



IBM Software Group

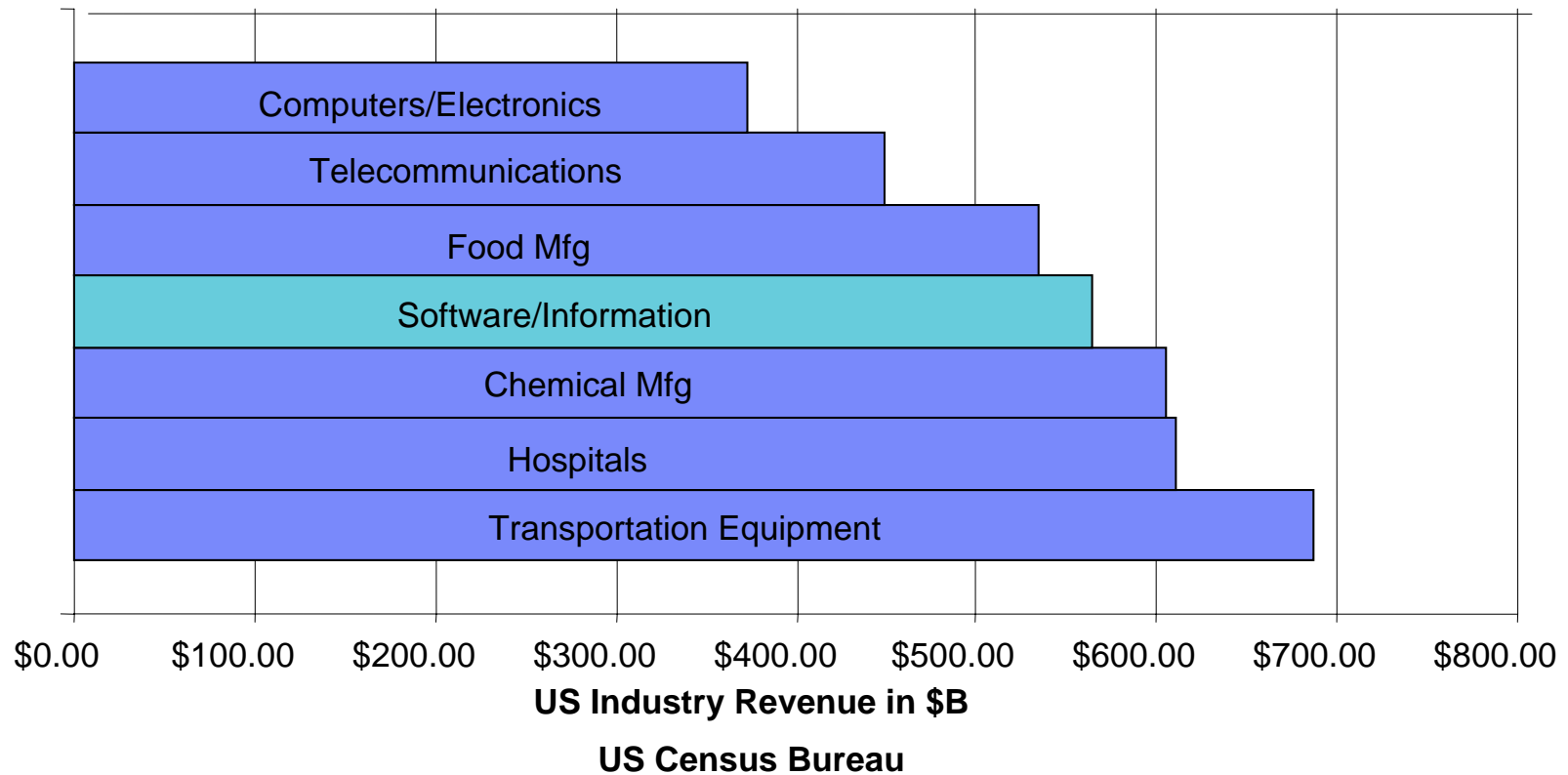
# Risk and Relevance

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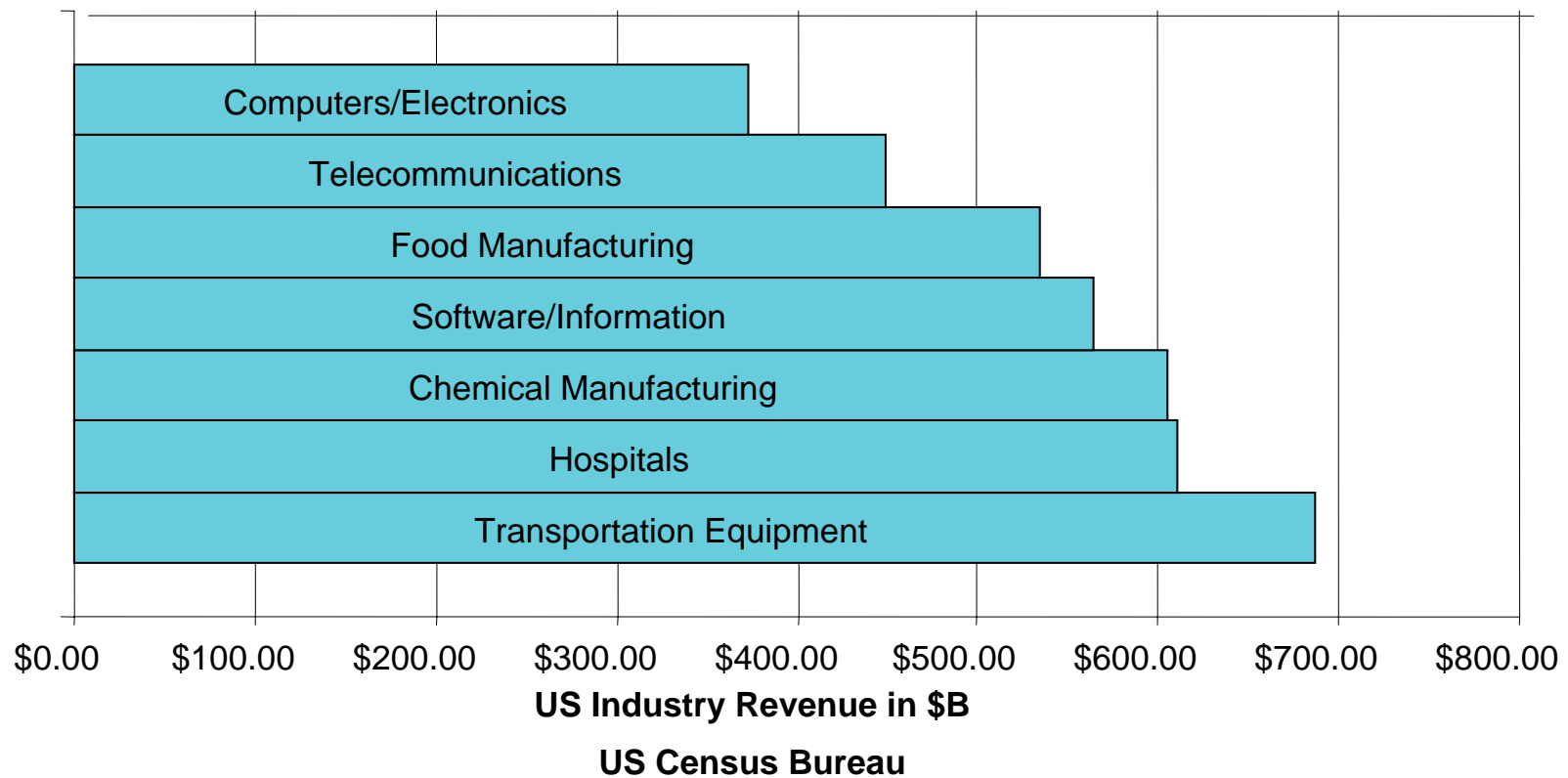
**Rational** software



