AGILE2015 AUG 3-7
WASHINGTON, D.C.

Troy Magennis (@t_magennis)

Risk: The Final Enterprise Frontier

Focused Objective
forecasting - risk - staff - cost of delay

Risk: The Final Agile Frontier

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Slides, Forecasting Spreadsheets, Resources

Bit.Ly/SimResources

(case sensitive)

And live tweets direct to material here

@t_magennis


I LOVE IT WHEN
A PLAN COMES
TOGETHER
memegenerator.ne

~~Plan A~~

~~Plan B~~

Plan C

Definition: **Risk**

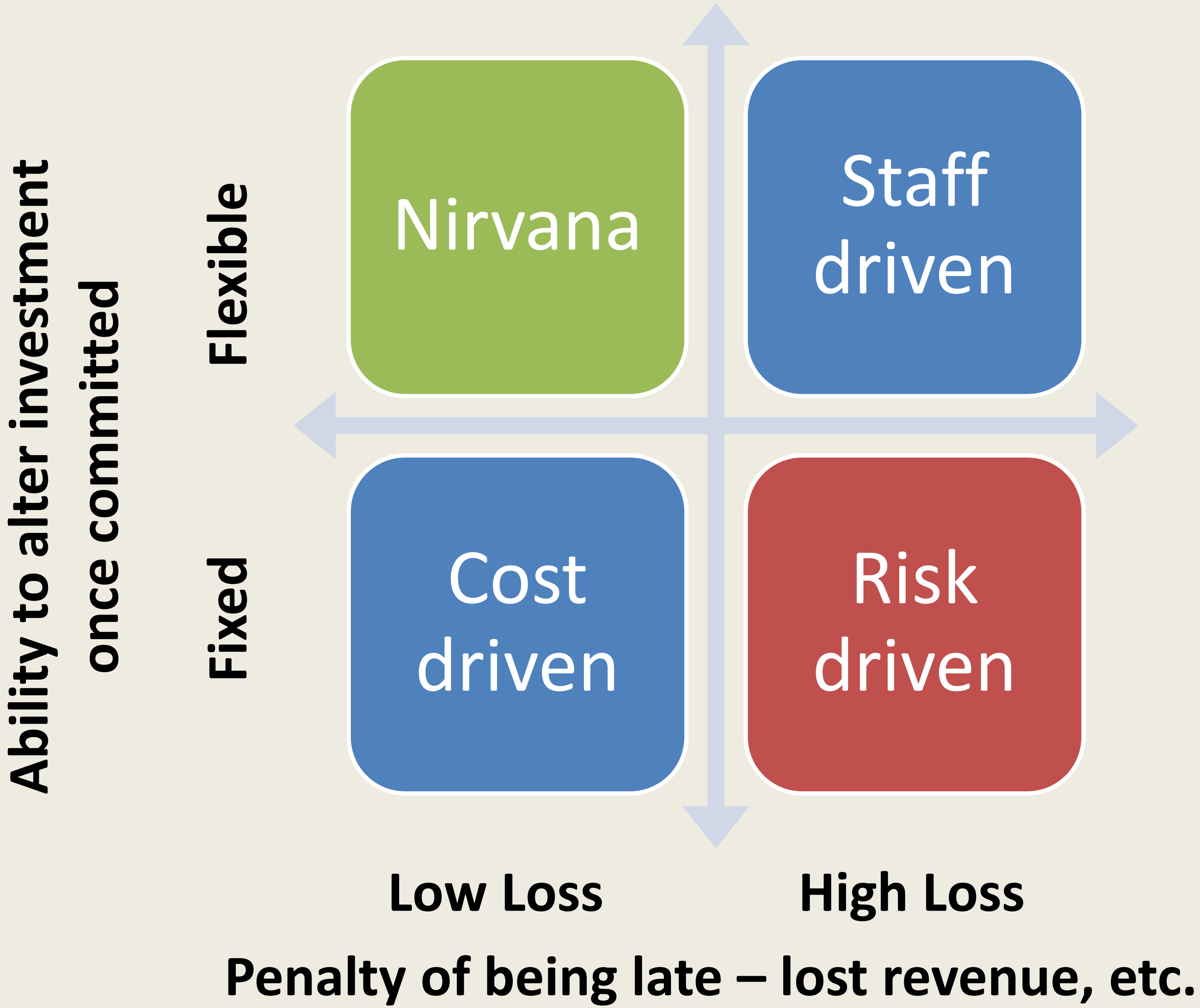
Anything that causes actual outcome to be different than the planned outcome.

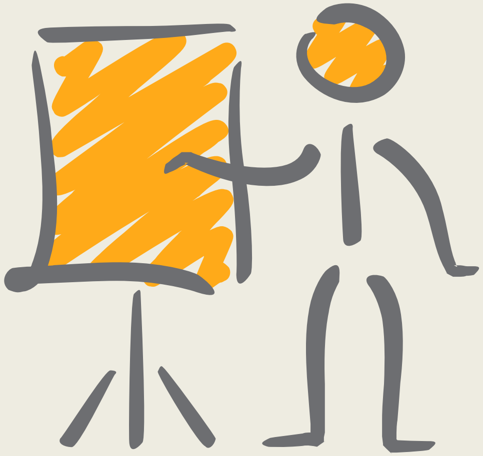
"Expectation is the root of all heartache"

- Shakespeare

Definition: **Risk**

Anything that causes actual outcome to be different than the ~~planned~~ **expected or desired** outcome.


Ability to alter investment
once committed
Flexible
Fixed
Nirvana
Staff driven
Cost driven
Risk driven
Low Loss
High Loss
Penalty of being late – lost revenue, etc.



RISK #1

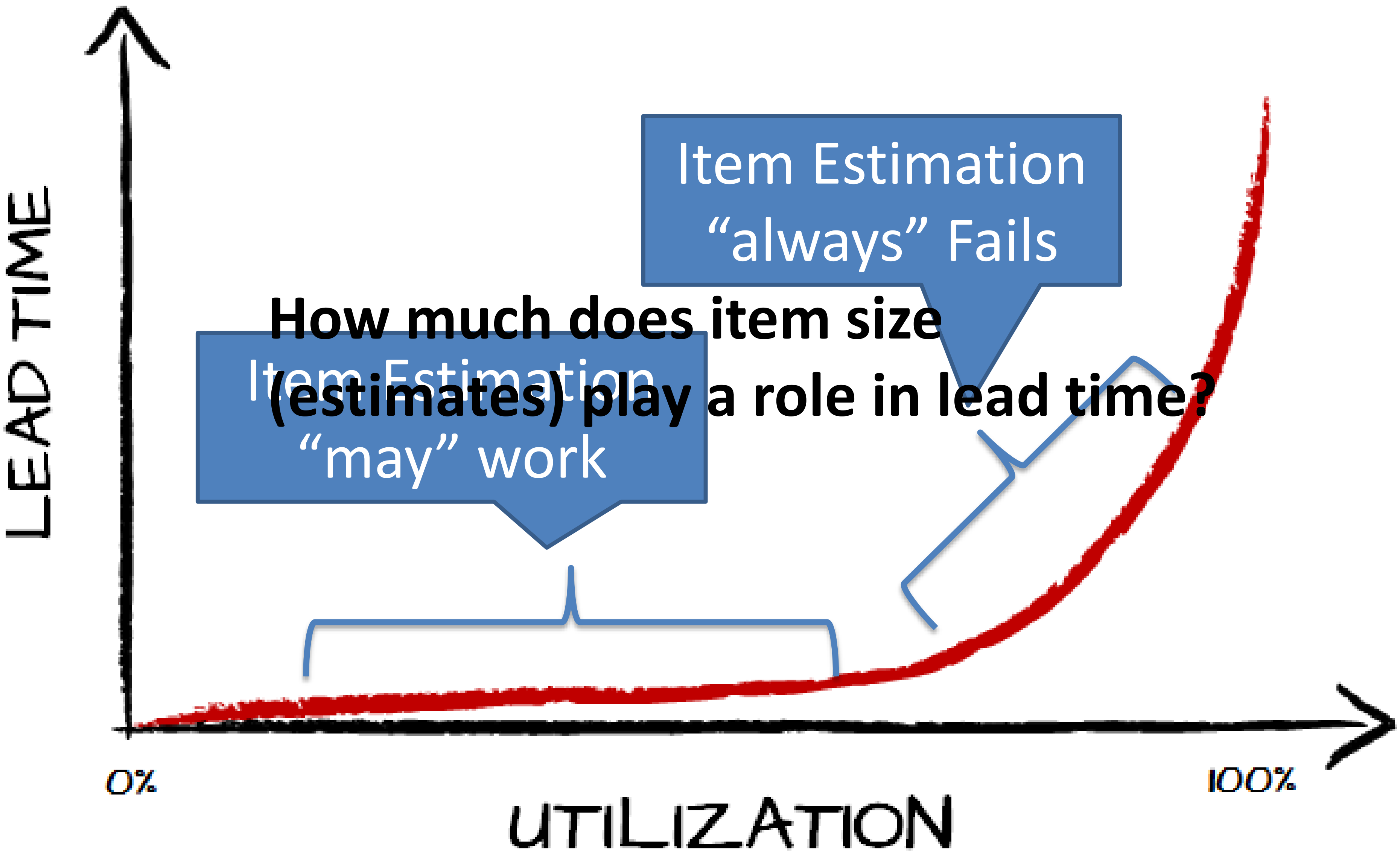
Network Throughput Test

Slides and spreadsheets at

Bit.ly/SimResources

(Case SENSITIVE)

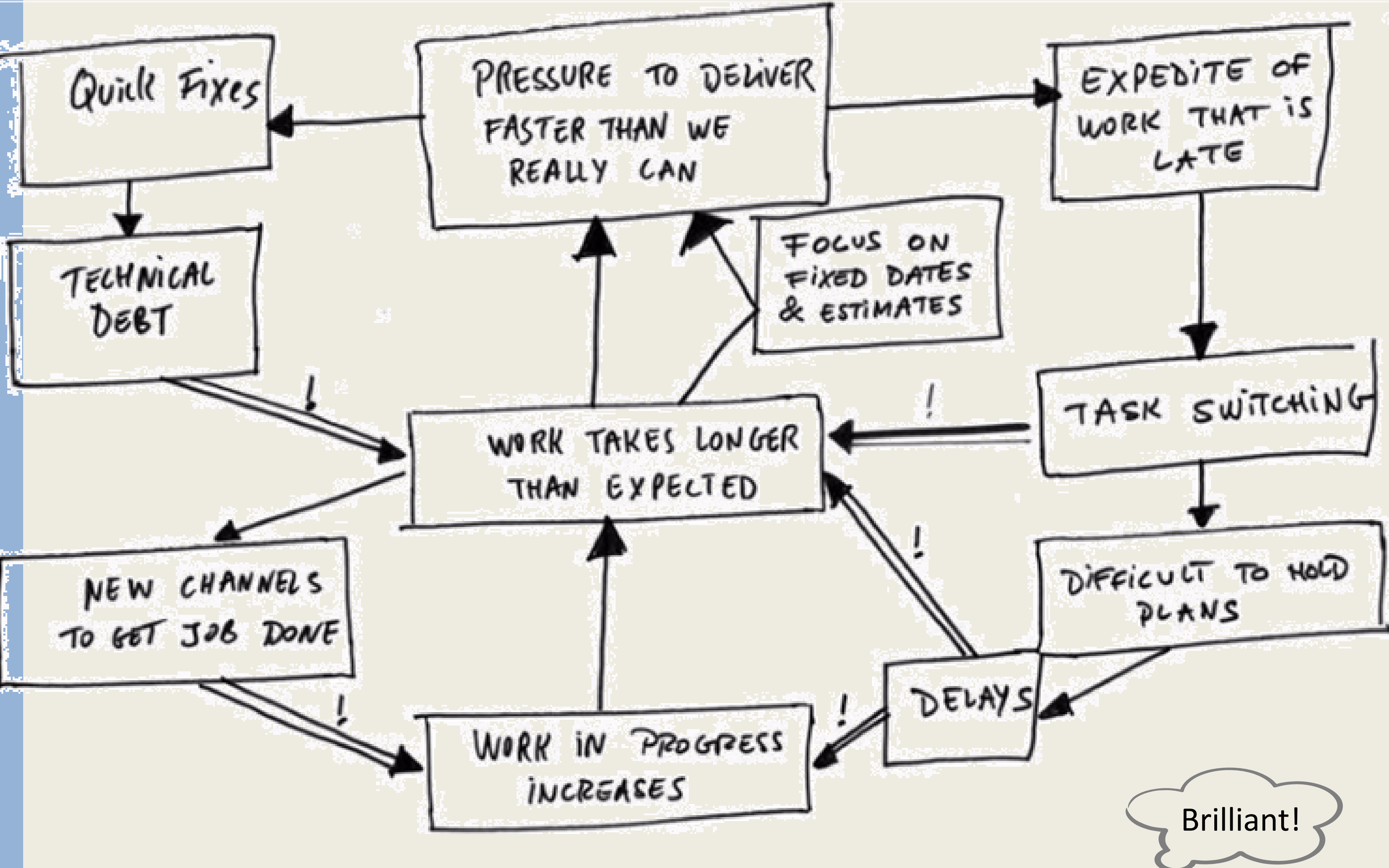

www.ExoticSpotter.com



See full story at http://brodzinski.com/2015/01/slack-time-value.html

Can’t forecast high utilization systems using item size

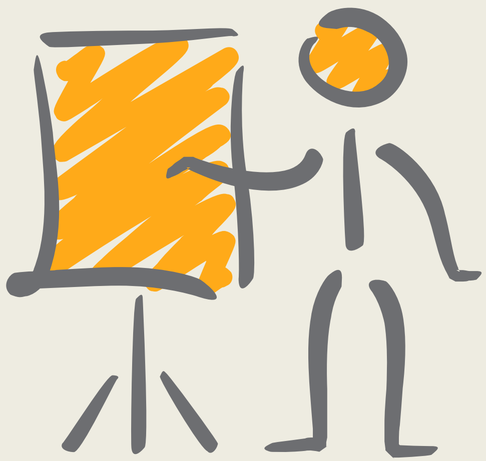
Trucks move at same speed as cars



The Kanban Kick-start Field Guide - Sandvik IT (C. Achouiantz & J. Nordin)

For high utilization systems we need to track/manage system level impediments

"Things that impact EVERY item"
"System Utilization"



TRADITIONAL RISK MANAGEMENT

PMBOK v5 Six-Step Risk Process

- **Plan Risk Management**
  - the process of defining how to conduct risk management activities for a project.
- **Identify Risks**
  - The process of determining which risks may affect the project and documenting their characteristics.
- **Perform Qualitative Risk Analysis**
  - The process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact.
- **Perform Quantitative Risk Analysis**
  - The process of numerically analyzing the effect of identified risks on overall project objectives.
- **Plan Risk Responses**
  - The process of developing options and actions to enhance opportunities and to reduce threats to project objectives.
- **Control Risks**
  - The process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process

Prince 2 Five-Step Risk Process

- **Step 1 – Identify**
  - Tailor a risk management strategy for the project and identify the risks including both threats and opportunities.
- **Step 2 – Assess**
  - for each risk identified estimate the probability, impact and proximity. Evaluate the overall risk exposure of the project.
- **Step 3 – Plan**
  - plan the risk responses. Electing to Avoid, Share, Reduce, Accept, Fallback (contingent action) or Transfer risks(threats) and Share, Enhance, Exploit, or Reject Opportunities
- **Step 4 – Implement**
  - Manage, control and report on the risks and their risk management progress.
- **Step 5 – Communicate**
  - continuously communicate the risks and their status to project stakeholders.

Risk Matrix	Low Likelihood (1)	Medium Likelihood (2)	High Likelihood (3)
High Impact (3)	3	6	9
Medium Impact (2)	2	4	6
Low Impact (1)	1	2	3

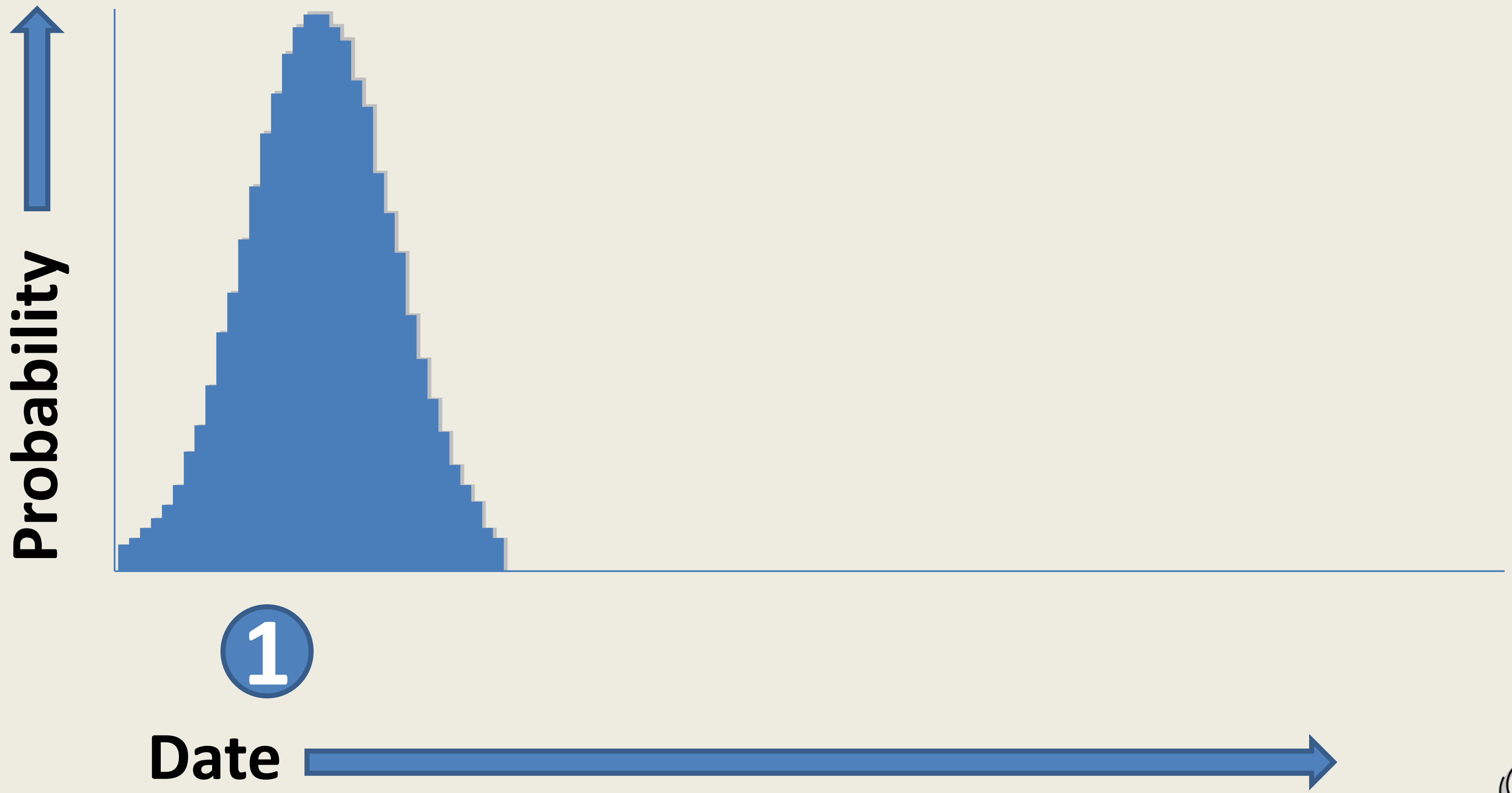
Risk x Impact = Irrelevant

50% Chance of a 1 month delay

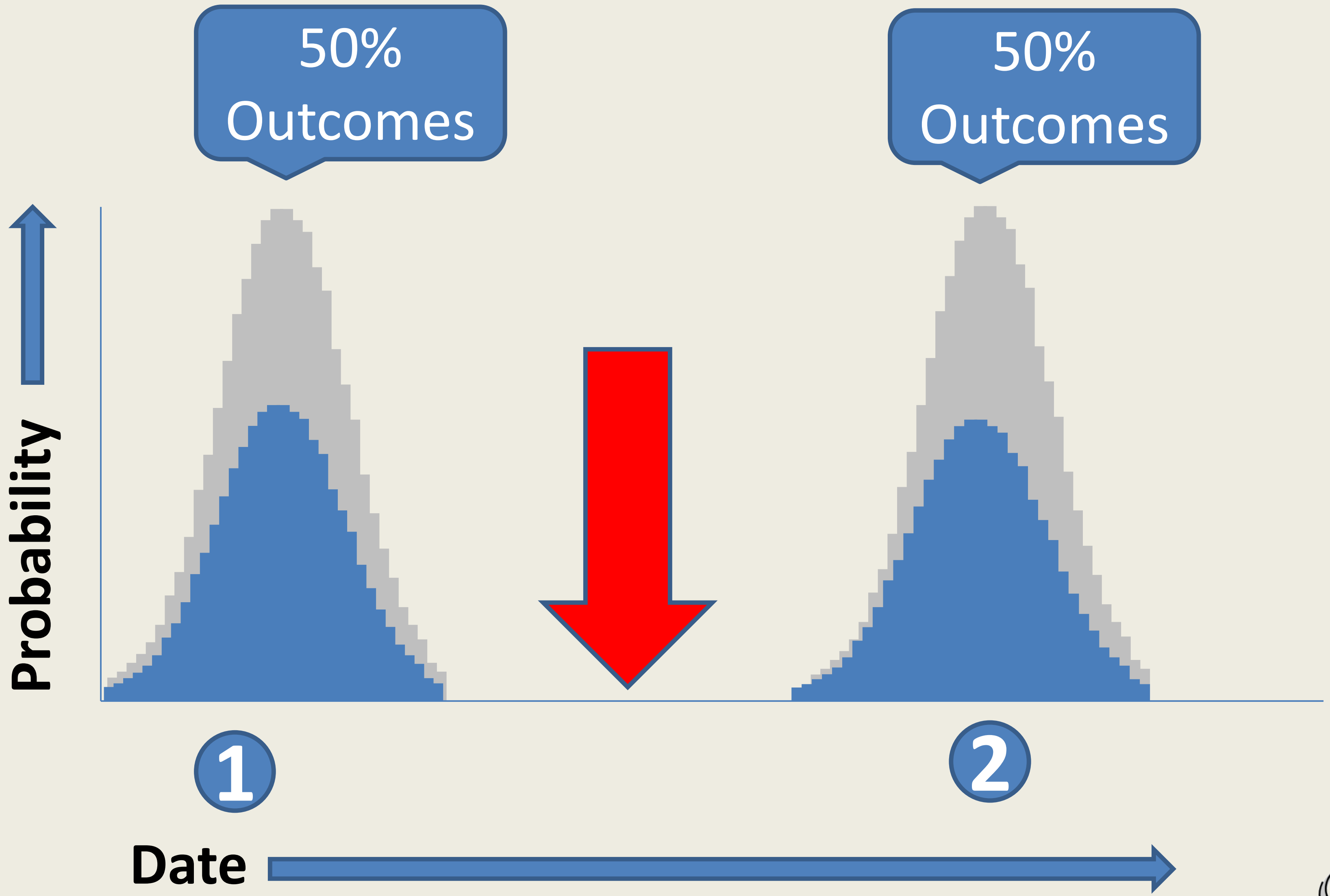
Probability x Impact = 0.5 x 1 month = 2 weeks

NO!

