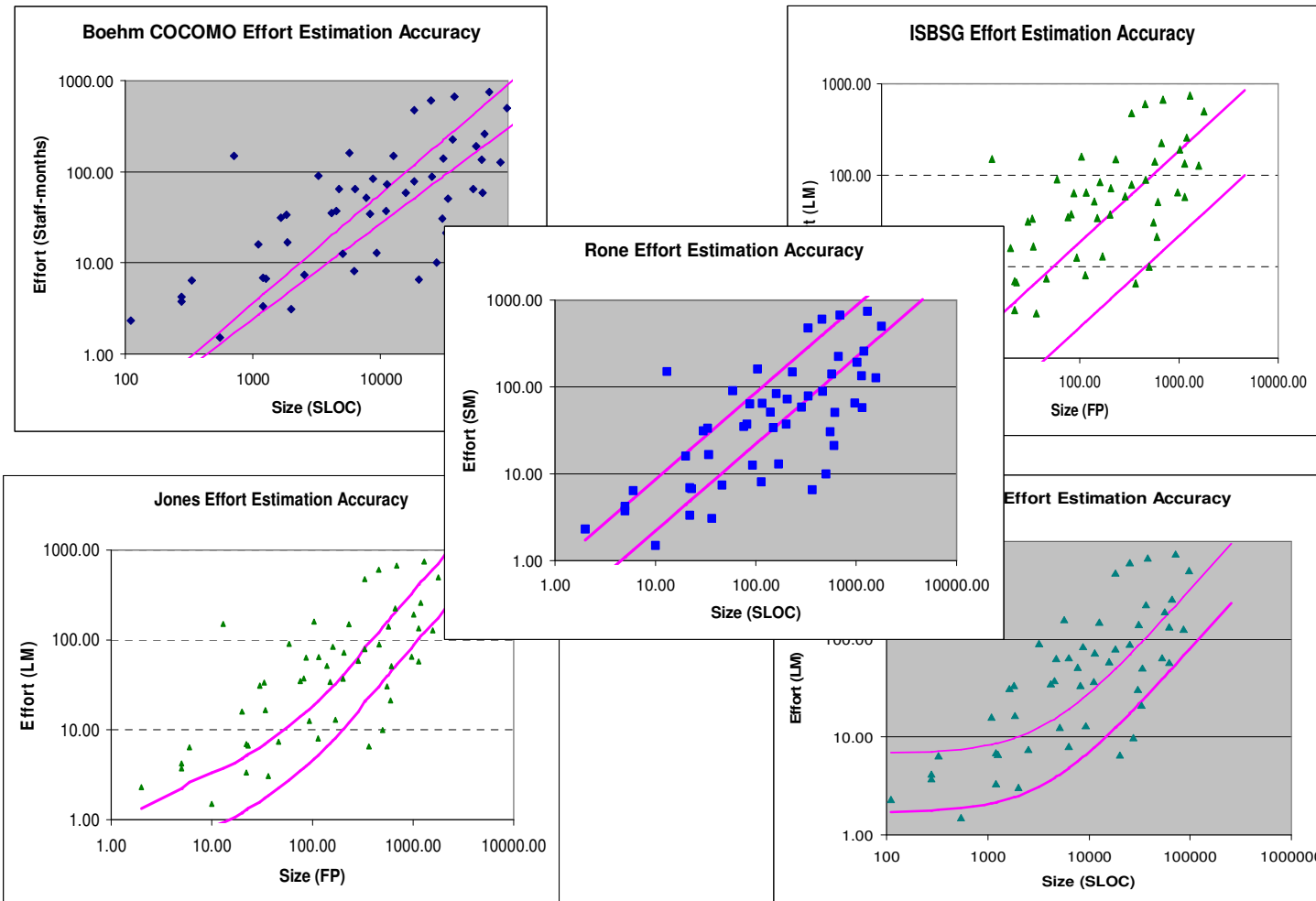
How should we meet the challenge of efficiently delivering value?

- Focusing on avoiding overruns?
 - ▶ Leads to risk avoidance
 - ▶ limits opportunity for creating value, to be relevant

- Rather, lets discuss how to apply some engineering discipline to creating value



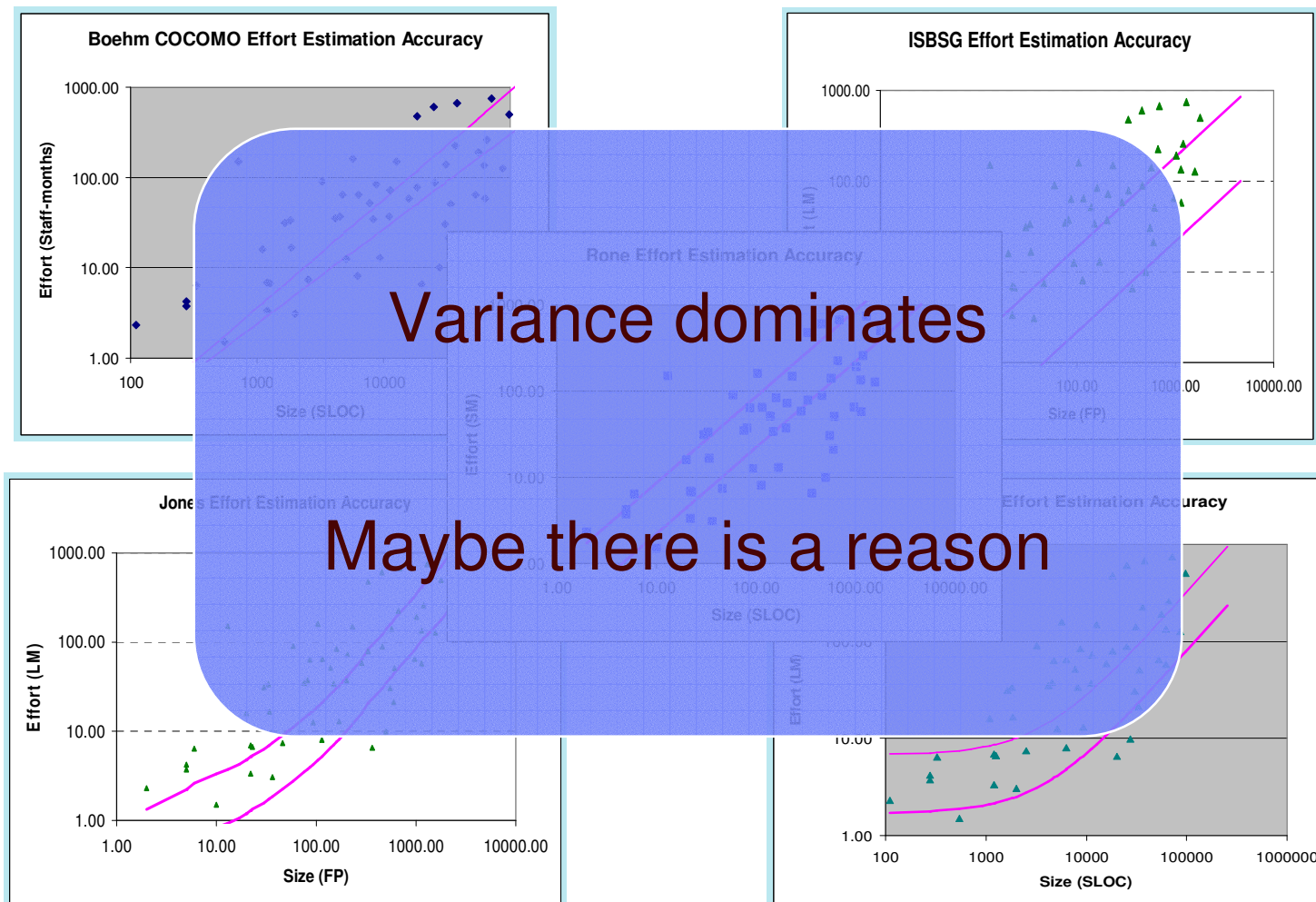
Can we get the estimates right?