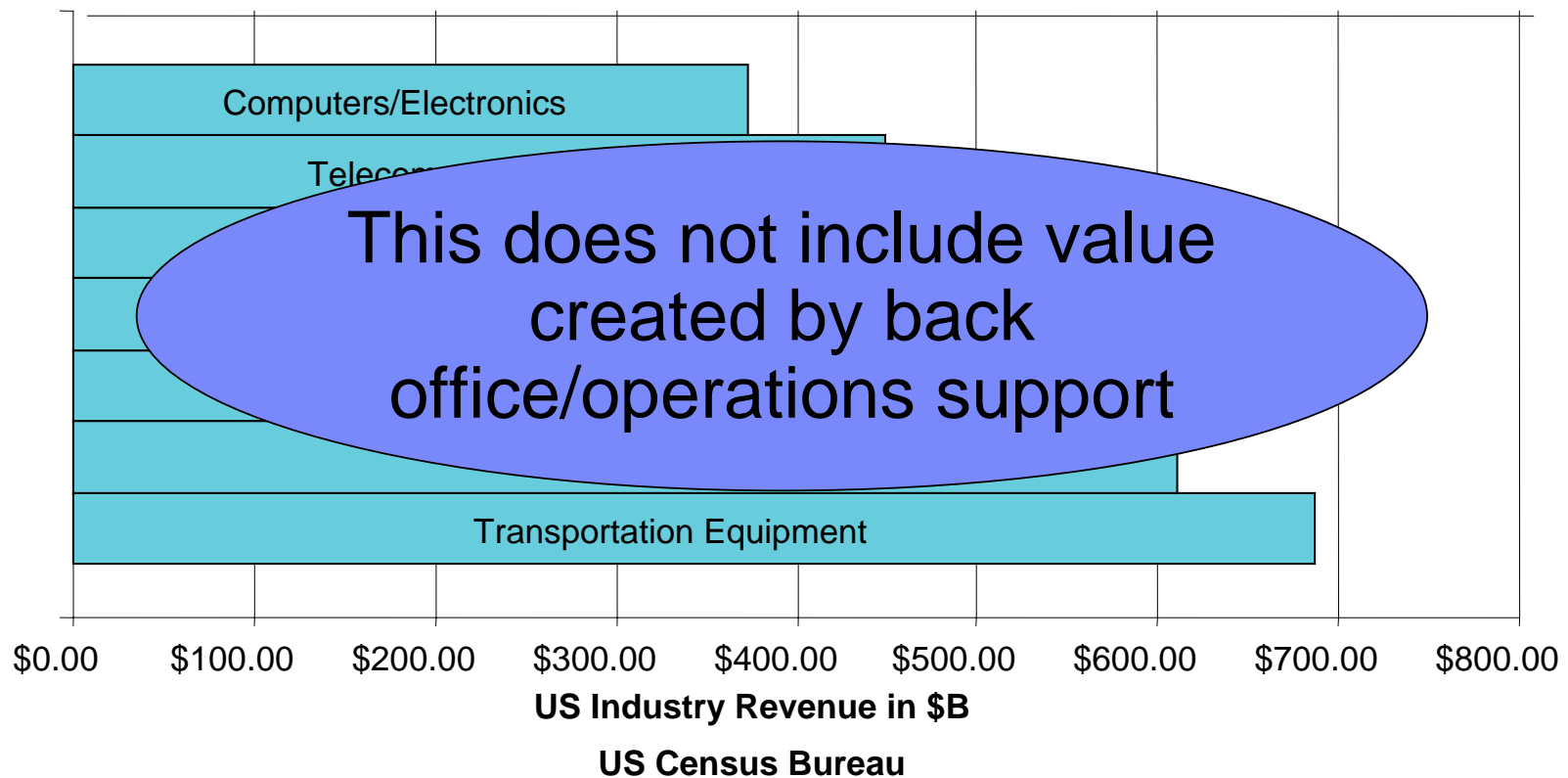
# Value is being created by Software/IT



# Software provides huge value for all the other industries



# Software provides huge value for all the other industries



## 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



# Eternal wisdom

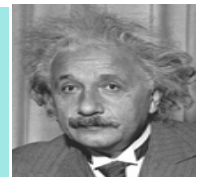
*"To measure is to know. If you can not measure it, you can not improve it."*  
- Lord Kelvin



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



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

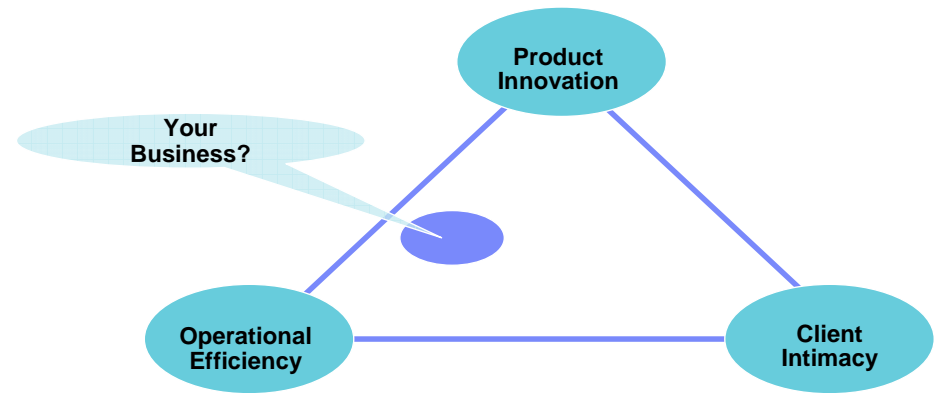


*"There are risks and costs to a program of action. But they are far less than the long-range risks and costs of comfortable inaction."*  
- John F. Kennedy



## First, what is the value conversation?

- Can vary:
  - ▶ Future cost avoidance – 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



## First, what is the value conversation?

- Can value be monetized?
  - ▶ Future
  - ▶ Operational
  - ▶ Business
  - Trust
  - Metrics

All can be monetized

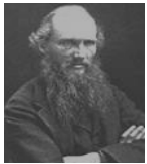
Privacy,

Efficiency

Client intimacy



## Just enough theory

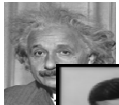


Money is how one measures value – need to monetize



The future cost, value is uncertain

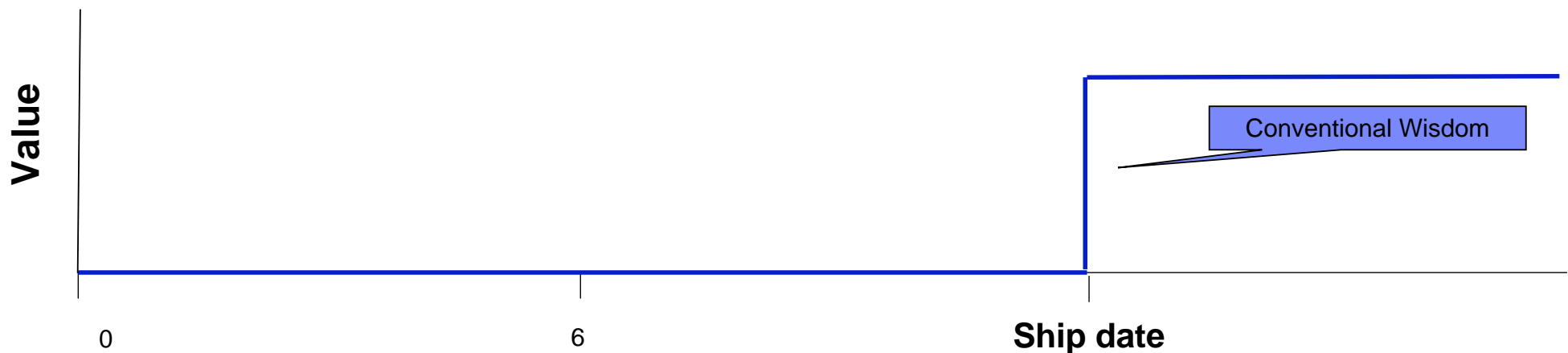
- ▶ Cost and risk are random variables
- ▶ Need to consider current *Net Present Value* of program



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*”.