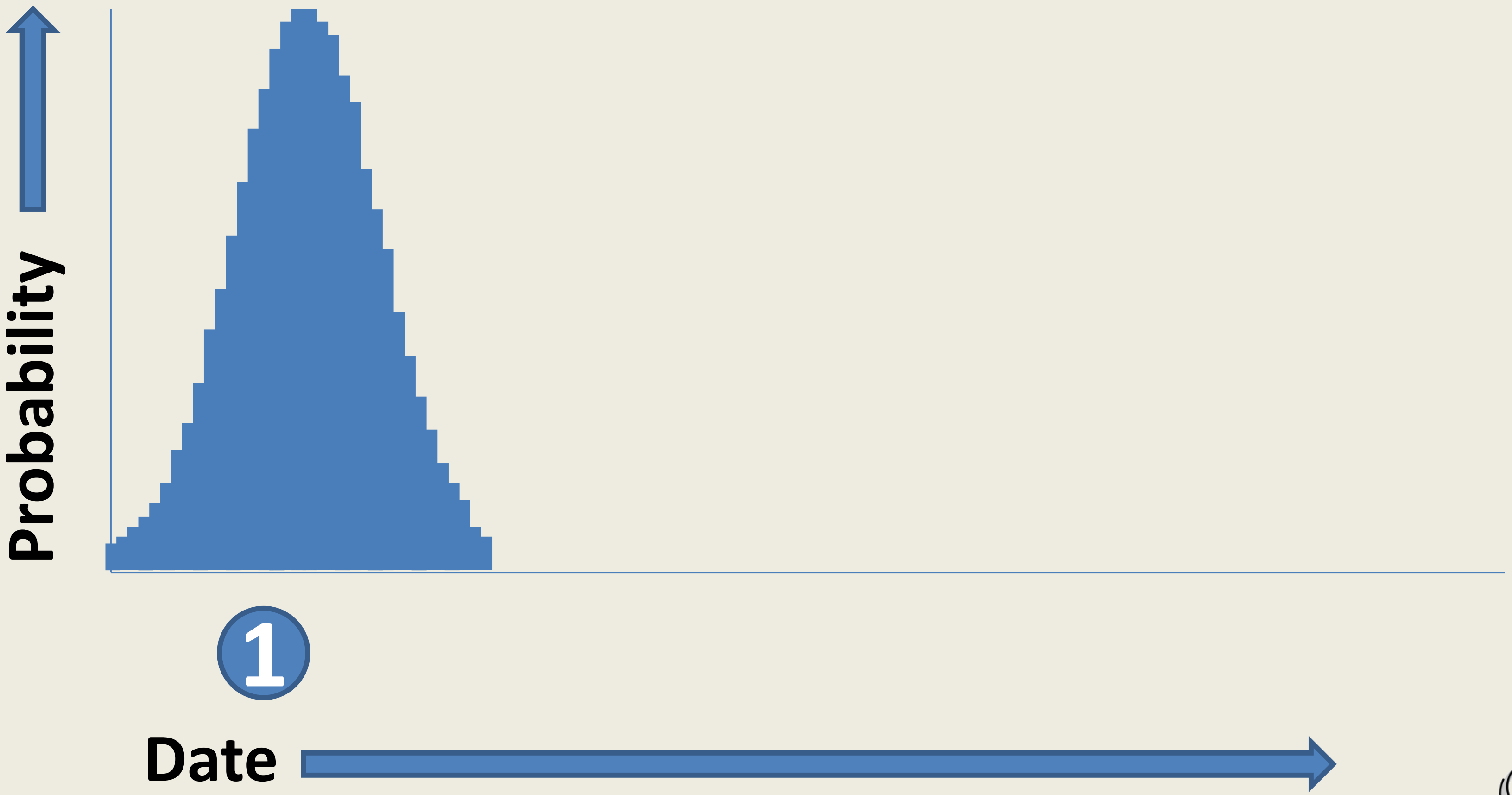
Risk x Impact = Irrelevant



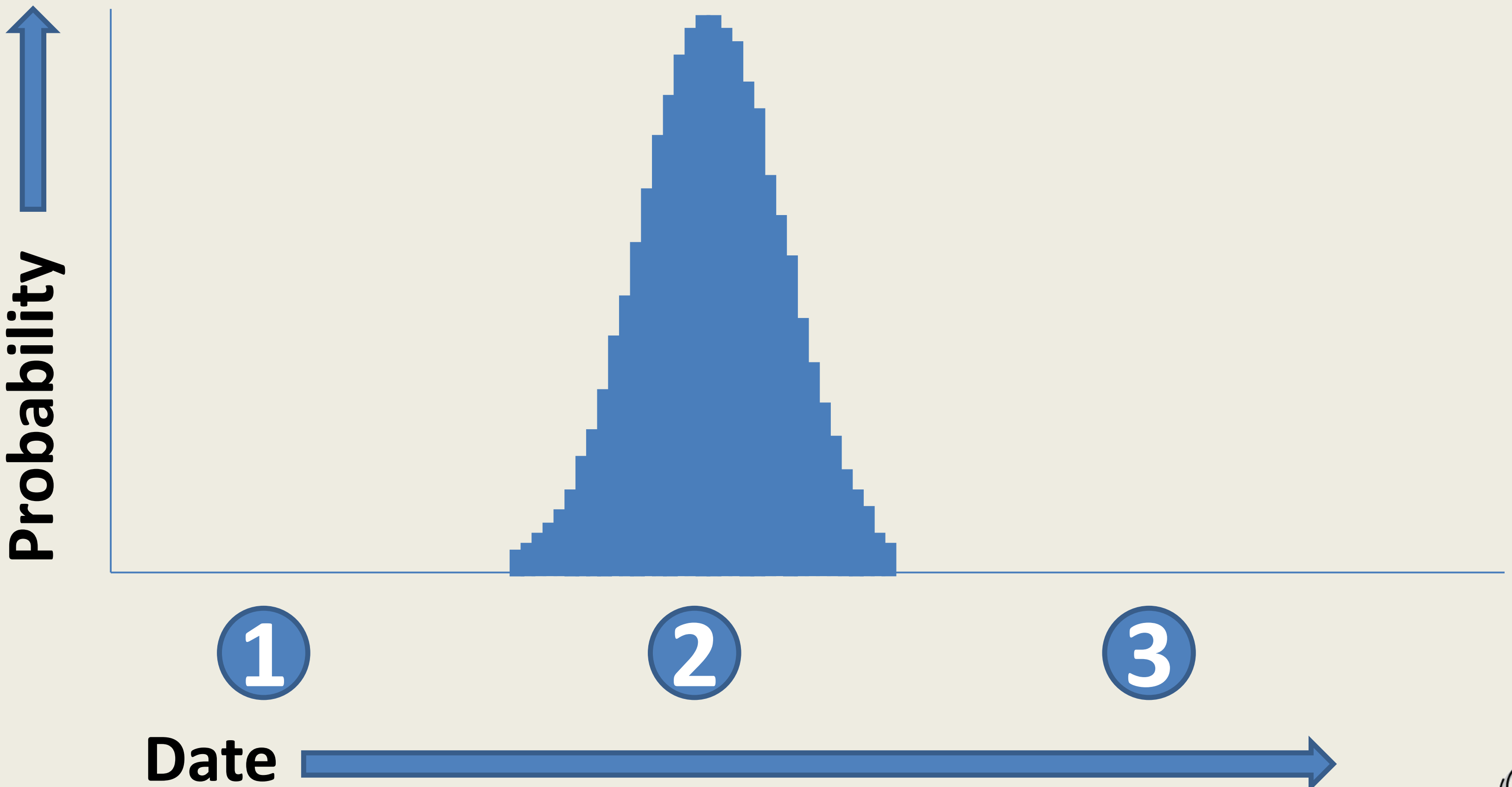
Risk x Impact = Irrelevant



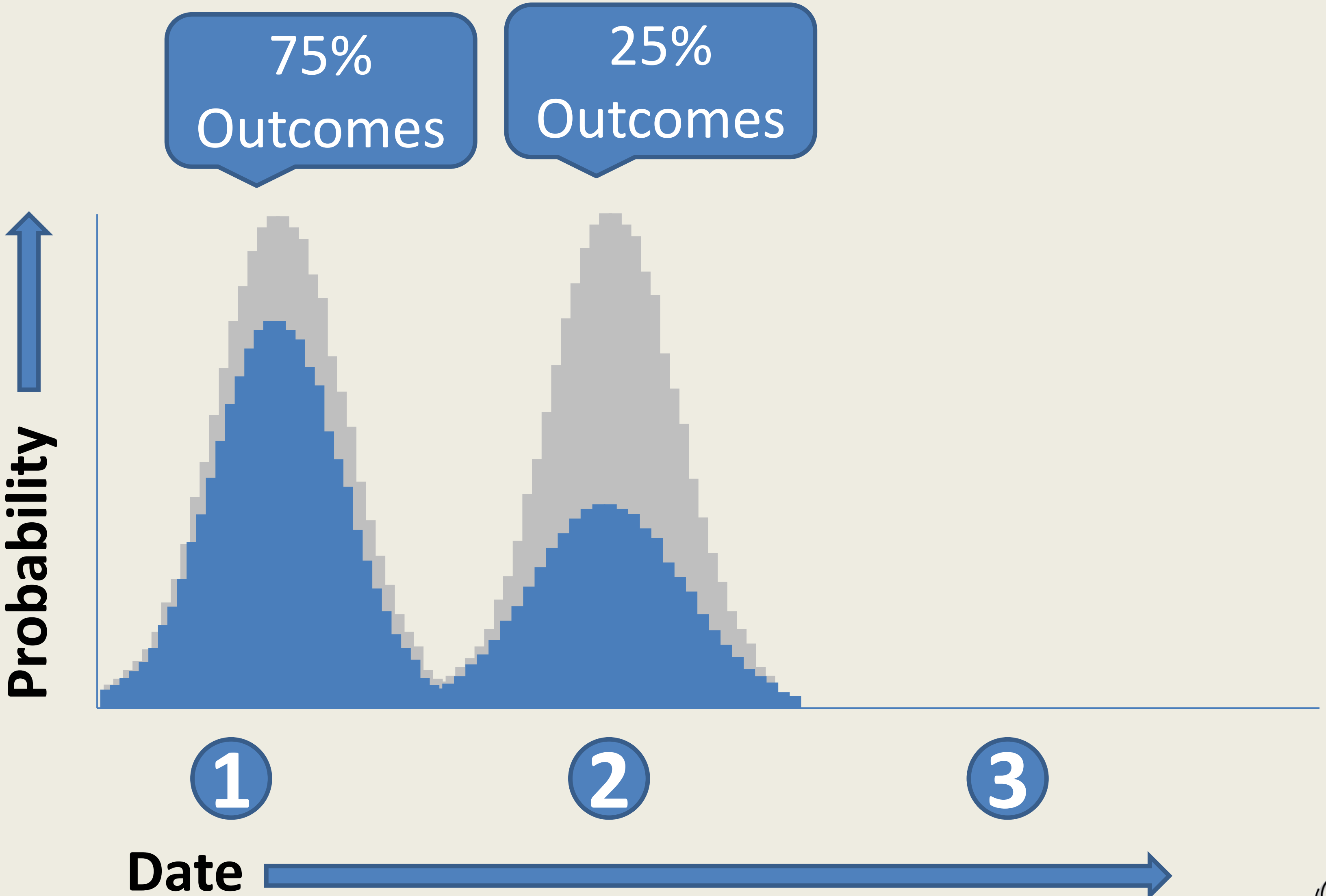
risk events – nothing goes wrong



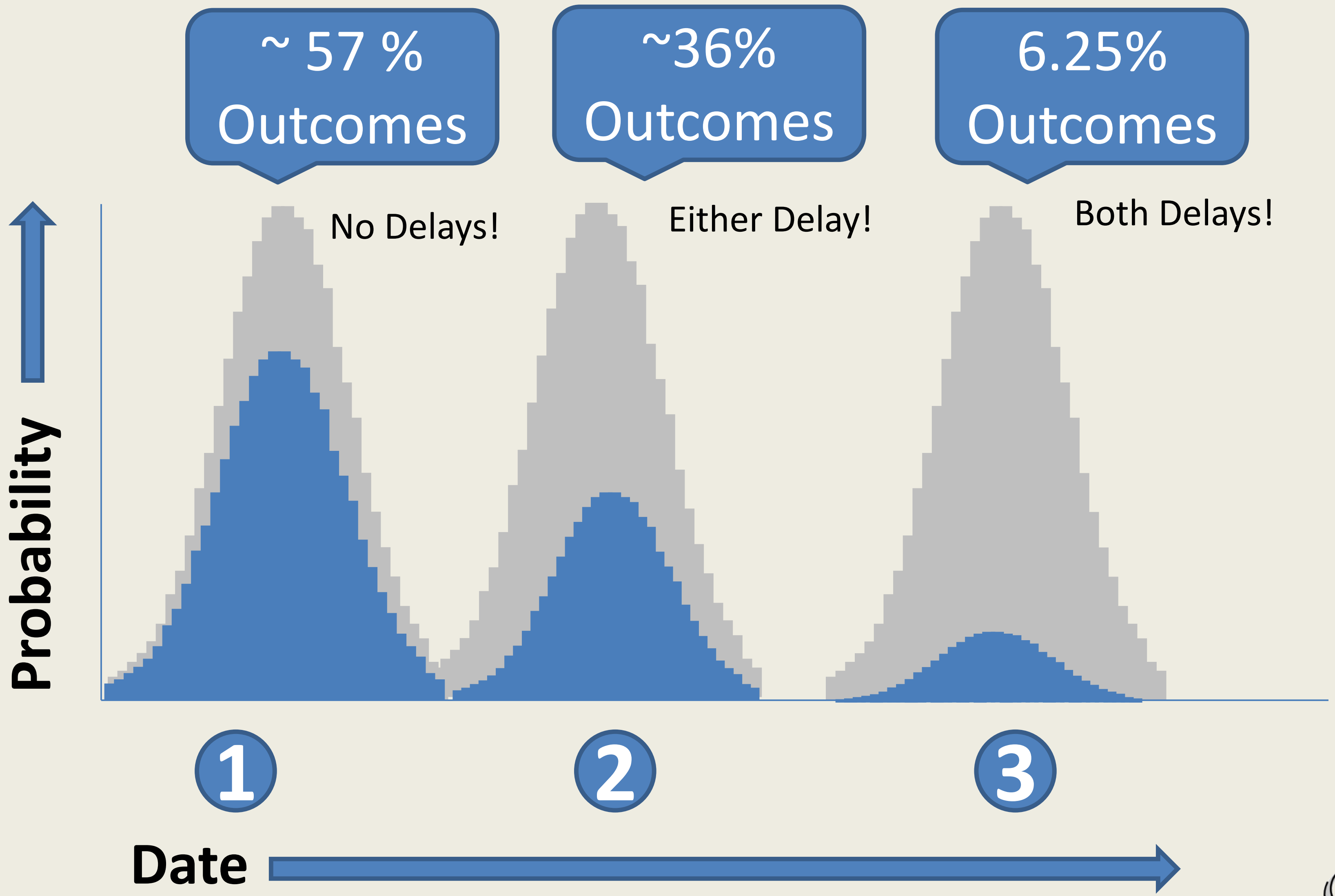
risk events – 1 delay comes true



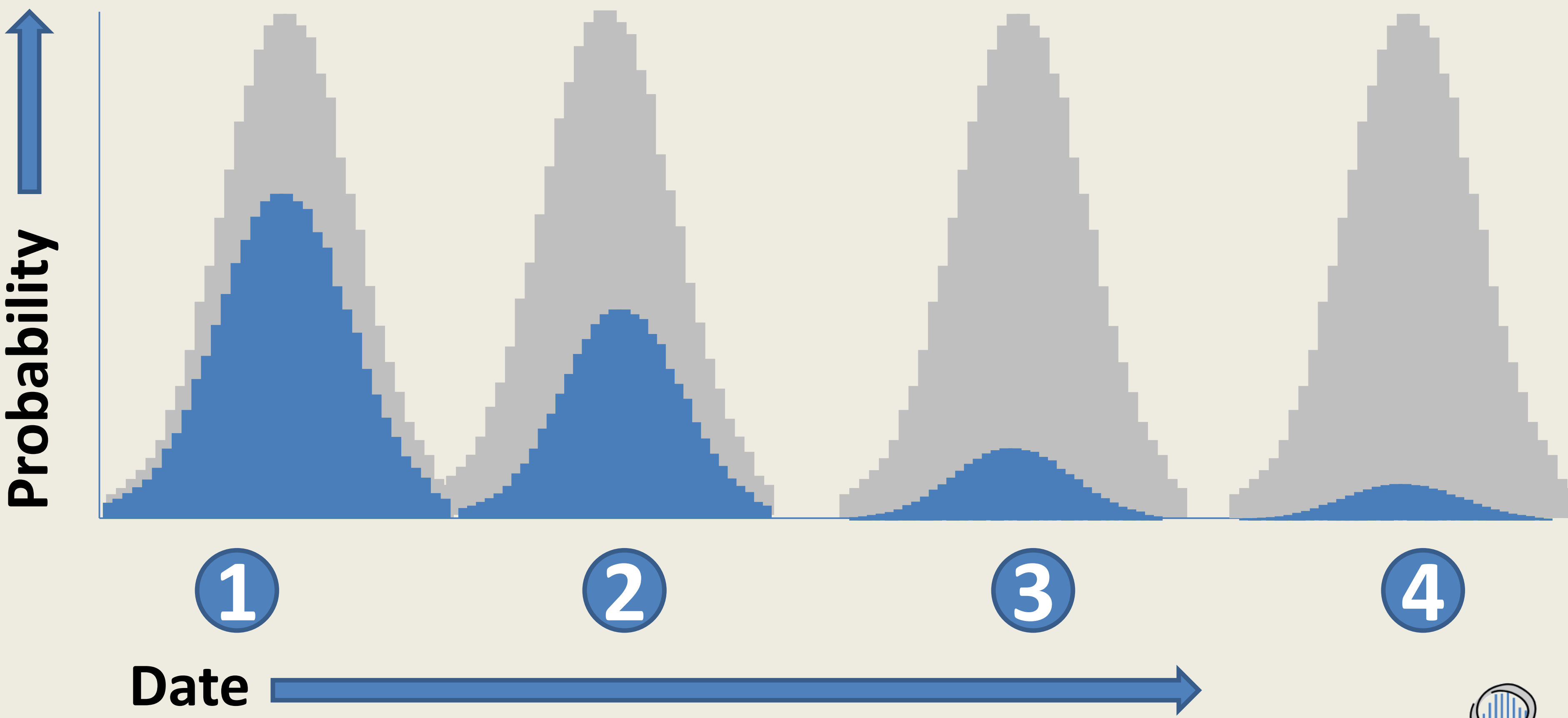
risk events – 1 delay 25% chance



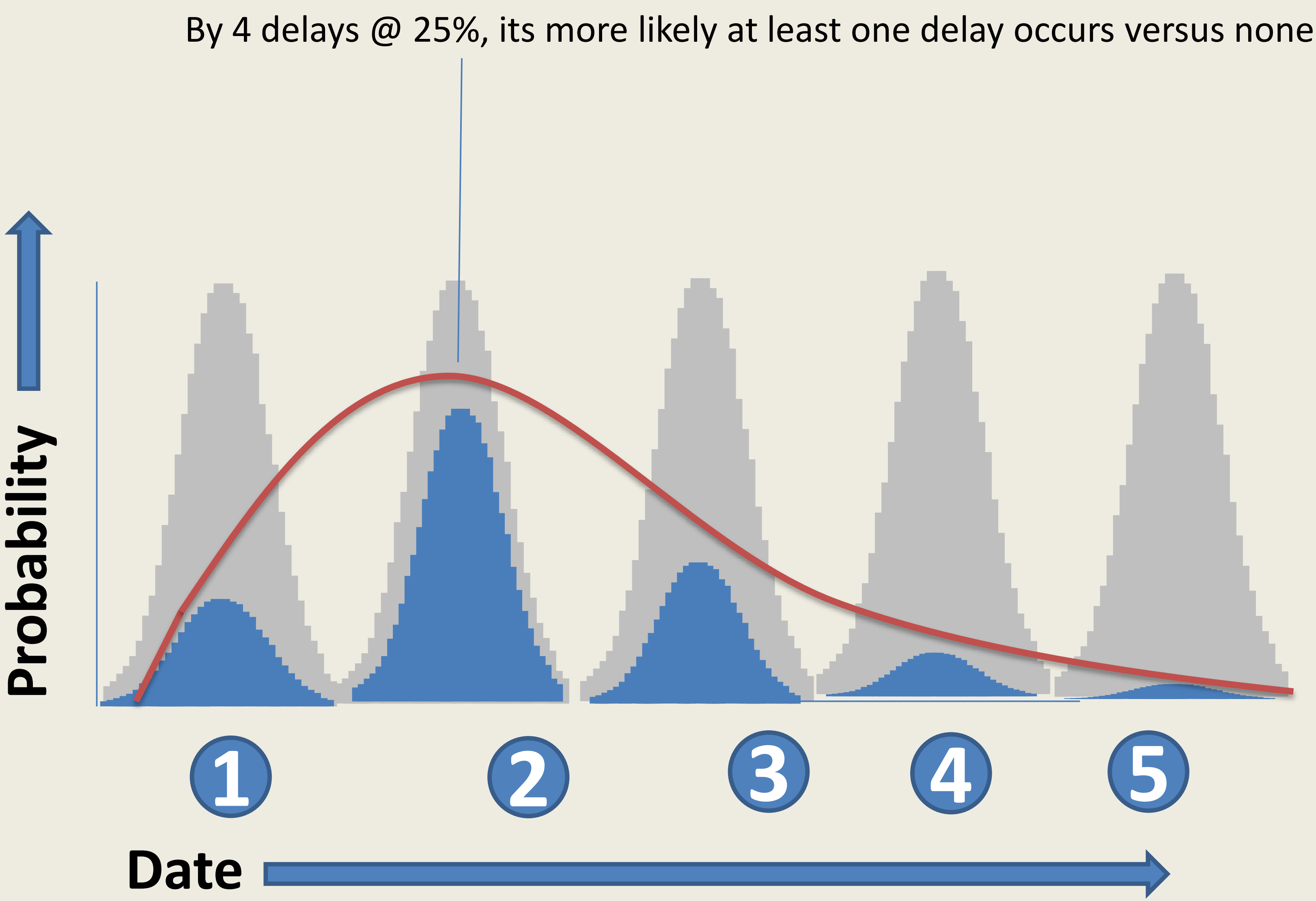
risk events – 2 delays @ 25% chance



risk events – 3 delays @ 25% chance



risk events – 4 delays @ 25% chance



Monte Carlo Forecasting

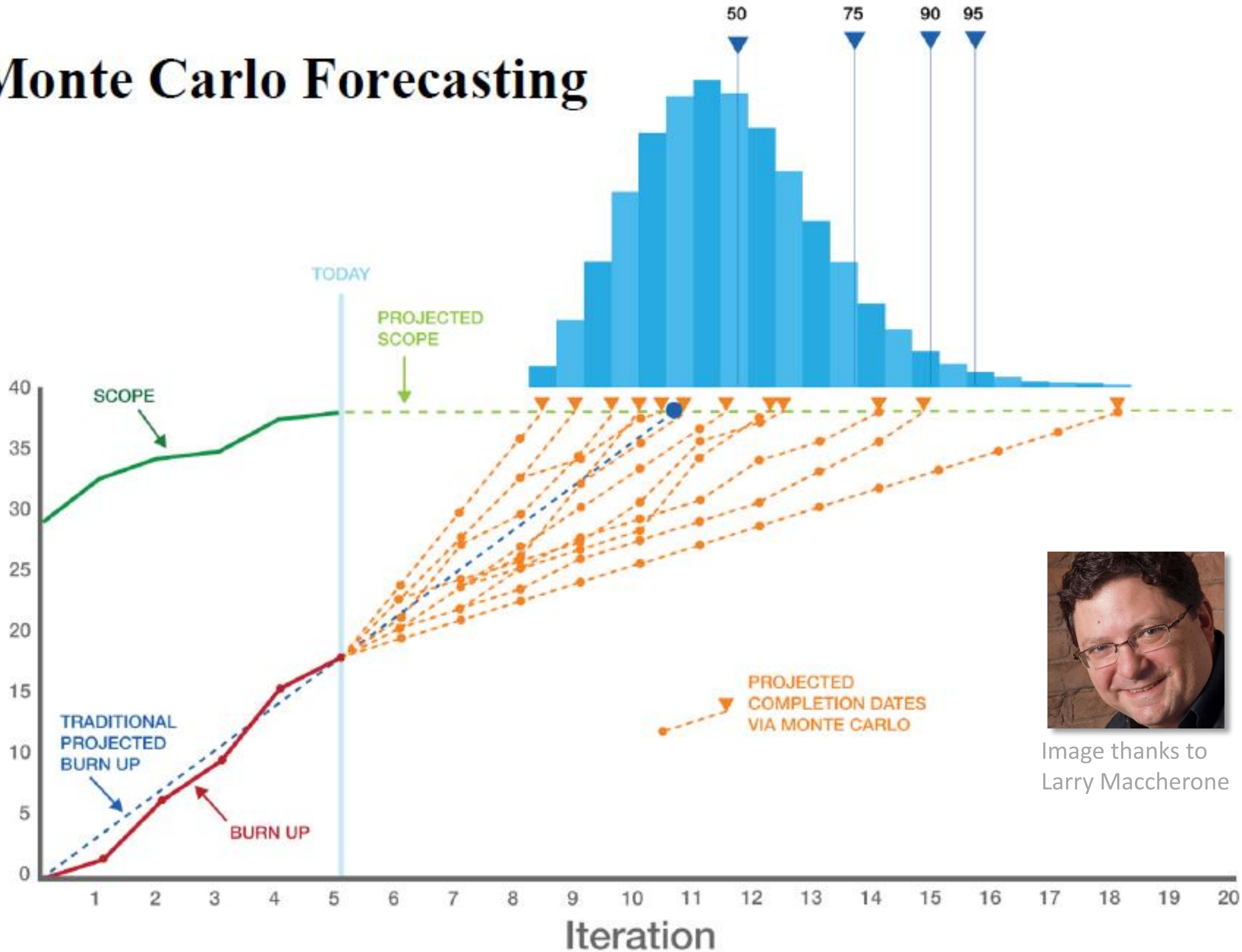
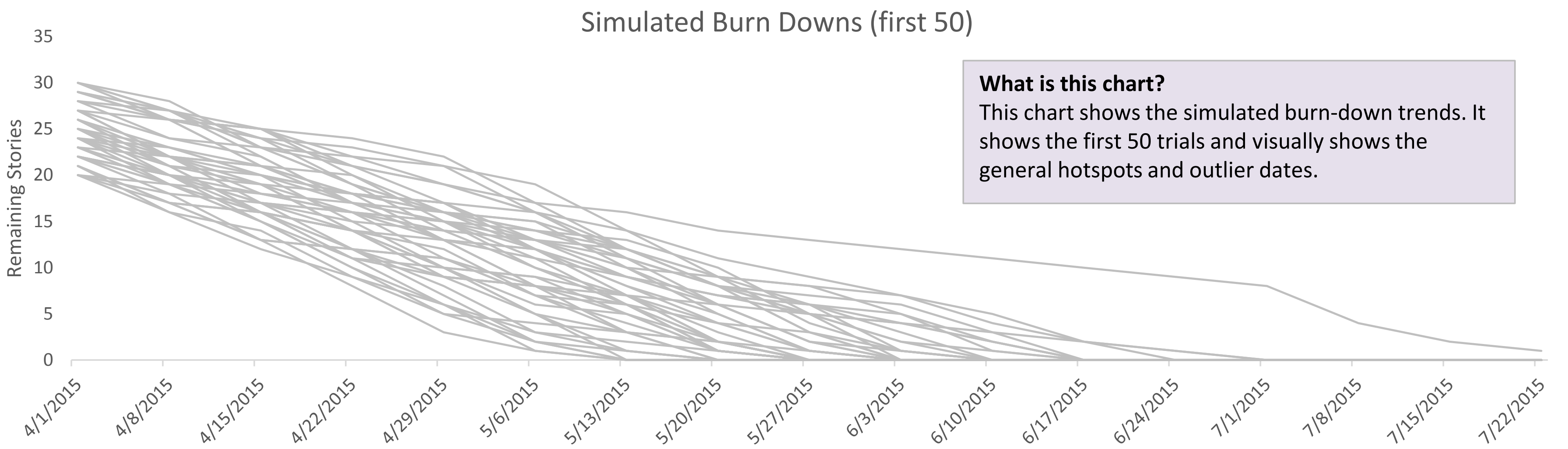


Image thanks to
Larry Maccherone



Bit.ly\SimResources

1. St

2. Ho

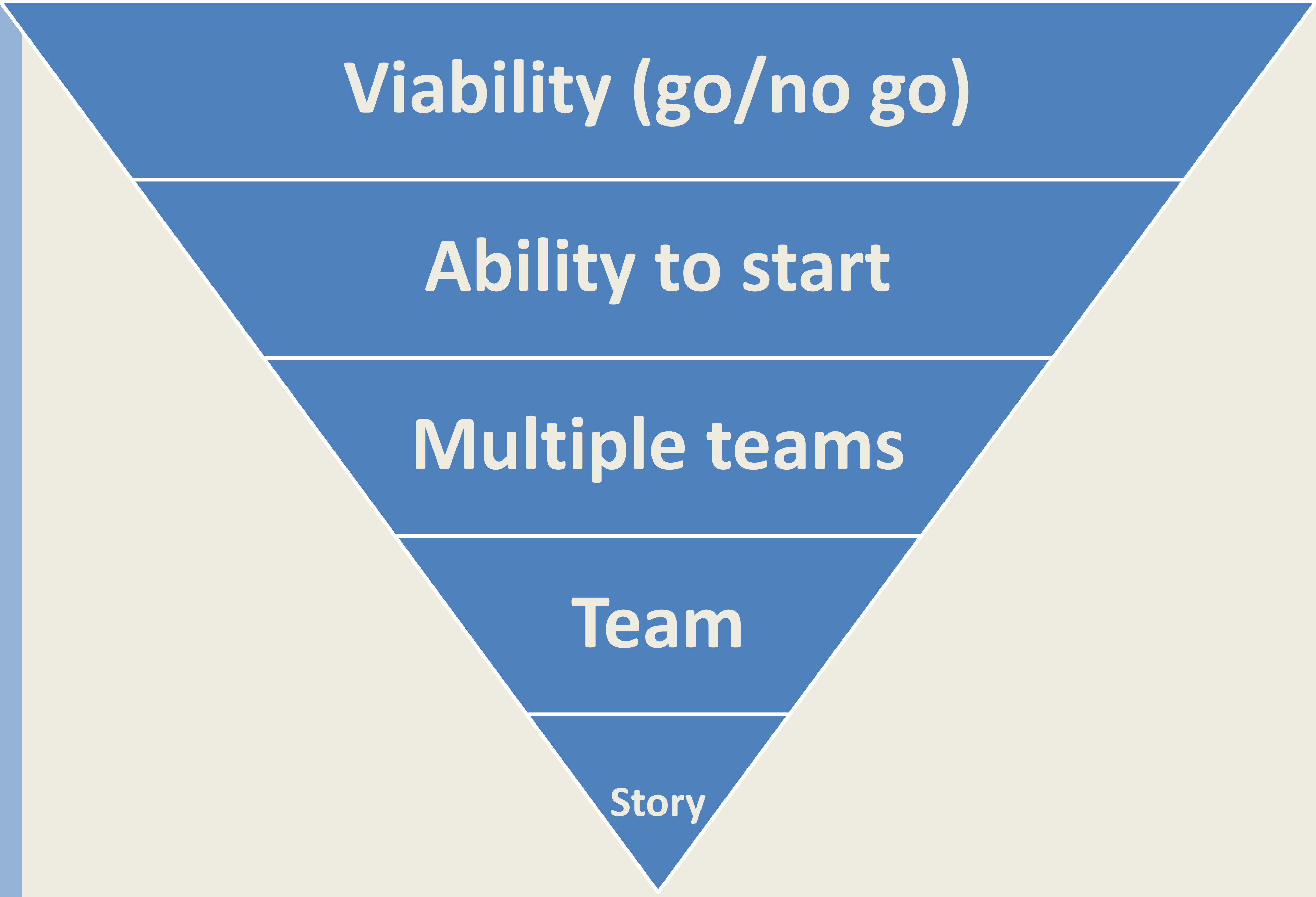
Low guess	20		Highest guess	30

3. Throughput. How many completed stories per week or sprint do you estimate low and high bounds?

Throughput estimate/samples are per Week 7 days

Use historical throughput data **OR** enter a low and high estimate below. Use: Estimate

Low guess	1		Highest guess	5


Viability (go/no go)
Ability to start
Multiple teams
Team
Story

Ten #Failed Forecasting Plan Assumptions

By Troy Magennis
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FocusedObjective.com

1: Missed Start Date

Mistake when planning portfolios

1: Missed Start Date
Actual Start Date > Planned Start

- How the planned date was chosen?
- Who signs off on the decision to do this project?
- Causes of past delays?