From George Stark, Paul Oman, "A comparison of parametric Software Estimation Models using real project data", in press



History has shown we do not get the estimates 'right'

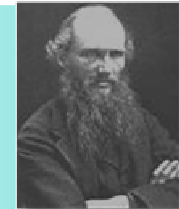


From George Stark, Paul Oman, "A comparison of parametric Software Estimation Models using real project data", in press, 2007



Eternal wisdom

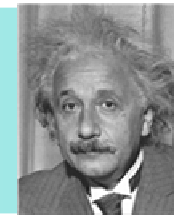
"To measure is to know. If you can not measure it, you can not improve it."
- Lord Kelvin



"We should be guided by theory, not by numbers."
- W. Edward Deming



"Make everything as simple as possible, but not simpler."
- Albert Einstein



"There are risks and costs to a program of action. But they are far less than the long-range risks and costs of comfortable inaction."
- John F. Kennedy



The value conversation can vary?

- **Future business efficiency**

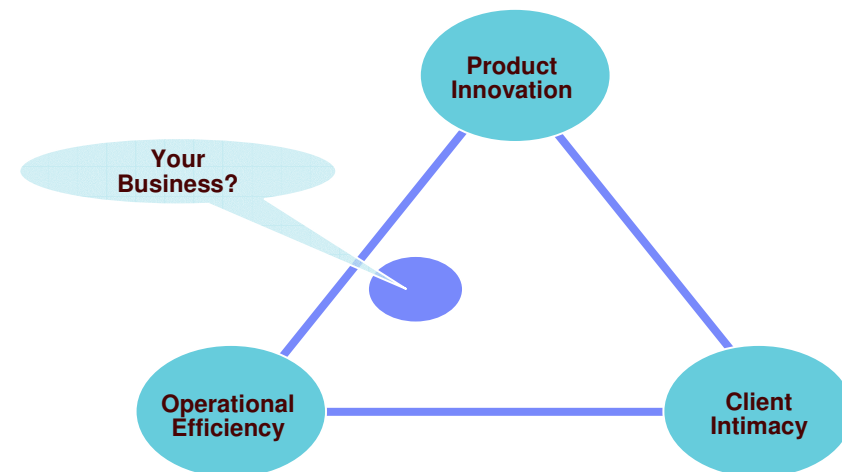
- ▶ Investing now to receive future savings, capacity, responsiveness

- **Operational risk avoidance**

- ▶ Investing now to avoid future business/IT risks, e.g., security, privacy, continuity ...

- **Business impact**

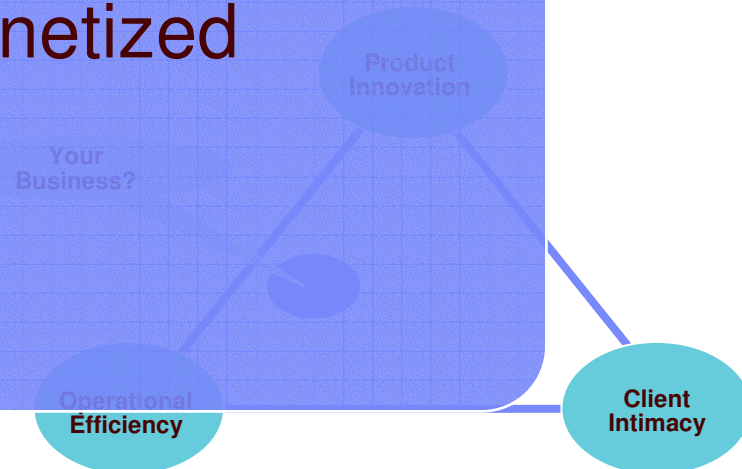
- ▶ Investing now to affect future top line
 - Treacy Framework
 - Mission capabilities



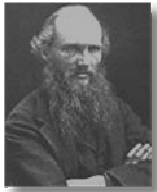
The value conversation can vary?

- **Future business efficiency**
 - ▶ Investing now to receive future savings, capacity, responsiveness
- **Operational risk avoidance**
 - ▶ Investing now to avoid future business/IT risks, e.g., security, privacy, continuity ...
- **Business impact**
 - ▶ Investing now to affect future top line
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All can be monetized



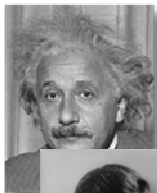
Just enough theory



- Money is how one measures value – need to monetize



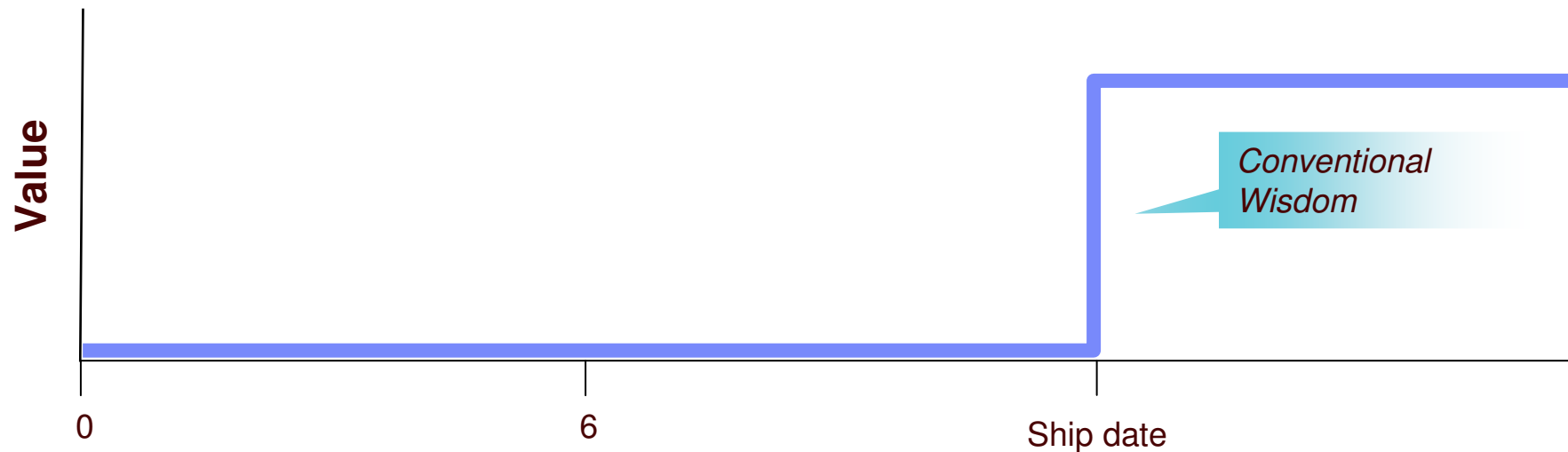
- The future cost, value is uncertain
 - ▶ Cost and risk are random variables
 - ▶ Need to consider current *Net Present Value* of program



- Results need only to be accurate enough to drive desired behavior: Assuming managed risk to deliver value



How much is an incomplete development program worth?



- Conventional wisdom is the accountants answer.
 - ▶ provides no opportunity for ongoing value management
- Can only discuss cost, not value

Little opportunity to show relevance





Imagine (if you will) you could sell your program

- The buyer would spend money now to get the right to invest in completing the program – *like a call option*
- The buyer, reasoning like an investor, would like to know
 - ▶ Expected cost to complete
 - ▶ Expected value received
 - ▶ The risk
- How would one reason about the fair price?

*This is what the economists call
“incomplete market reasoning”*



The Net Present Value of a development program

$$NPV = \sum_{i=1}^n \frac{R_i}{(1+r_R)^i} - \sum_{k=1}^p \frac{M_k}{(1+r_m)^k} - \sum_{j=1}^m \frac{E_j}{(1+r_E)^j} - E_0$$

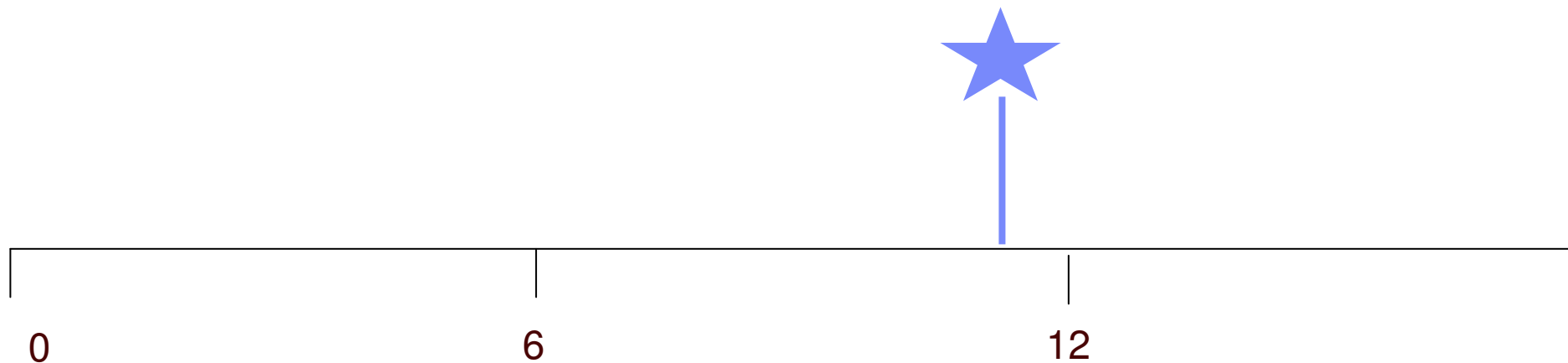
- R_i = revenue, benefits stream
- E_j = development expense stream
- M_k = maintenance expenses stream

