Dealing with Estimation, Uncertainty, Risk, and Commitment :

An Outside-In Look at Agility and Risk Management



Todd Little

Sr. Development Manager

Landmark Software & Services

Agenda



- Introduction
- Exercise
- Estimation and Uncertainty
- Exercise
- Break
- Risk Management, Real Options and Commitment
- Exercise
- Summary

A Game?



Form into teams.
Pick a name...
Shout out the name.





On a piece of paper, write

1. Your Name
2. Your Team Name
3. Team to complete task A first
4. Team to complete task B first







task “A”...

Create a six sided random number generator.
Something like a dice like thingy.

Every member of the team needs to roll a double six.

http://www.flickr.com/photos/palooza/3309242555/



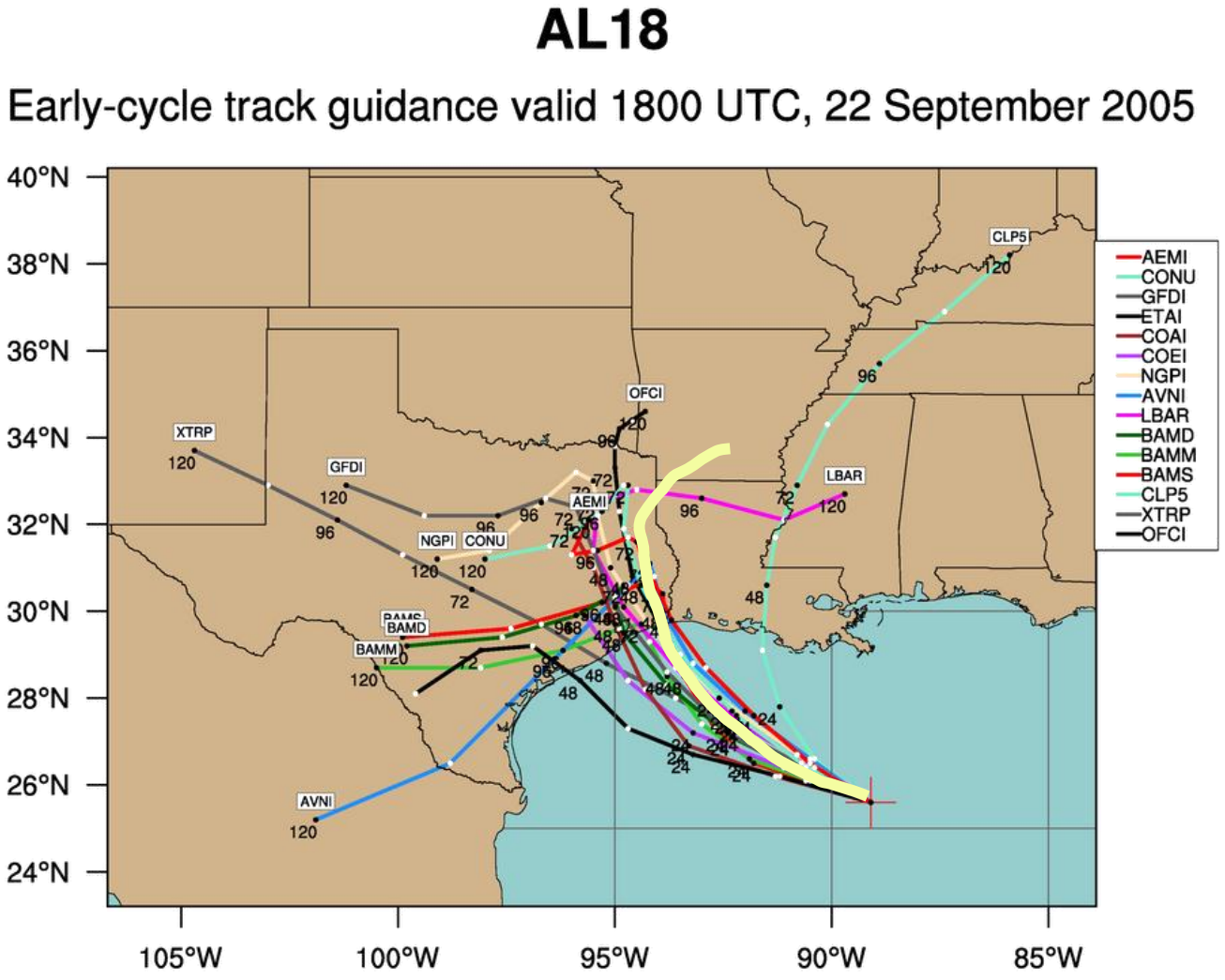
task “B”...

Create a four sided random number generator.
Something like a dice like thingy.

Every member of the team needs to roll a double six.

http://www.flickr.com/photos/palooza/3309242555/

Hurricane Rita



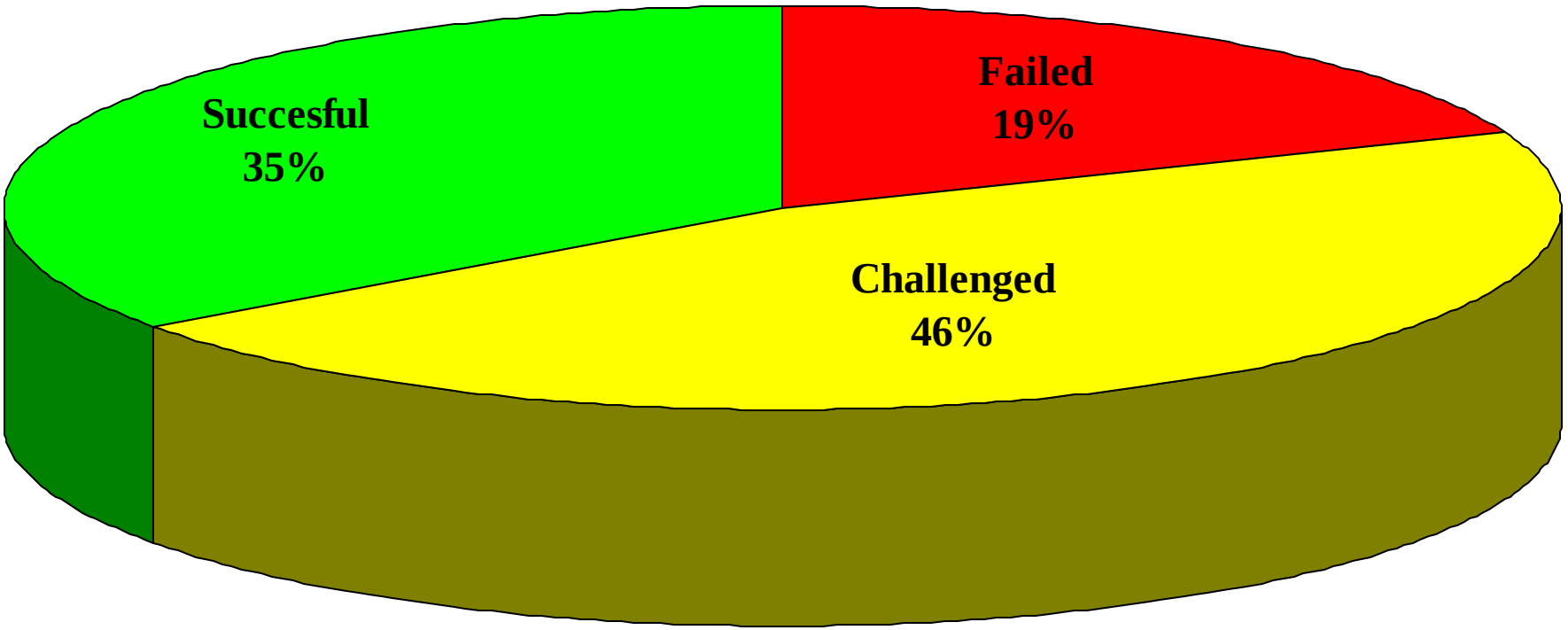
Risk and Uncertainty

	Risk	Uncertainty
Frank Knight	Immeasurable	Quantifiable
PMI	Risk can be positive or negative	???
English	A situation involving exposure to danger	The state of being uncertain Not known or established; questionable





Delivery Challenges/Failures



Standish Group 2006, reported by CEO Jim Johnson, CIO.com, 'How to Spot a Failing Project'

Managing the Coming Storm

Inside the Tornado

Project Kickoff



When will we get the requirements?

All in good time, my little pretty, all in good time

But I guess it doesn't matter anyway

Just give me your estimates by this afternoon

Team Unity



Not so fast! Not so fast! ... I'll have to give the matter a little thought. Go away and come back tomorrow

No, we need something today!

Ok then, it will take 2 years.

No, we need it sooner.

Doesn't anybody believe me?

I already promised the customer it will be out in 6 months

You're a very bad man!

We’re not in Kansas Anymore

Developer Hero



I may not come out alive, but I'm goin' in there!

Reorg



The Great and Powerful Oz has got matters well in hand.



My! People come and go so quickly here!

Testing

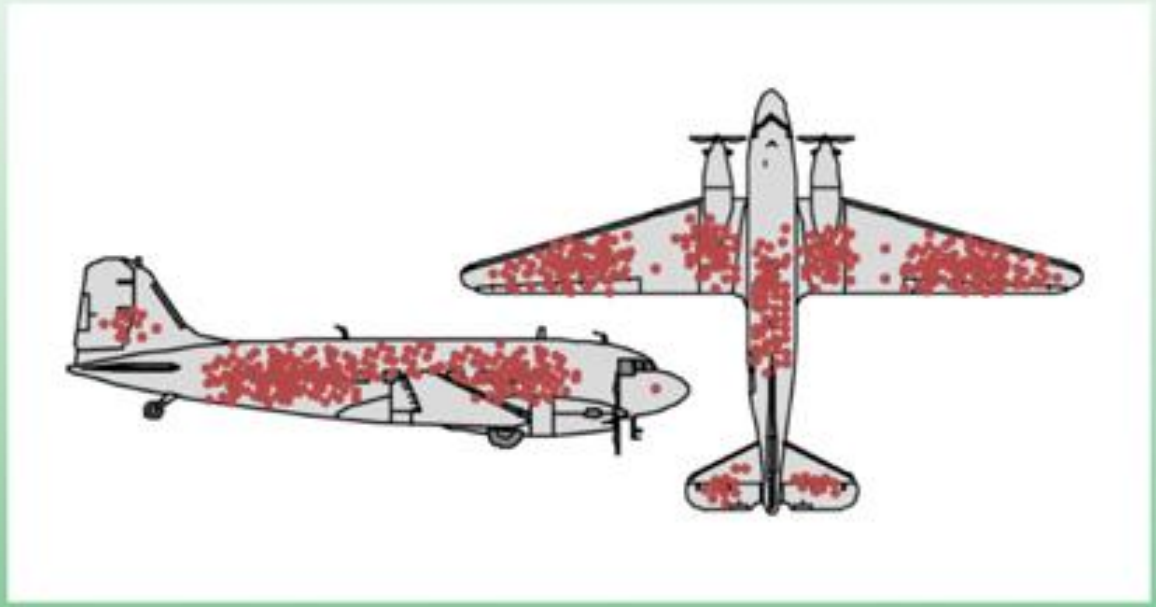


Hee hee hee ha ha! Going so soon? I wouldn't hear of it! Why, my little party's just beginning!

Why is Software Late? Genuchten 1991 IEEE

General Manager	Project Manager	Item
1	10	Insufficient front end planning
2	3	Unrealistic project plan
3	8	Project scope underestimated
4	1	Customer/management changes
5	14	Insufficient contingency planning
6	13	Inability to track progress
7	5	Inability to track problems early
8	9	Insufficient Number of checkpoints
9	4	Staffing problems
10	2	Technical complexity
11	6	Priority Shifts
12	11	No commitment by personnel to plan
13	12	Uncooperative support groups
14	7	Sinking team spirit
15	15	Unqualified project personnel

The Context of Feedback



Why is Software Late? Genuchten 1991 IEEE

General Manager	Project Manager	Item
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2	3	Unrealistic project plan
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Why is Software Late? Genuchten 1991 IEEE

General Manager	Project Manager	Item
H	H	Customer/management changes
L	H	Overall complexity
H	H	Unrealistic project plan
M	H	Staffing problems
H	L	Insufficient front end planning

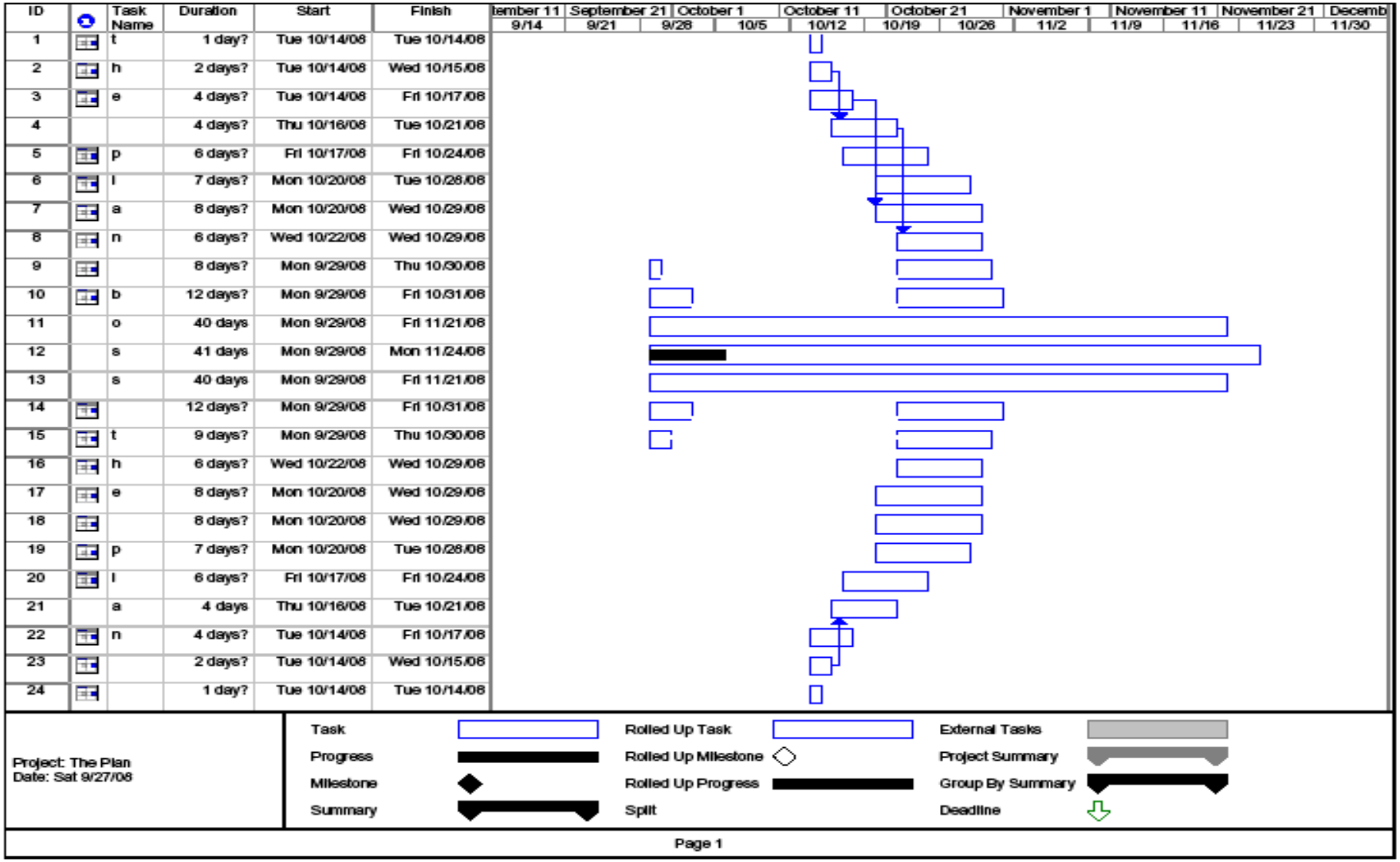
The Goal

On Time

To Spec

Within Budget

Da Plan, Boss – Da Plan



ID	Task Name	Duration	Start	Finish
1	t	1 day?	Tue 10/14/08	Tue 10/14/08
2	h	2 days?	Tue 10/14/08	Wed 10/15/08
3	e	4 days?	Tue 10/14/08	Fri 10/17/08
4		4 days?	Thu 10/16/08	Tue 10/21/08
5	p	6 days?	Fri 10/17/08	Fri 10/24/08
6	l	7 days?	Mon 10/20/08	Tue 10/28/08
7	a	8 days?	Mon 10/20/08	Wed 10/29/08
8	n	6 days?	Wed 10/22/08	Wed 10/29/08
9		8 days?	Mon 9/29/08	Thu 10/30/08
10	b	12 days?	Mon 9/29/08	Fri 10/31/08
11	o	40 days	Mon 9/29/08	Fri 11/21/08
12	s	41 days	Mon 9/29/08	Mon 11/24/08
13	s	40 days	Mon 9/29/08	Fri 11/21/08
14		12 days?	Mon 9/29/08	Fri 10/31/08
15	t	9 days?	Mon 9/29/08	Thu 10/30/08
16	h	6 days?	Wed 10/22/08	Wed 10/29/08
17	e	8 days?	Mon 10/20/08	Wed 10/29/08
18		8 days?	Mon 10/20/08	Wed 10/29/08
19	p	7 days?	Mon 10/20/08	Tue 10/28/08
20	l	6 days?	Fri 10/17/08	Fri 10/24/08
21	a	4 days	Thu 10/16/08	Tue 10/21/08
22	n	4 days?	Tue 10/14/08	Fri 10/17/08
23		2 days?	Tue 10/14/08	Wed 10/15/08
24		1 day?	Tue 10/14/08	Tue 10/14/08