- Possible delays of this project?

- Give estimates as duration rather than end-date
- Keep history of planned date versus start date delay
- Model start date risk using the historical range of delays

2: No Team (Team not ready)

2: Team Not "Ready" at Start Date
Actual Team = 0

- Is the team in place already? Can I see them?
- What are they working on now? Is it likely to be delayed?
- Higher priority projects?

- Plans to hire aren't always achievable by given date
- Plan environment factors: space to sit, equipment, meeting space
- What infrastructure does the team need to "start" work?

3: Partial Team (Team < planned)

4: Partial Body Staffing

5: Missing Skillsets

3, 4 & 5: Team Skill and Strength

- How were the skill-sets required determined
- Did skill level factor into team planning
- What other duties do the planned staff perform (production support, etc.)
- How ramp up time for new members is considered

- Plan what skills are necessary for the project
- Perform Capability Matrix to find skill gaps and resolve
- Estimate and plan how long it takes from "**hire to productive**" for skills
- Only plan using "**productive date"** (not the hire date)

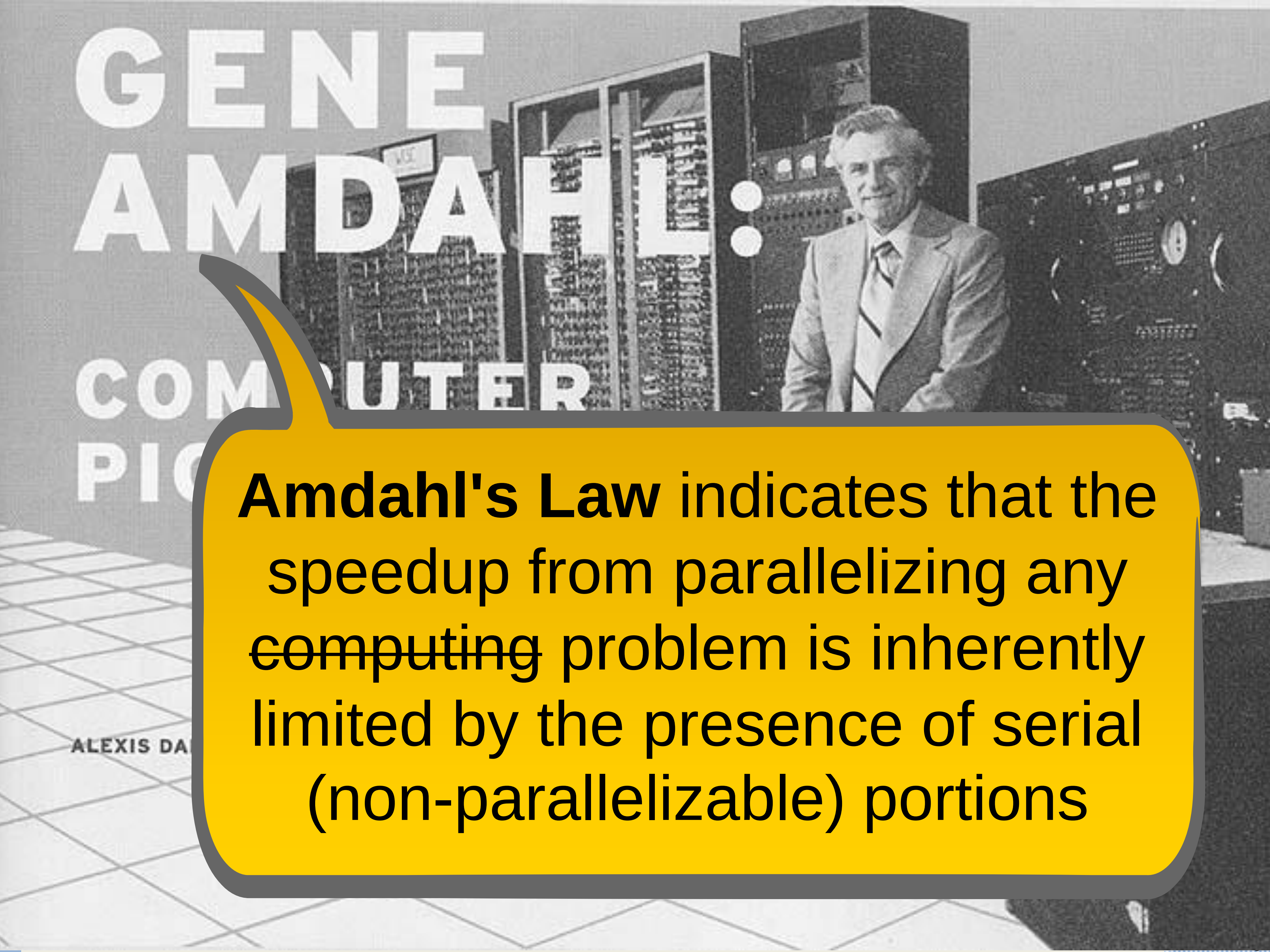
Capability Matrix

	CSS	Javascript	Run DB Backup / Rest
Person 1	Can run and use the tools needed	Know nothing	Can run and use the t
Team 1	Know nothing	Can start from nothing and create	Can tweak it or do ea
Team 2	Can start from nothing and create	Know nothing	Can start from nothir