NPV, R_i, E_j, M_k are all random variables



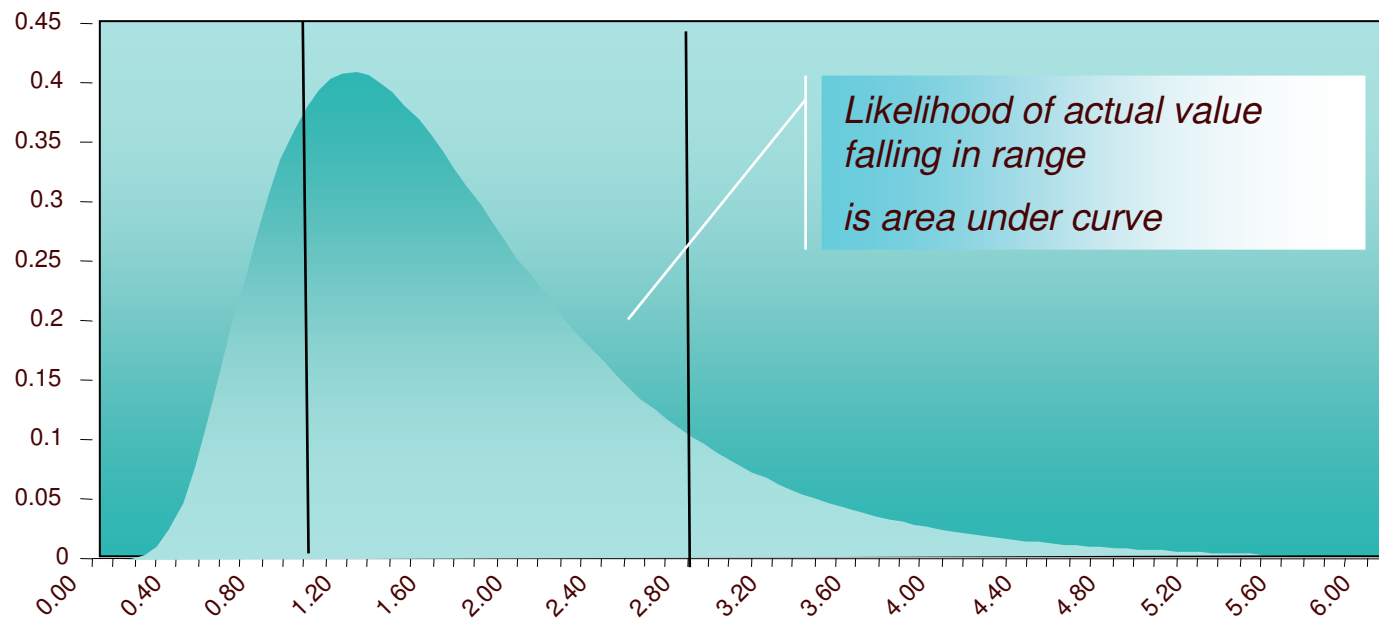
Expense risk: Imagine you have 12 months to deliver a business critical system

- Your estimators tell you it will be done in 11 months
- What do you do with the information?
 - ▶ Rest easy, believing there is no risk?



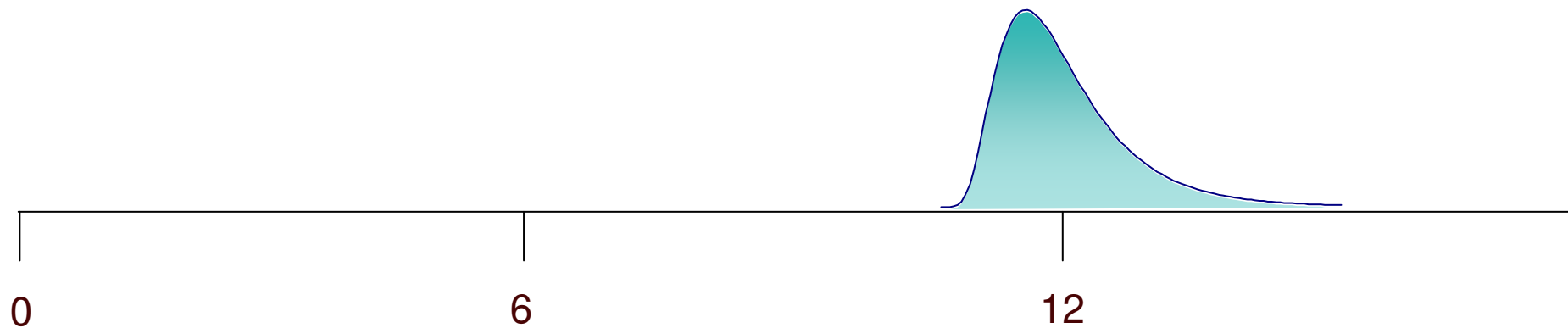
Maybe you realize that program parameters (cost, schedule, effort, quality, ...) are random variables

- Area under curve describes probability of measurement falling in range



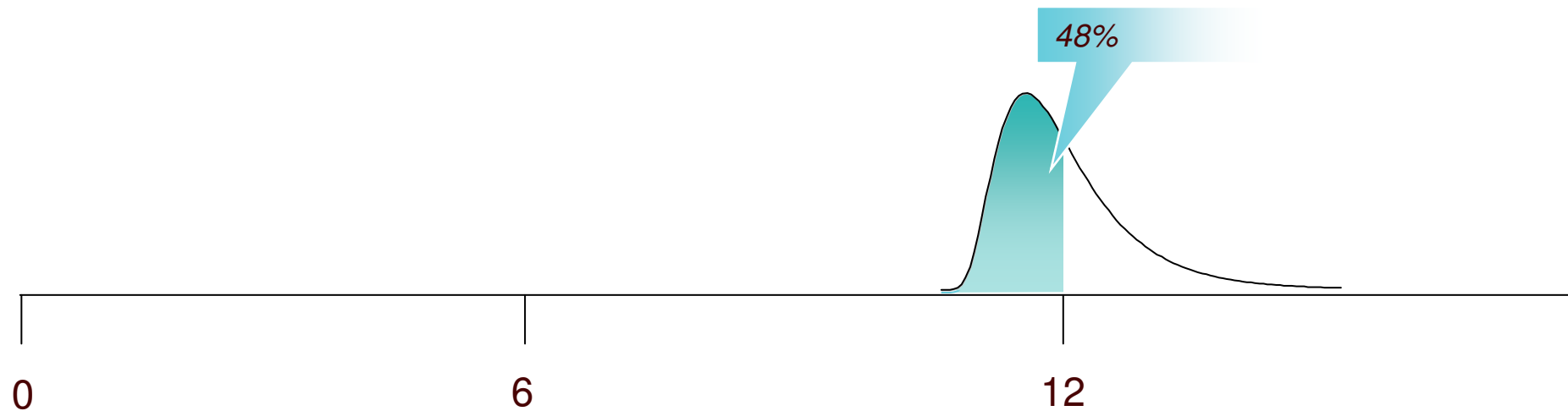
Imagine you have 12 months to deliver a business critical systems