## *Key Development Risk, Value Measurement Considerations*

- The Einstein test: “Make the solution as simple as possible, but no simpler”
  - ▶ Simple input, output
  - ▶ Use, but hide math
    - But math should be comprehensible
- Monetize
  - ▶ Currency is the lingua franca of value
  - ▶ Each kind of value in the conversation is monetized differently
  - ▶ May need to monetize mission capabilities – hard, but in the end investment decisions are made
- Reinforce desired behavior
  - ▶ Project – Invest in working off delivery risk
  - ▶ Portfolio – Balance risk and value



## Measuring value

- Key principle: Since future value is uncertainty, we are less concerned with accuracy than ROM to drive
  - ▶ Right behavior
  - ▶ Right discussions
- For business can use NPV revenue projections (using triangular distributions)
- For public sector, you will find there is some monetized value reasoning done in setting budgets.
  - ▶ Gives opportunity for closer alignment
  - ▶ Again right discussions



## 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*

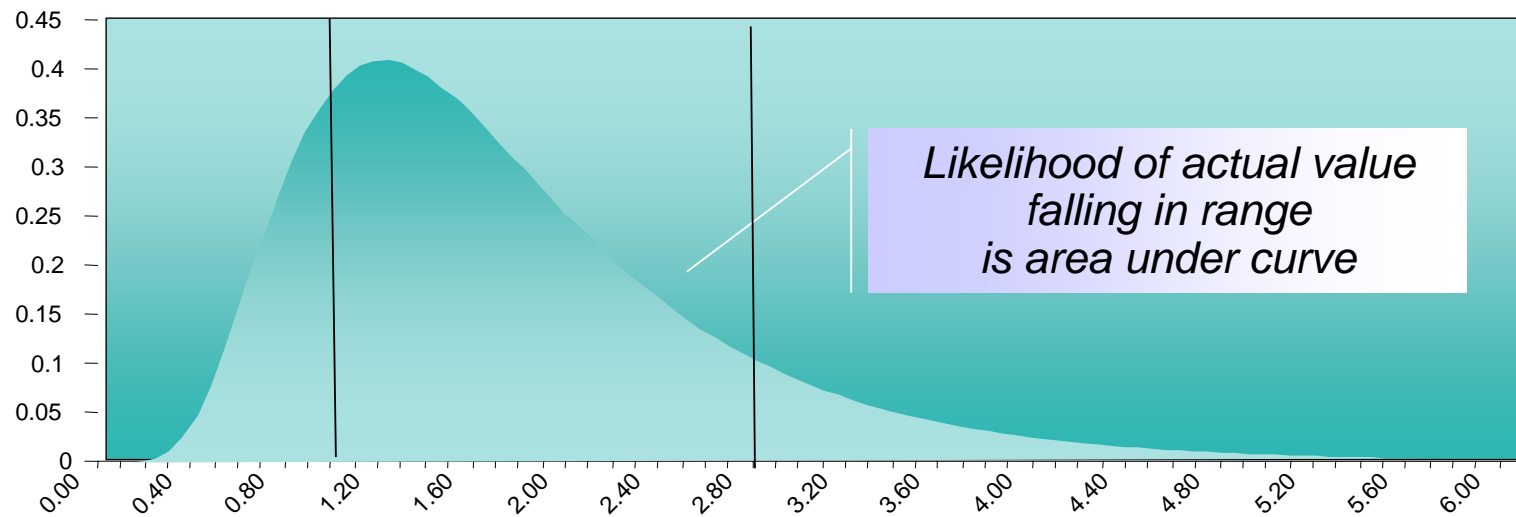


## Imagine you have 12 months to deliver a business critical system

- 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



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



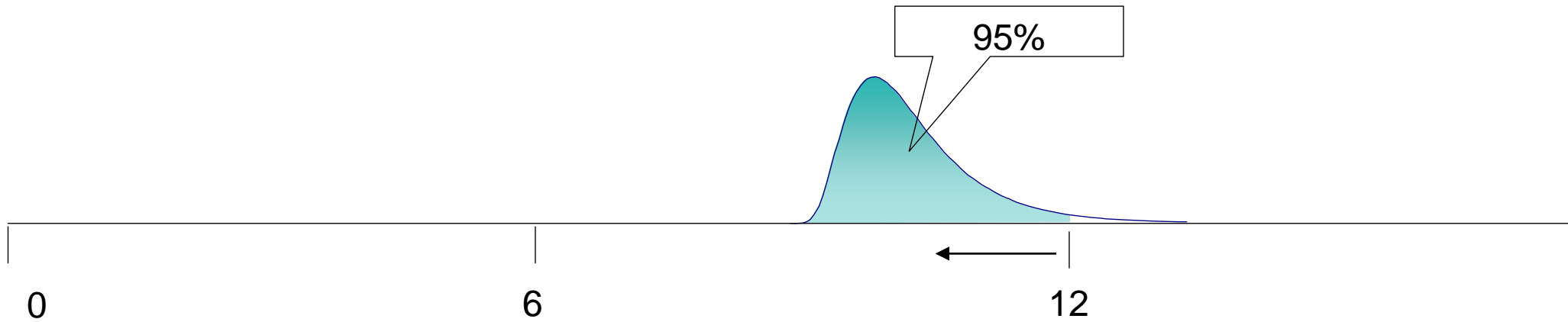
## Then what?

- Move out the date to improve likelihood of shipping?



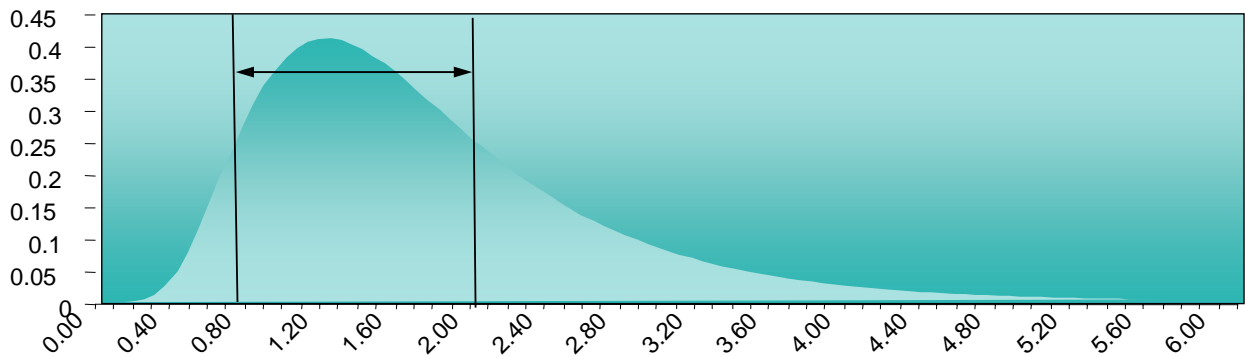
## Then what?

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



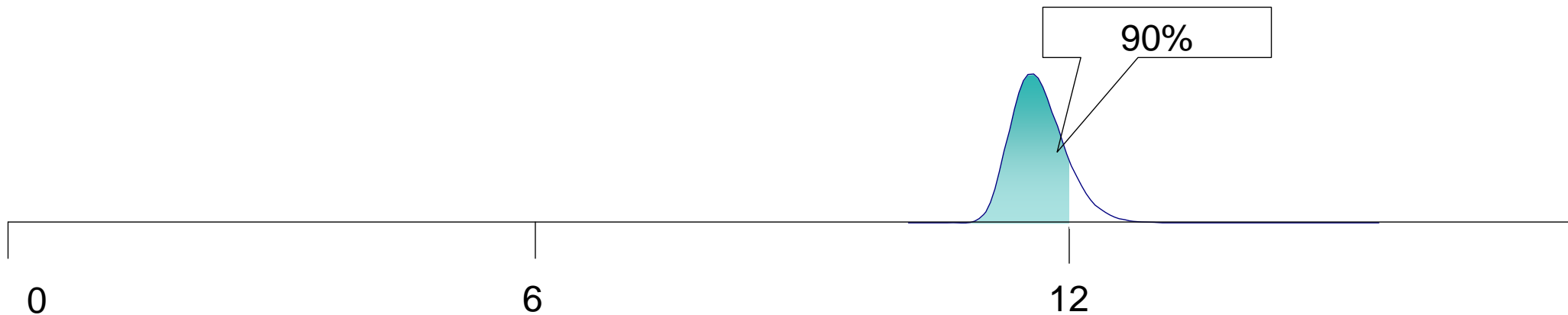
# The estimate variance reflects current state of understanding

- 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?