Project: The Plan
Date: Sat 9/27/08

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary
Deadline

Page 1

IEEE Software, May/June 2006

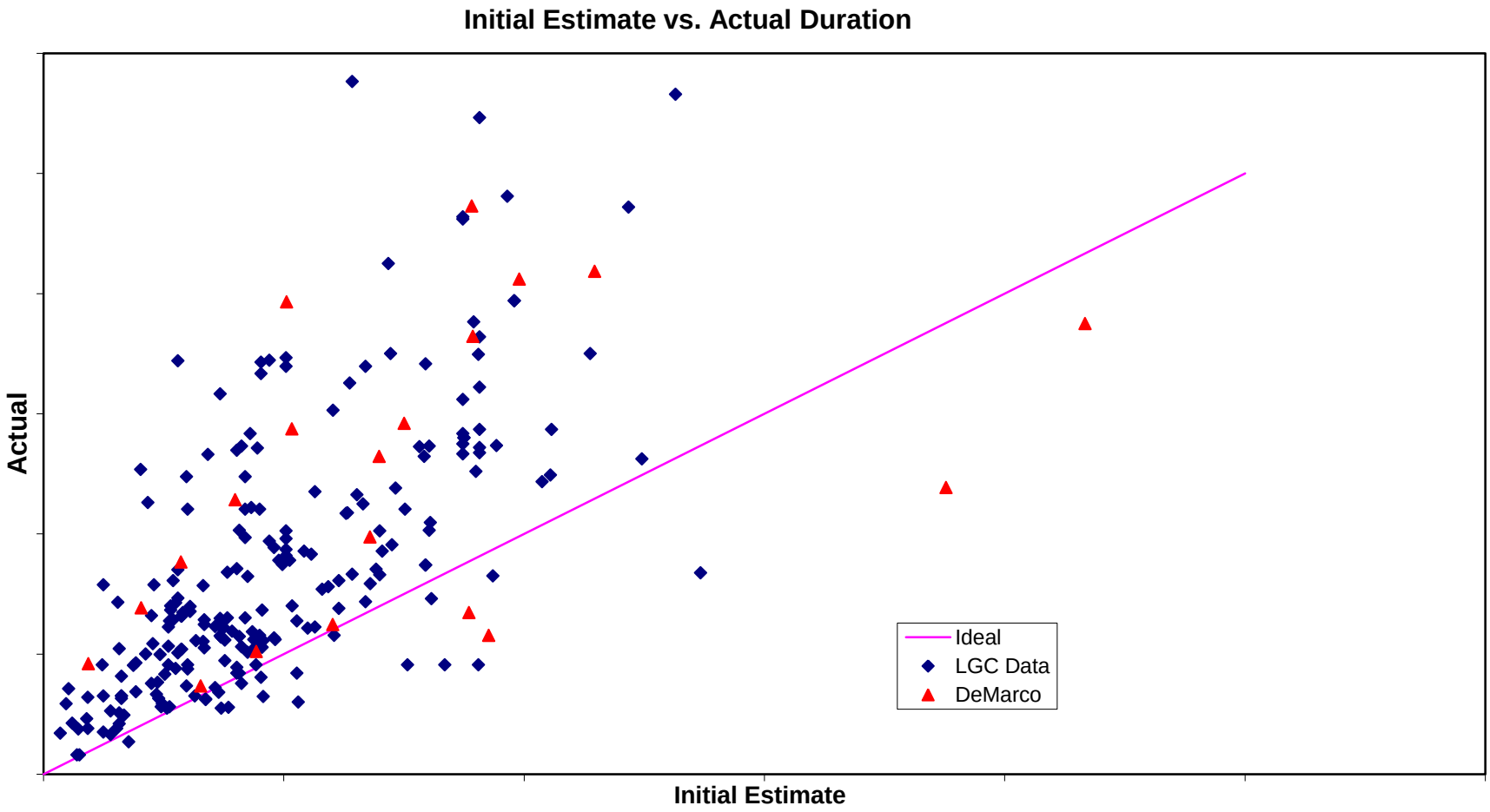
feature

project estimation

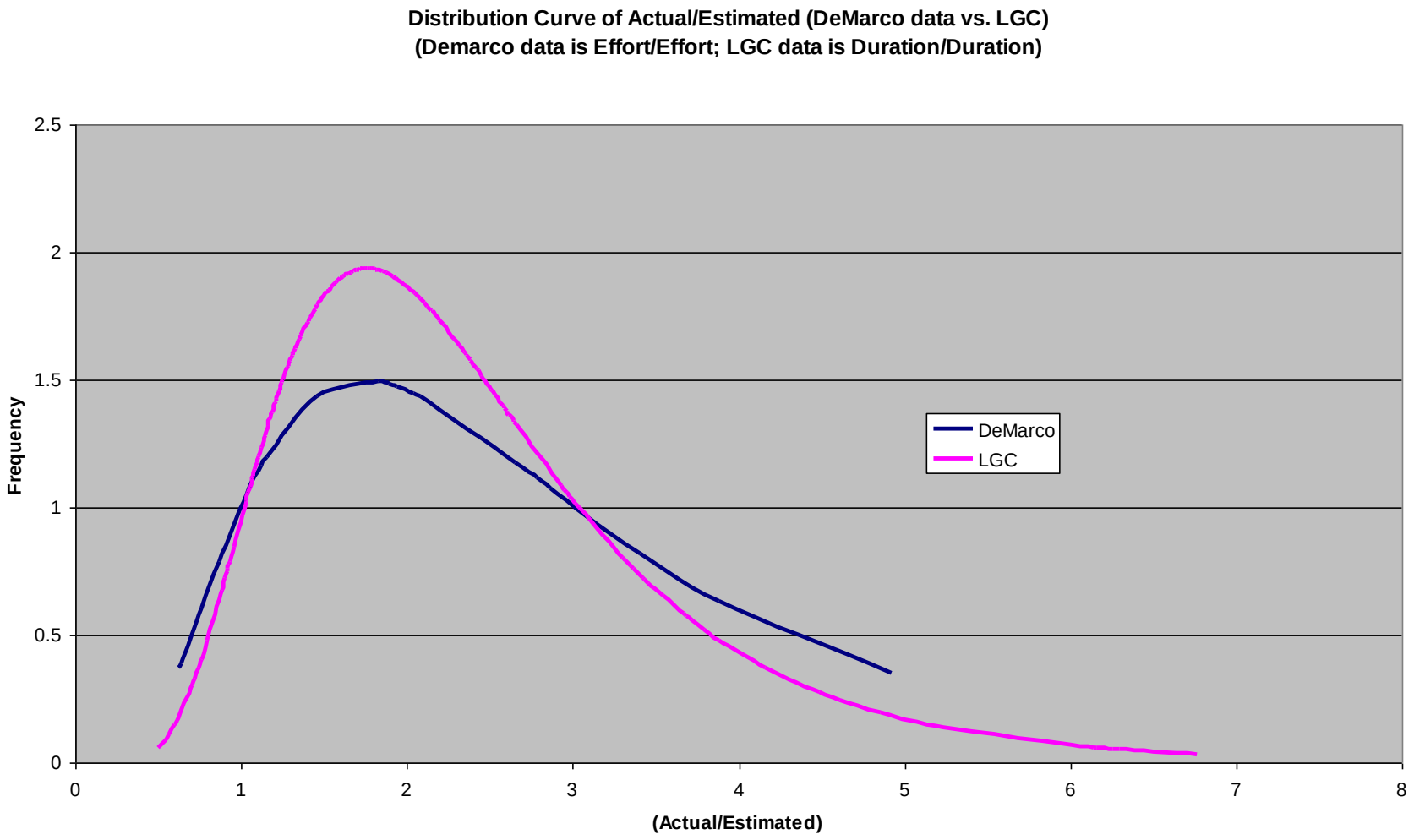
Schedule Estimation and Uncertainty Surrounding the Cone of Uncertainty

Todd Little, *Landmark Graphics*

Accuracy of Initial Estimate

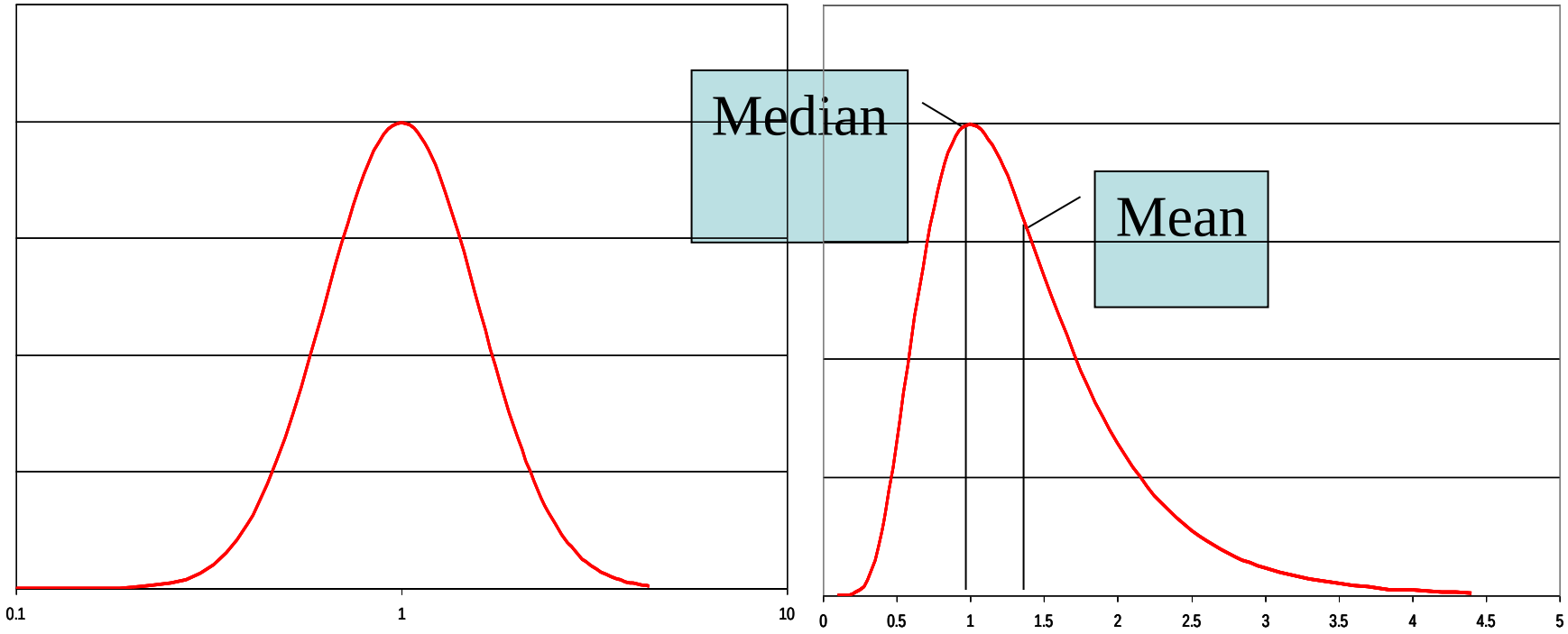


Probability Distribution Curve

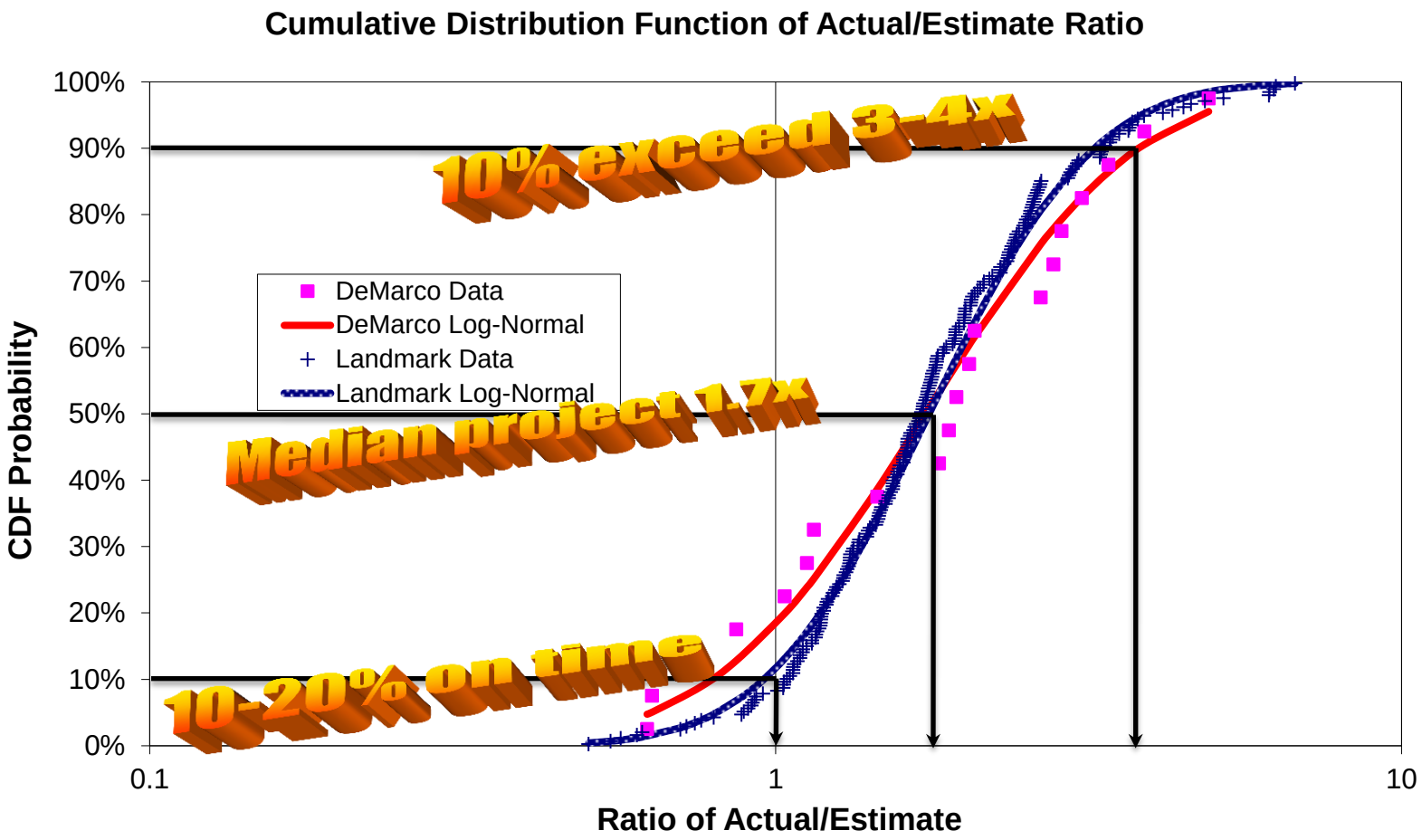


Log Normal Distribution

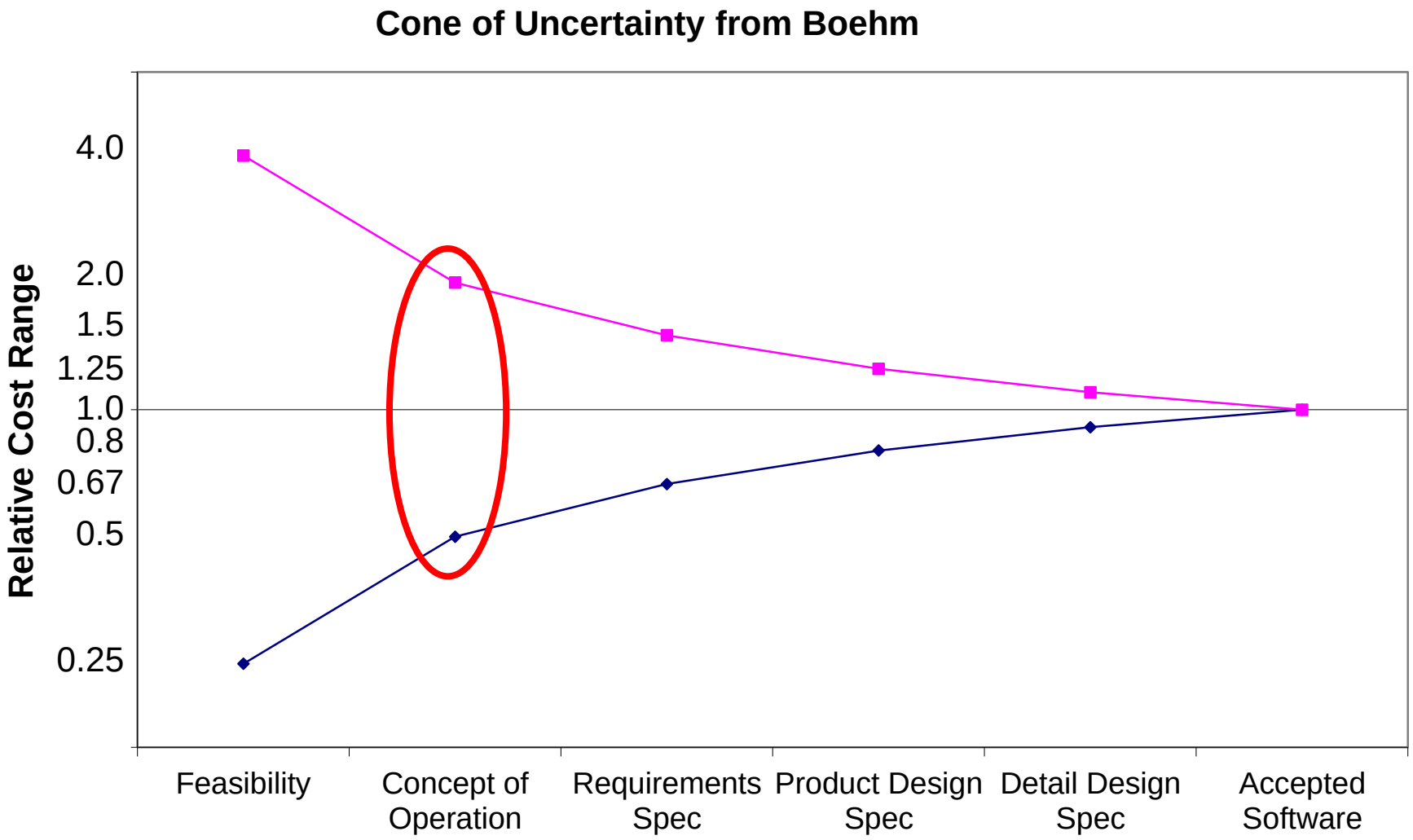
- Estimation Accuracy follows a Log Normal distribution