- So you ask for the distribution and discover there is some uncertainty



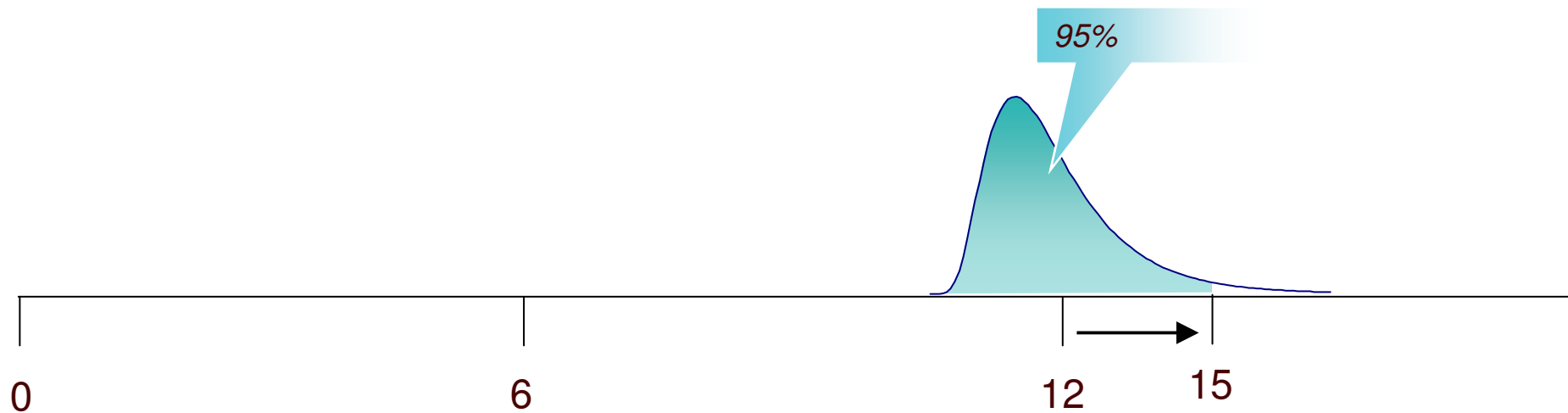
Imagine you have 12 months to deliver a business critical systems

- In fact there is less than 50% chance of making the date



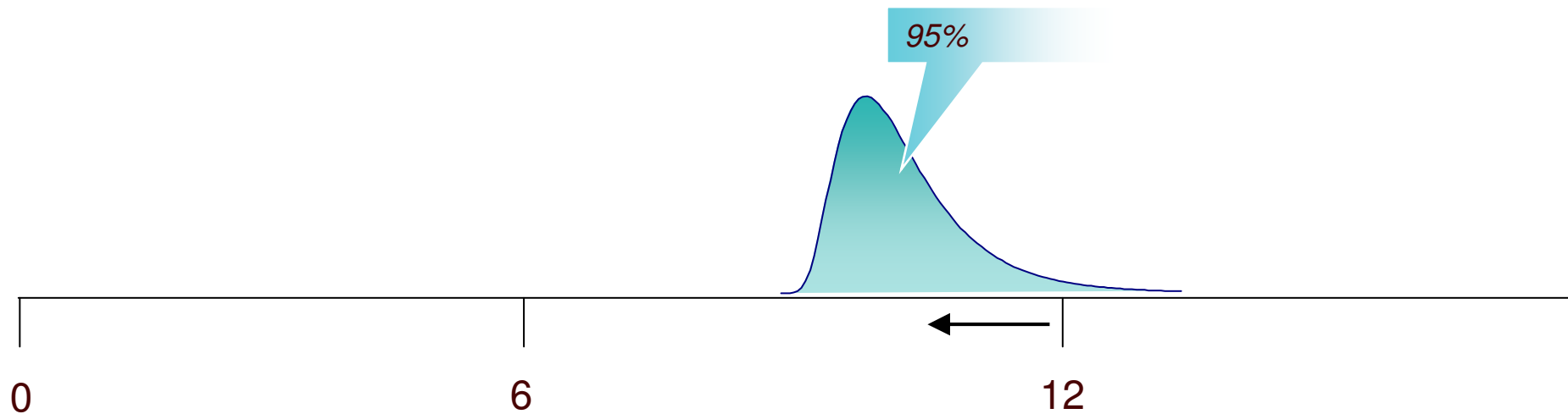
Then what?

- Move out the date to improve likelihood of shipping?



Then what?

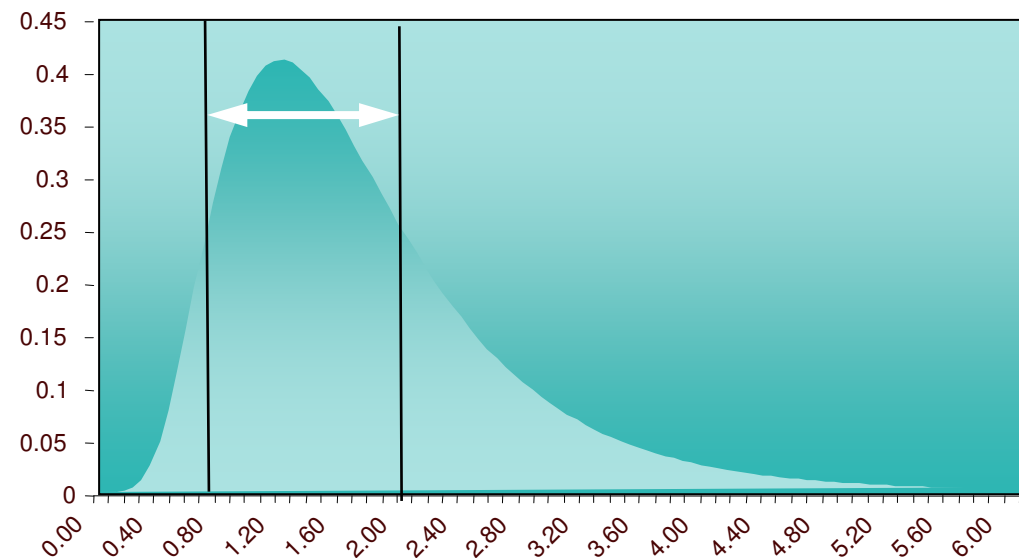
- Or move in the estimate by sacrificing quality or content?



The estimate variance reflects current state of understanding

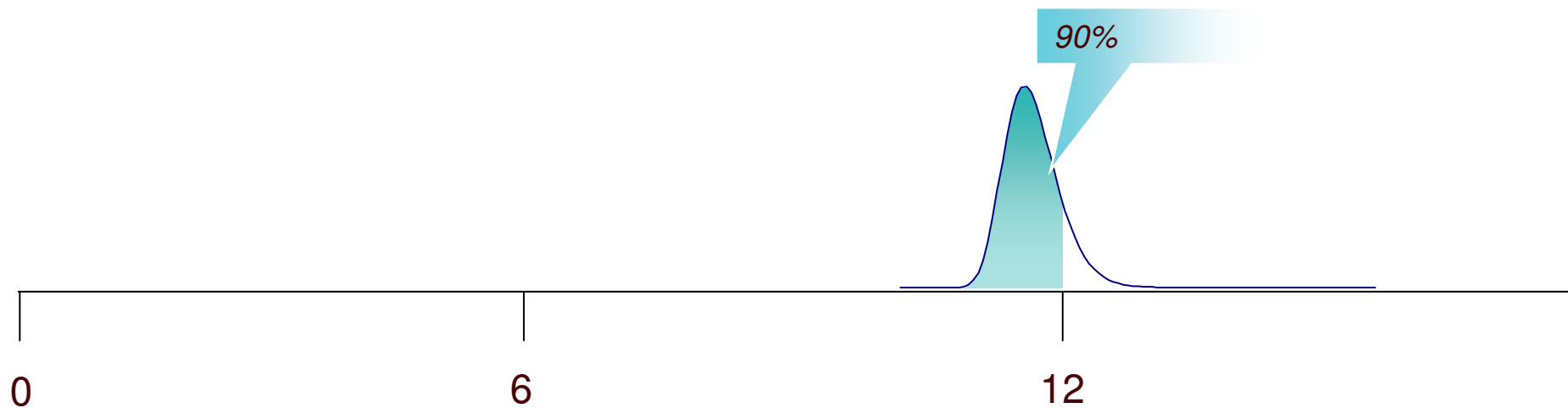
- Source
 - ▶ Lack of knowledge
 - ▶ Lack of confidence

- Reduction of variance reflects
 - ▶ Increased knowledge about
 - Client needs
 - Technology
 - Team capability
 - ▶ Good decisions



Then what?

- Determine the source of the variance
- Over the project lifecycle, reduce the variance to improve likelihood



Then what?