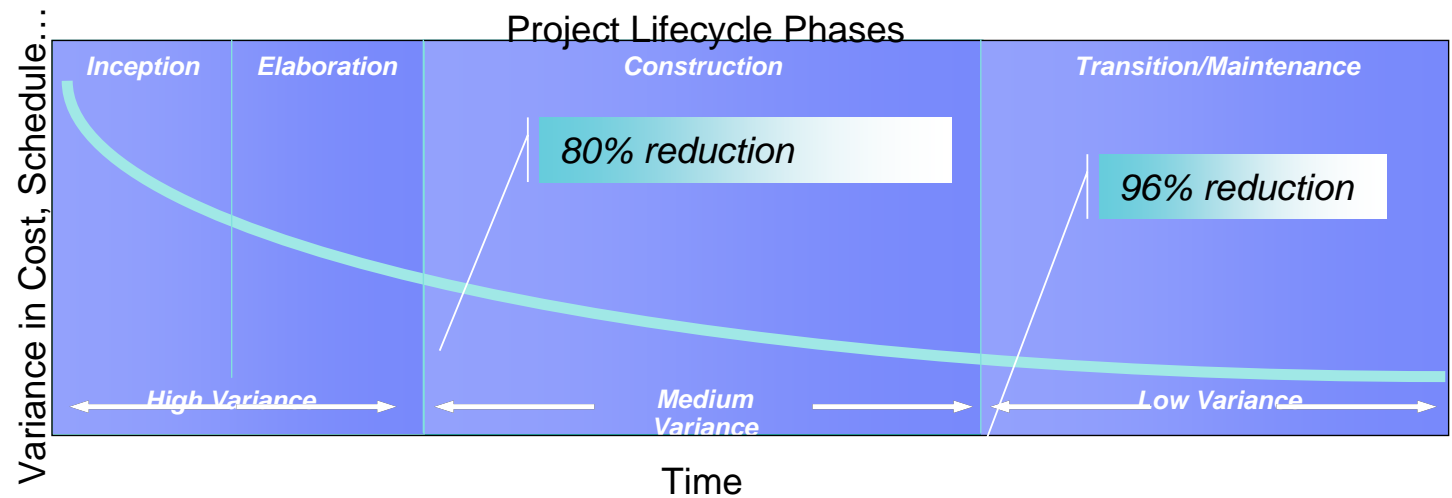
- Over the lifecycle, reduce the variance further to improve likelihood



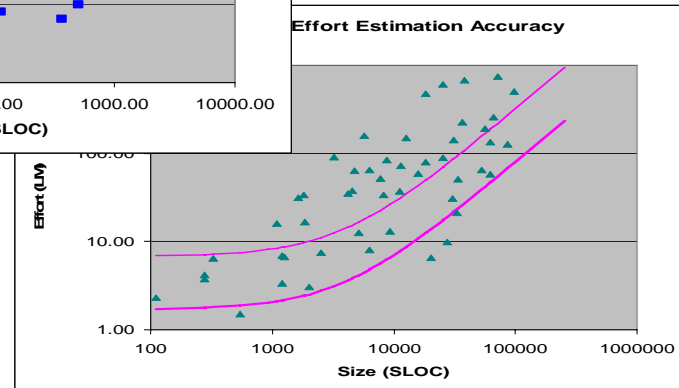
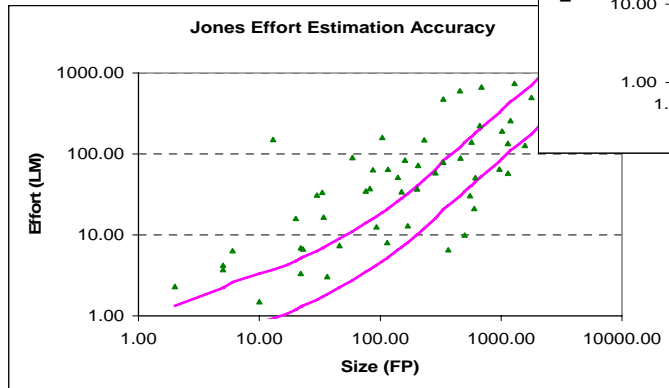
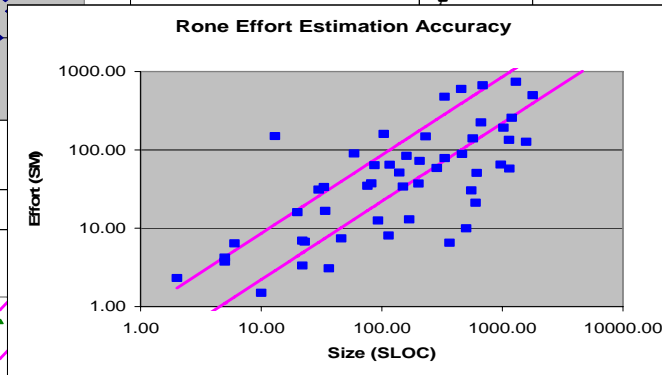
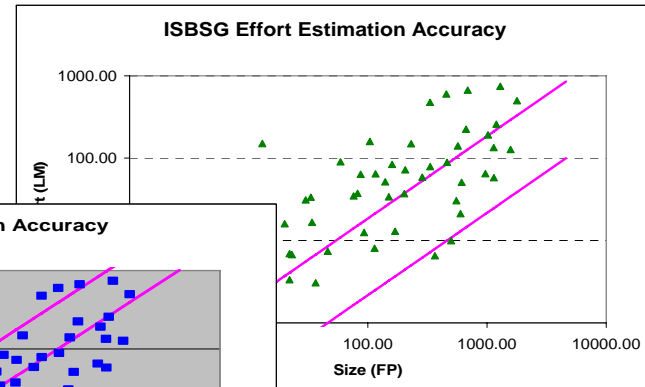
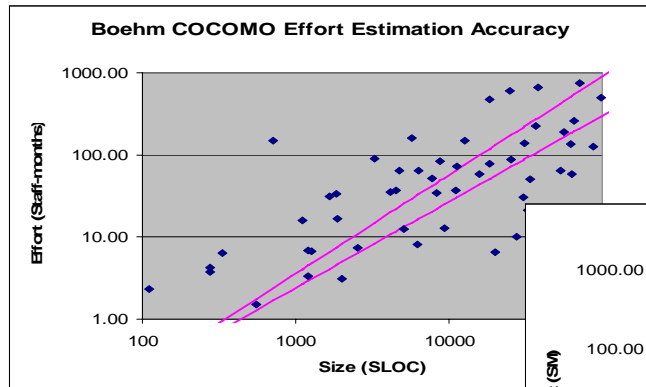
## To summarize so far

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

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



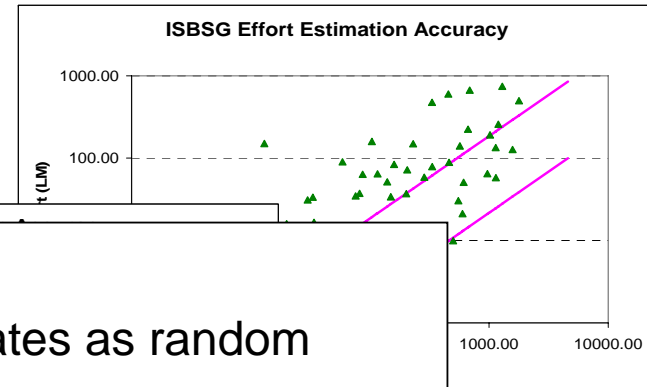
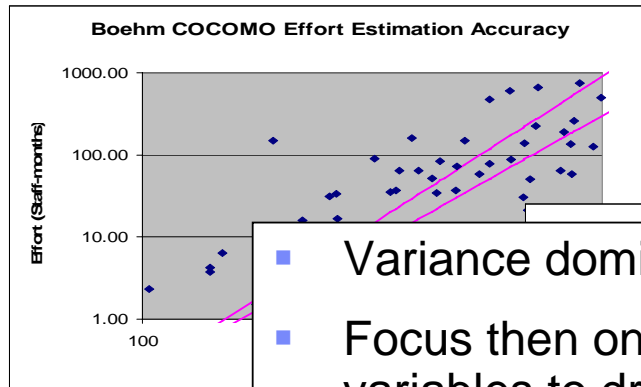
# Can we get the estimates right?