Analysis:

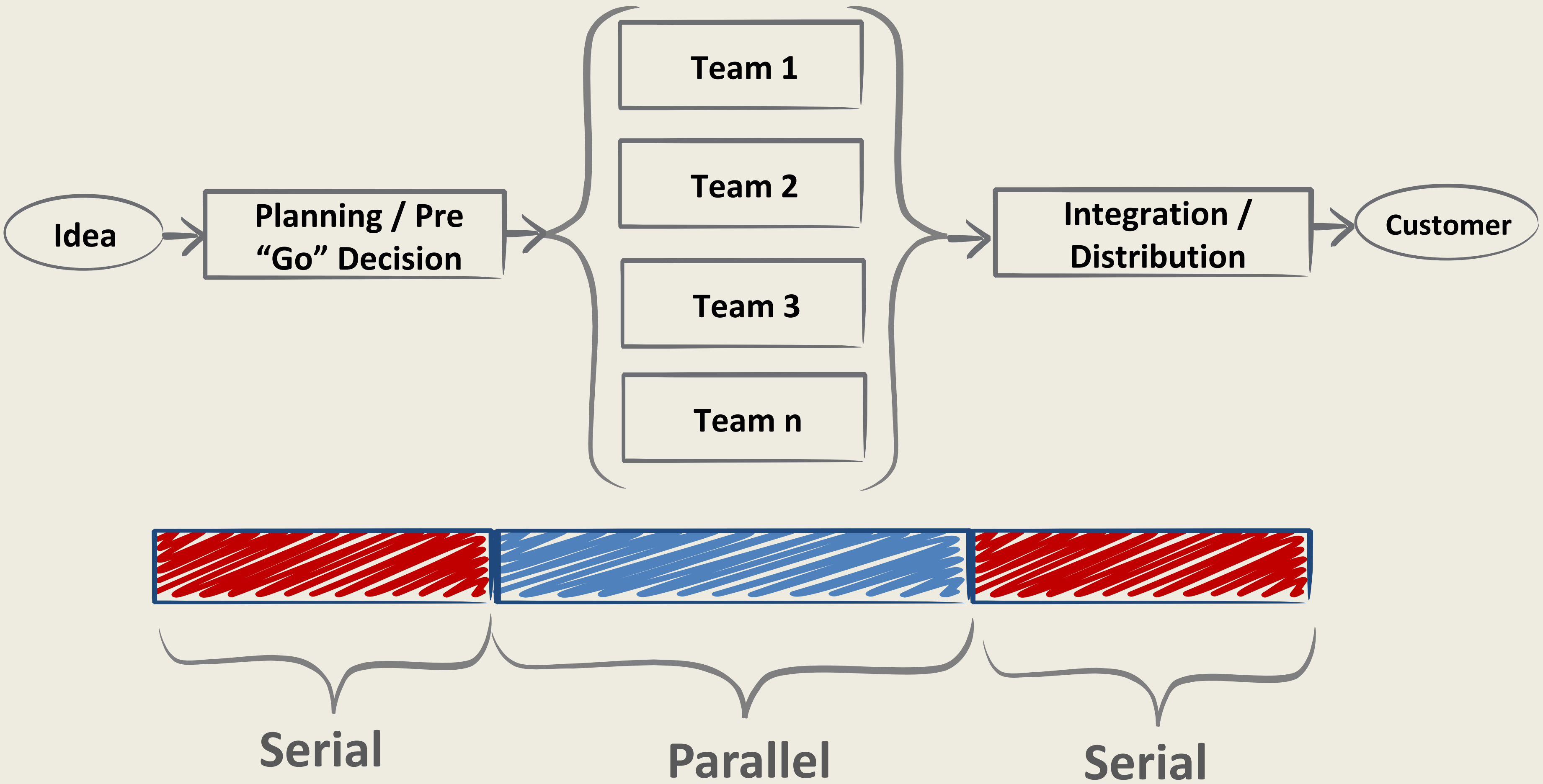
	CSS	Javascript	Run DB Backup /
Player Coaches: Ability to Create	1	1	1
Players: Ability to Maintain	1	1	2
Bench: Ready to Train Up	1	0	1

General guidelines: 0 = bad, 1 = single point of failure, >2 cool!
Player Coaches: These are the people/teams who can create new work and teach others. You need at least one (right?). Are y
Players: These are the people/teams who can maintain current work, but struggle to create new work. If new work isn't expec
Bench: These are the people/teams who although haven't got this skill yet, have the tools required to perform this task if men



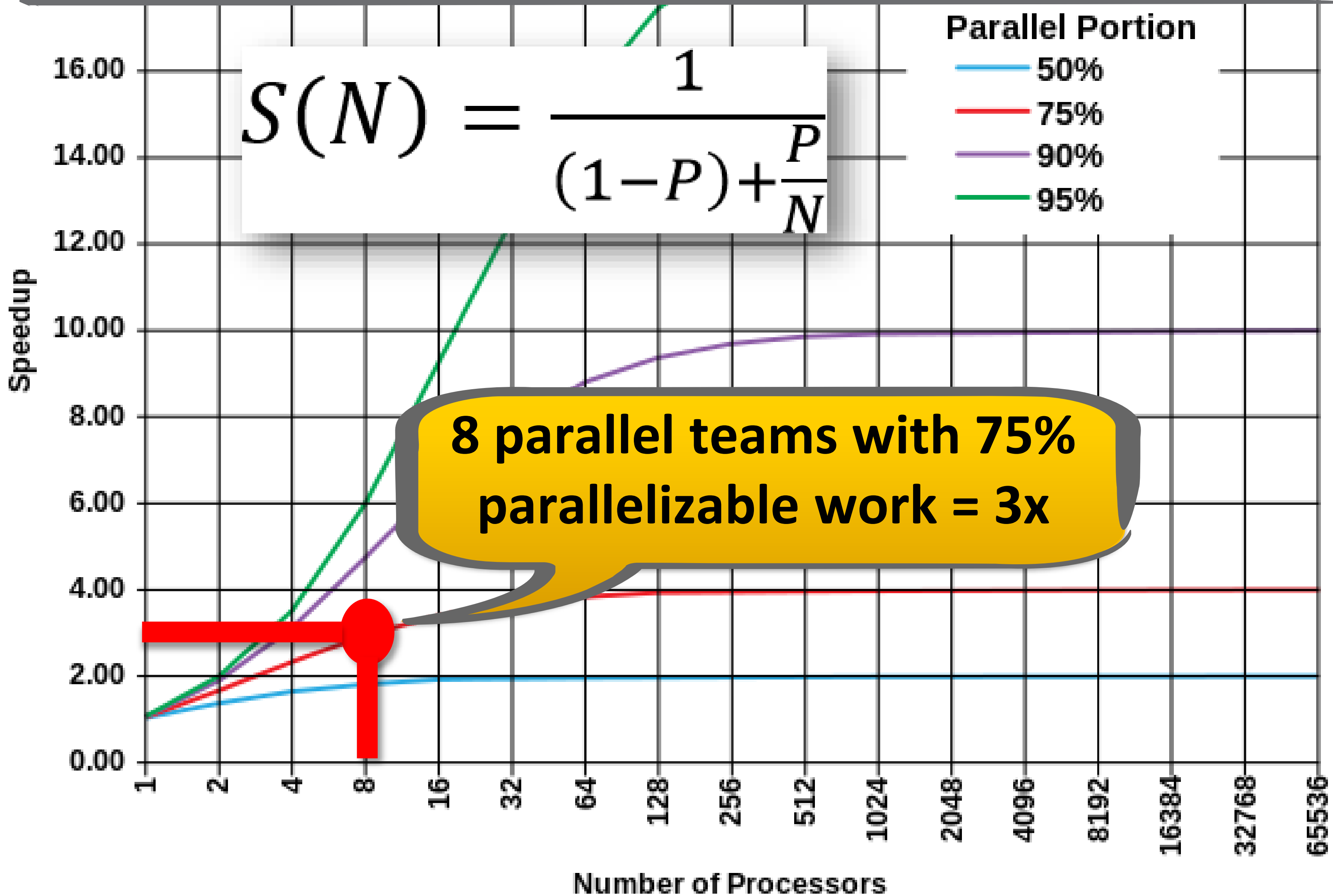
Amdahl's Law indicates that the speedup from parallelizing any ~~computing~~ problem is inherently limited by the presence of serial (non-parallelizable) portions

6: Overstated Parallel Effectiveness



6: Overstated Parallel Effectiveness

$$S(N) = \frac{1}{(1-P)+\frac{P}{N}}$$



6: Overstating Parallel Scalability
Actual Benefit < Assumed Benefit

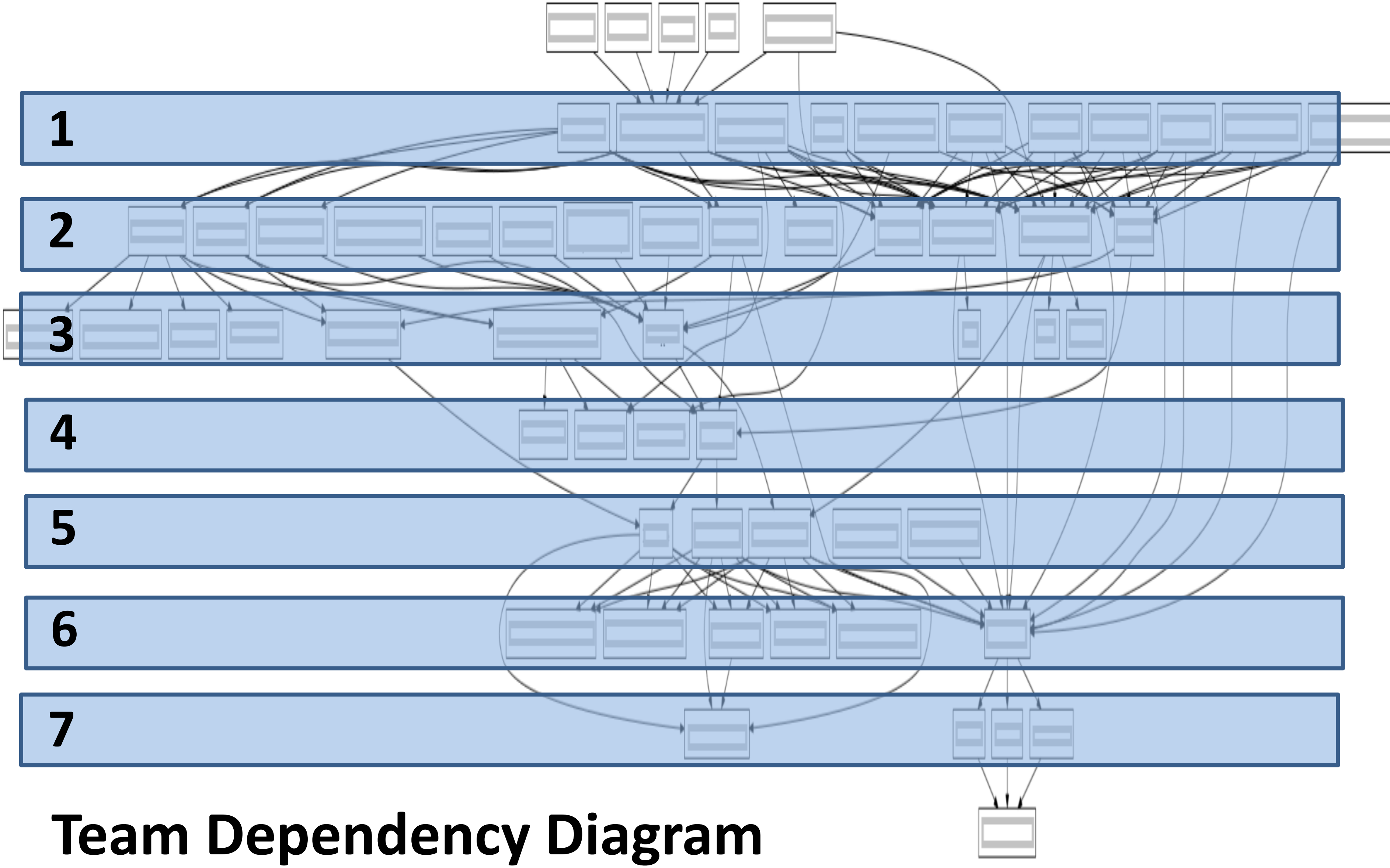
- What are the serial parts of a complete system path (often shared resources)
- How do teams plan to integrate work
- How do team co-ordinate and plan work
- What are the inter-dependencies between teams

- Find ways to eliminate serial paths
- Track and prioritize fixing blockers in serial paths
- Organize teams to reduce inter-dependencies
- Remind people non-linearity of parallel scaling

7: Dependencies and Friction

Amdahl was an Optimist

Error for high team count



Team Dependency Diagram

Chances at least one team not delayed

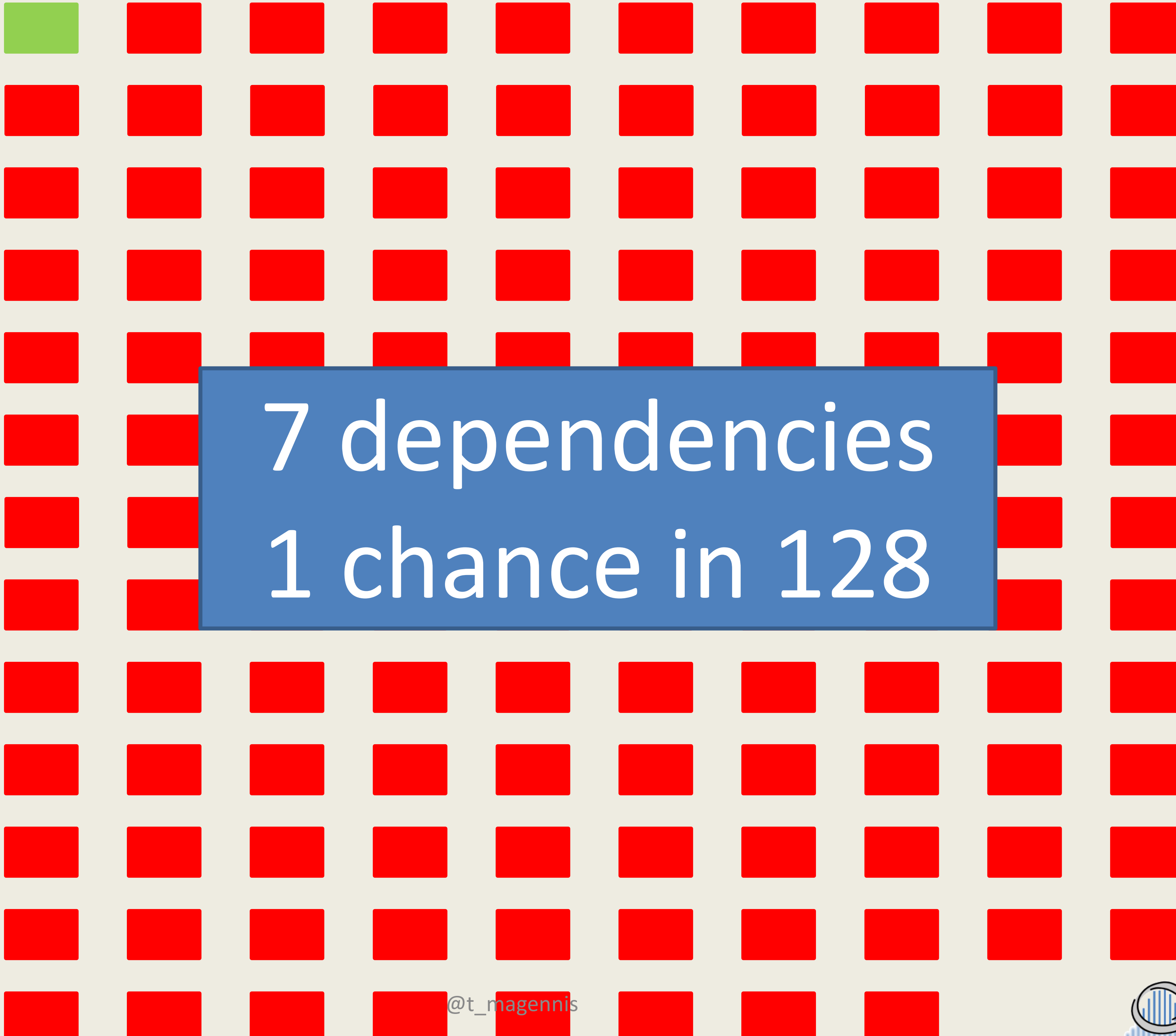
1 in 2^n

or

1 in 2^7

or

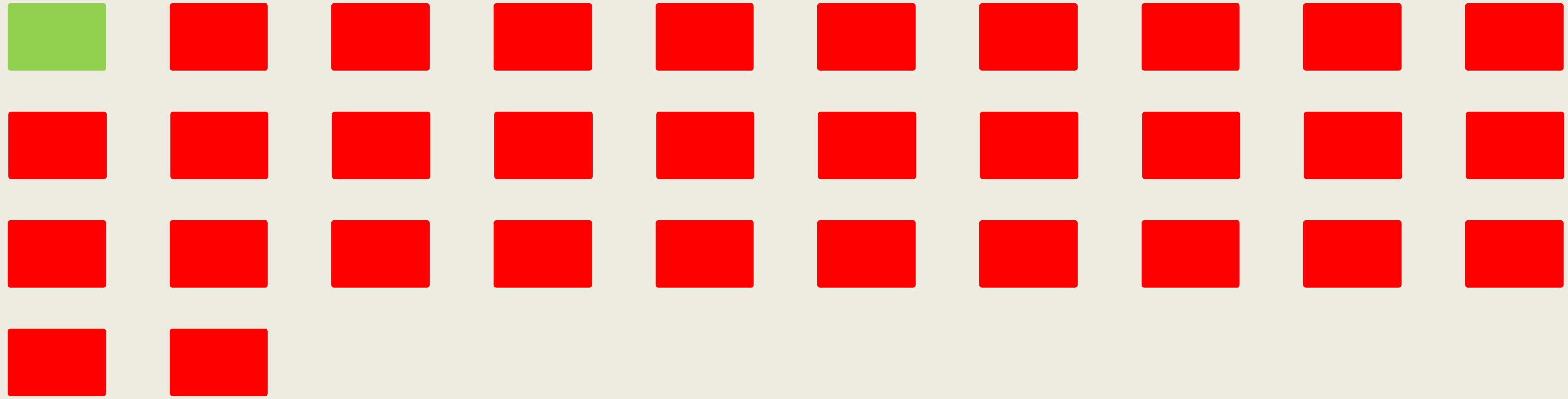
1 in 128



7 dependencies
1 chance in 128

6 dependencies

1 chance in 64



5 dependencies
1 chance in 32

7: Dependency Impacts
Your timetable != Someone else's

- Determine complexity in build order dependencies
- Determine is-aligned priorities
- Determine what incentives are in place