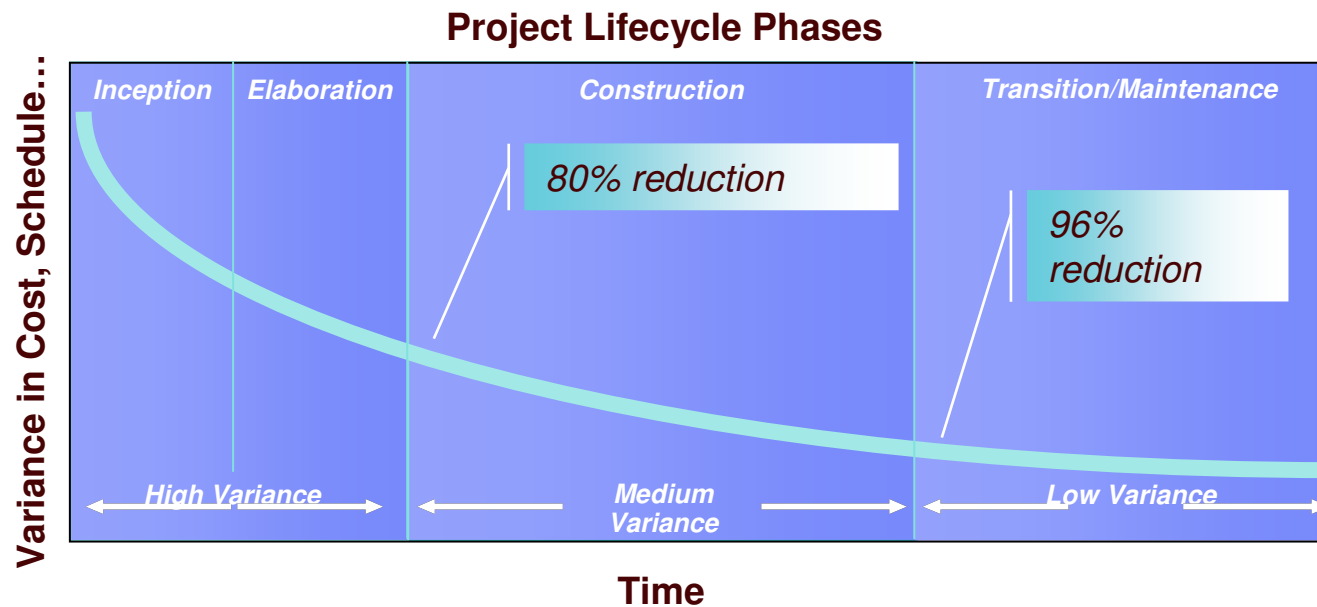
- Over the lifecycle, reduce the variance further to improve likelihood



To summarize so far

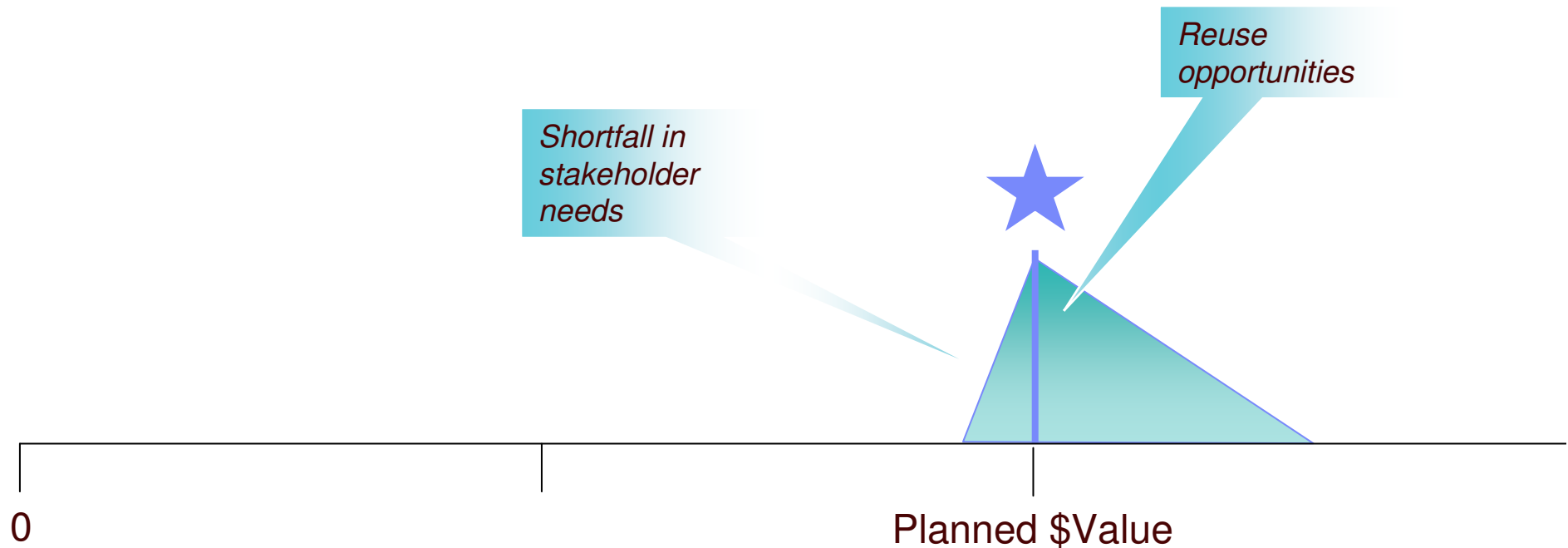
- Cost, schedule are random variables
- Variance is the measure of risk
- Progress measured by reduction of risk

$$NPV = \sum_{i=1}^n \frac{R_i}{(1+r_R)^i} - \sum_{k=1}^p \frac{M_k}{(1+r_m)^k} - \sum_{j=1}^m \frac{E_j}{(1+r_E)^j} - E_0$$



Benefits: Delivered value is also a distribution

$$NPV = \sum_{i=1}^n \frac{R_i}{(1+r_R)^i} - \sum_{k=1}^p \frac{M_k}{(1+r_m)^k} - \sum_{j=1}^m \frac{E_j}{(1+r_E)^j} - E_0$$