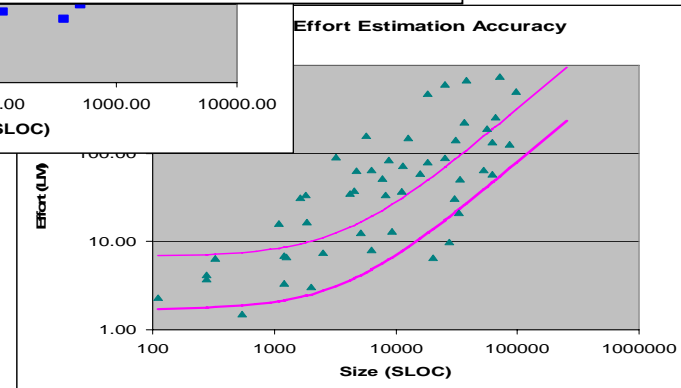
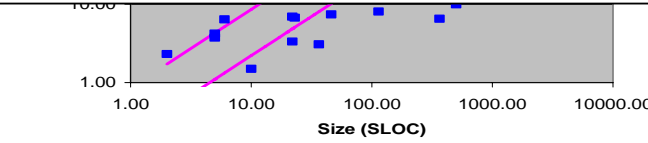
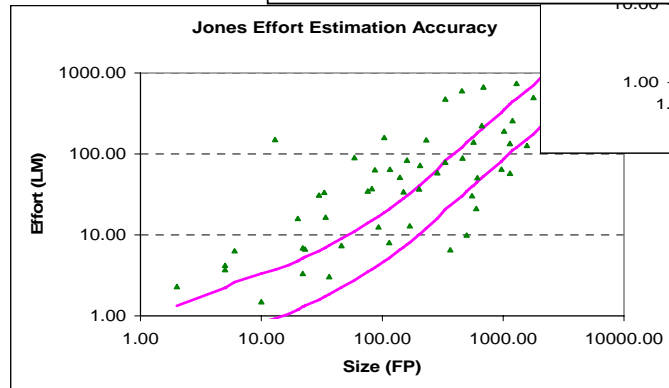
From George Stark, Paul Oman, "A comparison of parametric Software Estimation Models using real project data", in press



# Can we get the estimate right?



- Variance dominates
- Focus then on using estimates as random variables to drive decisions

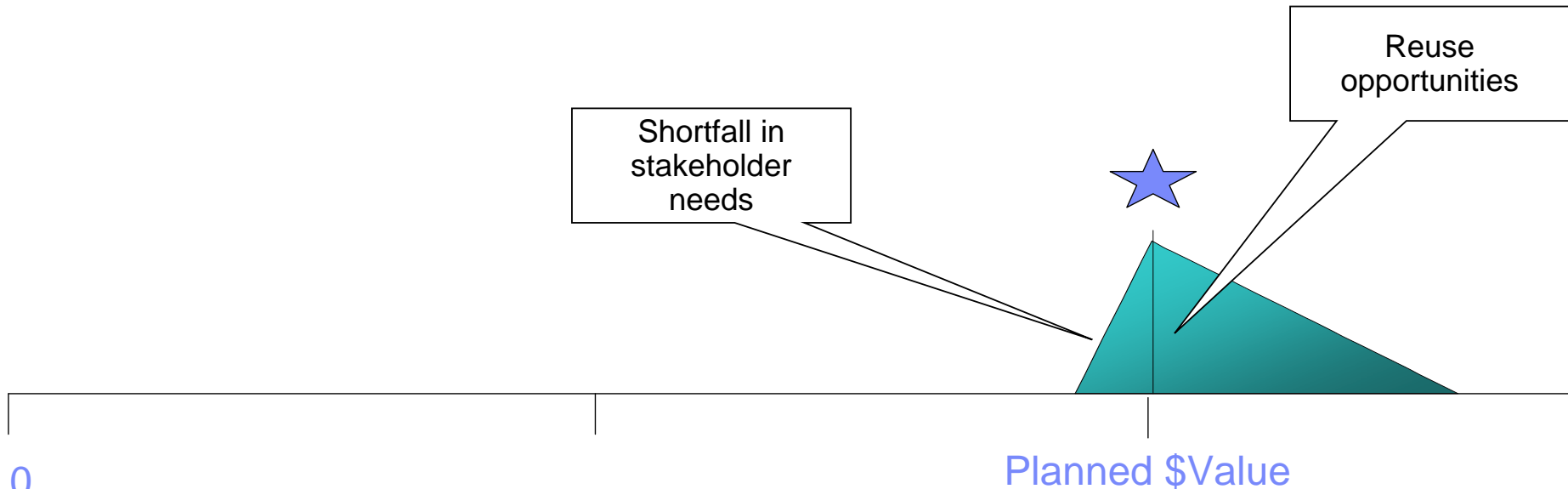


From George Stark, Paul Oman, "A comparison of parametric Software Estimation Models using real project data", in press, 2007