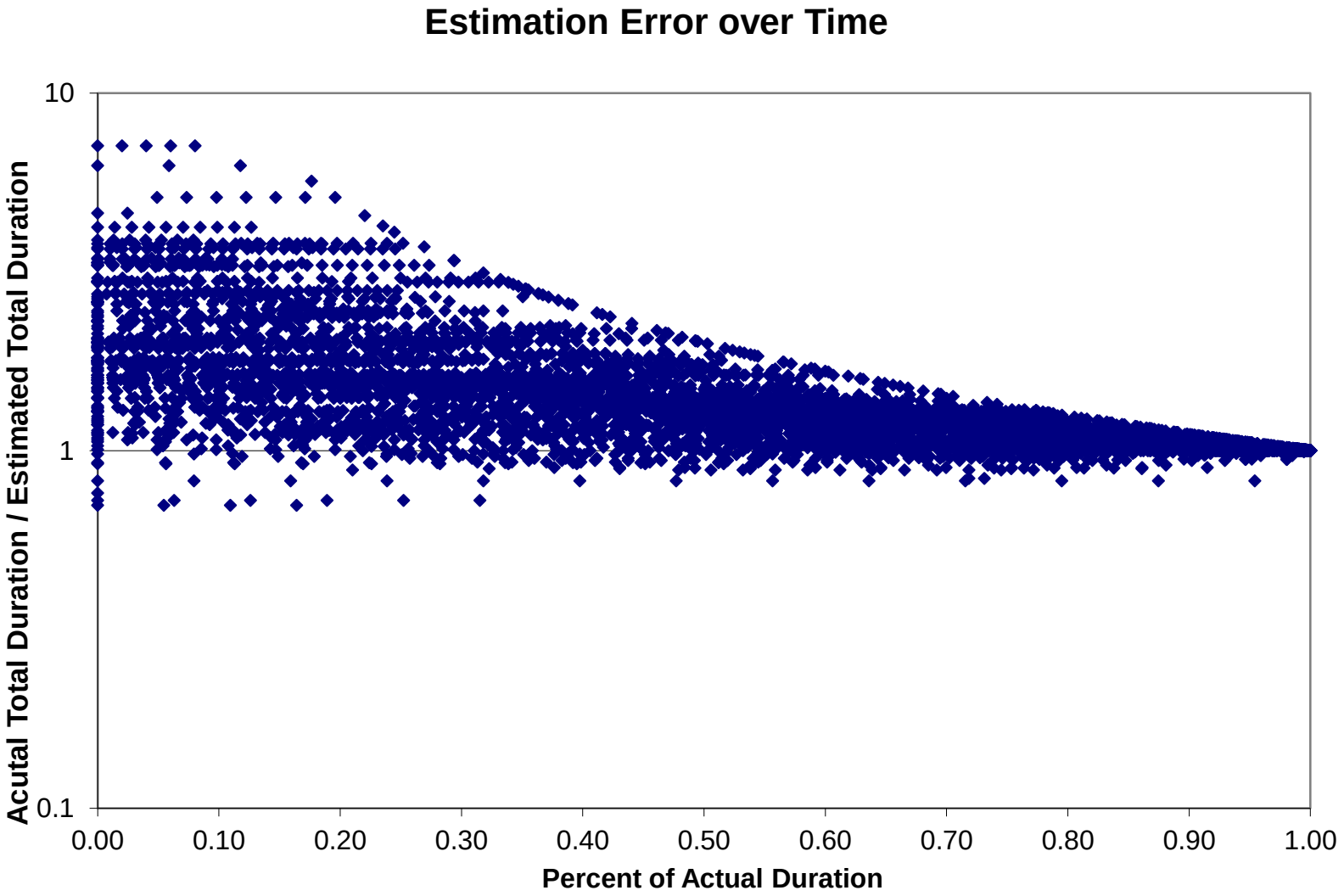
Uncertainty Bounds



How does Estimation Accuracy Improve Over Time?



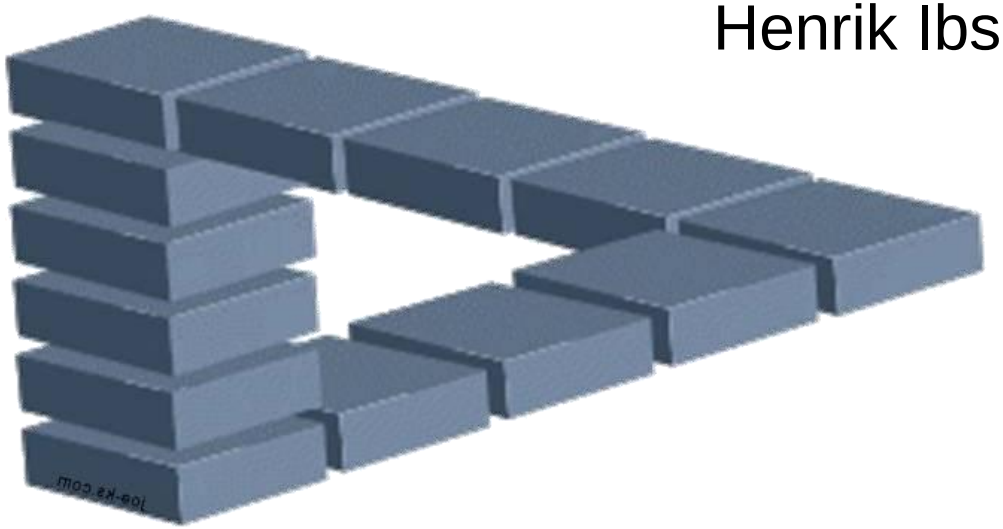
Landmark Cone of Uncertainty



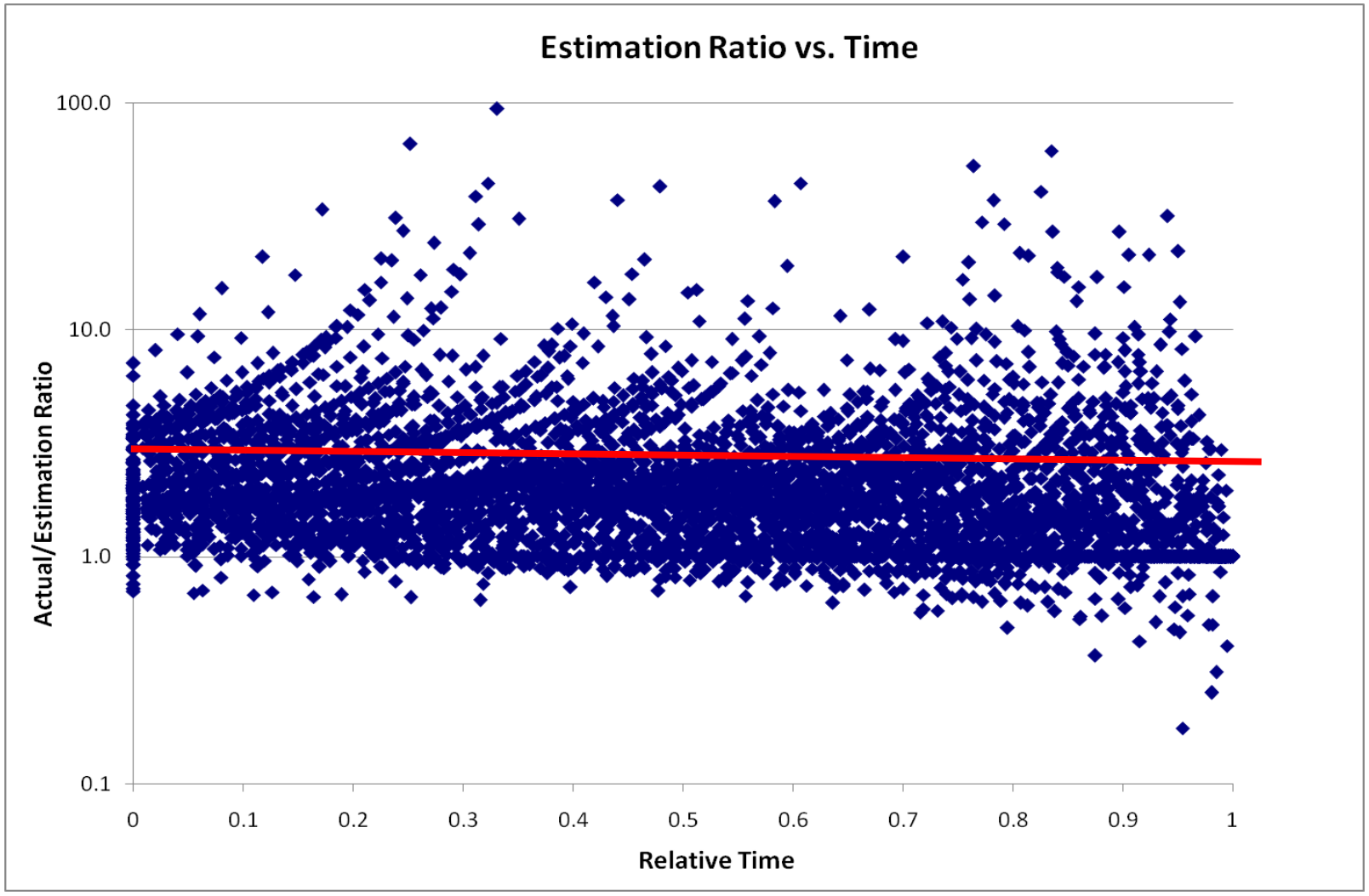
But is Uncertainty Really Reduced?

"Take away an ordinary person's illusions and you take away happiness at the same time."

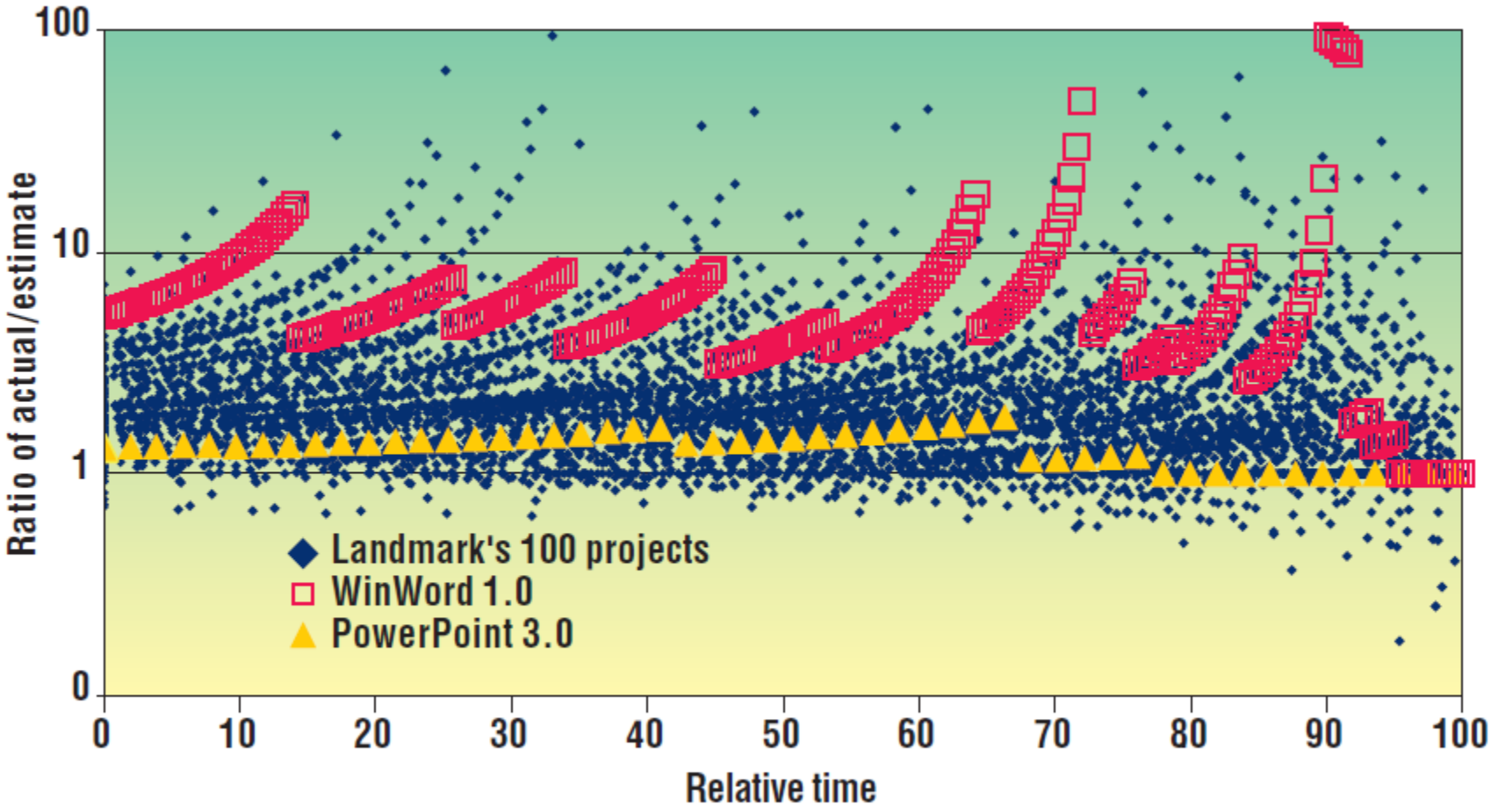
Henrik Ibsen--*Villanden*



Remaining Uncertainty



Remaining Uncertainty

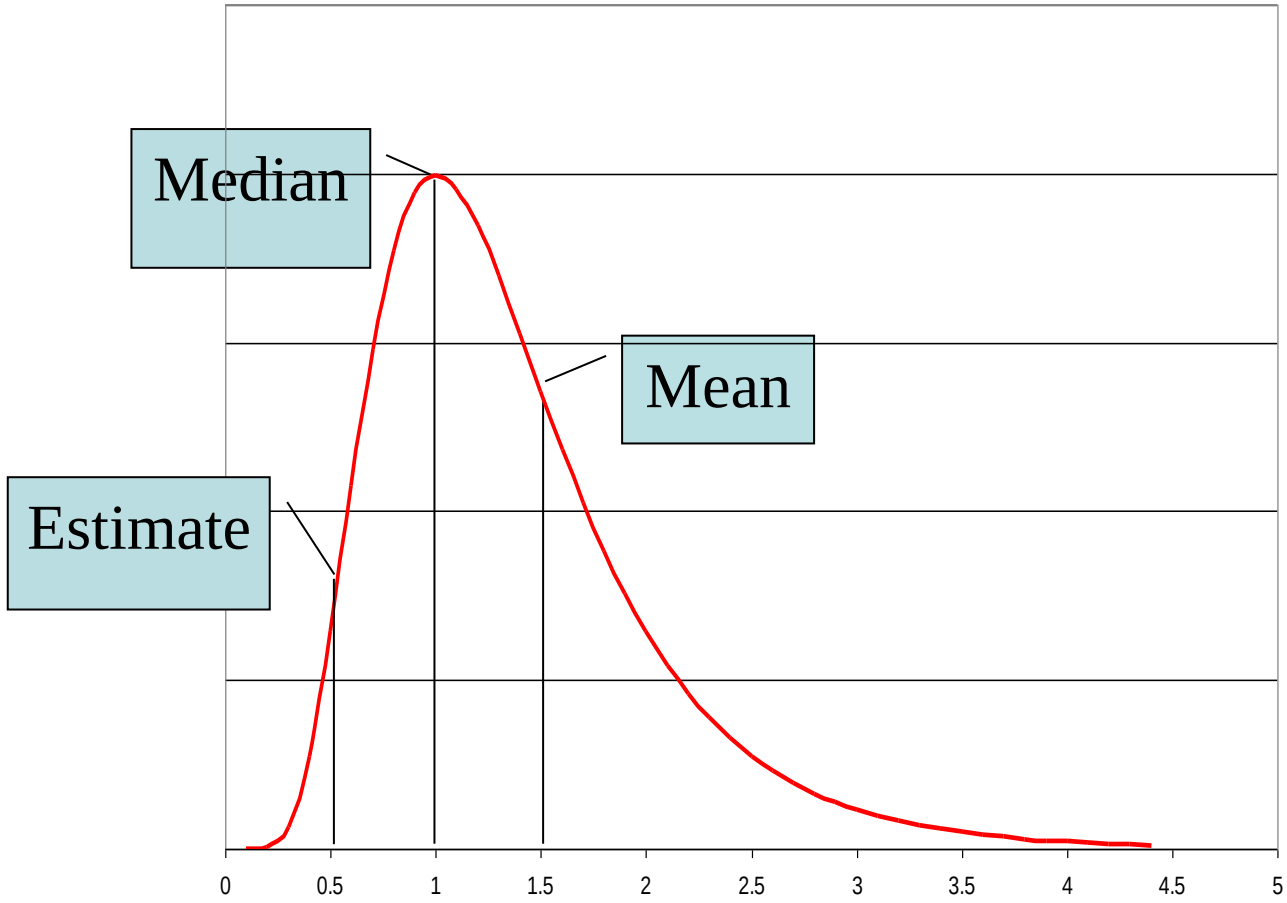


Sources of Error

- Bias
- Uncertainty Range
- Scope Creep

Sources of Error

- Bias



Negotiation Bias

- *"It is difficult to get a man to understand something when his salary depends upon his not understanding it.“*

» *Upton Sinclair*:

Politics and Schedule Estimation

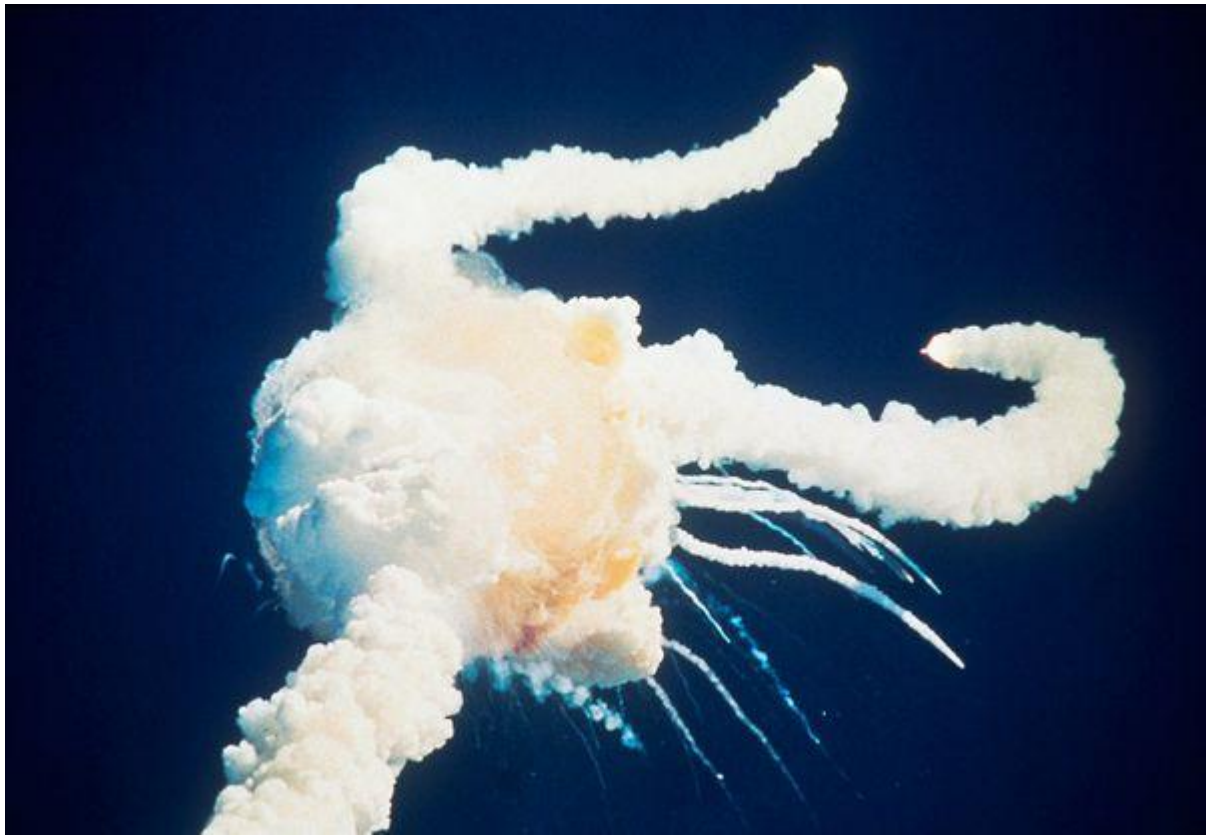
- *Developers tend to be temperamentally opposed to the use of negotiating tricks. Such tricks offend their sense of technical accuracy and fair play. Developers don't want to offer lopsidedly high initial estimates even when they know that customers, marketers, or bosses will start with lopsidedly low bargaining positions.*