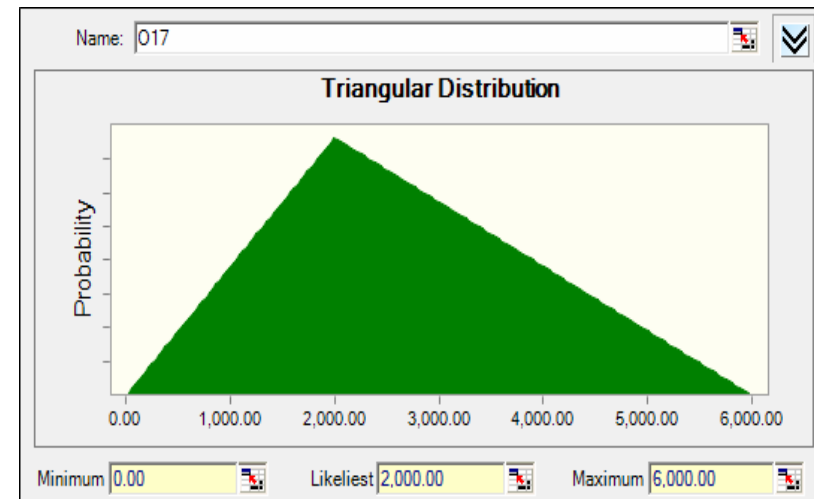


Value is improved by increasing upside variance

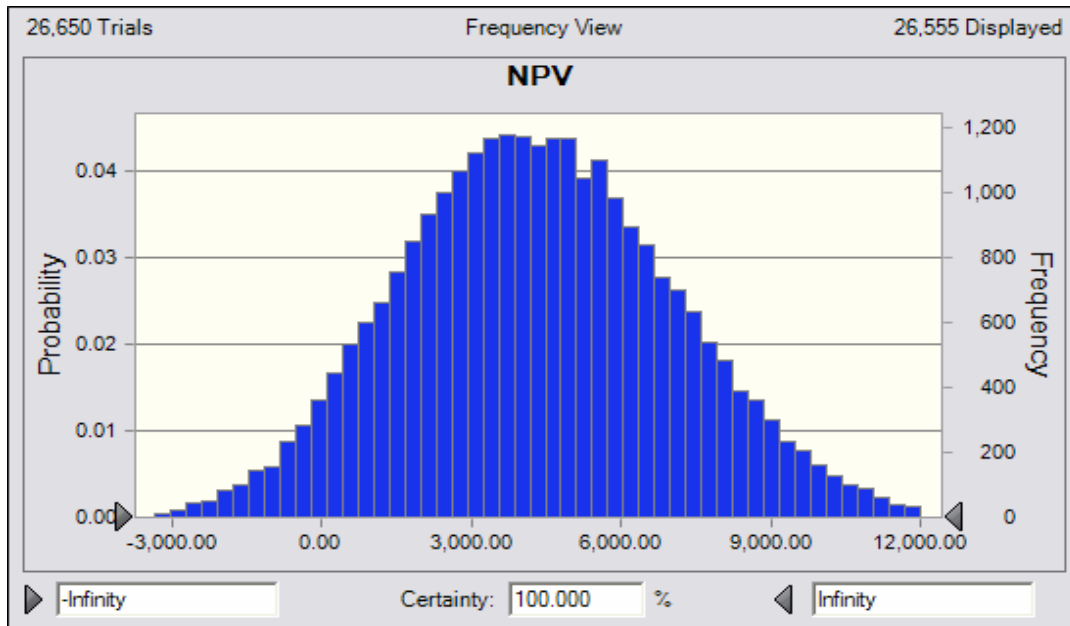


Simple inputs

- Expert opinion
 - ▶ Just guess using expert opinion
 - ▶ Use optimistic, pessimistic, nominal assumptions in other models
 - Function point, Use case point, Cocomo
 - ▶ Enter into triangular distributions
- Historical data
 - ▶ Use other distributions if you have them



Model output

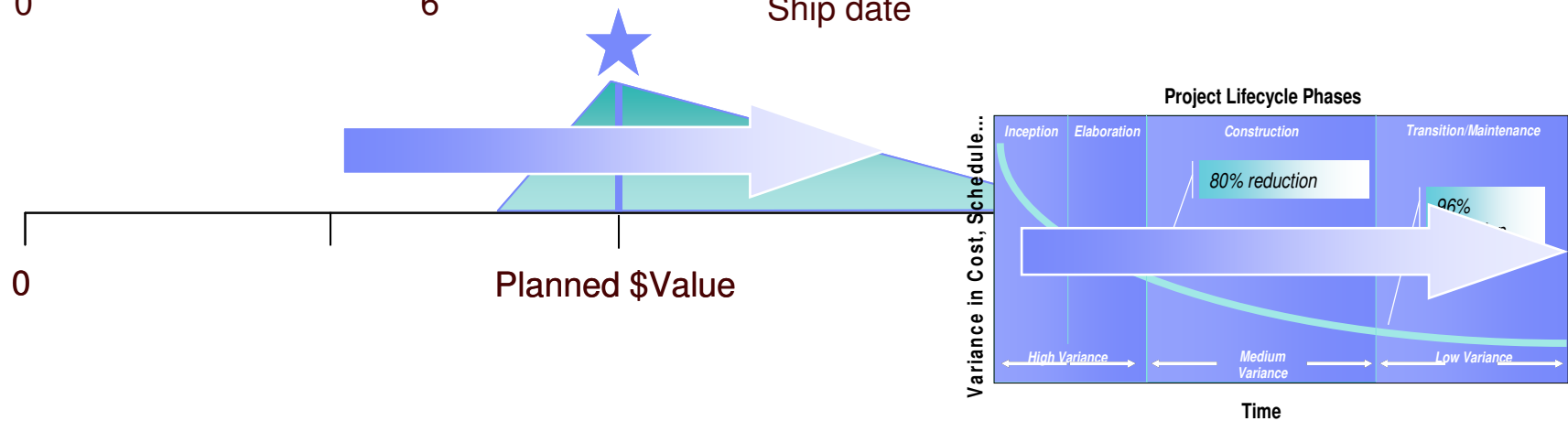
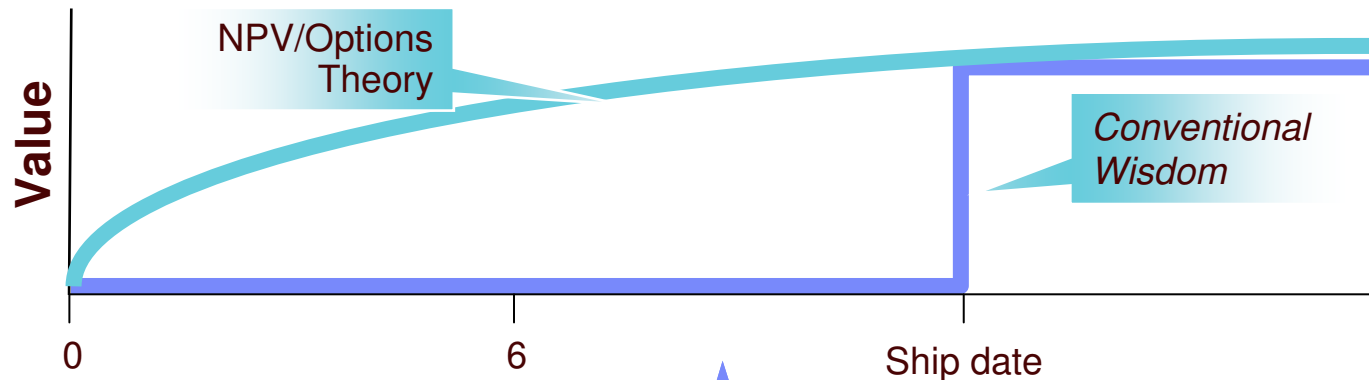


Mean	4,324.45
Standard Deviation	2,738.59
Variance	7,499,853.36
0%	-4,836.65
10%	818.52
20%	1,959.10
30%	2,804.66
40%	3,541.42
50%	4,249.81
60%	4,972.52
70%	5,739.09
80%	6,661.06
90%	7,928.97
100%	14,923.77

- In this case
 - ▶ Expected NPV = \$4,324K
 - ▶ No chance > \$14,924K, < (\$4,837k)

No initial risk – little opportunity to add value, stay relevant

- NPV increases when you invest in
 - ▶ Improving likelihood of delivery (reduce variance of costs)
 - ▶ Improving range of value at delivery (increase upside variance of benefits)