## Delivered value is also a distribution

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

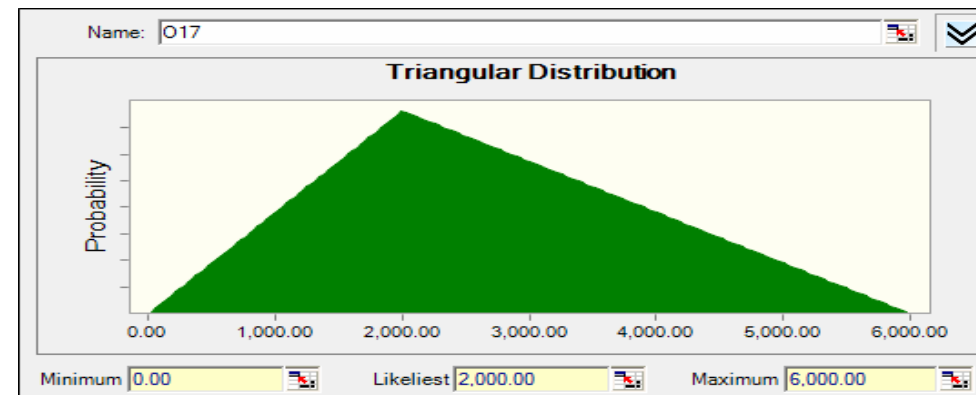


Value is improved by increasing upside variance

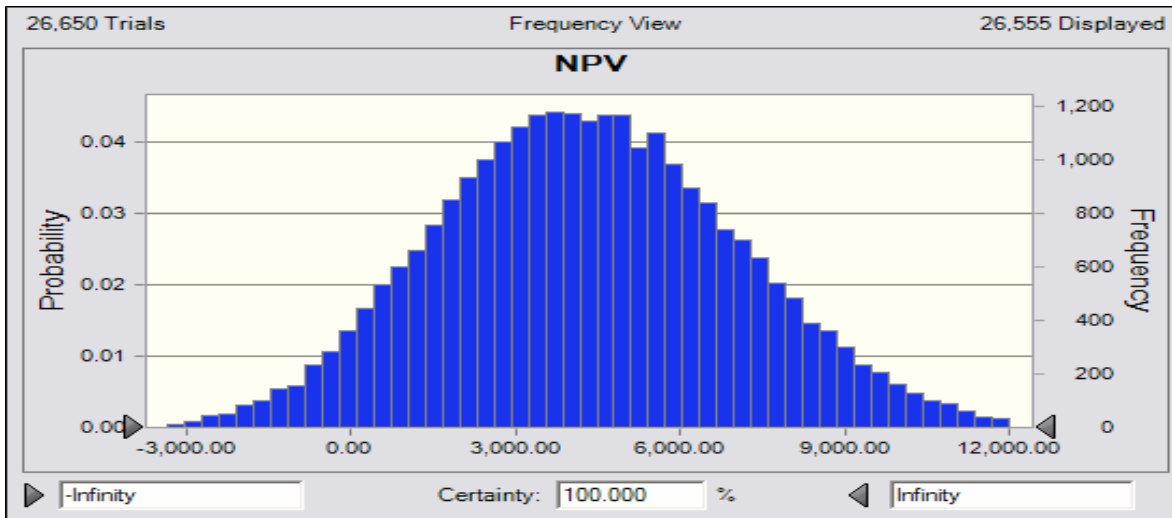


## Simple Inputs

- 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 got them



# Model Output



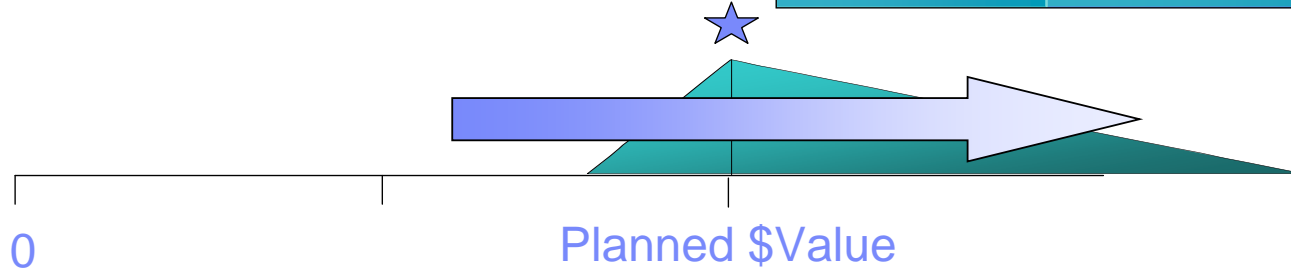
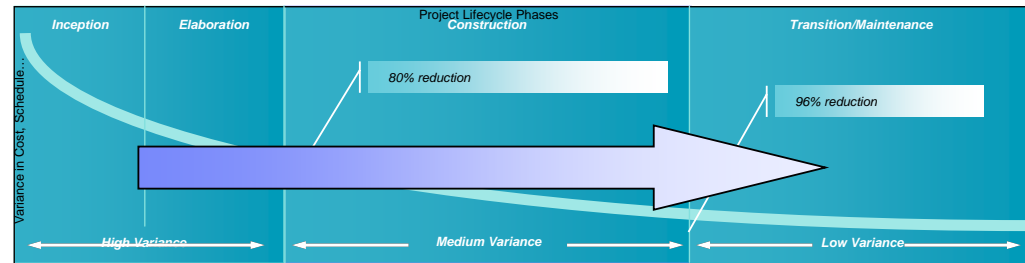
Mean	4,324.45
Standard Deviation	2,738.59
Variance	7,499,853.36
0%	-4,836.65
10%	818.52
20%	1,959.10
30%	2,804.66
40%	3,541.42
50%	4,249.81
60%	4,972.52
70%	5,739.09
80%	6,661.06
90%	7,928.97
100%	14,923.77

- 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)