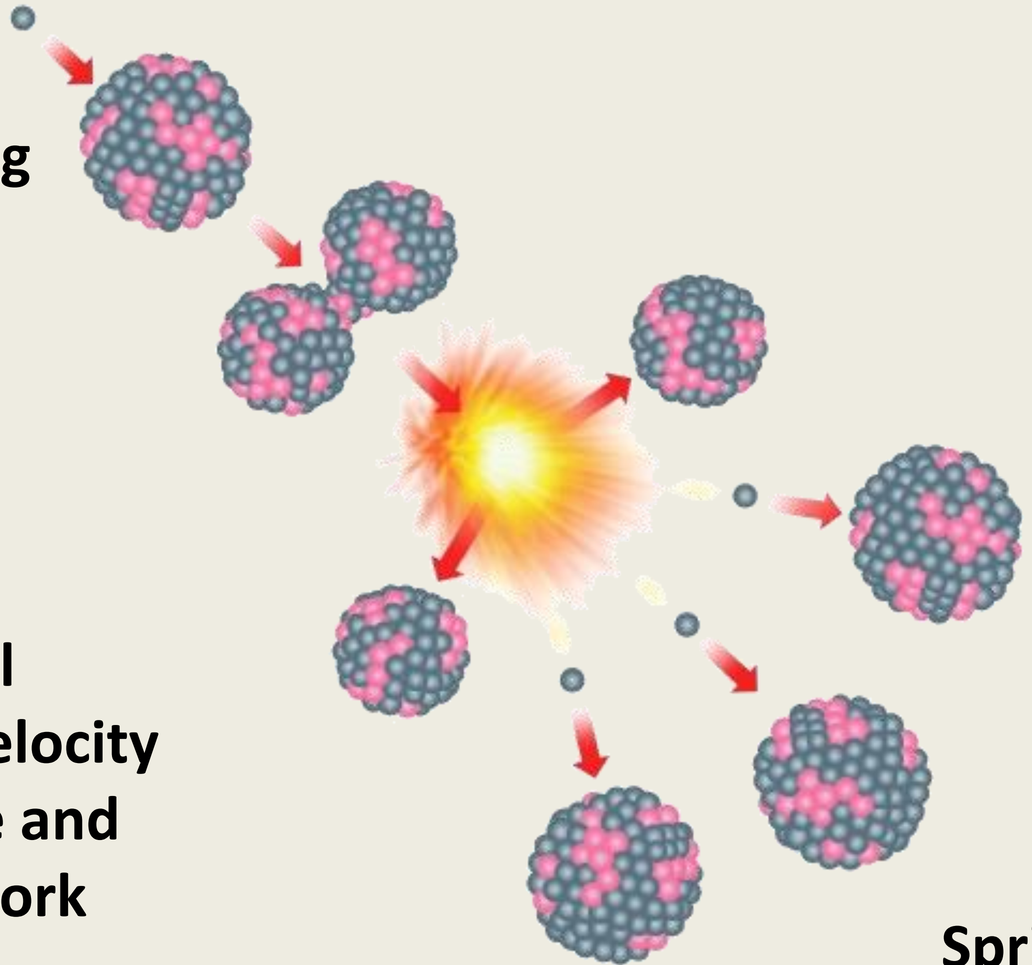
- Look for re-organization opportunities to reduce dependencies
- Reduce batch sizes
- Communicate initial and updated information often
- Build incentives to align priorities


Defects
Technical Debt
Mistake for startups & older systems
8: Carried over defects and debt

9: Ship Stoppers

10: Splitting

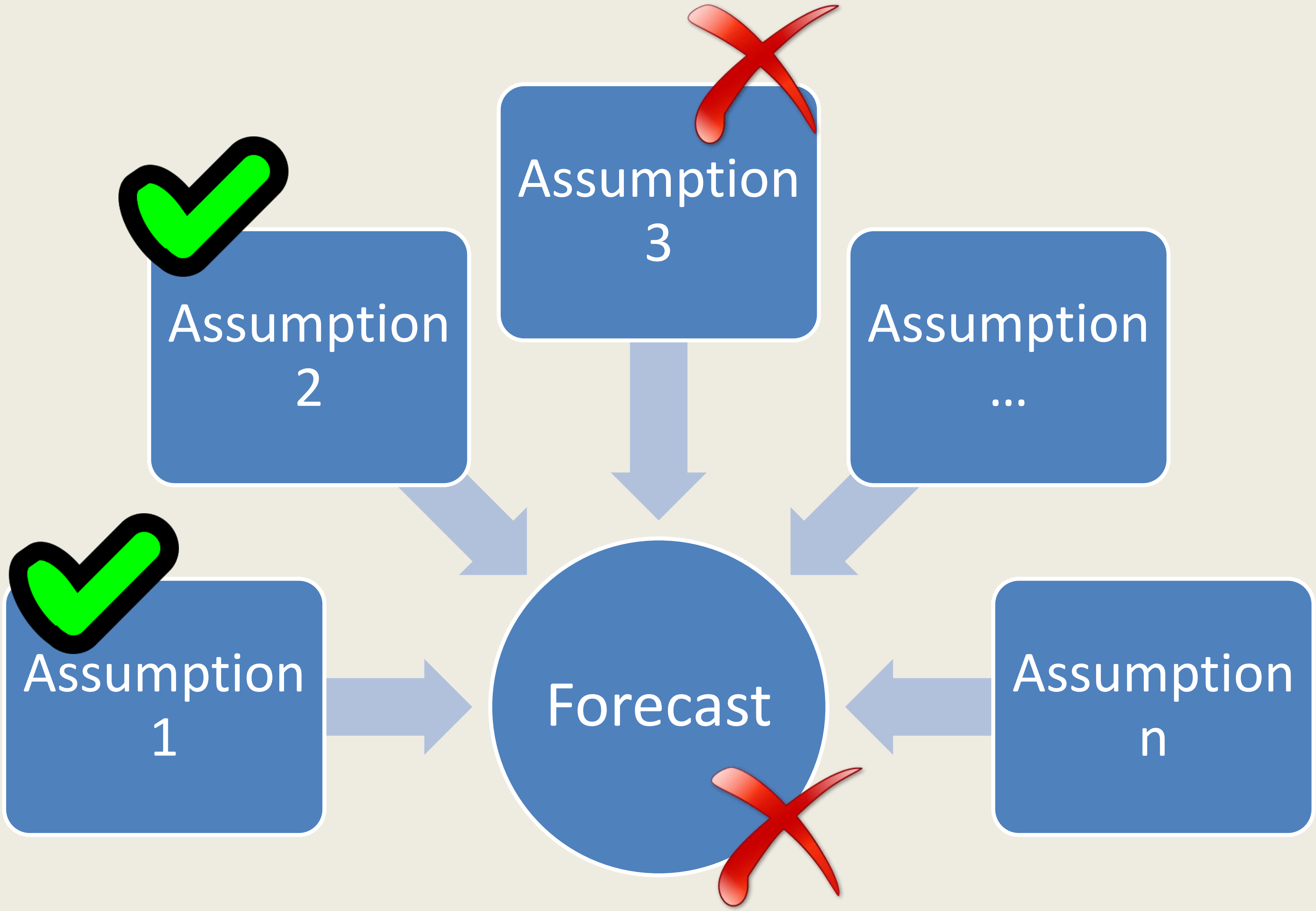
Product Backlog



Mistake when forecasting using data

Historical throughput/velocity based on pre and post split work

Sprint Backlog


Assumption 3
Assumption 2
Assumption ...
Assumption 1
Forecast
Assumption n

Calls to action…

- Understand when estimation is NOT needed
- Track failed assumptions not work item status
- Build achievable plans and goals
  - Free tools / Spreadsheets / Exercises **Bit.ly/SimResources**
- Twitter: @t_magennis
- Email: troy.magennis@focusedobjective.com

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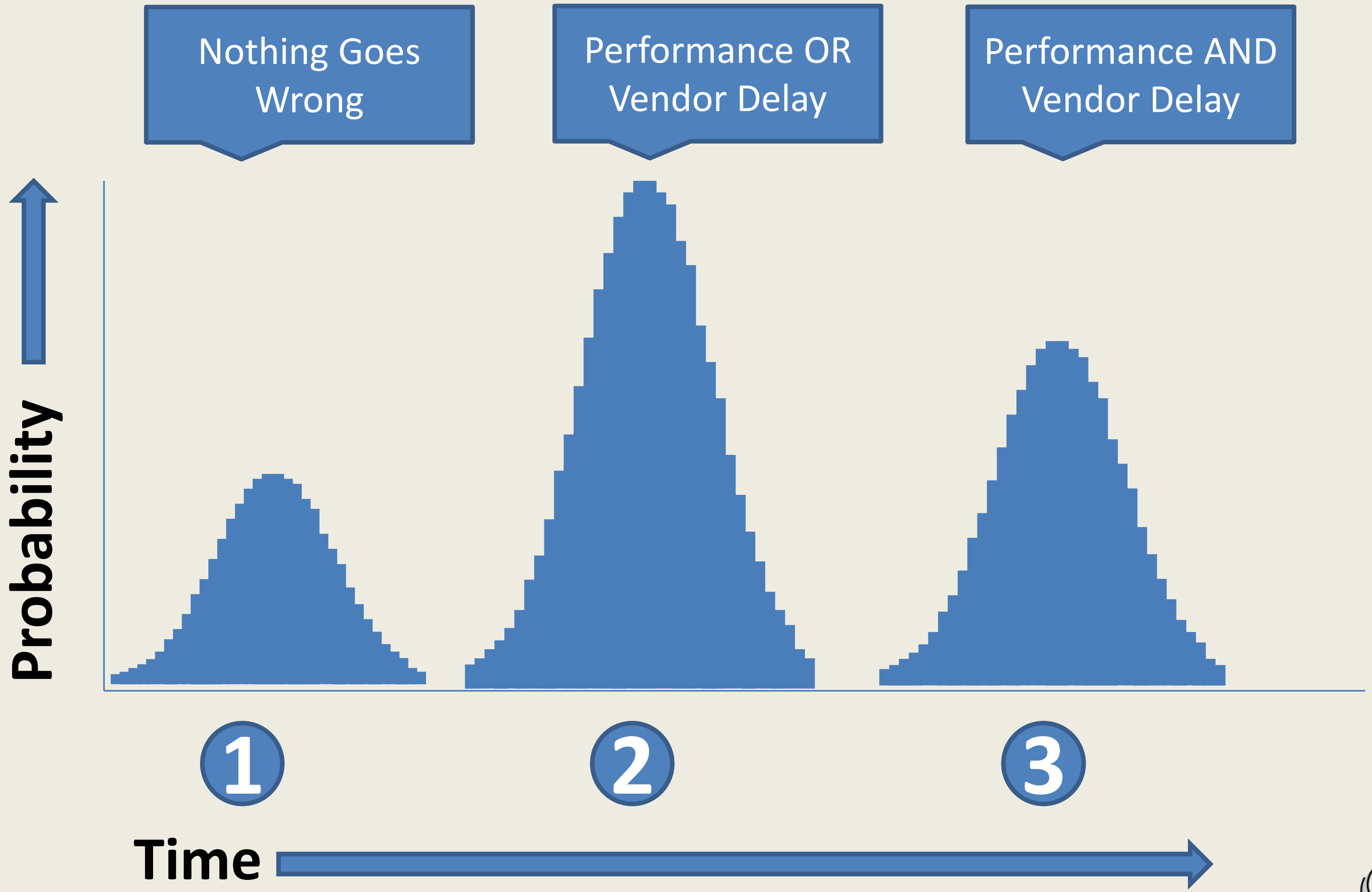
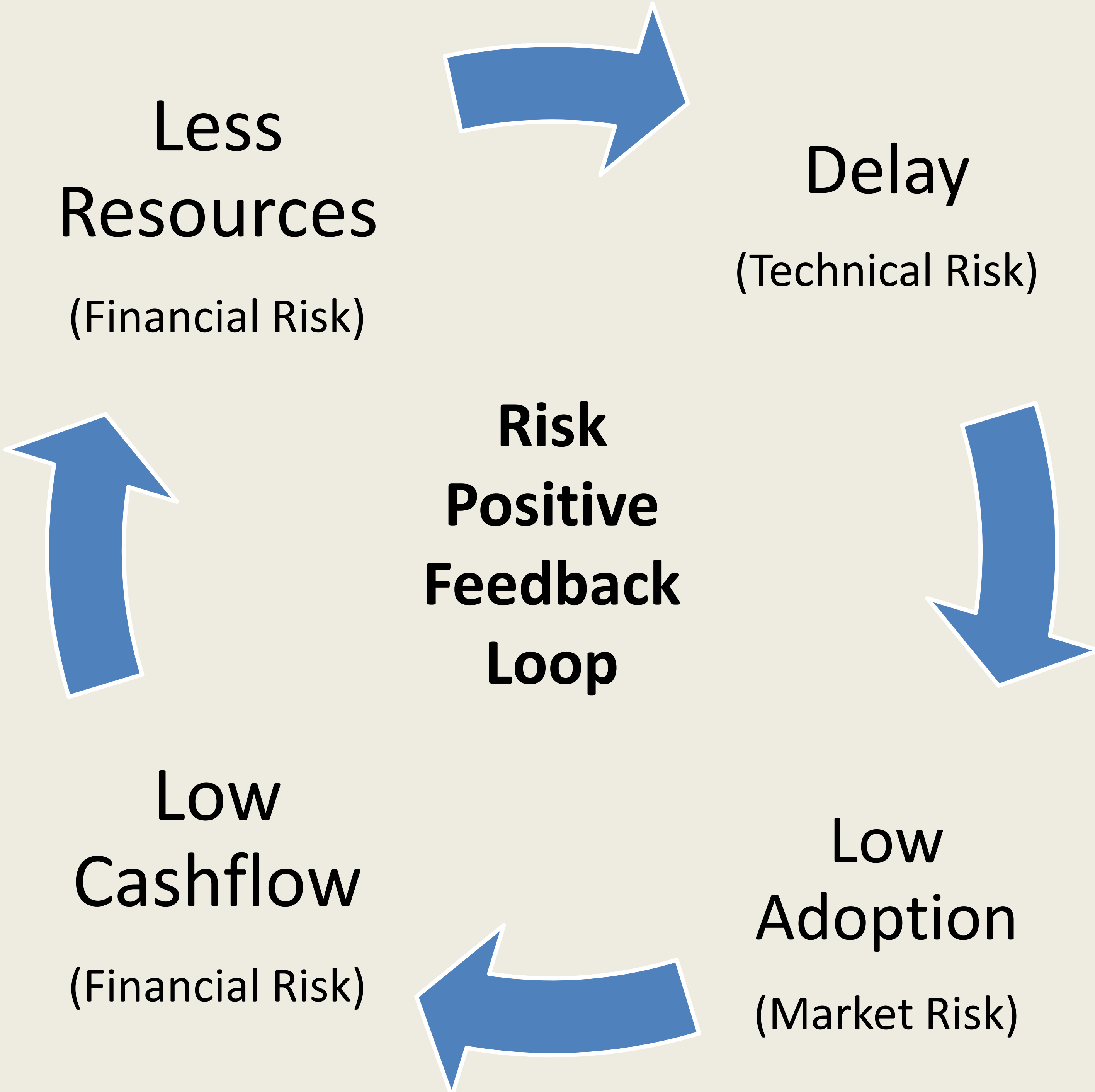
Entangled: Solving the Hairy Problem of Team Dependencies


Histogram of possible Return on Inv.
Likelihood
Does Nothing OR kills rat's
Kills Humans Trial subjects
-30
-20
-10
$0
+10
+20
+30
+40
+50
Break Even.

risk events


Nothing Goes Wrong
Performance OR Vendor Delay
Performance AND Vendor Delay
Probability
1
2
3
Time


Less Resources
(Financial Risk)
Delay
(Technical Risk)
Low Adoption
(Market Risk)
Low Cashflow
(Financial Risk)
Risk Positive Feedback Loop

Key Point

Occurrence of a risk Increases exposure to other risks

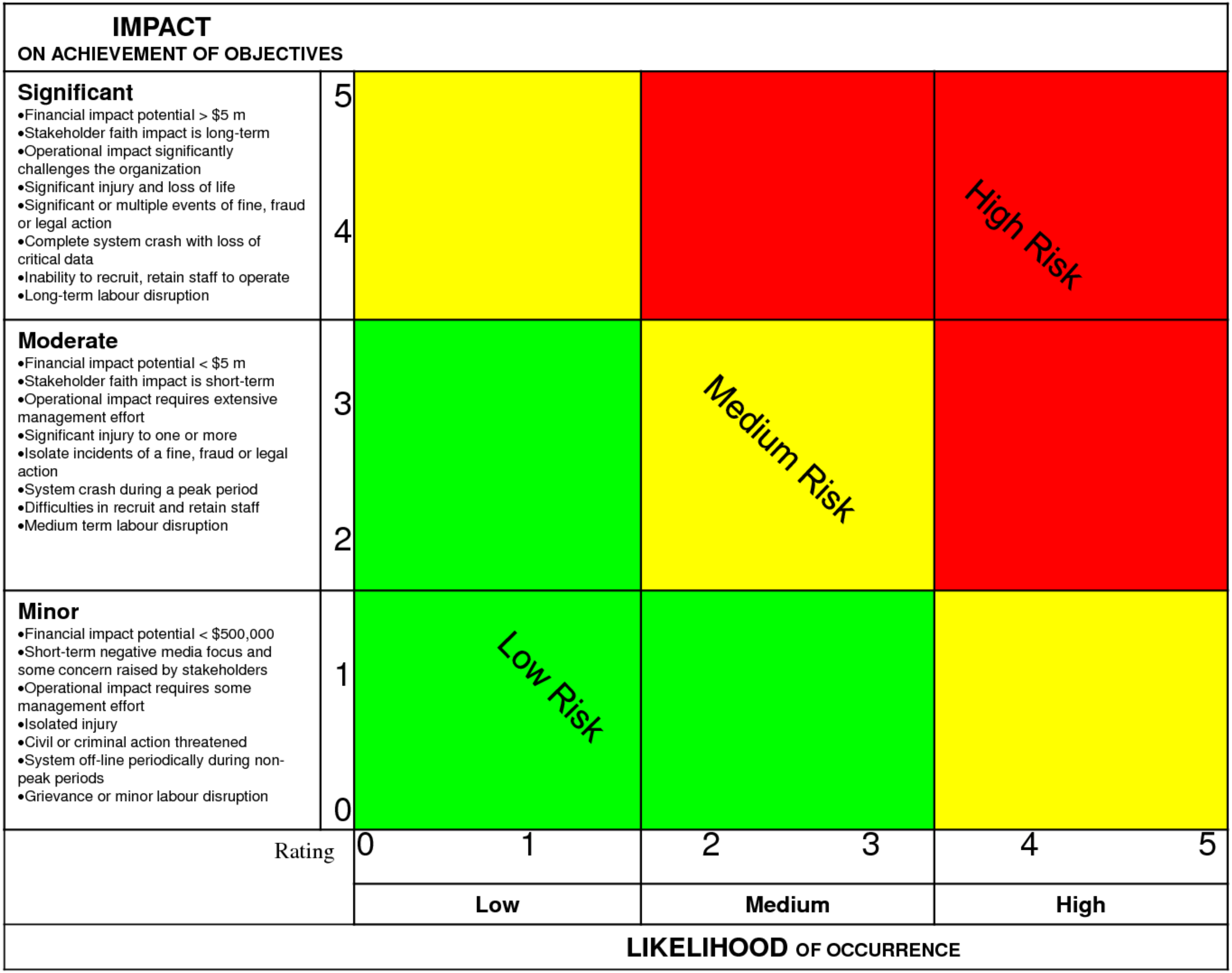
Break the chain early

Likelihood

What is the chance it will happen?	Minor	Moderate	Major
Very likely	**Acceptable risk** Medium 2	**Unacceptable risk** High 3	**Unacceptable risk** Extreme 5
Likely	**Acceptable risk** Low 1	**Acceptable risk** Medium 2	**Unacceptable risk** High 3
Unlikely	**Acceptable risk** Low 1	**Acceptable risk** Low 1	**Acceptable risk** Medium 2

Impact

How serious is the risk?