  – *Steve McConnell*

http://www.stevemcconnell.com/ieeesoftware/bp03.htm

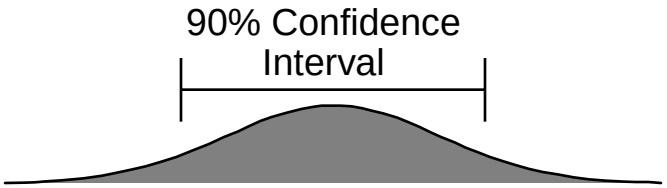
Space Shuttle Challenger

	Engineers	Management
Probability of loss of life	1 in 100	1 in 100,000



Overconfidence in Ranges

- Most people are significantly ***overconfident*** about their estimates, especially educated professionals



Group	Subject	% Correct (target 90%)
Harvard MBAs	General Trivia	40%
Chemical Co. Employees	General Industry	50%
Chemical Co. Employees	Company-Specific	48%
Computer Co. Managers	General Business	17%
Computer Co. Managers	Company-Specific	36%
AIE Seminar (before training)	General Trivia & IT	35%-50%
AIE Seminar (after training)	General Trivia & IT	~90%

Hubbard Decision Research

Test 1 (Jørgensen IEEE Software 2008)

Group	Guidance	Result
A	800	
B	40	
C	4	
D	None	160

Test 1

Group	Guidance	Result
A	800	300
B	40	100
C	4	60
D	None	160

Test 2

Group	Guidance	Result
A	Minor Extension	
B	New Functionality	
C	Extension	50

Test 2

Group	Guidance	Result
A	Minor Extension	40
B	New Functionality	80
C	Extension	50

Test 3

Group	Guidance	Result
A	Future work at stake, efficiency will be measured	
B	Control	100

Test 3

Group	Guidance	Result
A	Future work at stake, efficiency will be measured	40
B	Control	100

Understand Bias

- *"What gets us into trouble is not what we don't know. It's what we know for sure that just ain't so.“*

  » *Mark Twain*



task “A”...

Create a six sided random number generator.
Something like a dice like thingy.

Every member of the team needs to roll a double six.

http://www.flickr.com/photos/palooza/3309242555/

Relative Sizing

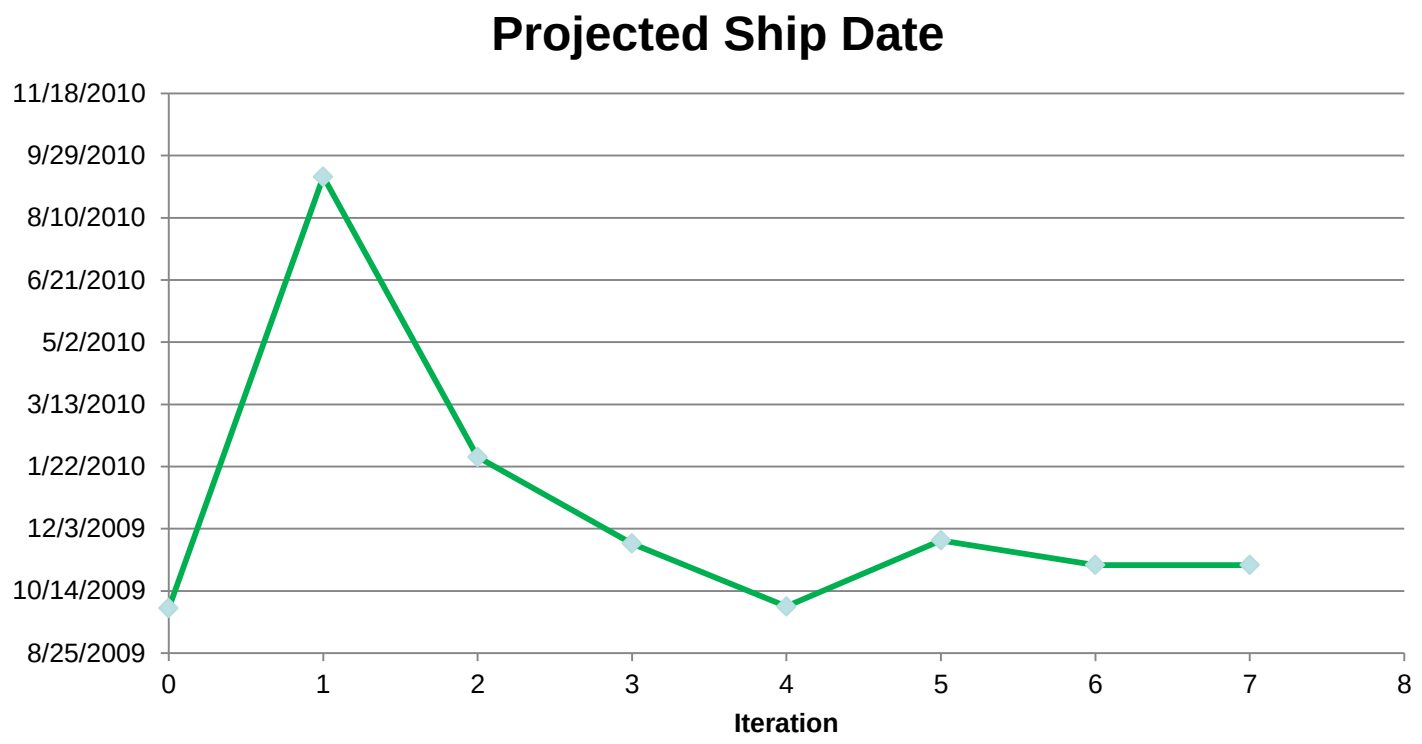


Did you know? (Jørgensen IEEE Software March 2013)

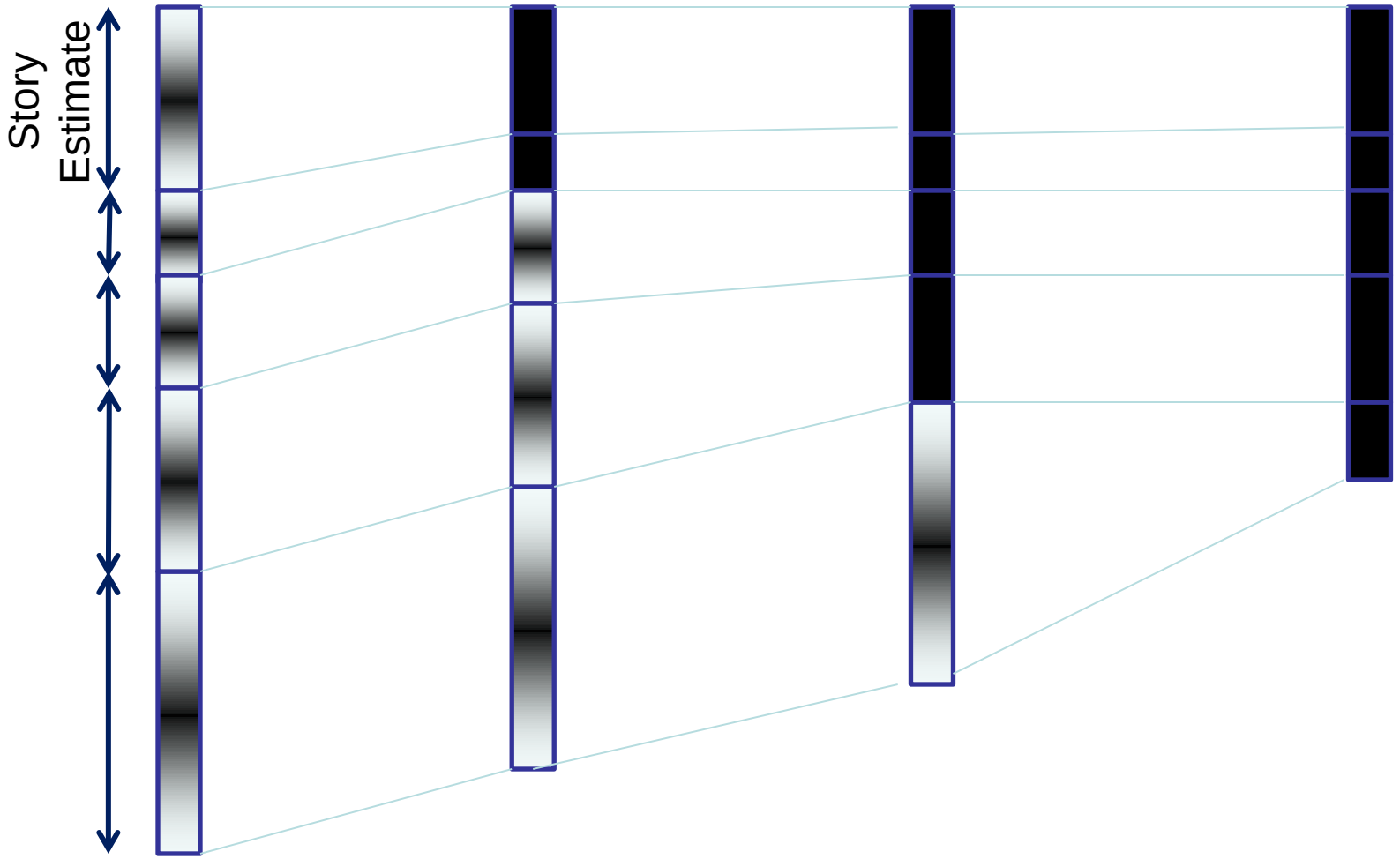
- The US has 155 million more inhabitants than Mexico, but Mexico has 100 million fewer inhabitants than the US.
- Poland has 10 million more inhabitants than Romania, but Romania has about the same number of inhabitants as Poland.
- Austria's population is 70% of Hungary's, while Hungary's population is 80% of Austria's.