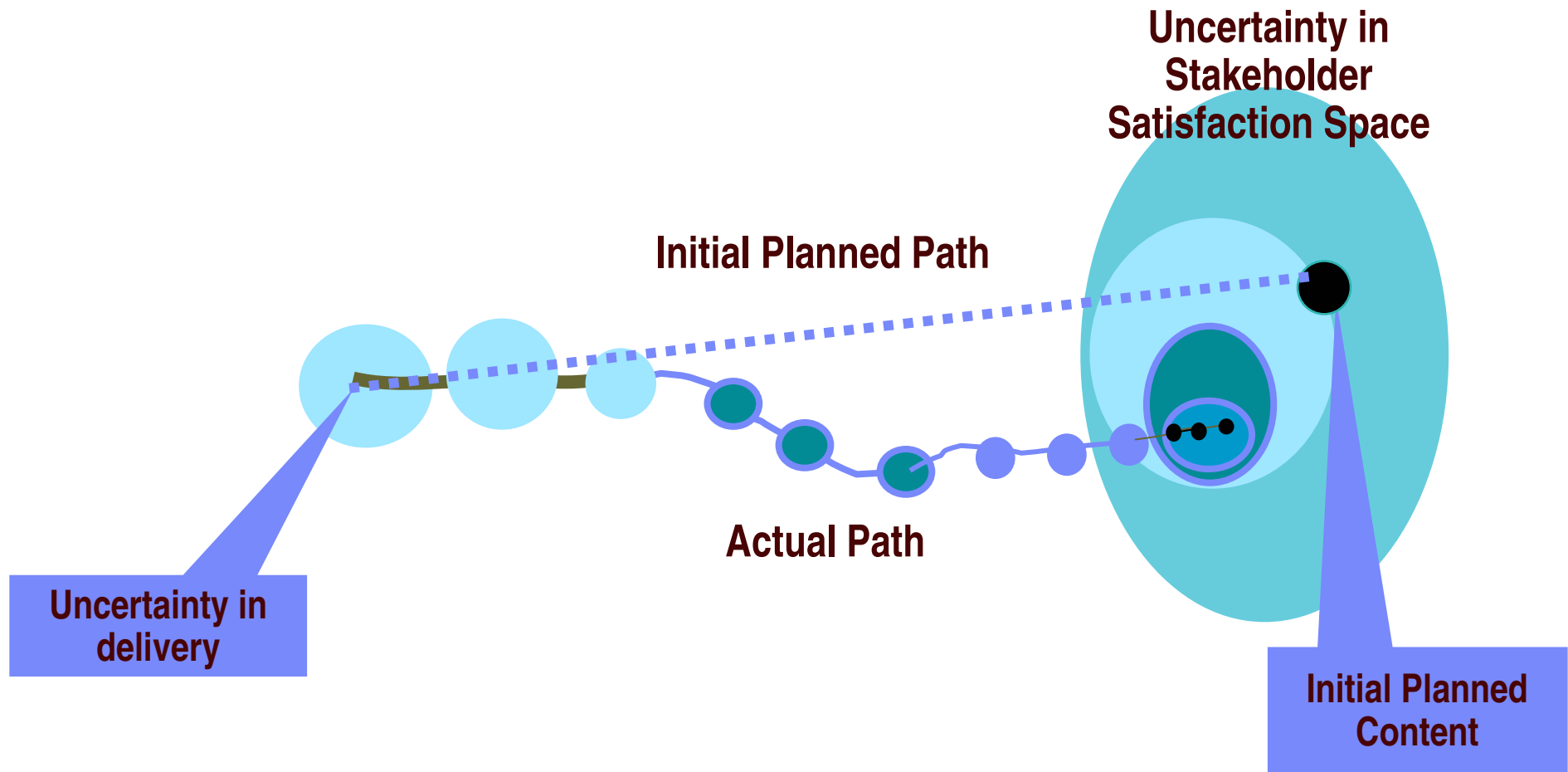


So, what can you do?

- **Measure, analyze and embrace estimation variance**
 - ▶ Tells you how to steer your project to success
- **Tailor governance to your risk/value context**
 - ▶ Determine if governance approach is paying off
 - Getting more or less value from agile, non-agile projects?
- **Invest with discipline**
 - ▶ Detect early when risks are not paying off – abandon projects that are not delivering
- **Have improved stakeholder conversations**
 - ▶ Risk and value with funders
 - Conveys more complete information for better collaboration
 - ▶ Inputs/assumptions with program staff
 - Asking experts for likely and ranges elicits more complete information
 - Forces needed discipline
 - Wide ranges engenders discussion on where to focus efforts

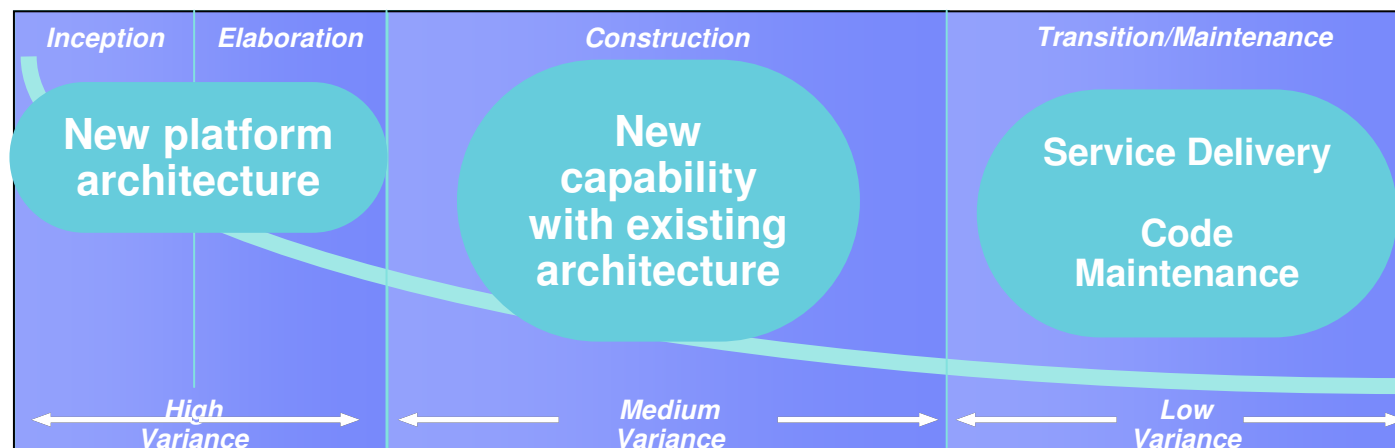


Each iteration should reduce variance

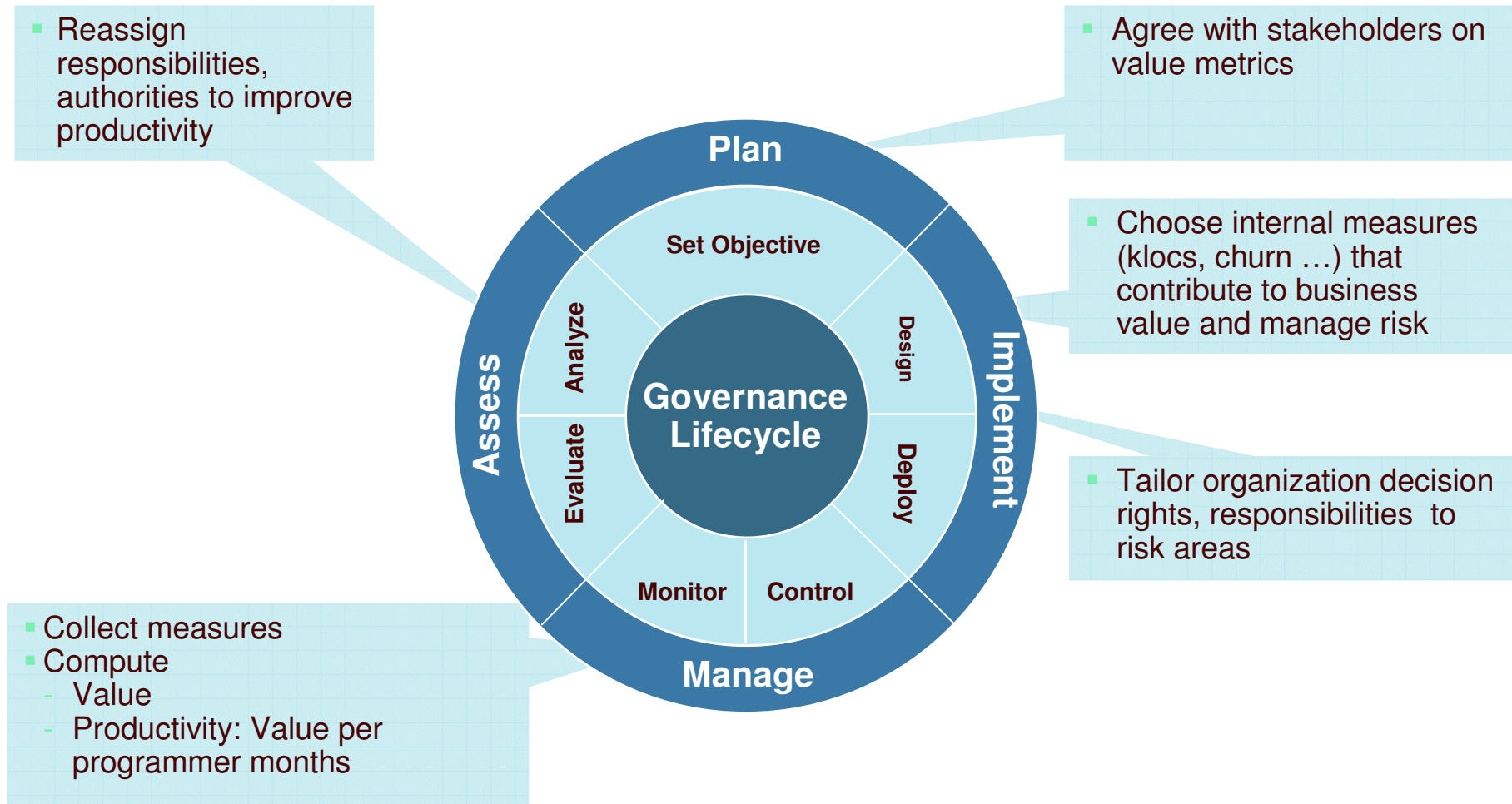


Tailor the governance solution

- Kind of value for organization processes
- Kind of projects
 - ▶ Full variance – foster discovery and learning
 - ▶ Medium Variance – architecture alignment, lean methods
 - ▶ Low variance – focus on automation, cost