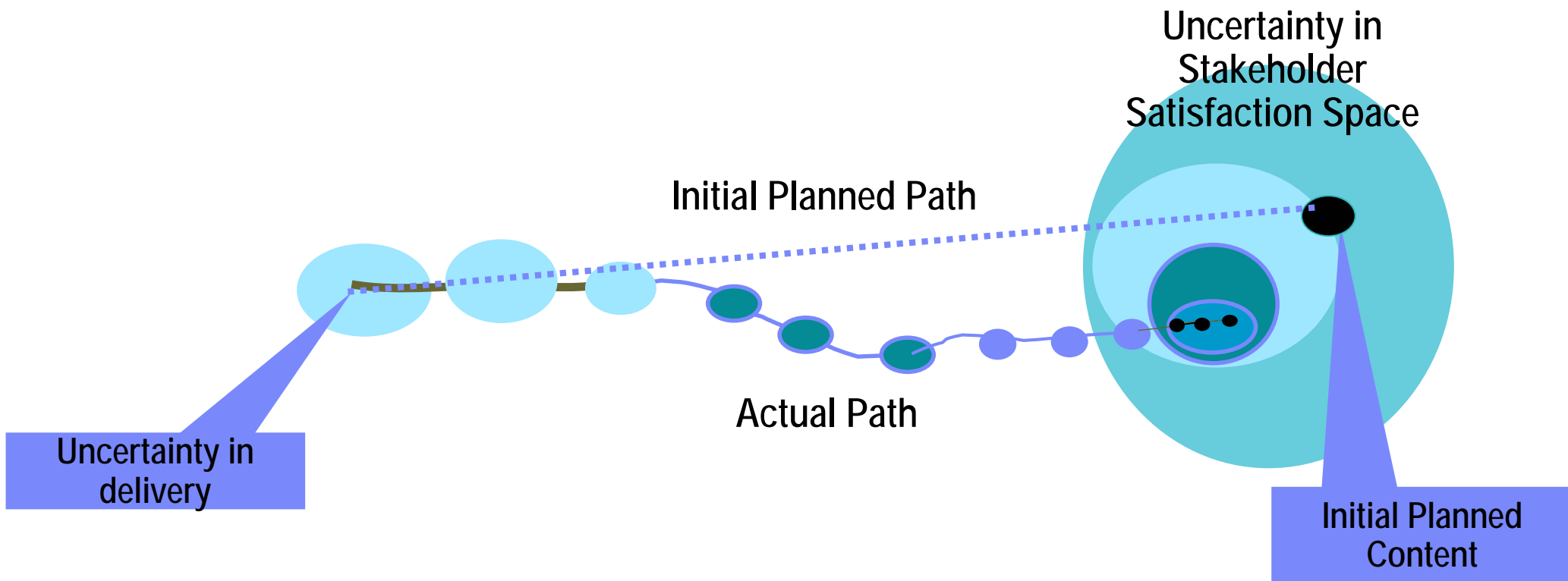


## So, what can you do?

- **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

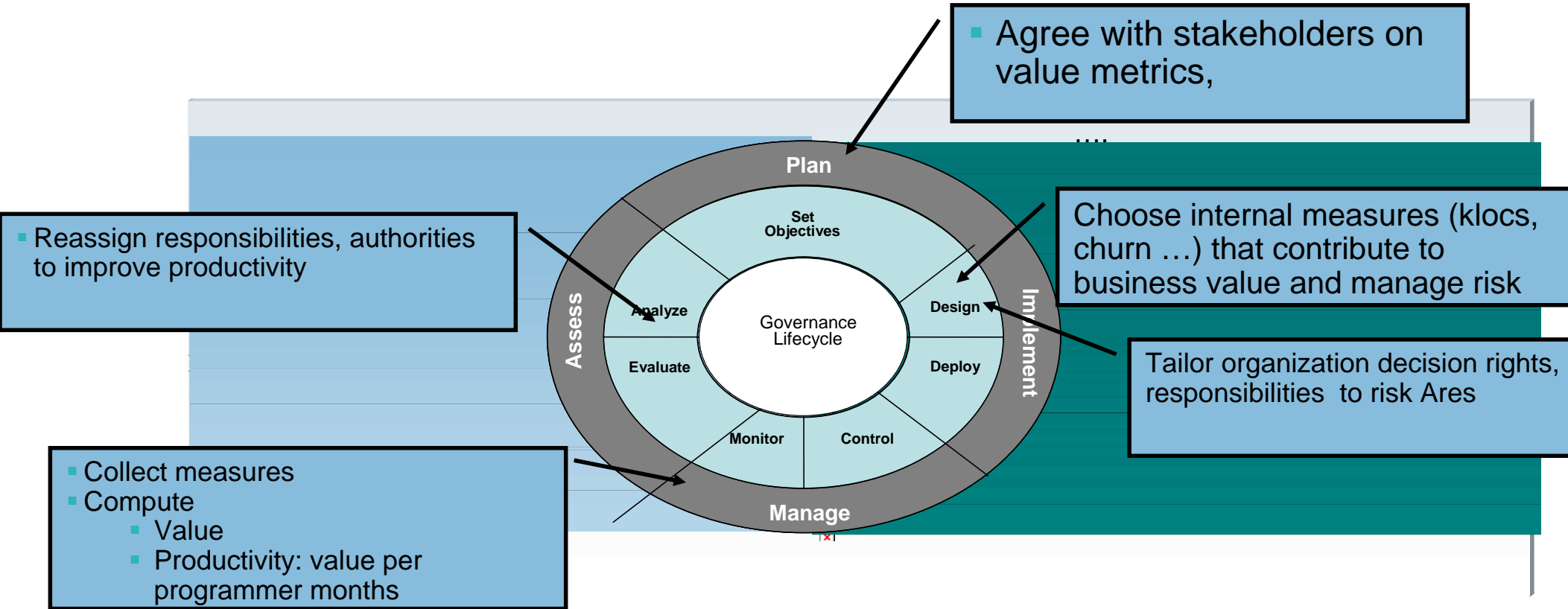


# Tailor the governance solution

- 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

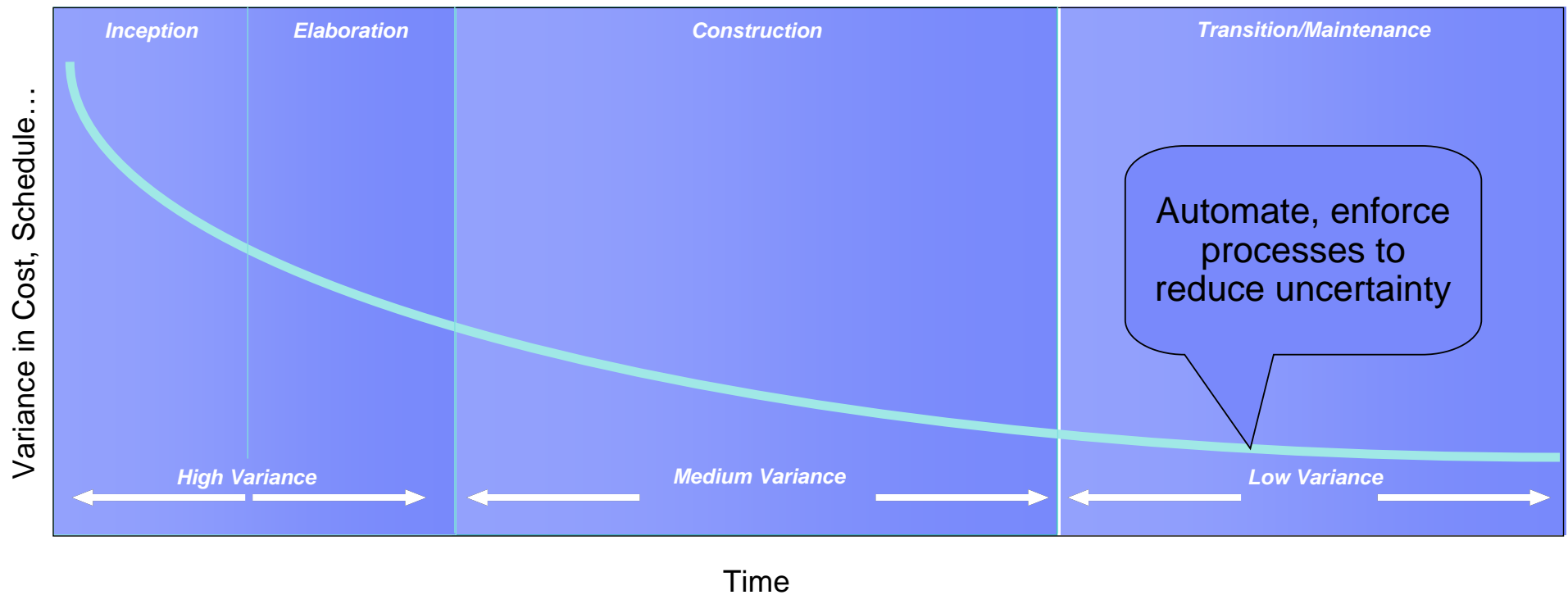


# Tailoring Governance is a process

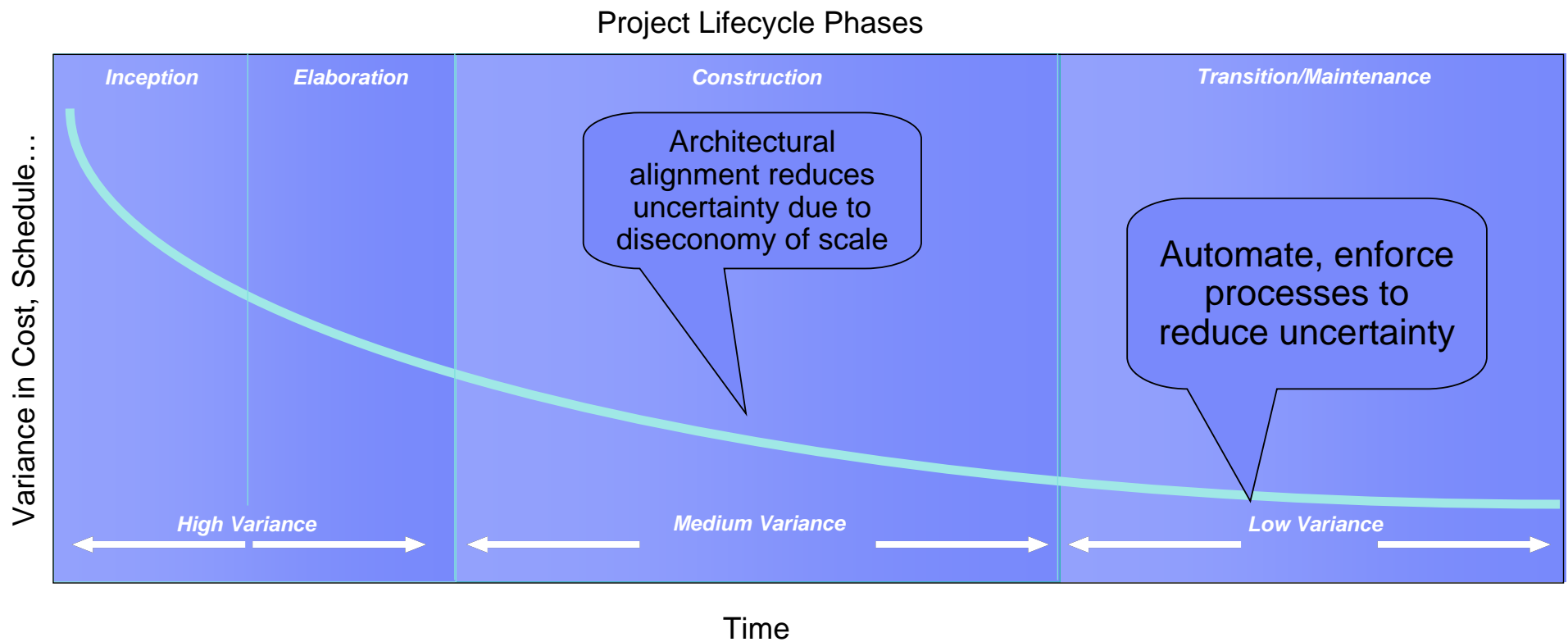


# Apply proven practices for each risk area

Project Lifecycle Phases

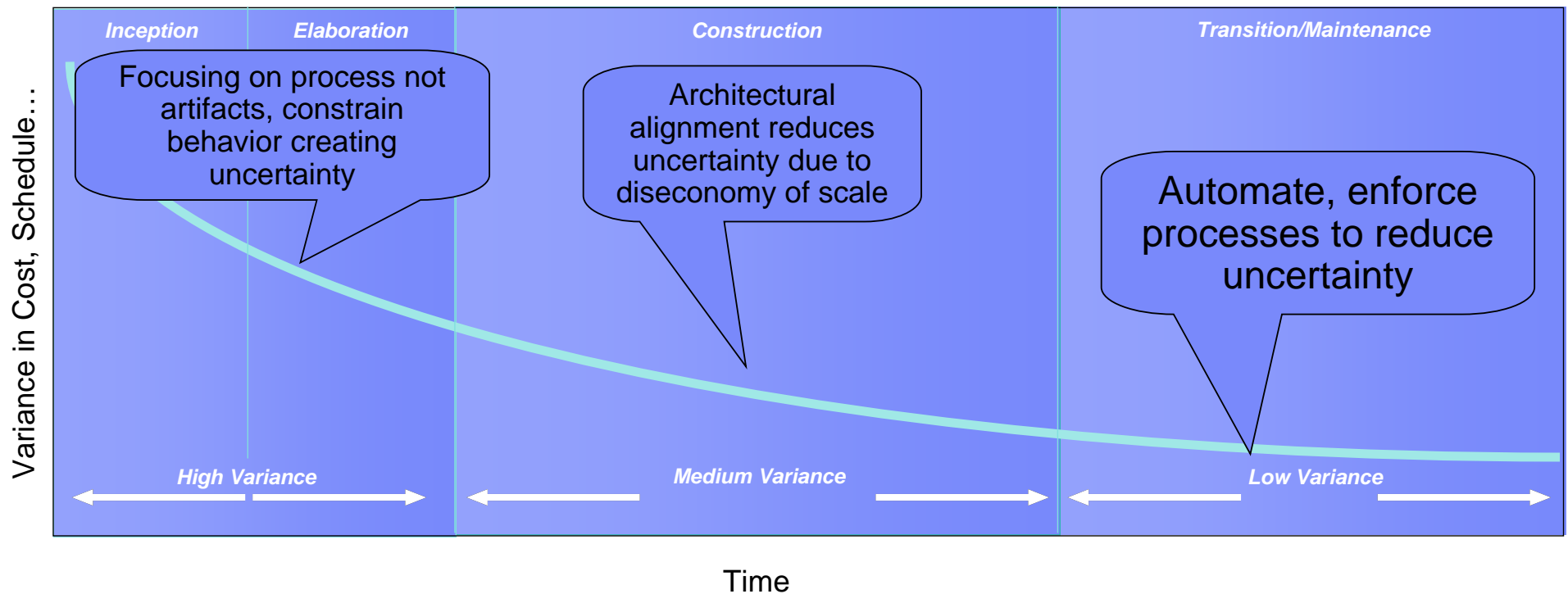