Velocity Helps Remove Bias

- $\frac{Story\ Points}{\frac{Story\ Points}{Iteration}} = Iterations$



But Velocity is not a Silver Bullet



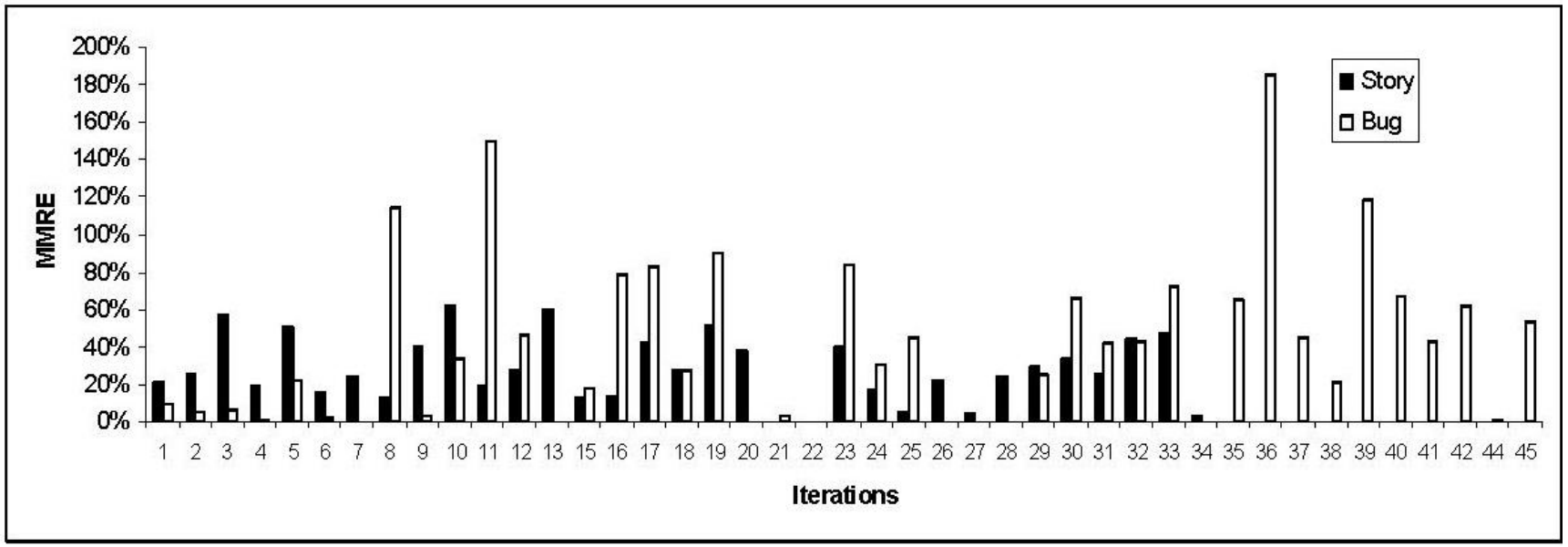
Sources of Error

- Range of Uncertainty

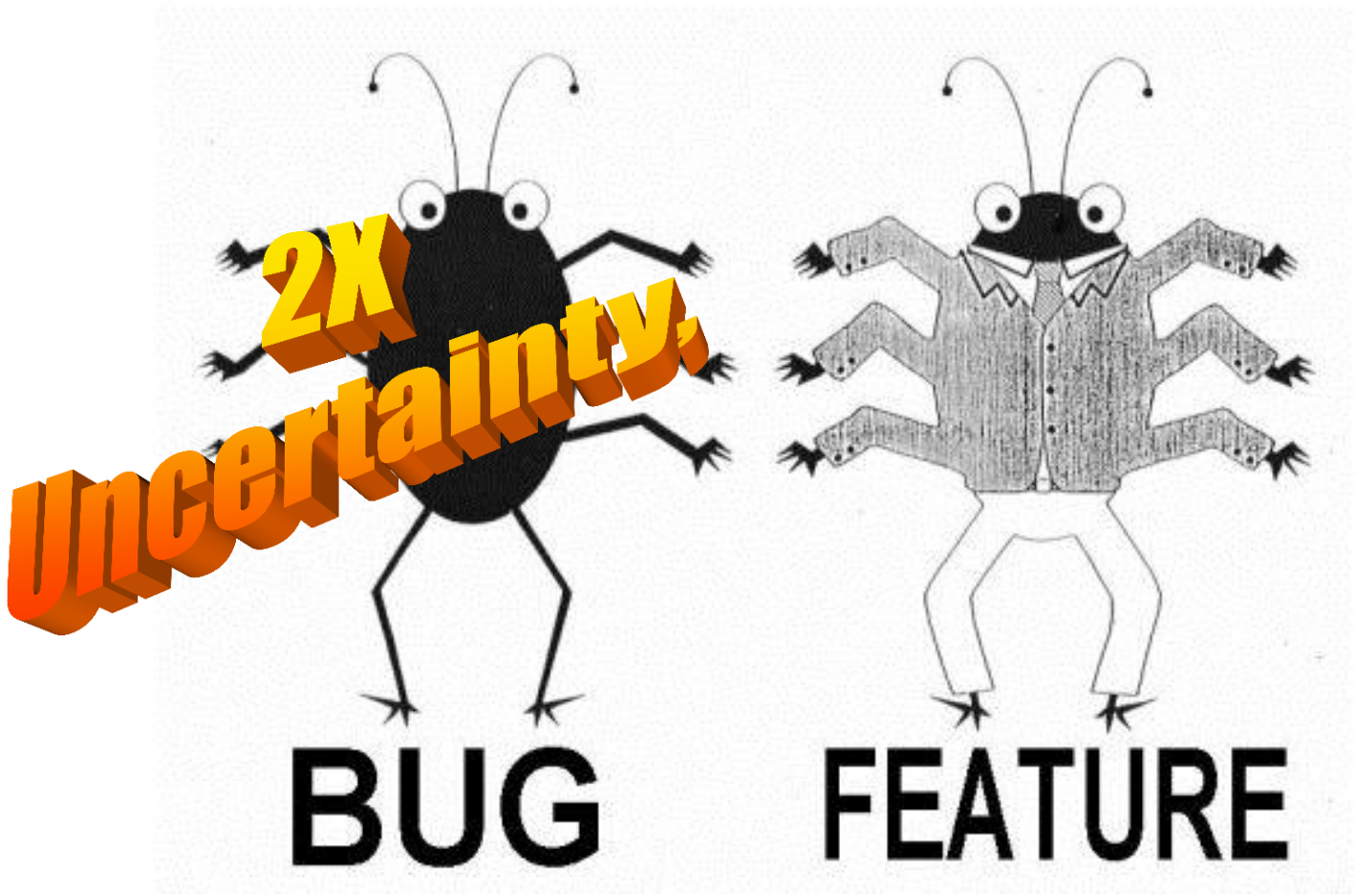


Estimation Errors

- Lan Cao - Estimating Agile Software Project Effort: An Empirical Study



Lan Cao - Estimating Agile Software Project Effort: An Empirical Study



Sources of Error

- Scope Creep



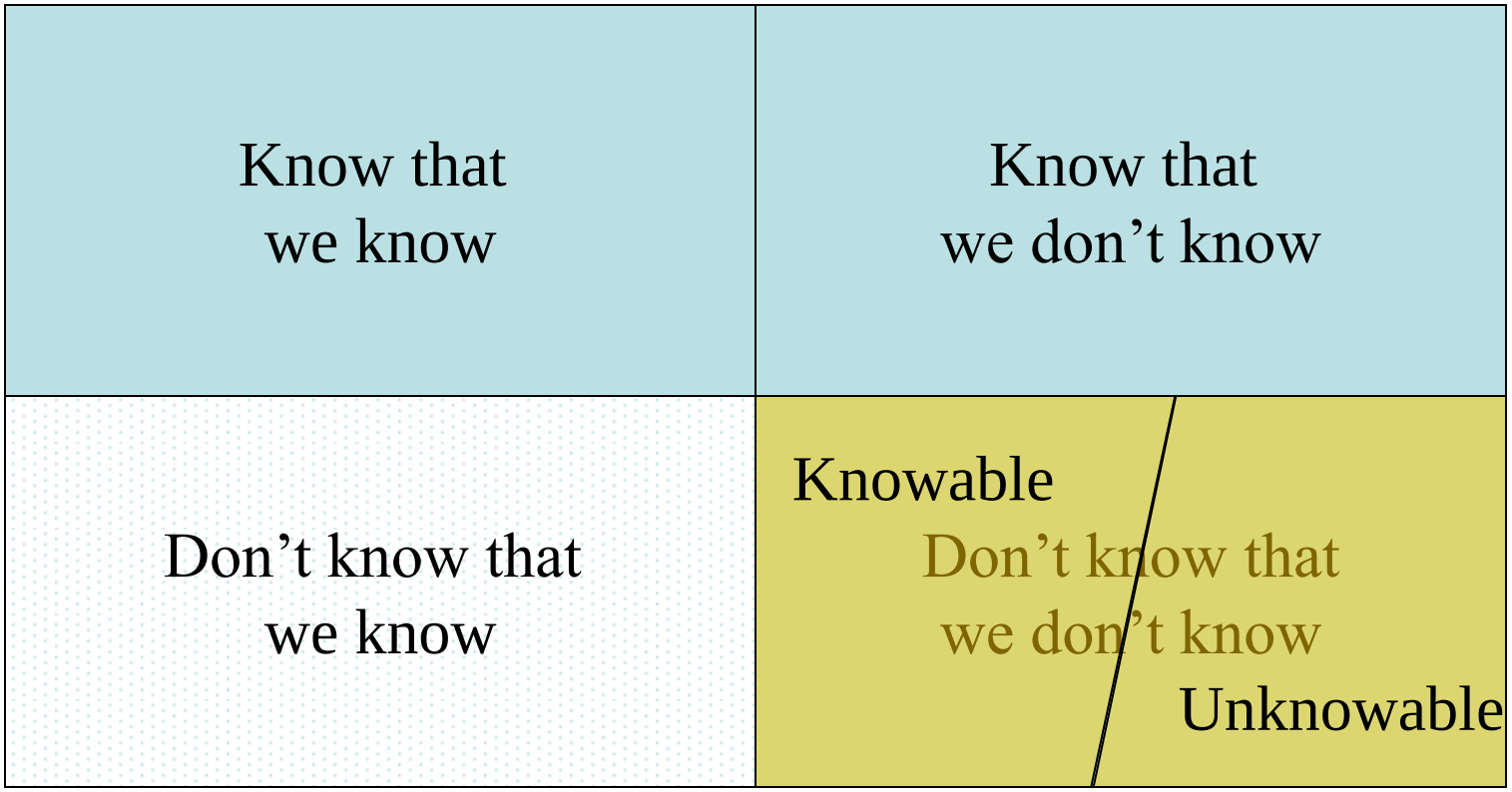
Scope Creep

- Capers Jones
  - 2% per month
  - 27% per year




Innovation
Predictability
Revenue
Efficiency
Late projects
CLOUD
Mobility
Integration
SOA
Business
Intelligence
Agile
BPM

Uncertainty



Uncertainty

Wishful Thinking p10	Discoverable Risks p50
Don’t know that we know	Uncertainty Management p90

Estimation Exercise



Risky Business



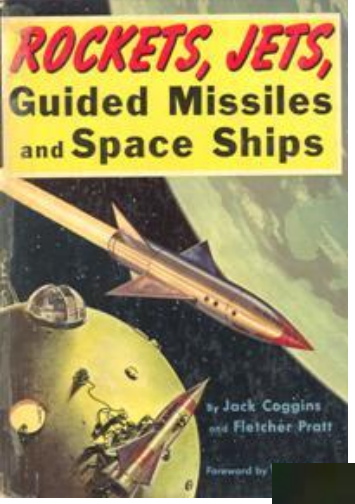
War

They couldn't hit an elephant at this dist…

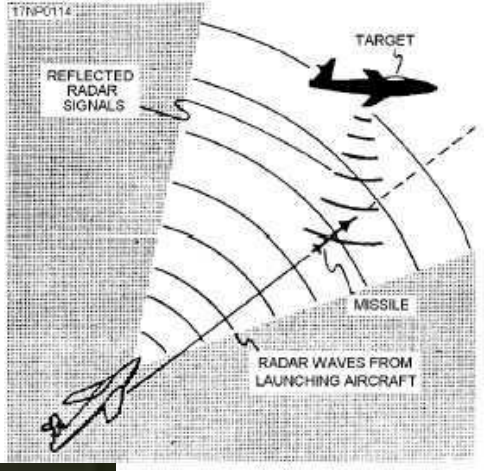
General John B. Sedgwick, Union Army Civil War officer's last words, uttered during the Battle of Spotsylvania, 1864







Gordon the Guided Missile

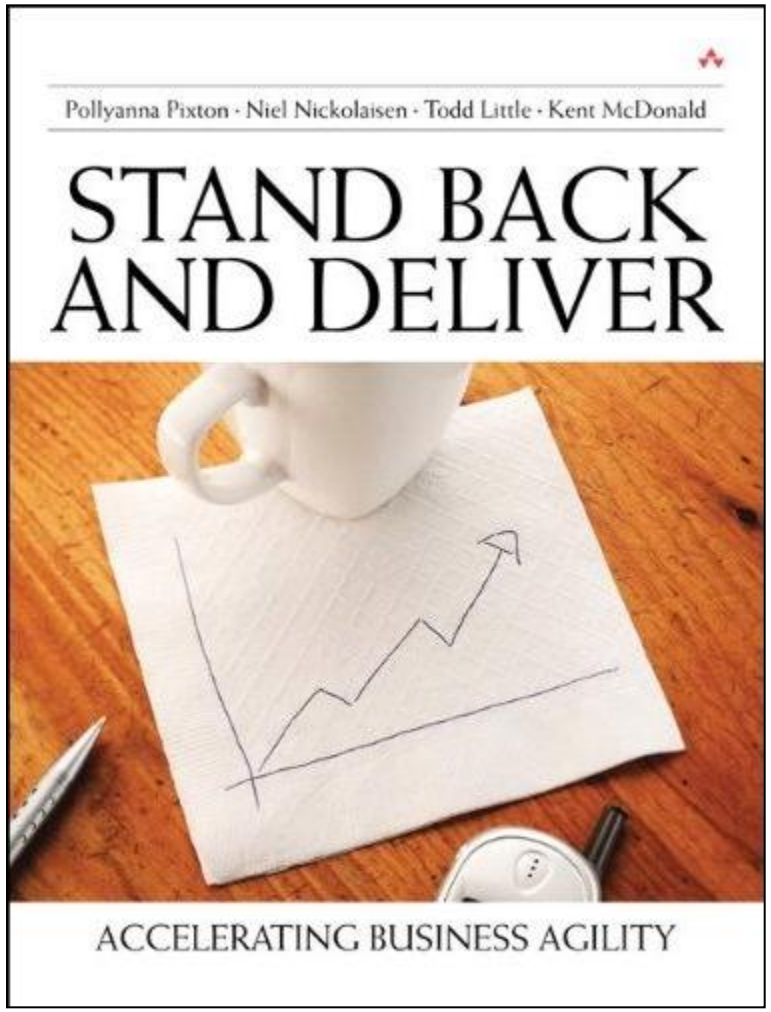




Movies



Books



300,000 in 2004,

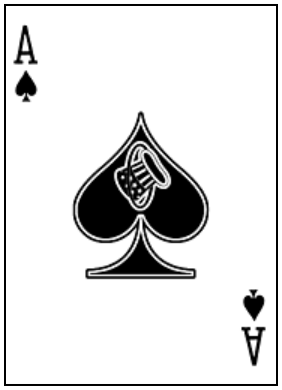
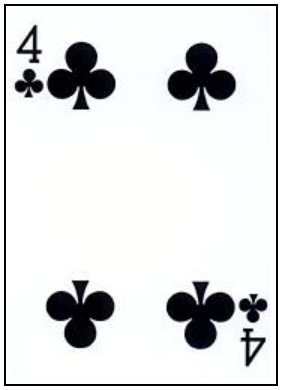
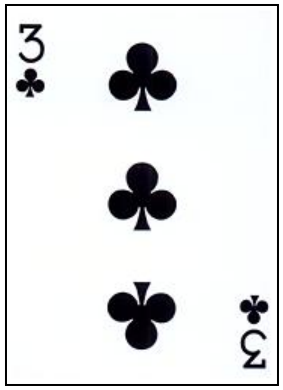
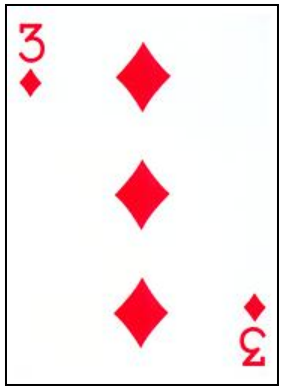
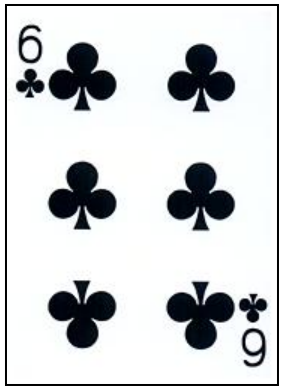
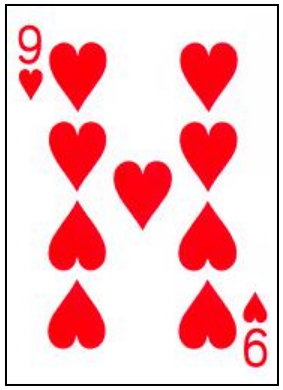
<25% sold more Than 100 copies

Poker

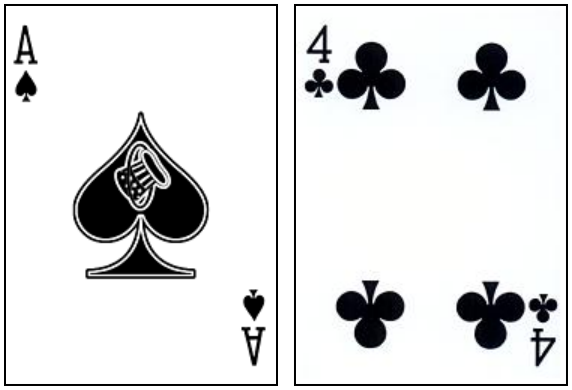
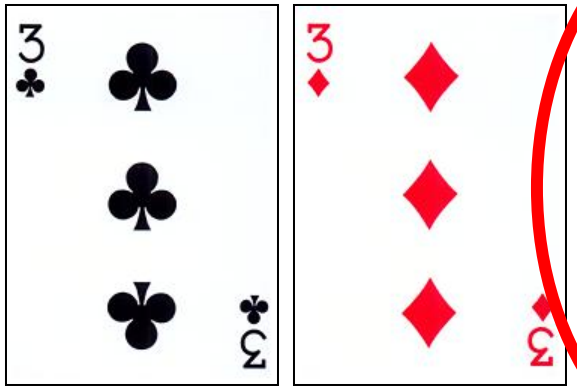
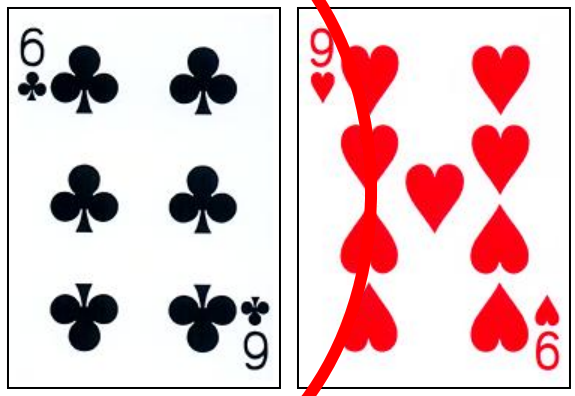


Texas Hold'em:
Which is the best hole hand?

A	B	C

Texas Hold'em:
Which is the best hole hand?

A	B	C
		
33.5%	29.6%	36.5%

Poker Metric:
Percent of Hands Won



Oil & Gas Exploration



Oil & Gas Exploration



CAUTION

THIS SIGN HAS

SHARP EDGES

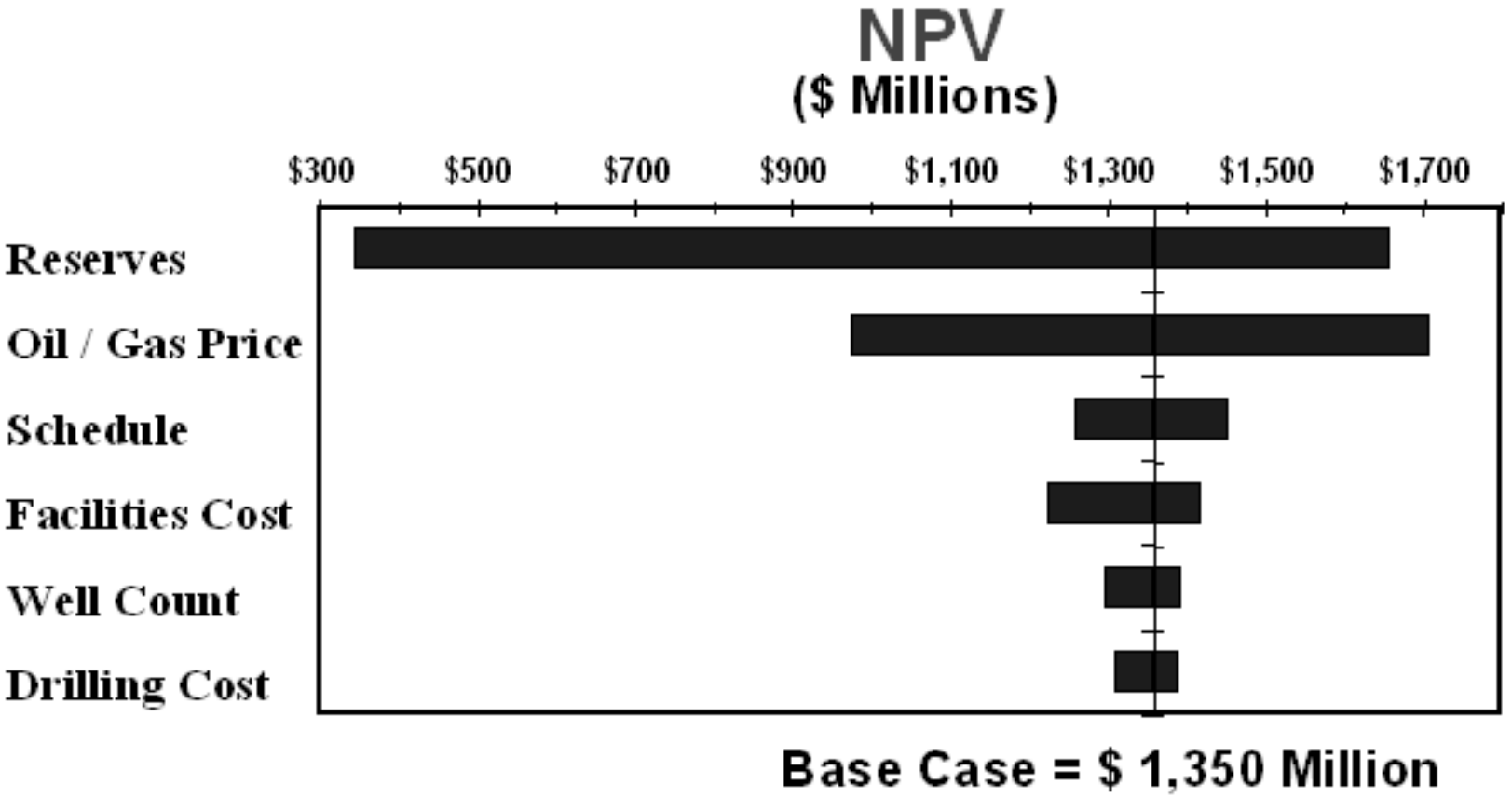
DO NOT TOUCH THE EDGES OF THIS SIGN



ALSO, THE BRIDGE IS OUT AHEAD



Which Risks Are Important

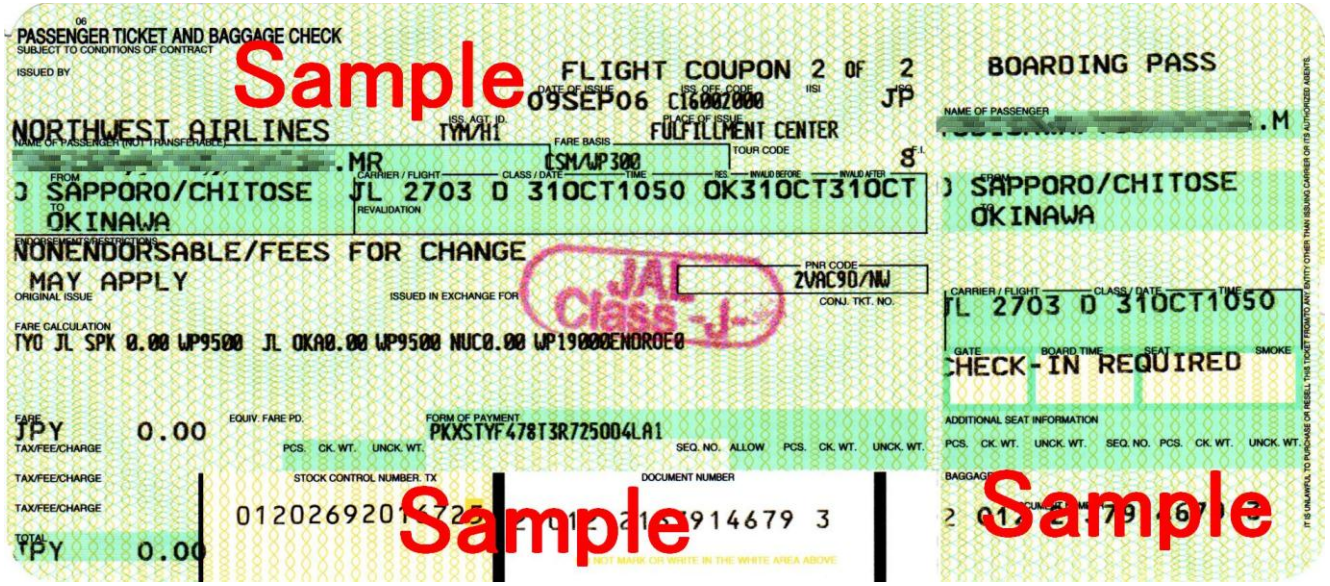


Real Options

- The right — but not the obligation — to undertake certain actions prior to an expiry date