IMPACT
ON ACHIEVEMENT OF OBJECTIVES
Significant
•Financial impact potential > $5 m
•Stakeholder faith impact is long-term
•Operational impact significantly challenges the organization
•Significant injury and loss of life
•Significant or multiple events of fine, fraud or legal action
•Complete system crash with loss of critical data
•Inability to recruit, retain staff to operate
•Long-term labour disruption
Moderate
•Financial impact potential < $5 m
•Stakeholder faith impact is short-term
•Operational impact requires extensive management effort
•Significant injury to one or more
•Isolate incidents of a fine, fraud or legal action
•System crash during a peak period
•Difficulties in recruit and retain staff
•Medium term labour disruption
Minor
•Financial impact potential < $500,000
•Short-term negative media focus and some concern raised by stakeholders
•Operational impact requires some management effort
•Isolated injury
•Civil or criminal action threatened
•System off-line periodically during non-peak periods
•Grievance or minor labour disruption
5
4
3
2
1
0
High Risk
Medium Risk
Low Risk
Rating
0
1
2
3
4
5
Low
Medium
High
LIKELIHOOD OF OCCURRENCE

Team 1	Team 2	Team 3	Team 4
0	0	0	0
0	[illegible]	0	0.75
0	[illegible]	1	[illegible]
0	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]
1	[illegible]	1	[illegible]
1	[illegible]	0	0
1	[illegible]	0	0.75
1	0.25	1	0
1	0.25	1	0.75

Week 1
0
[illegible]
[illegible]
[illegible]
[illegible]
1
1.25
2
1
[illegible]
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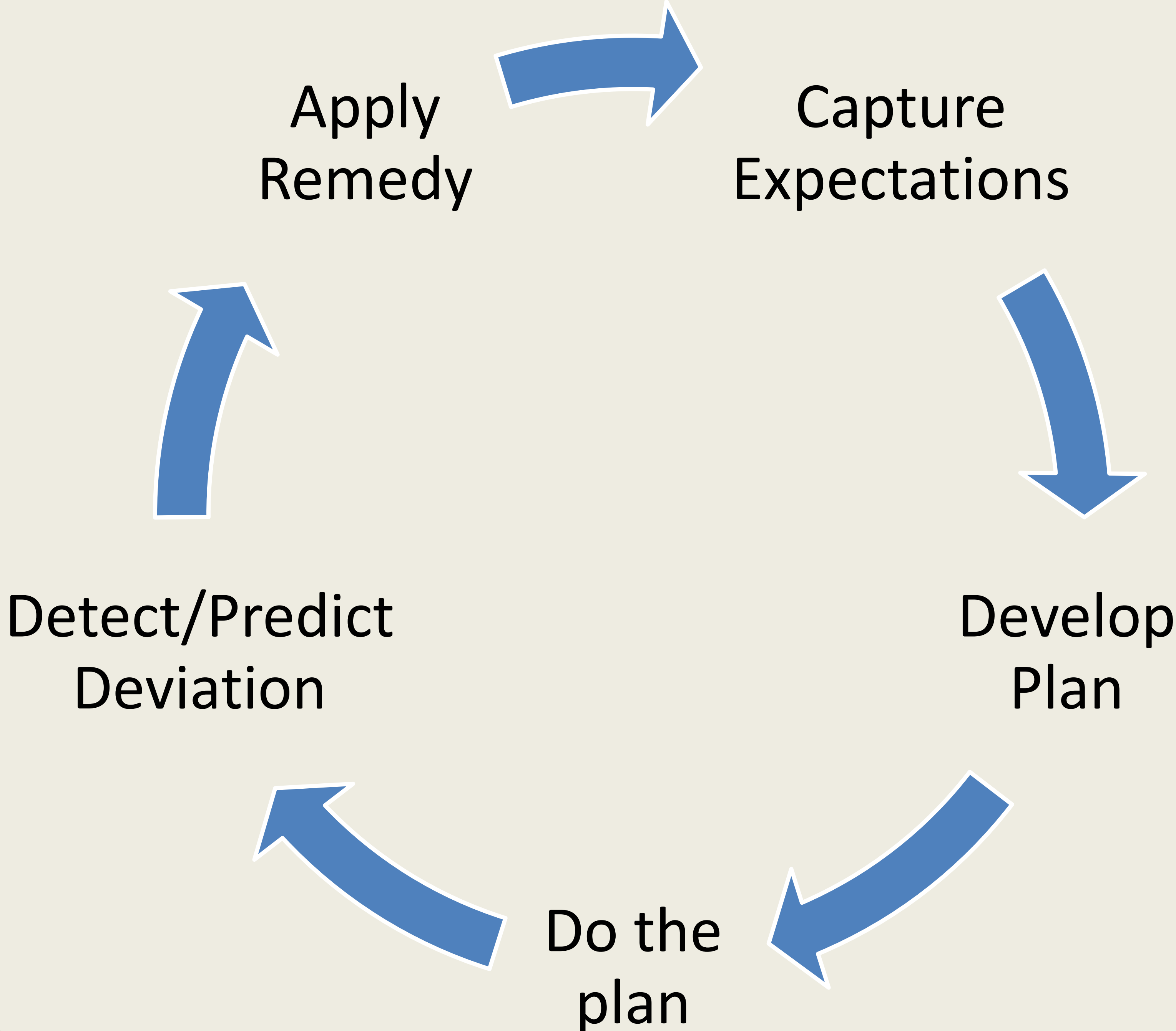
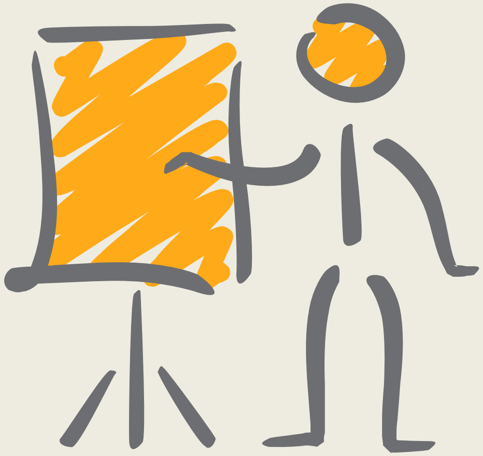
[illegible]
[illegible]
2
2.25
3

24


Apply Remedy
Capture Expectations
Develop Plan
Do the plan
Detect/Predict Deviation



What distribution fits cycle time data and why…

THE SHAPE OF CYCLE TIME

If we understand how cycle time is statistically distributed, then an initial guess of maximum allows an inference to be made

Alternatives -

- Borrow a similar project's data
- Borrow industry data
- Fake it until you make it… (AKA guess range)

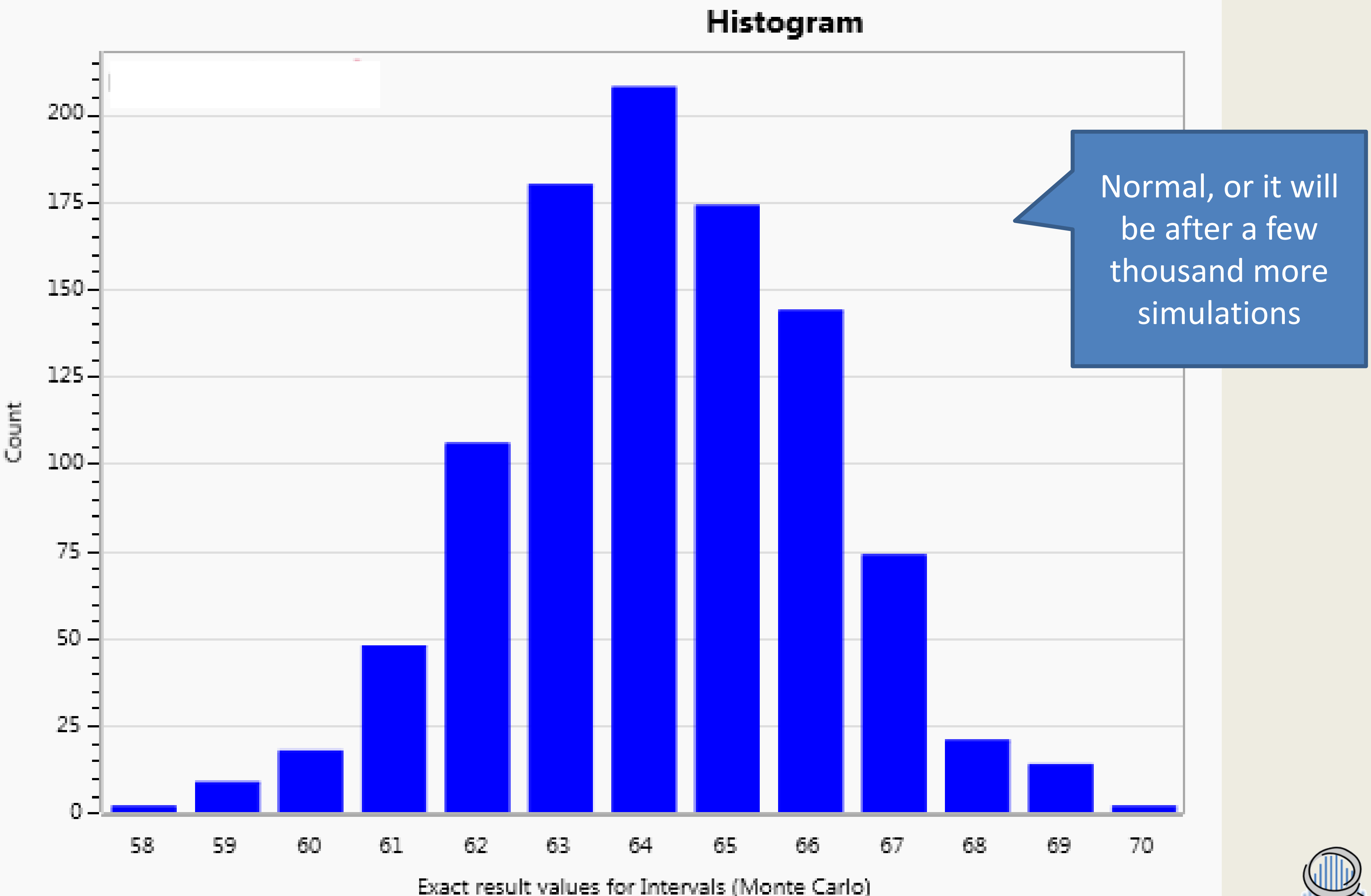
Why Weibull

- Now for some Math – I know, I’m excited too!

- Simple Model
- All units of work between 1 and 3 days
- A unit of work can be a task, story, feature, project
- Base Scope of 50 units of work – Always Normal
- 5 Delays / Risks, each with
  - 25% Likelihood of occurring
  - 10 units of work (same as 20% scope increase each)

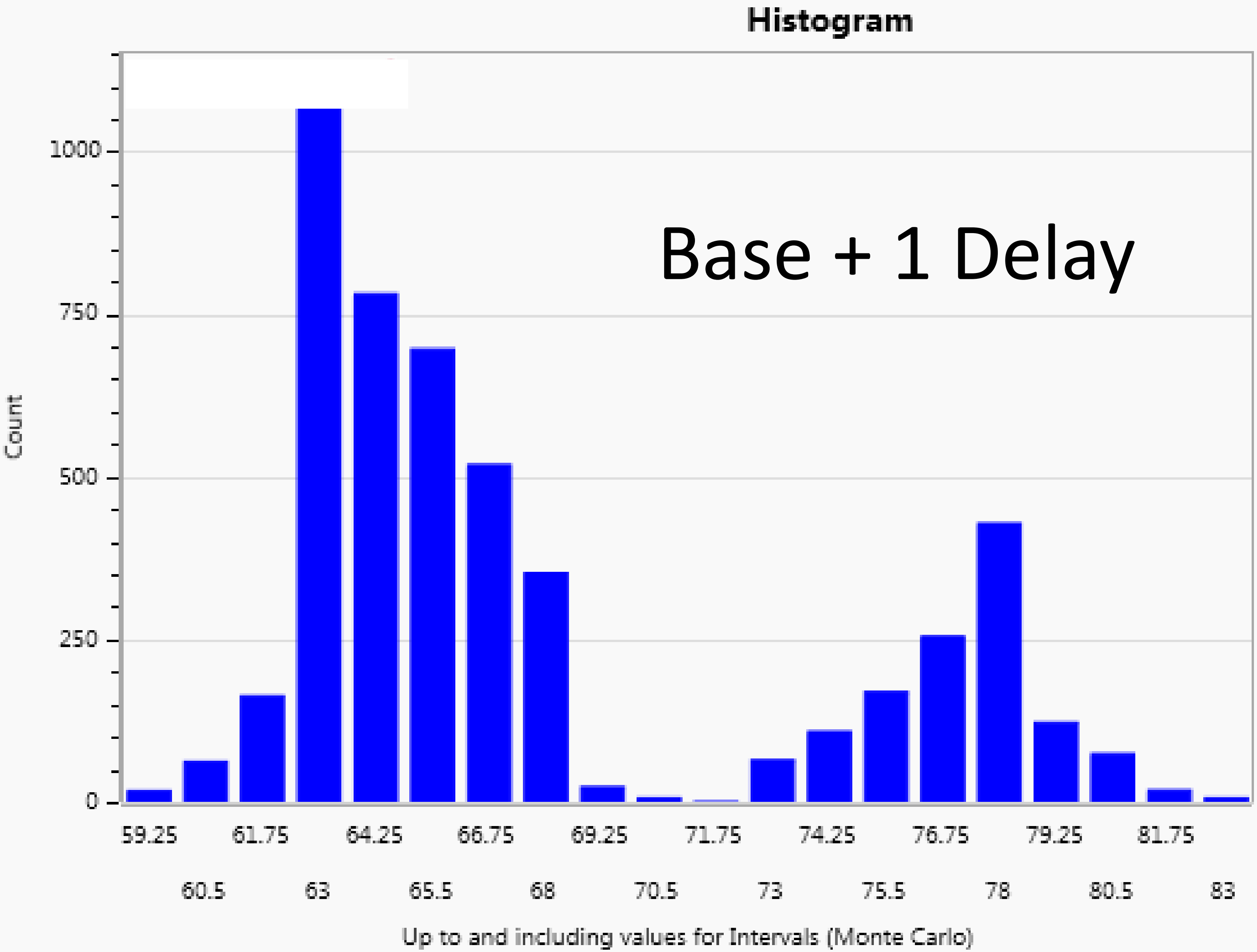
Sample Count: 1000 **Min:** 58 **Avg:** 64.185 **Median:** 64 **Max:** 70 **Standard Dev:** 1.94

5th %: 61 **25th%:** 63 **75th%:** 66 **95th%:** 67



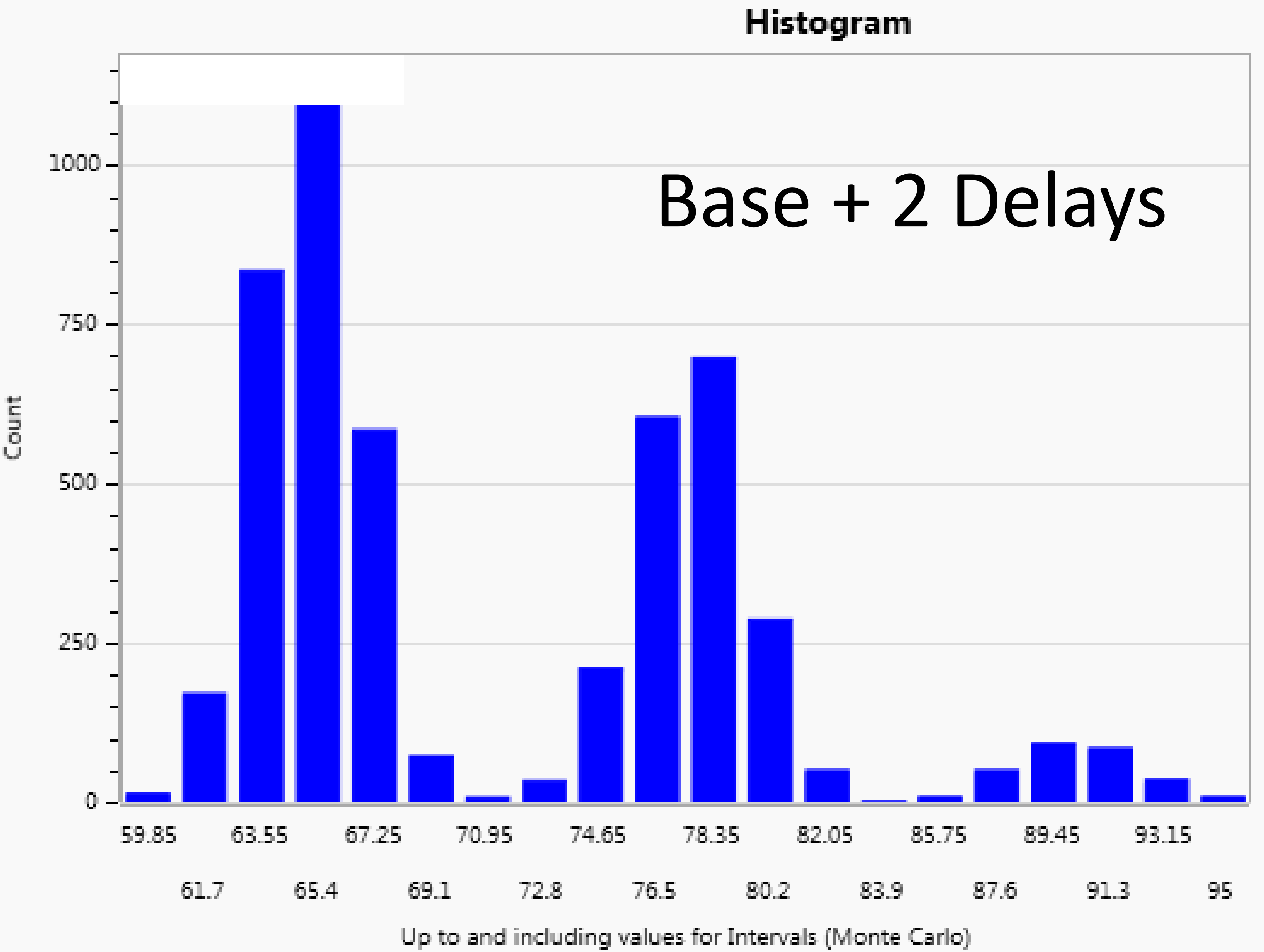
Sample Count: 5000 **Min:** 58 **Avg:** 67.344 **Median:** 65 **Max:** 83 **Standard Dev:** 5.747

5th %: 62 **25th%:** 63 **75th%:** 72 **95th%:** 78



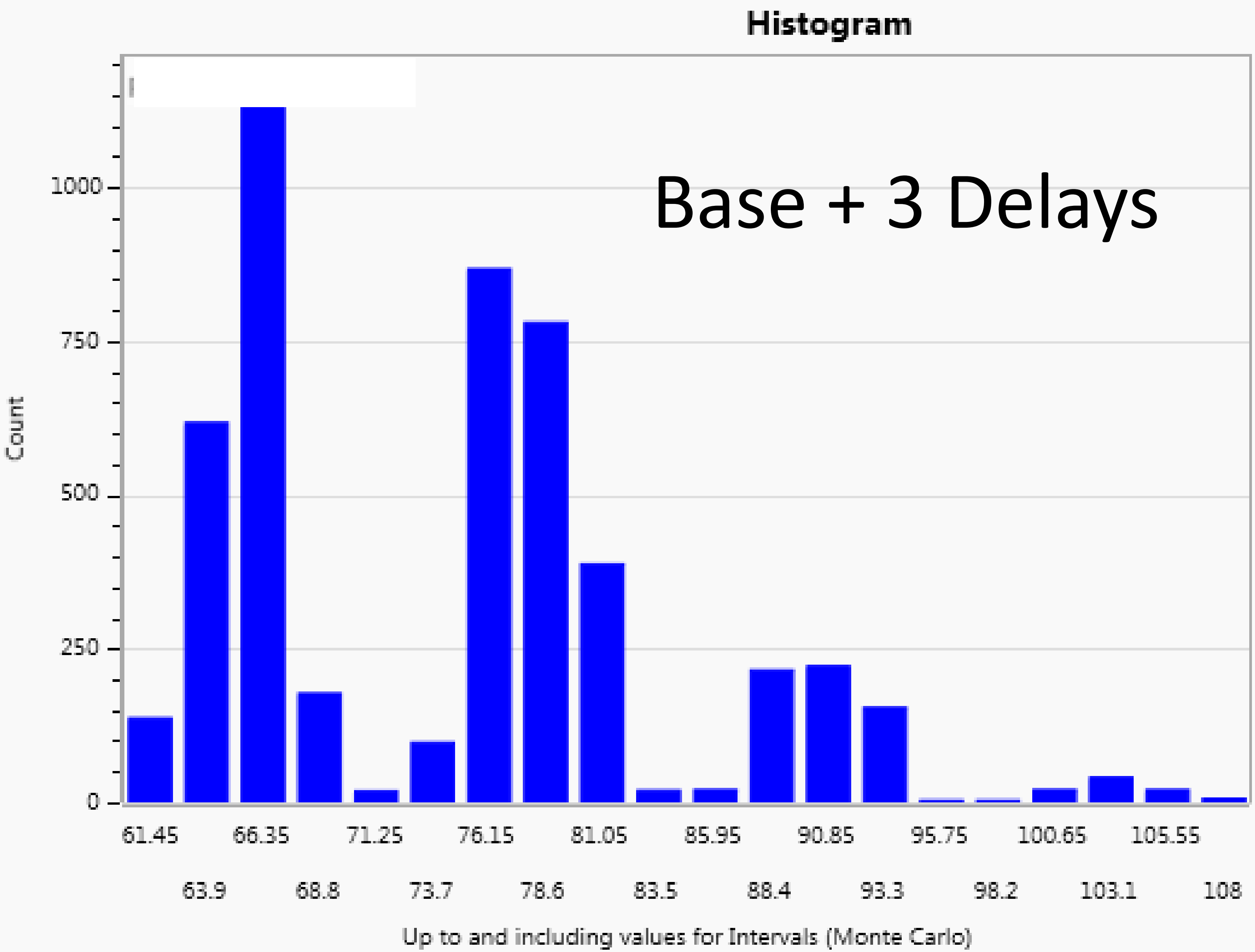
Sample Count: 5000 **Min:** 58 **Avg:** 70.376 **Median:** 66 **Max:** 95 **Standard Dev:** 7.836