# Apply proven practices for each risk area

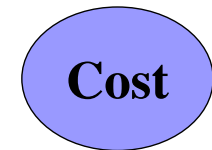
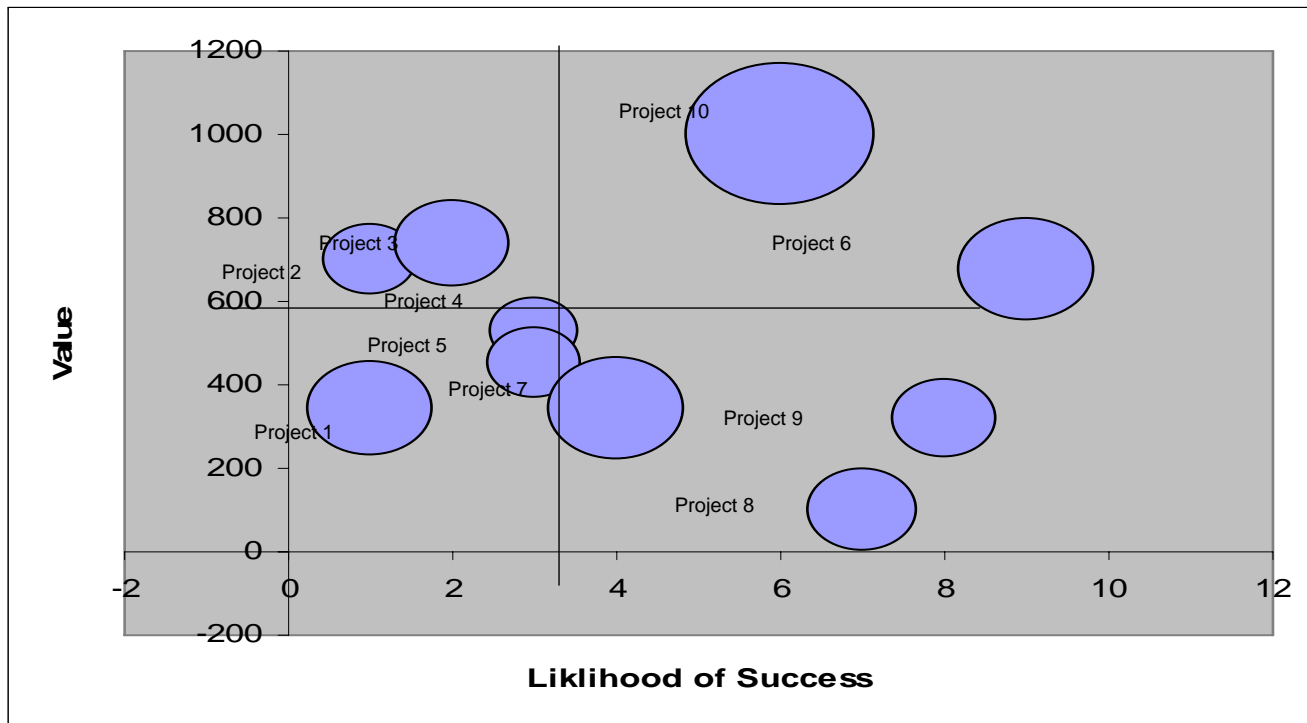


# Apply proven practices for each risk area

Project Lifecycle Phases



# 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**

**Value delayed is value denied**

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





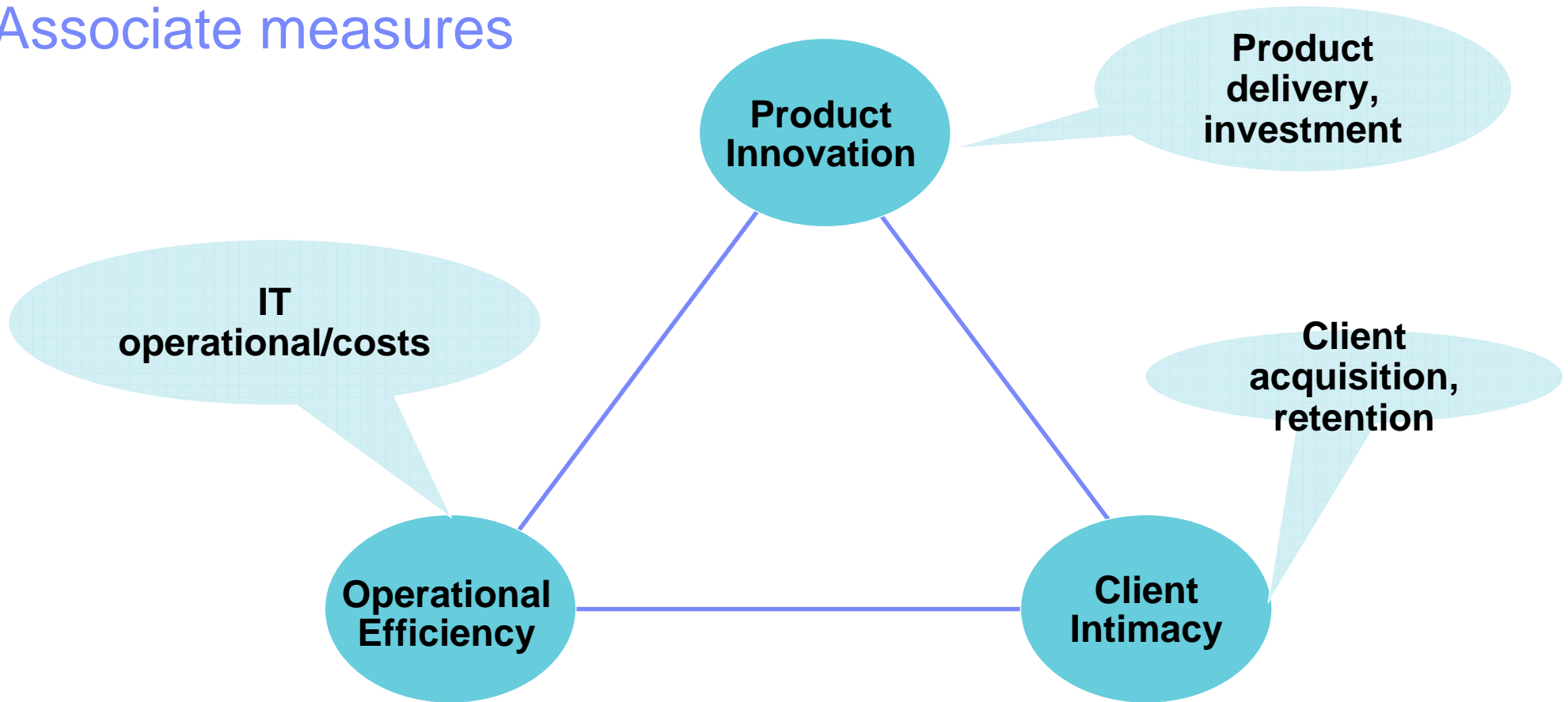
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# Associate measures



Based on *The Discipline of Market Leaders* by Michael Treacey and Fred Wiersma