Airline Tickets



Real Options

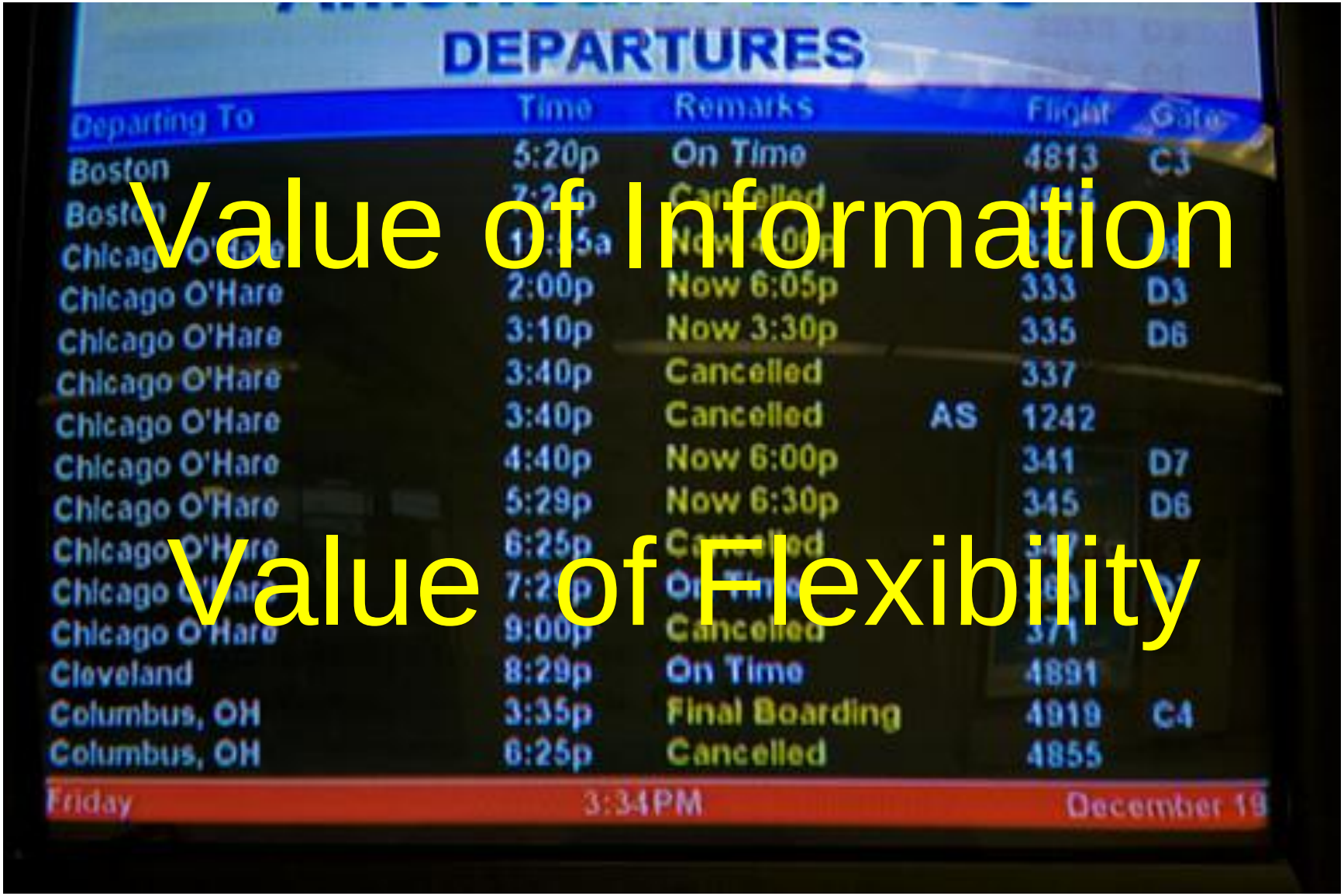
- The right, but not the obligation to take some action prior to an expiry date







Real Options



Value of Information



Value of Information

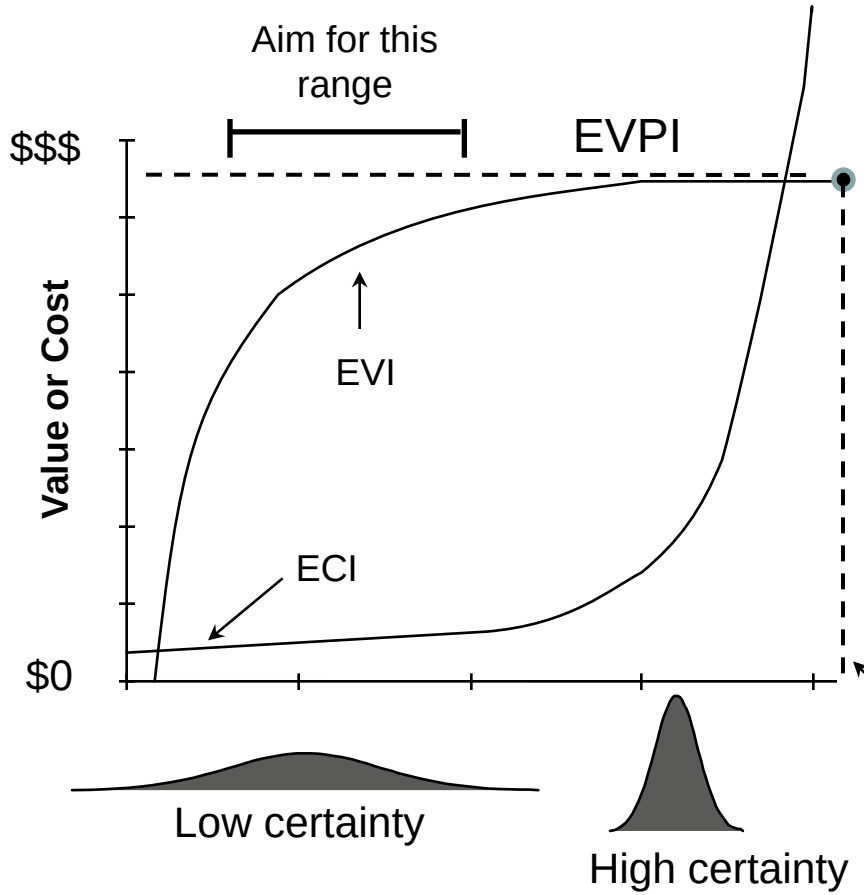


Tooth looks fine
to the naked eye.



But an xRay
reveals the decay.

Increasing Value & Cost of Info.



- EVPI – Expected Value of Perfect Information
- ECI – Expected Cost of Information
- EVI – Expected Value of Information

Hubbard Decision Research

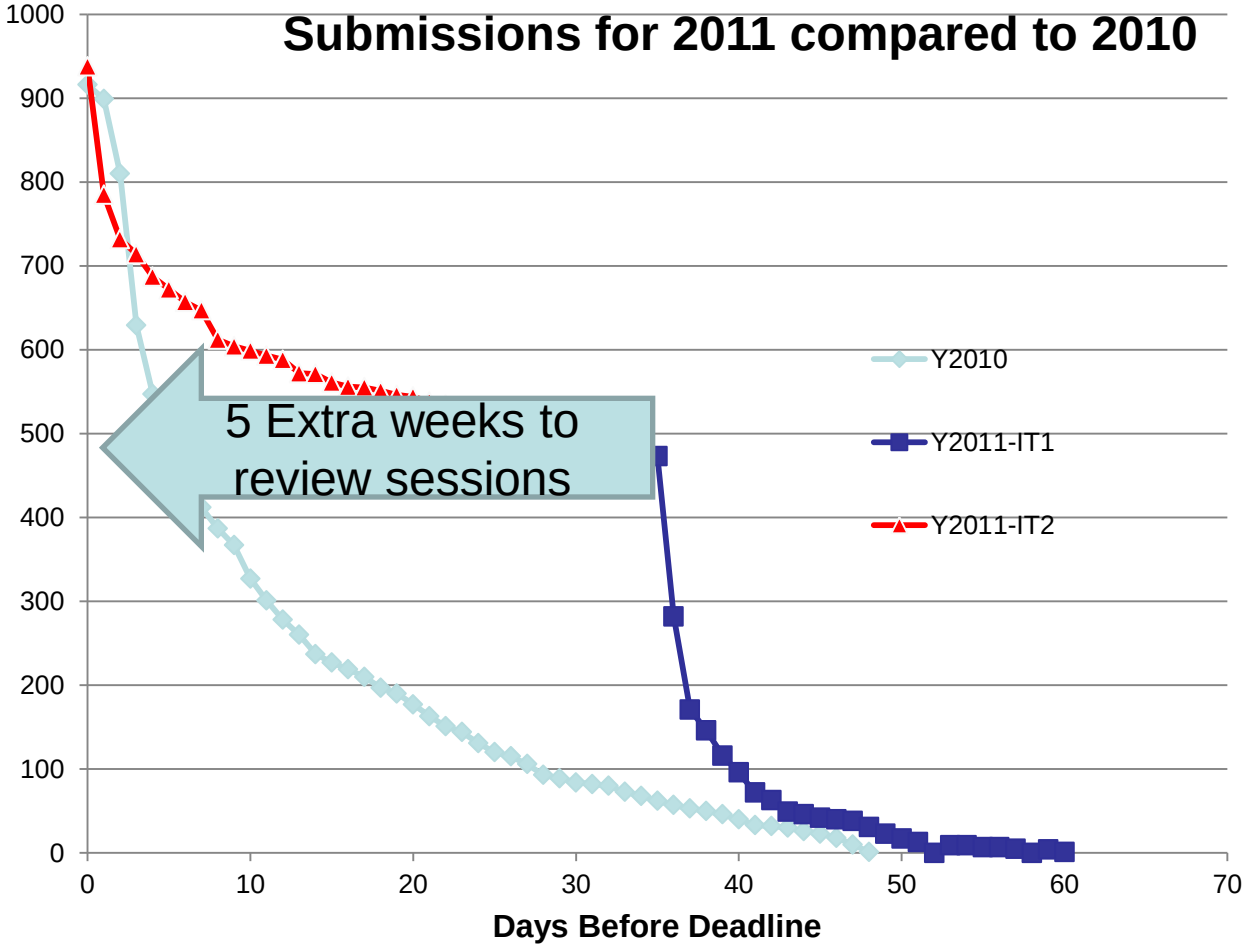
Value of Flexibility



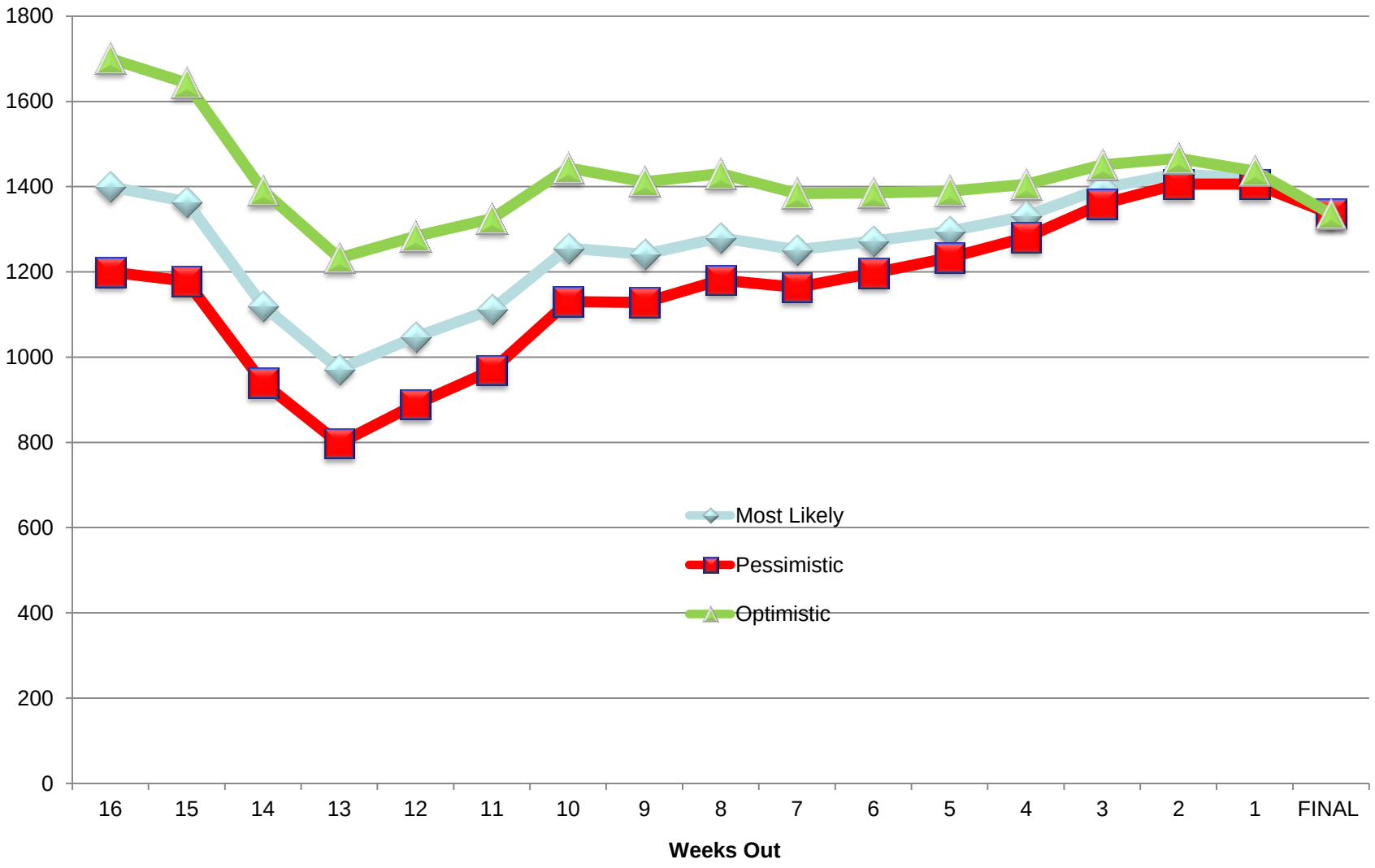


- The right — but not the obligation — to undertake certain actions prior to an expiry date

Making An Agile Conference Agile



Estimated Agile 2010 Attendance



Do you have a choice?