5th %: 62 **25th%:** 64 **75th%:** 77 **95th%:** 87



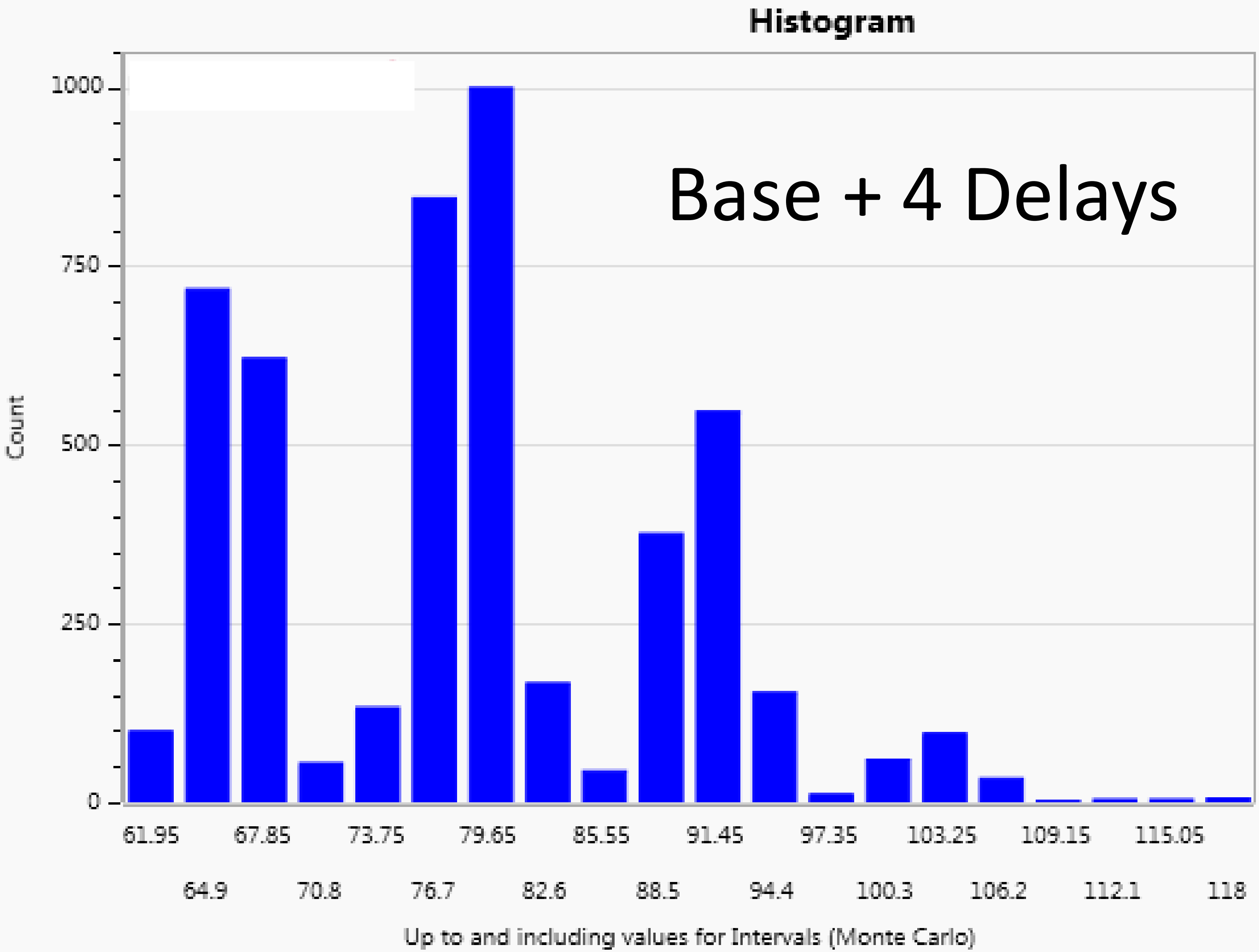
Sample Count: 5000 **Min:** 59 **Avg:** 73.491 **Median:** 75 **Max:** 108 **Standard Dev:** 9.592

5th %: 62 **25th%:** 65 **75th%:** 78 **95th%:** 91



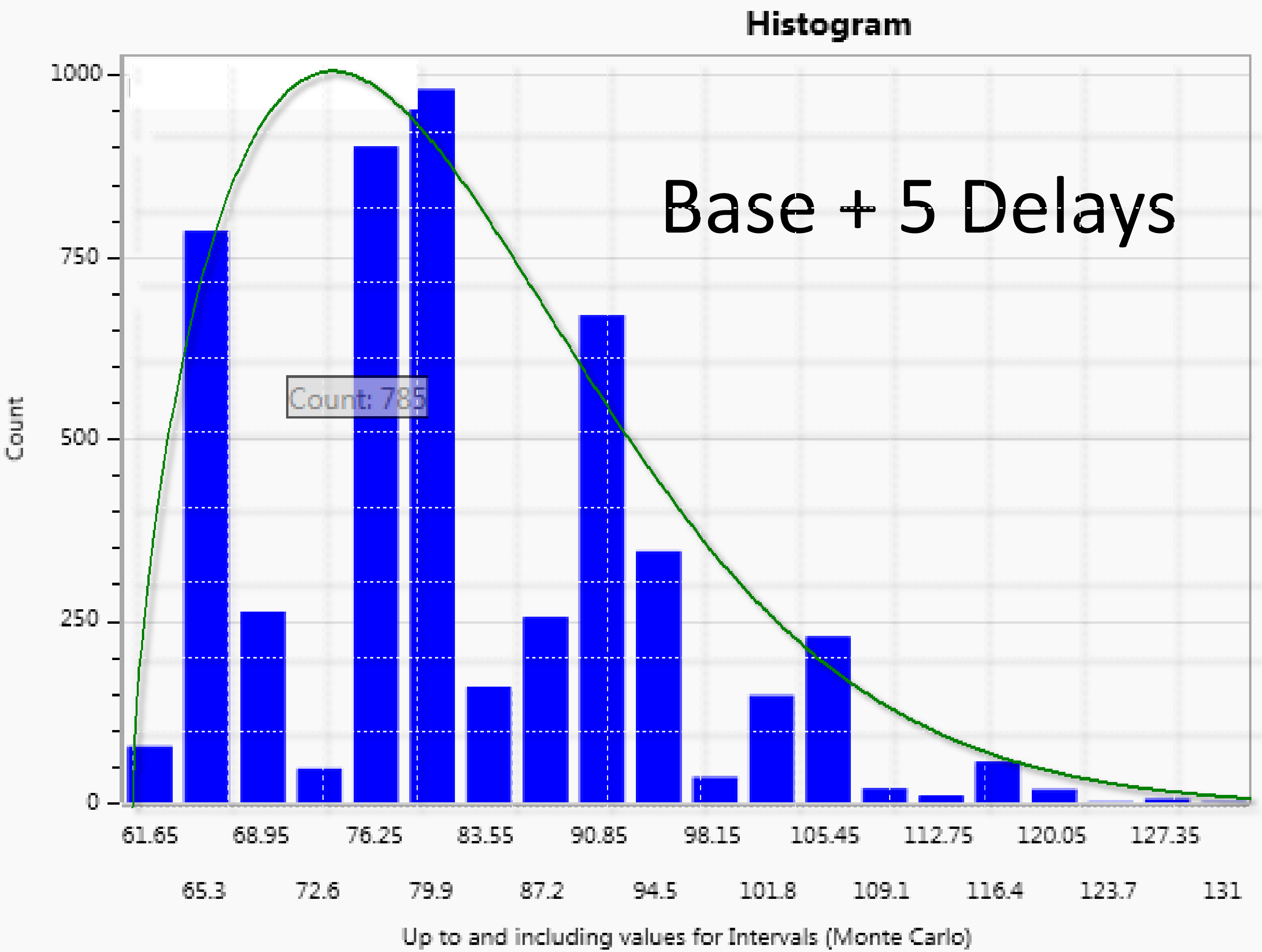
Sample Count: 5000 **Min:** 59 **Avg:** 76.941 **Median:** 77 **Max:** 118 **Standard Dev:** 10.766

5th %: 62 **25th%:** 66 **75th%:** 86 **95th%:** 93



Sample Count: 5000 **Min:** 58 **Avg:** 79.931 **Median:** 78 **Max:** 131 **Standard Dev:** 12.247

5th %: 63 **25th%:** 74 **75th%:** 89 **95th%:** 103



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		<custom count="10" />
	</deliverable>
	<deliverable name="Delay2" skipPercentage="75">
		<custom count="10" />
	</deliverable>
	<deliverable name="Delay3" skipPercentage="75">
		<custom count="10" />
	</deliverable>
	<deliverable name="Delay4" skipPercentage="75">
		<custom count="10" />
	</deliverable>
	<deliverable name="Delay5" skipPercentage="75">
		<custom count="10" />
	</deliverable>
</backlog>