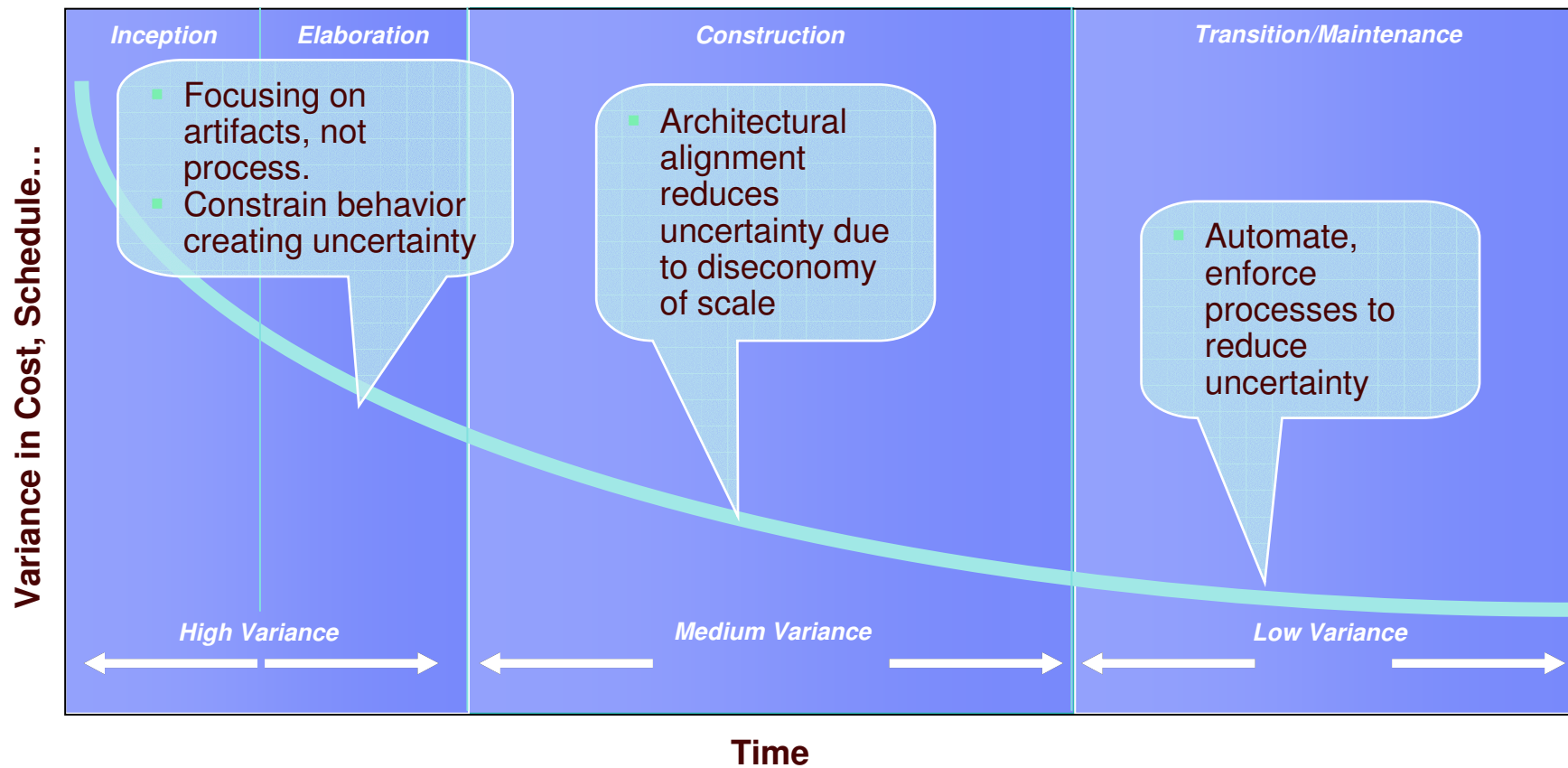


Tailoring governance is a process

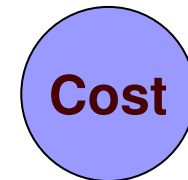
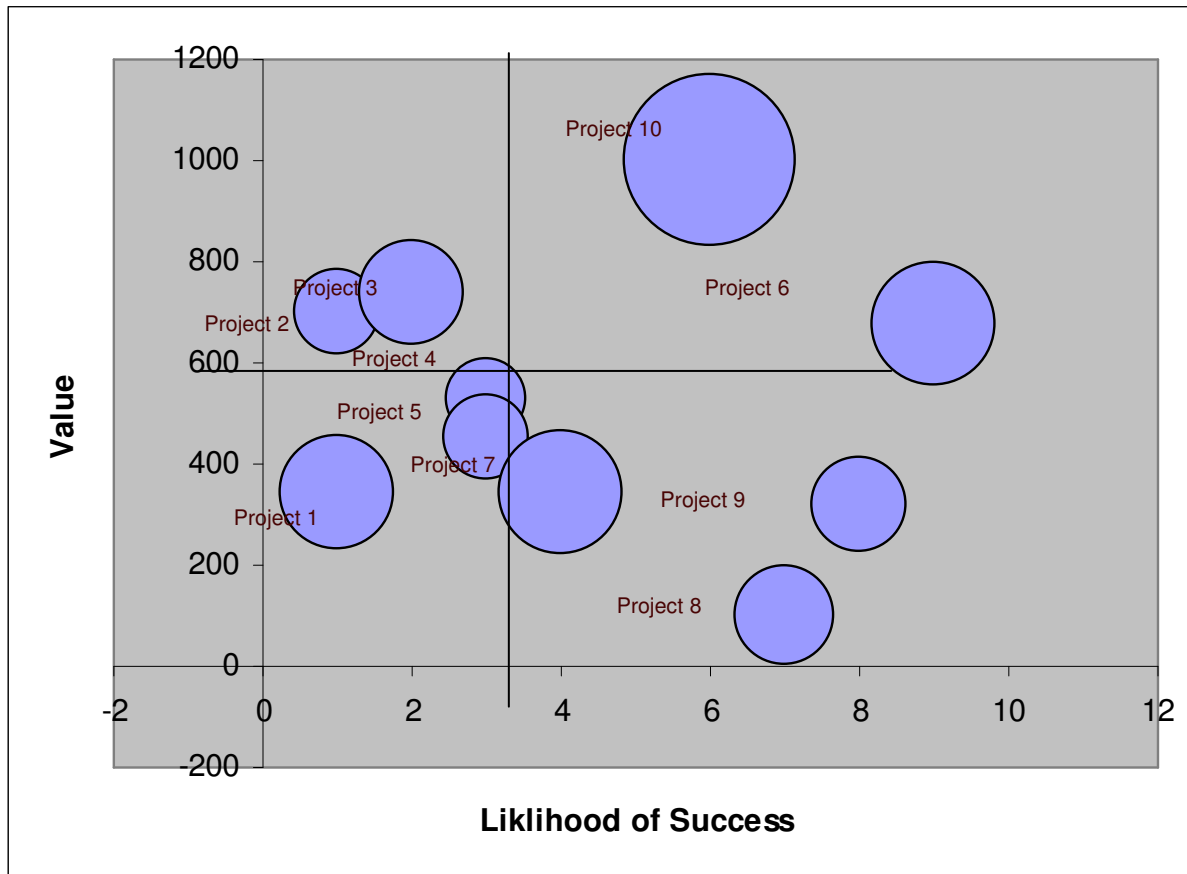


Adjust governance for each risk area

Project Lifecycle Phases



Disciplined Investment: Apply quantitative portfolio analysis, not only scorecards



Pilots anyone?

- We are creating new tools applying these ideas to
 - ▶ Instrument iterative development
 - ▶ Measure and manage value of development
 - ▶ Measure and manage architecture alignment

- Looking for pilot programs, let us know if you are interested
 - ▶ Seating is limited!



Some final thoughts

Staying relevant requires smart risk taking

Value can only be reliably delivered if it measured and managed

Value delayed is value denied

**In the end, these techniques do allow us to
“Take risks and add value”**





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