Option

Commitment

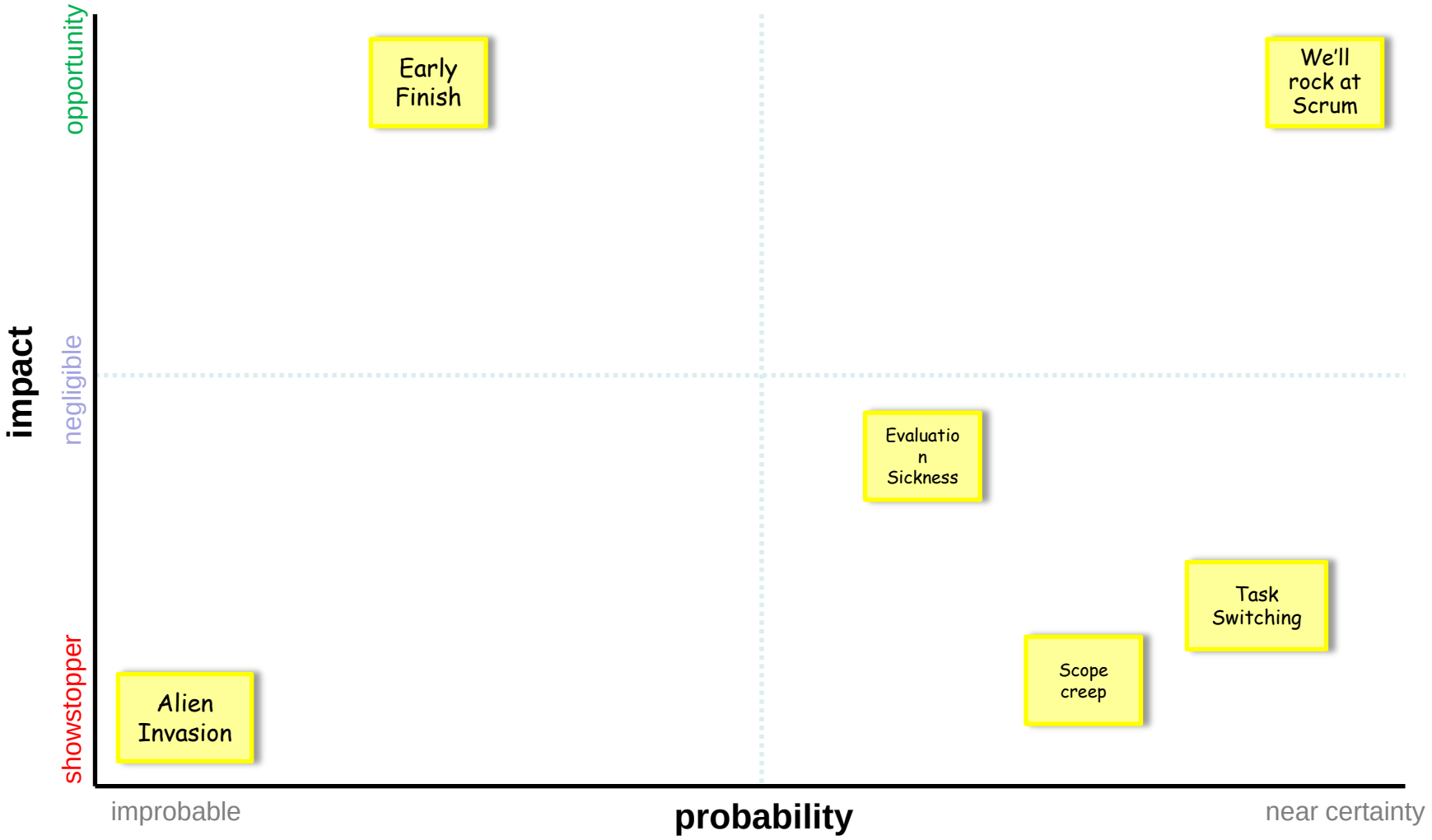
Decision

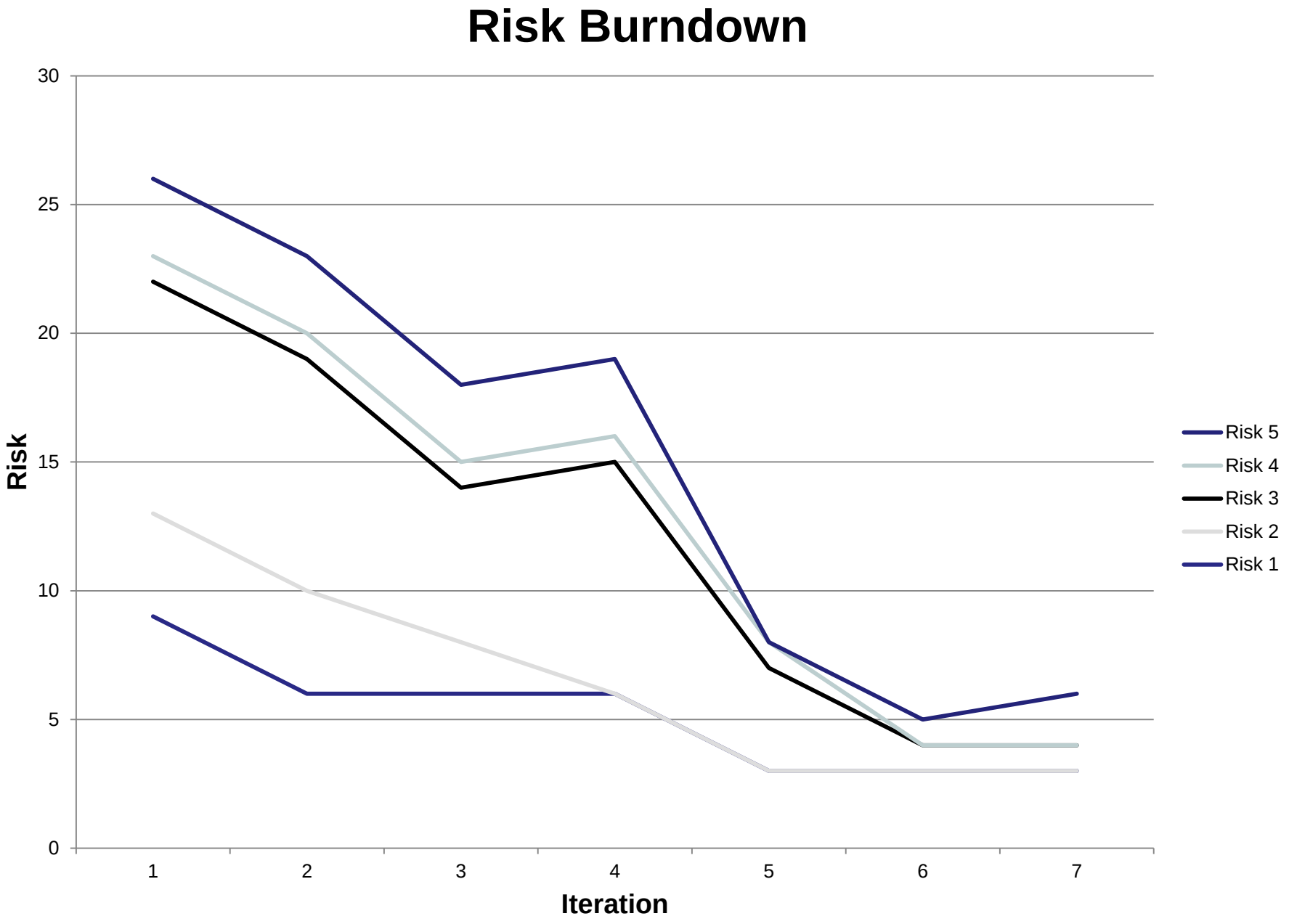


Agile projects need risk management too

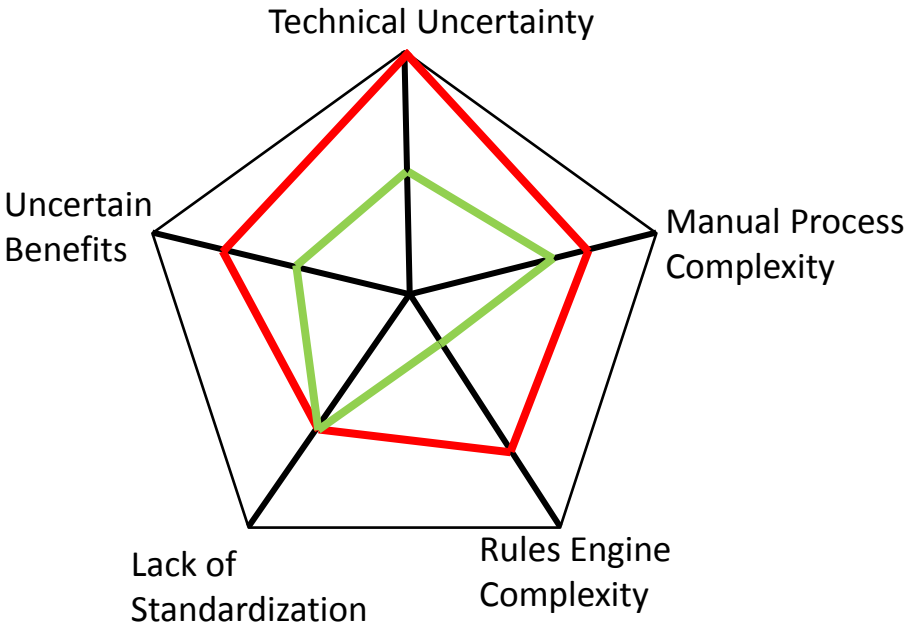


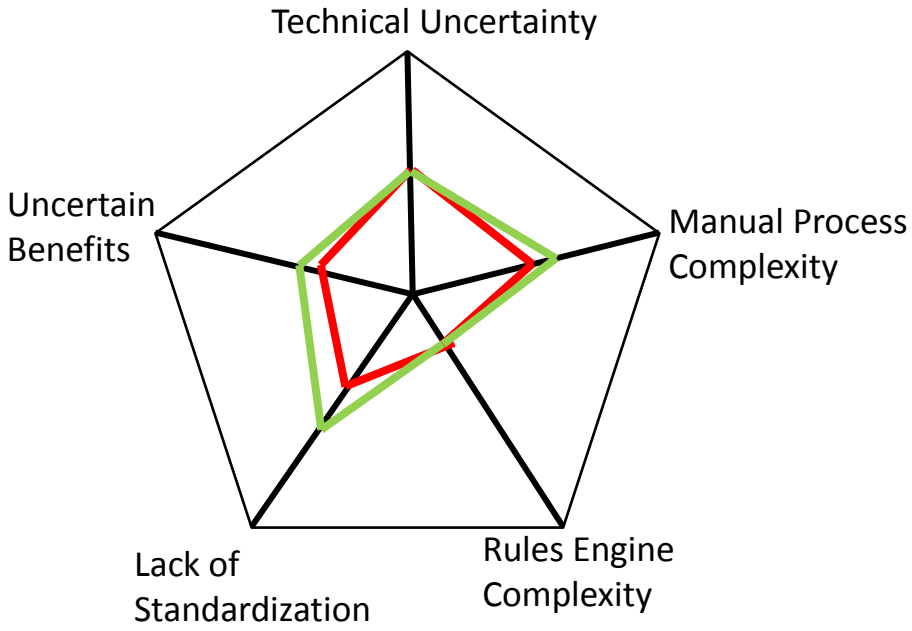
Analyze risks




Risk Burndown
30
25
20
15
10
5
0
Risk
1
2
3
4
5
6
7
Iteration
Risk 5
Risk 4
Risk 3
Risk 2
Risk 1

Risk


Technical Uncertainty
Manual Process Complexity
Rules Engine Complexity
Lack of Standardization
Uncertain Benefits


Technical Uncertainty
Manual Process Complexity
Rules Engine Complexity
Lack of Standardization
Uncertain Benefits

Categories of risk







Quality and Market Acceptance





Two Risk Perspectives



Business Perspective





Individual Perspective

Collateral Damage



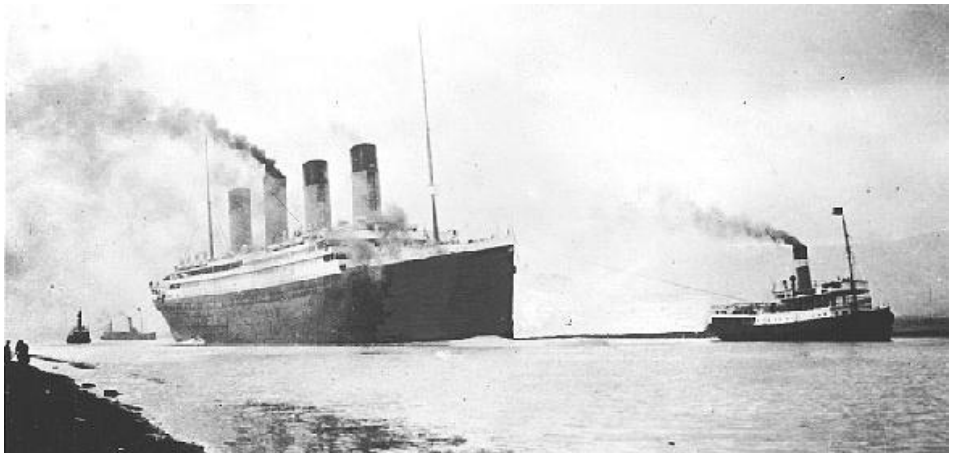
Delivery Failure results in Collateral Damage

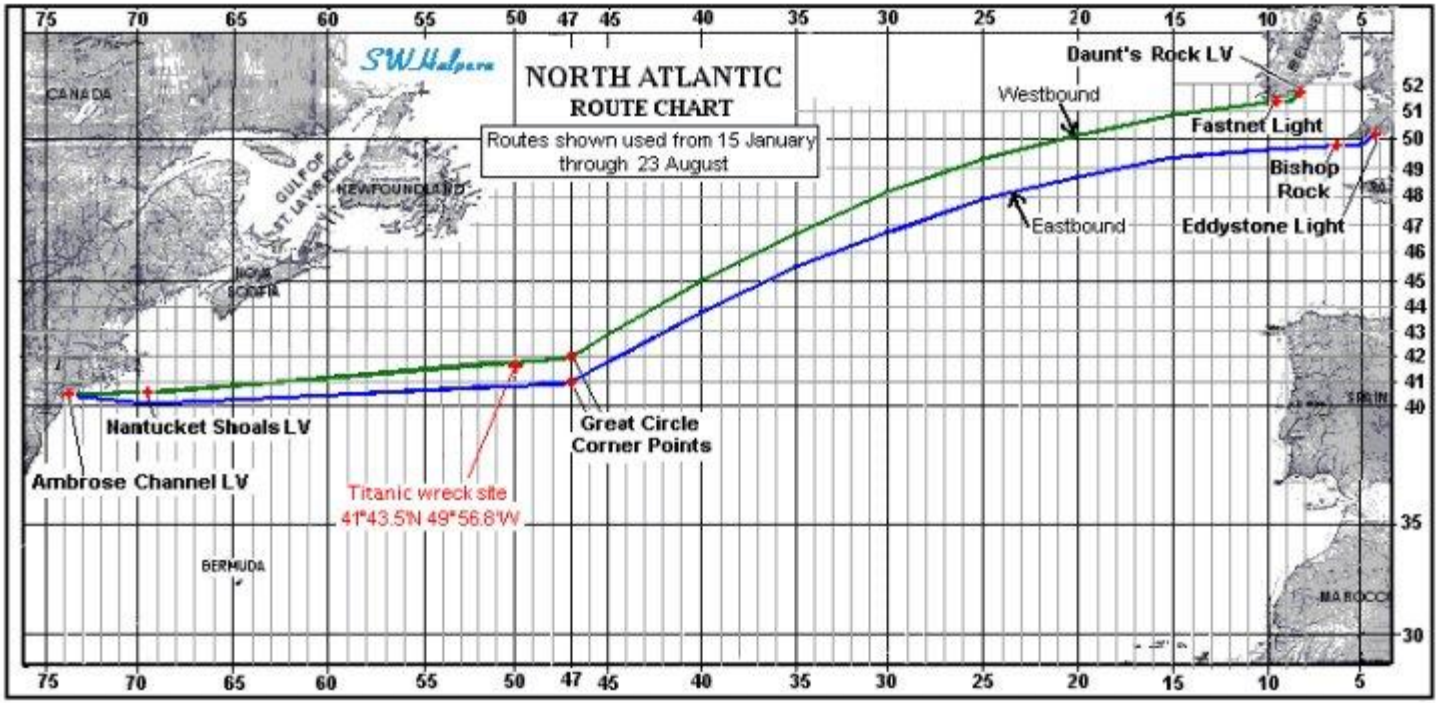




Titanic

- Time pressure
- Feedback blocks
- Unsinkable






I’m beginning to think it wasn’t such a good idea to turn off those unit tests



Collateral Damage



Business Perspective	Individual Perspective
Could be catastrophic	Some individuals may be willing to take on more risk than desired


THE TI

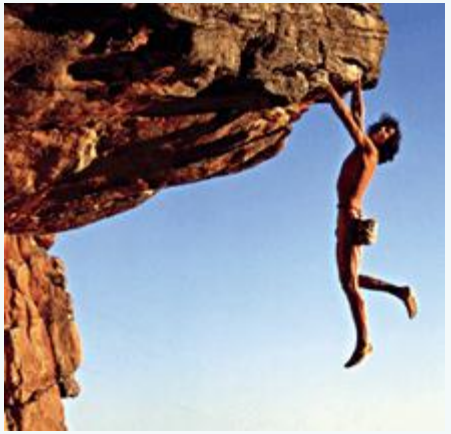
Max 18C, min 5C

Tuesday September 16 2008 timesonline.co.uk No 69430

Lehman collapse sends shockwave round world

hares and oil prices plunge, thousands lose jobs

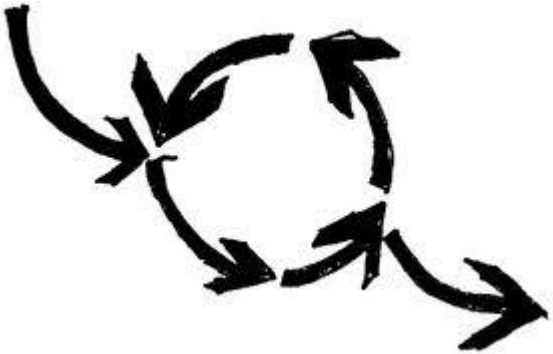
Dow Jones industrial average was down 300 points, or 2.6 per cent. Sentiment was also bolstered by steep falls in oil prices, which dropped by more than $5 a barrel to $96, closing under $100 for the first time in six months and raising hopes that cheaper fuel would ease economic stresses on Western nations