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</columns>

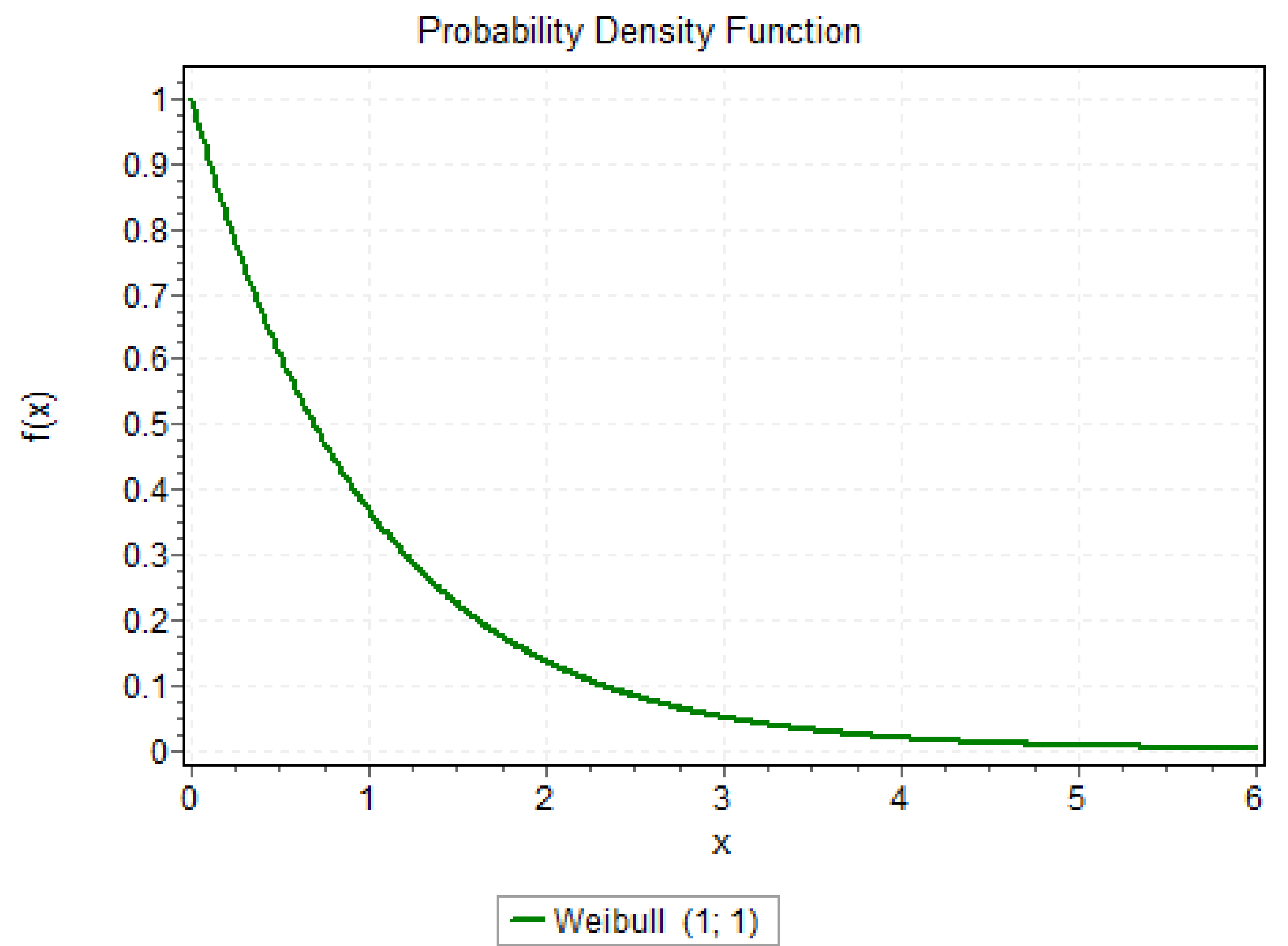
<forecastDate startDate="01-May-2012" costPerDay="2500" />
```

Exponential Distribution (Weibull shape = 1)

The person who gets the work can complete the work

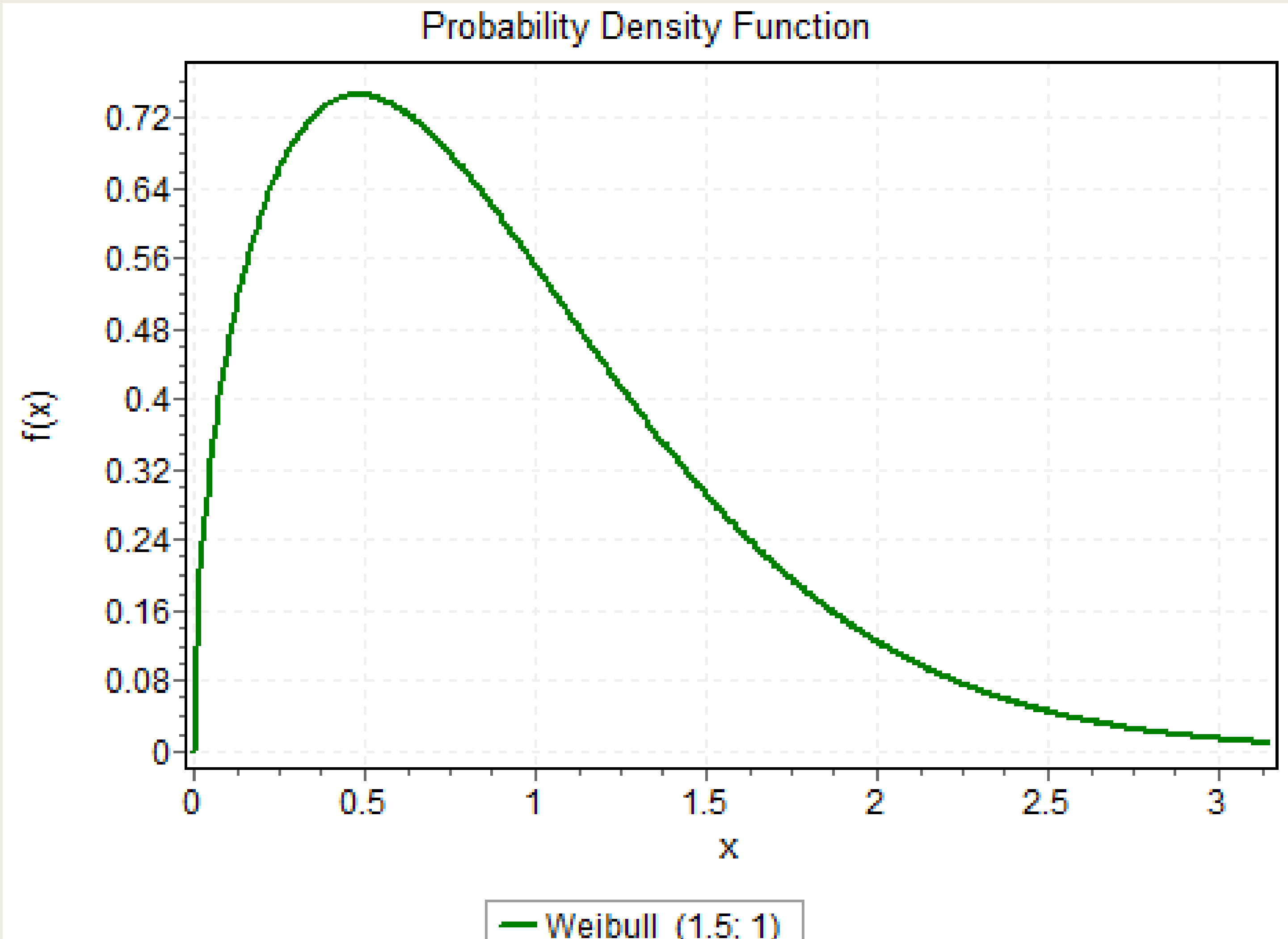
Teams with no external dependencies

Teams doing repetitive work E.g. DevOps, Database teams,



Weibull Distribution (shape = 1.5)

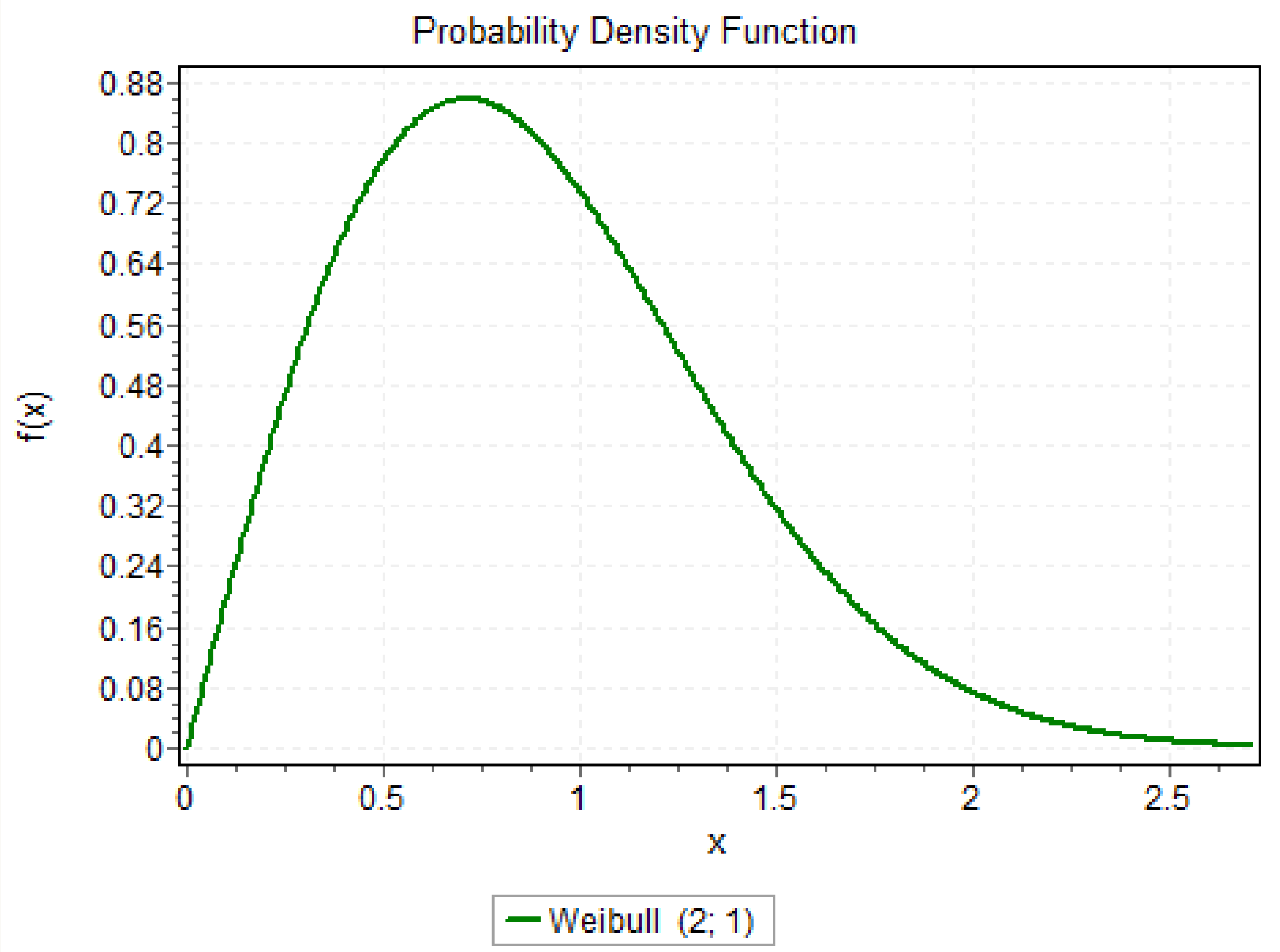
Typical dev team ranges between 1.2 and 1.8



Rayleigh Distribution (Weibull shape = 2)

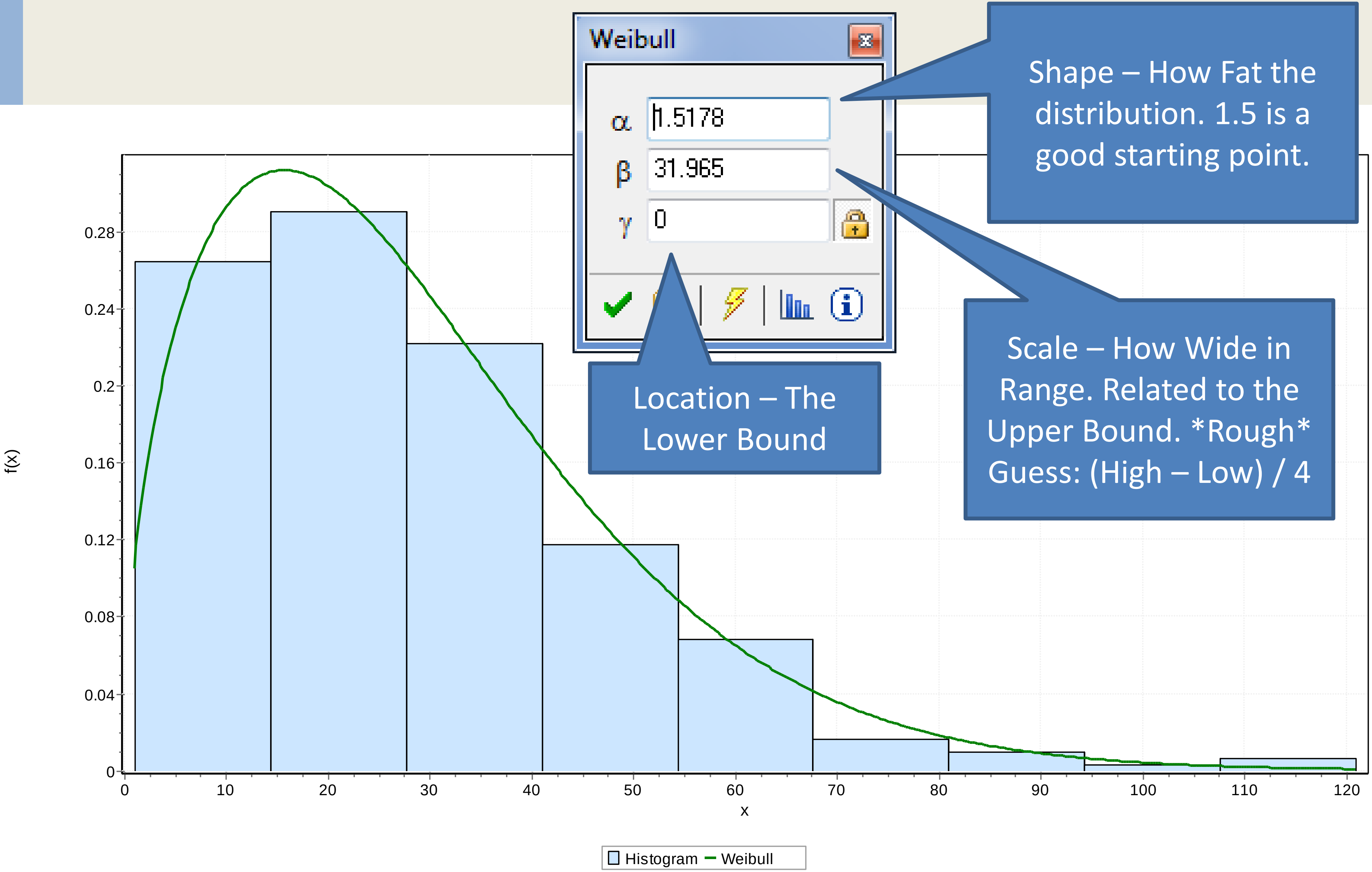
Teams with MANY external dependencies

Teams that have many delays and re-work. E.g. Test teams



What Distribution To Use...

- No Data at All, or Less than < 11 Samples (why 11?)
  - Uniform Range with Boundaries Guessed (safest)
  - Weibull Range with Boundaries Guessed (likely)
- 11 to 30 Samples
  - Uniform Range with Boundaries at 5^{th} and 95^{th} CI
  - Weibull Range with Boundaries at 5^{th} and 95^{th} CI
- More than 30 Samples
  - Use historical data as bootstrap reference
  - Curve Fitting software



Weibull
α 1.5178
β 31.965
γ 0
Shape – How Fat the distribution. 1.5 is a good starting point.
Scale – How Wide in Range. Related to the Upper Bound. *Rough* Guess: (High – Low) / 4
Location – The Lower Bound
f(x)
0.28
0.24
0.2
0.16
0.12
0.08
0.04
0
0
10
20
30
40
50
60
70
80
90
100
110
120
x
Histogram
Weibull

The Economic Impact of Software Development Process Choice - Cycle-time Analysis and Monte Carlo Simulation Results

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Abstract

IT executives initiate software development process methodology change with faith that it will lower development cost, decrease time-to-market and increase quality. Anecdotes and success stories from agile practitioners and vendors provide evidence that other companies have succeeded following a newly chosen doctrine. Quantitative evidence is scarcer than these stories, and when available, often unverifiable.

This paper introduces a quantitative approach to assess software process methodology change. It proposes working from the perspective of impact on cycle-time performance (the time from the start of individual pieces of work until their completion), before and after a process change.

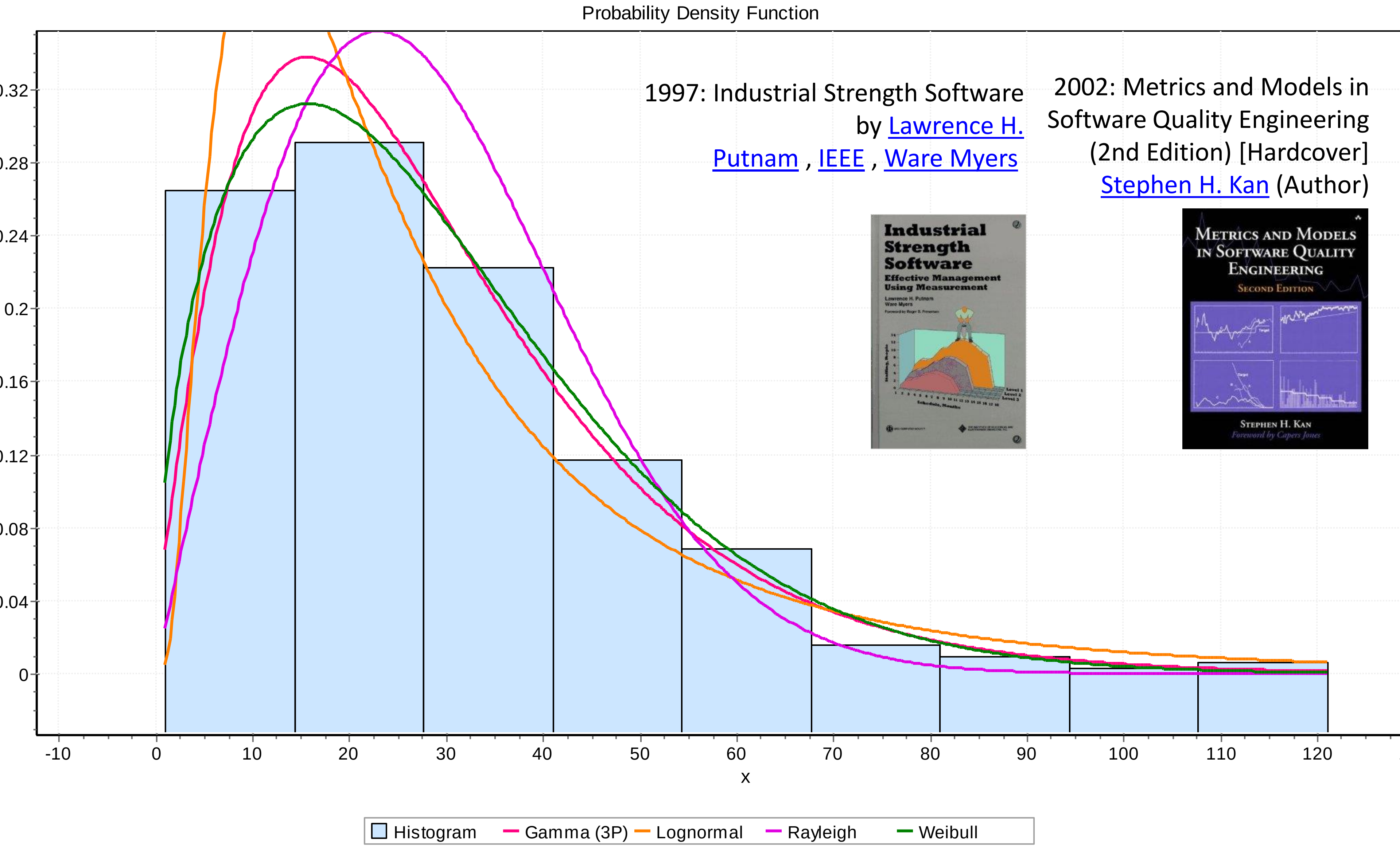
This paper introduces the history and theoretical basis of this analysis, and then presents a commercial case study. The case study demonstrates how the economic value of a process change initiative was quantified to understand success and payoff.

Cycle-time is a convenient metric for comparing proposed and ongoing process improvement due to

Scrum, and Kanban are some of the well-known processes that have risen to the top of the popularity charts, each with case studies (often just one) showing great impact when applied correctly by the inventors. The final choice appears to fall on faith based lines, with many organizations moving from one process to the next in search of nirvana. A quantitative framework for estimating and assessing true impact is needed for informed decisions.

Measuring the quantitative impact of a software development process change is hard. Measurable change takes weeks or months to evolve, and there is little in the way of control group – change is implemented and the outcome if that change wasn't performed isn't an interesting or easily discernable metric. This paper presents one technique for quantitatively estimating the potential economic outcomes both before and after a change has been implemented.

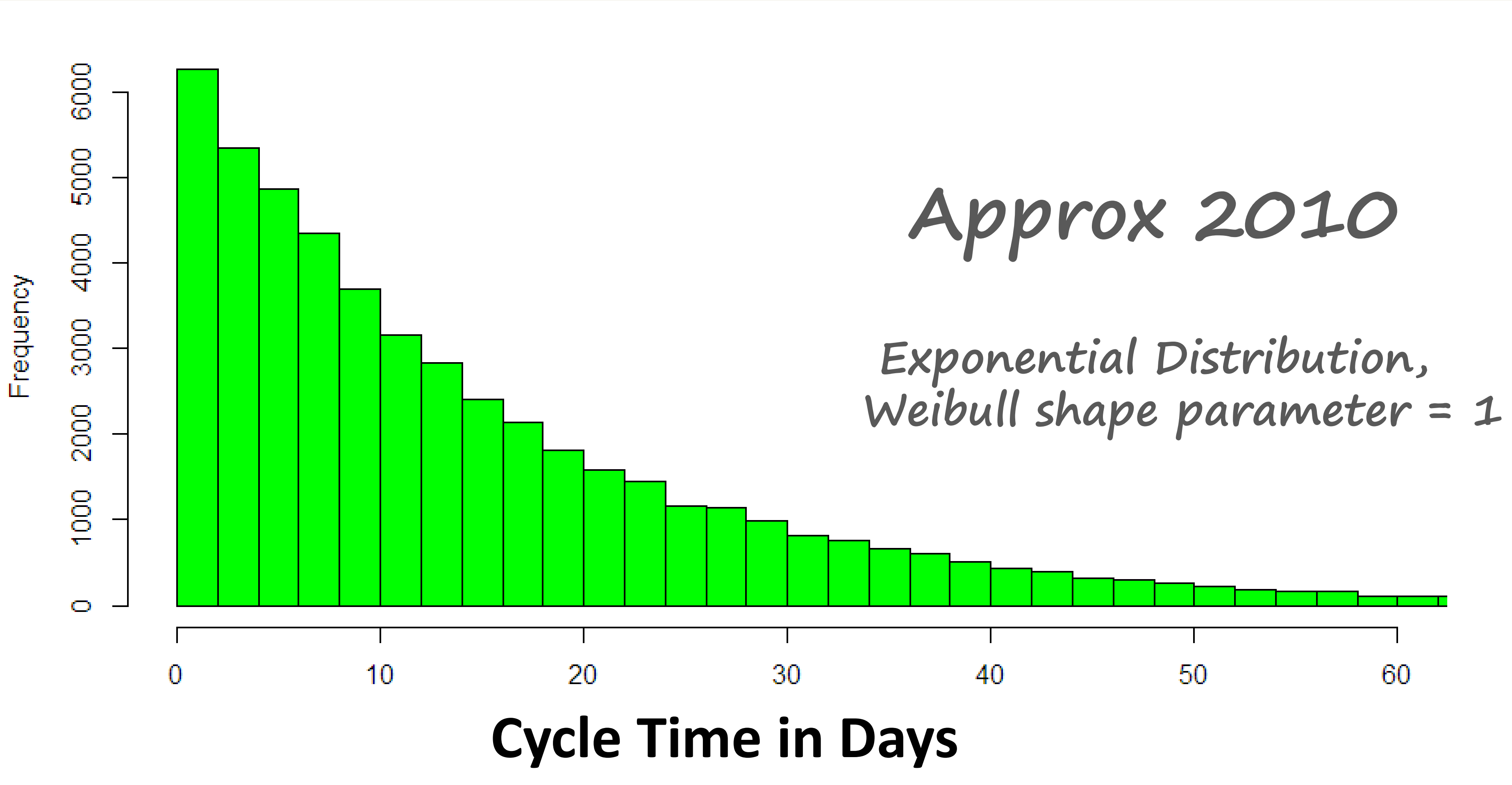
The basis for the method described here is probabilistically simulating the impact of changes in cycle-time samples from a prior project to a completed project using new methodology. To



1997: Industrial Strength Software by Lawrence H. Putnam , IEEE , Ware Myers

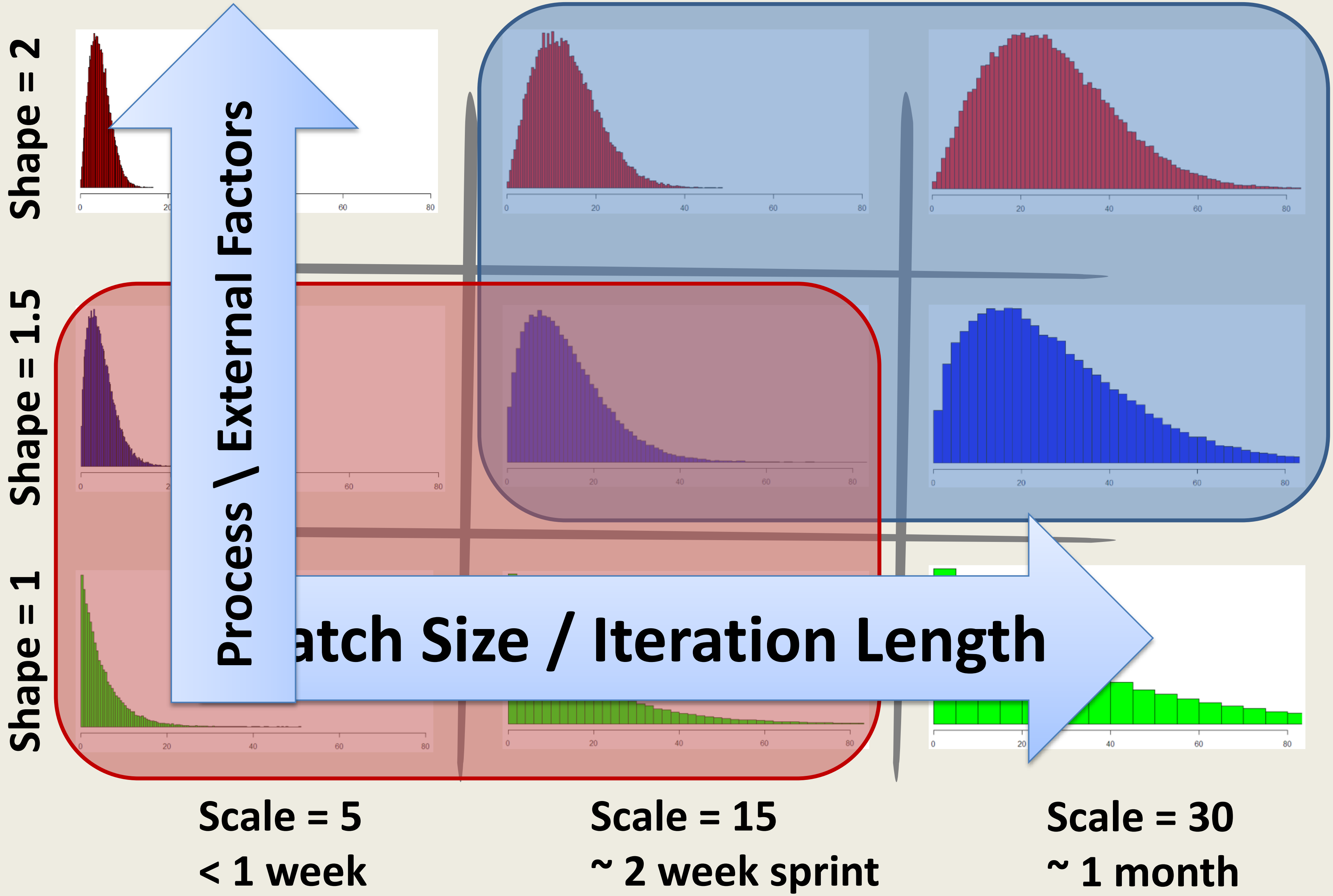
2002: Metrics and Models in Software Quality Engineering (2nd Edition) [Hardcover] Stephen H. Kan (Author)

Paper: http://bit.ly/14eYFM2

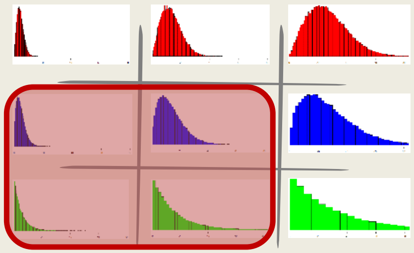


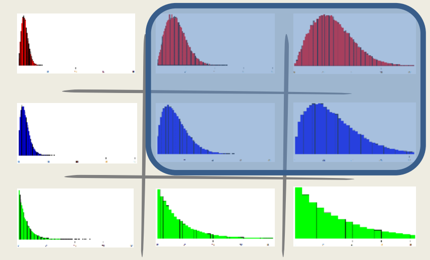
Work Item Cycle Time or Lead Time Distribution Through the Ages

Paper: http://bit.ly/14eYFM2



Work Item Cycle Time or Lead Time





Lean, Few dependencies

- Higher work item count
- More granular work items
- Lower WIP
- Team Self Sufficient
- Internal Impediments

- Do: Automation
- Do: Task Efficiency

Sprint, Many dependencies

- Lower work item count
- Chunkier work items
- Higher WIP
- External Dependencies
- External Impediments

- Do: Collapse Teams
- Do: Impediment analysis

Paper: http://bit.ly/14eYFM2