Collateral Damage Management



Inspect



Incremental Delivery



Honor feedback

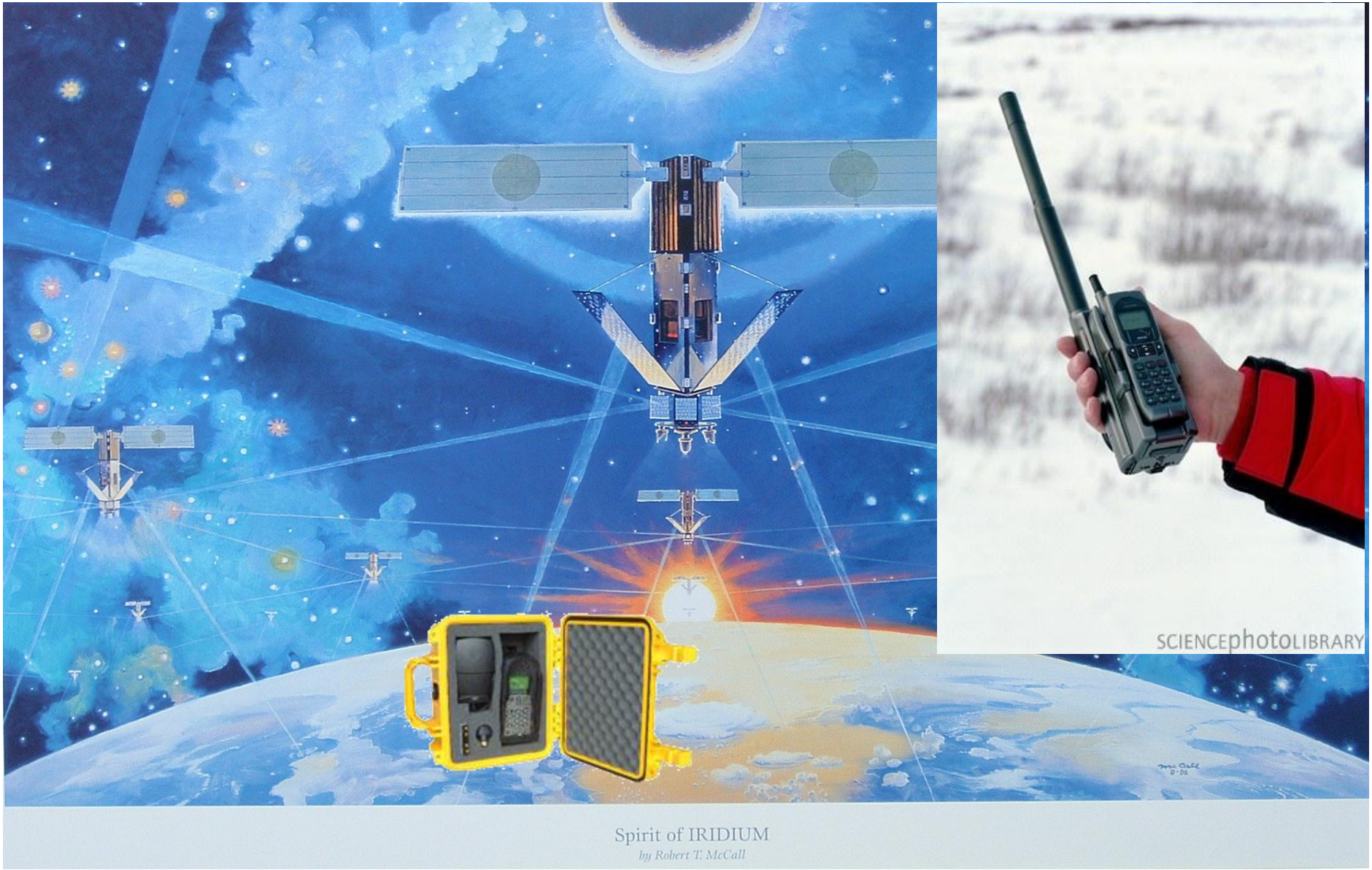


An effective roll-back strategy

Business Case Failure



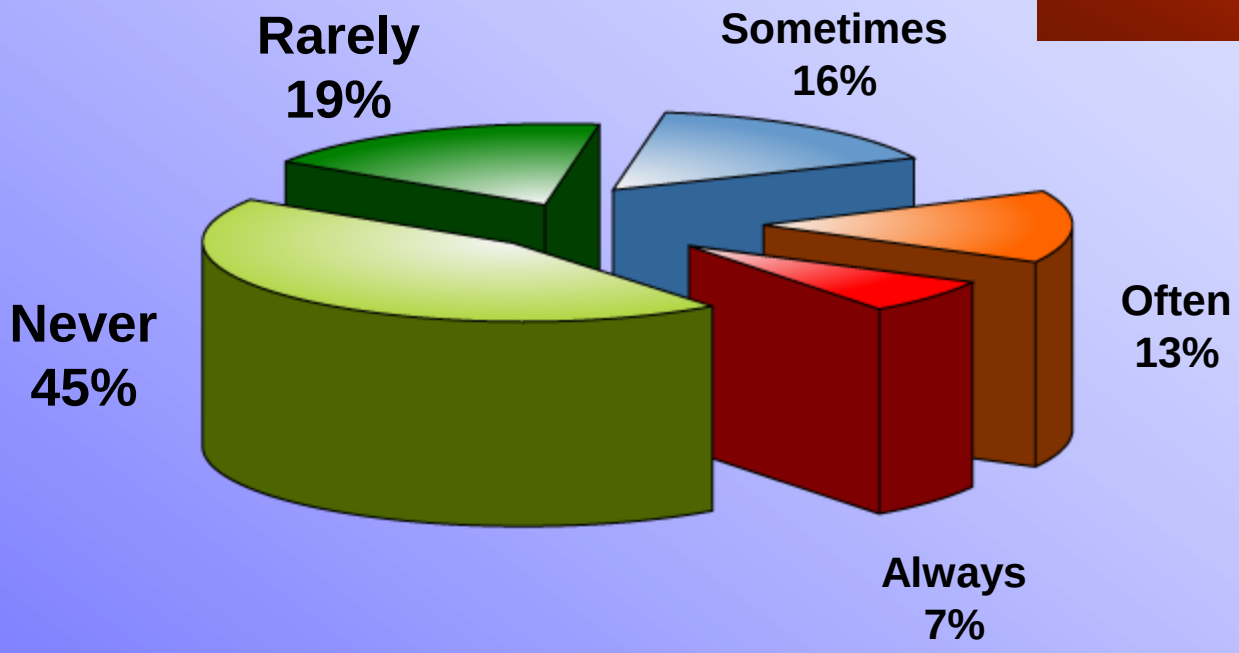
Business Case Failure



Features and Functions

Never or Rarely Used: 64%

Always or Often Used: 20%



Standish Group Study, reported by CEO Jim Johnson, XP2002

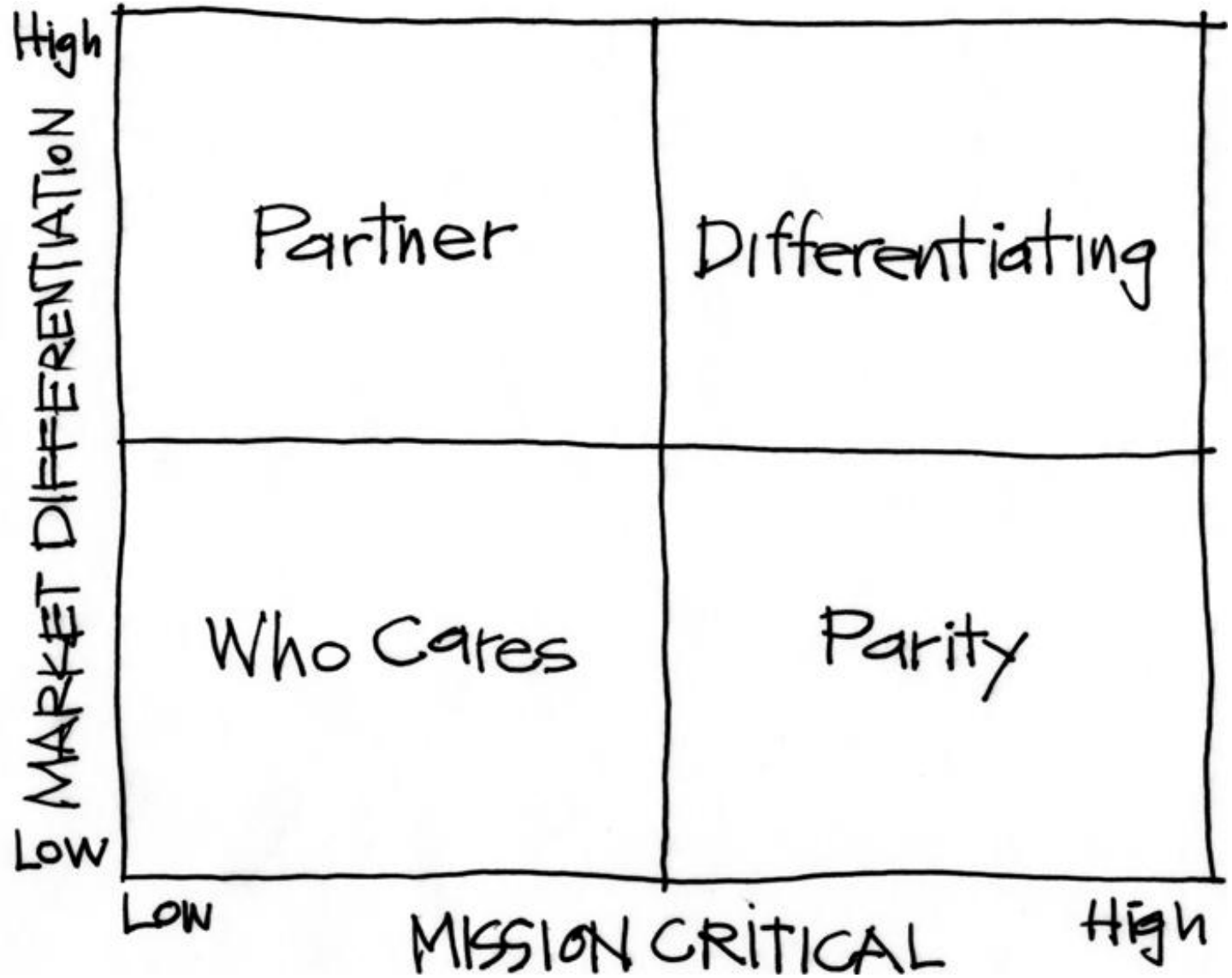
Powerful Questions are:
What are we building?
What Business are we in?



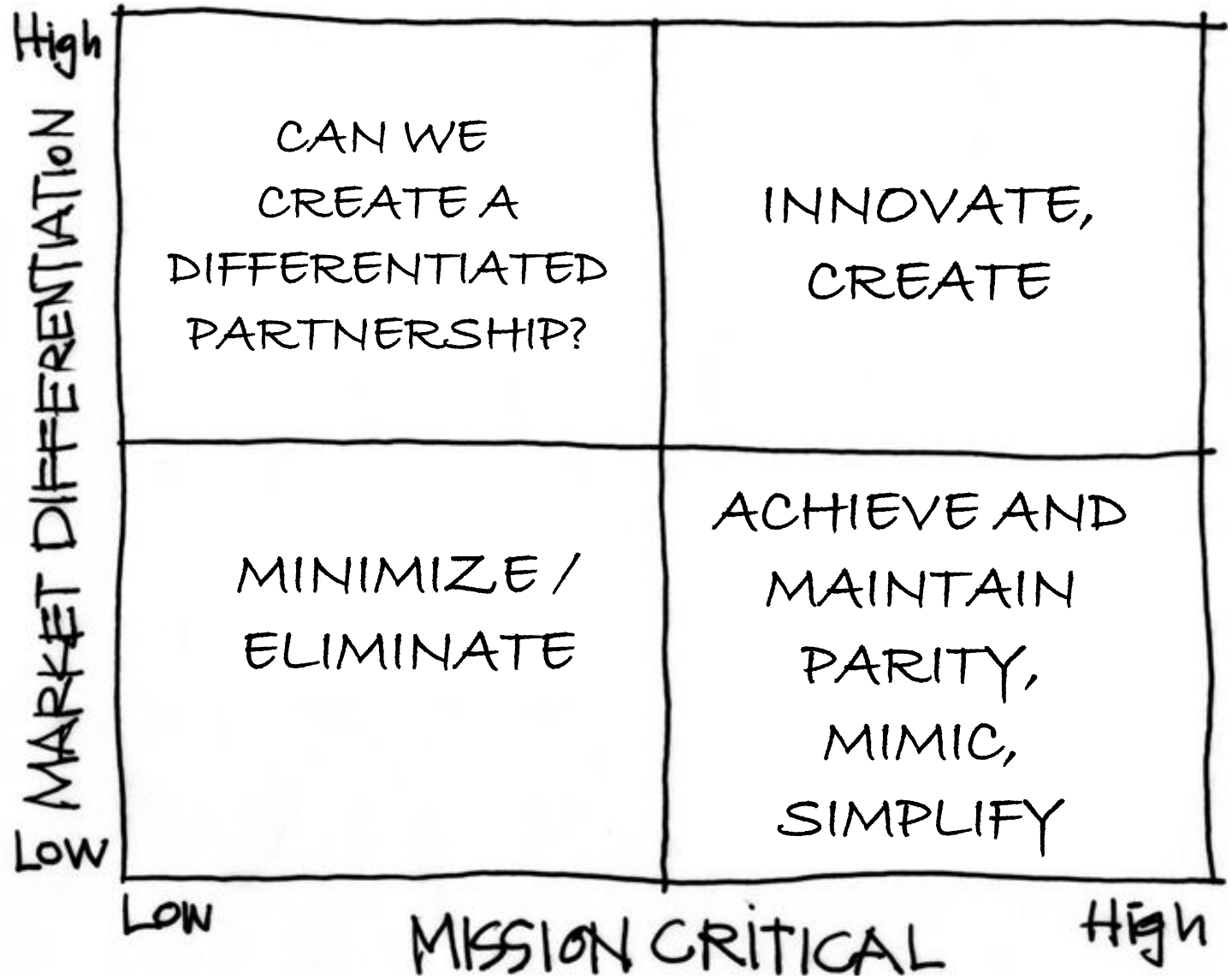
What
Building are
we in?



The Purpose Alignment Model



In Practice

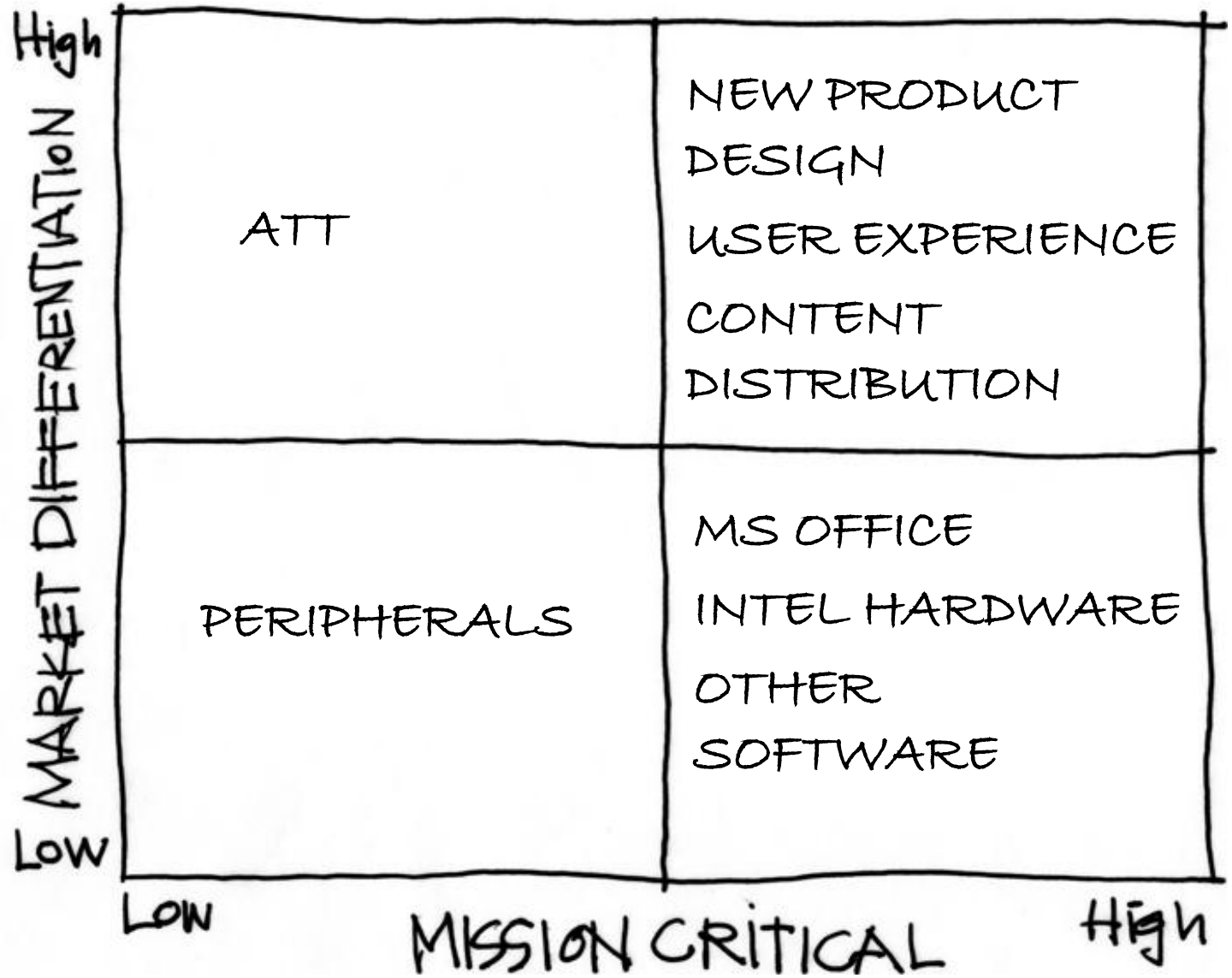

High
MARKET DIFFERENTIATION
Low
CAN WE CREATE A DIFFERENTIATED PARTNERSHIP?
INNOVATE, CREATE
MINIMIZE / ELIMINATE
ACHIEVE AND MAINTAIN PARITY, MIMIC, SIMPLIFY
Low
MISSION CRITICAL
High

Applicable at all Levels

- Corporate Strategy
- Product Strategy



A View of Strategy - Apple





Business Case



Business Perspective	Individual Perspective
Sustainable competitive advantage	How can I sell this so that I can get more budget?
	

Delivery Failure

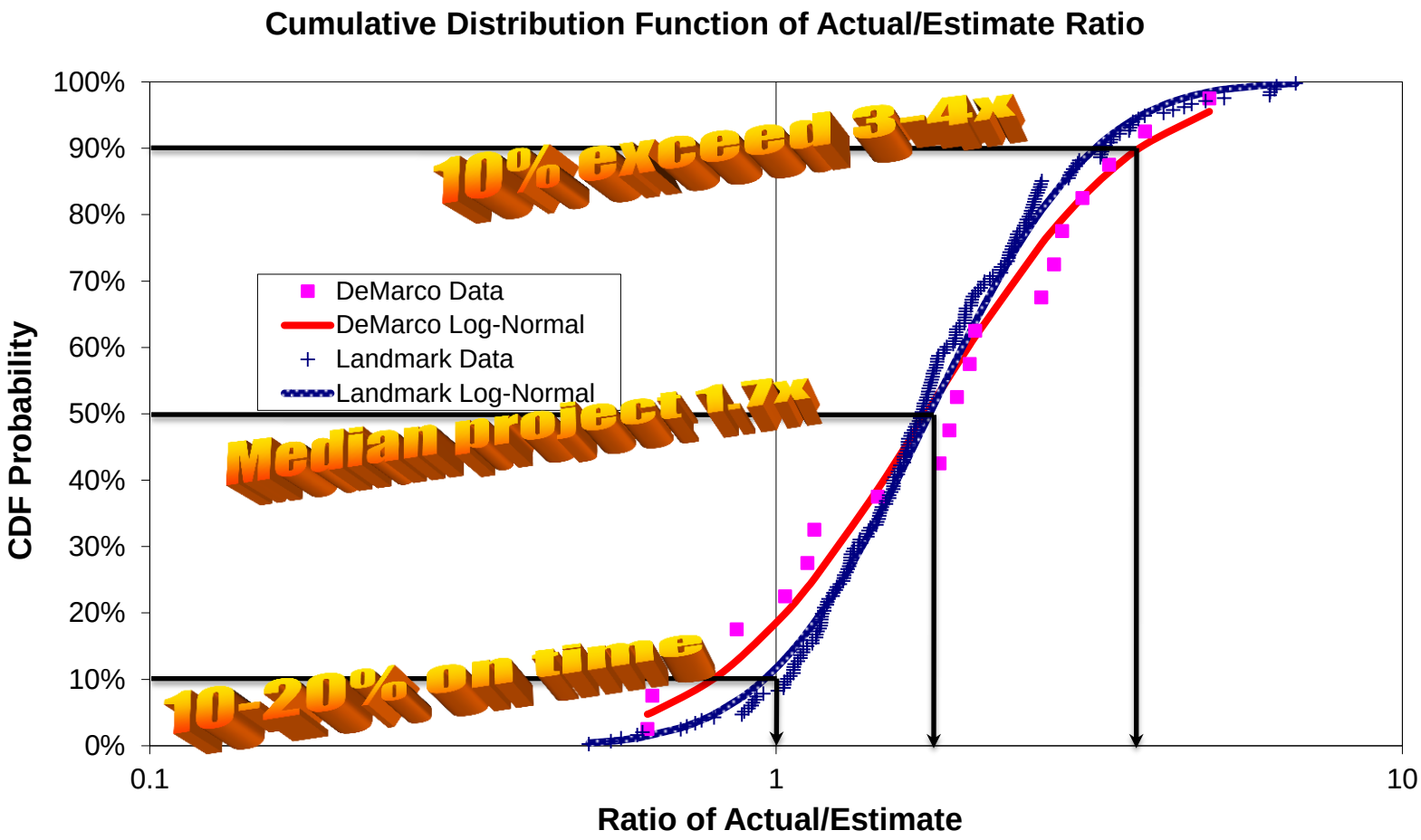


Late

Over Budget



Uncertainty Bounds



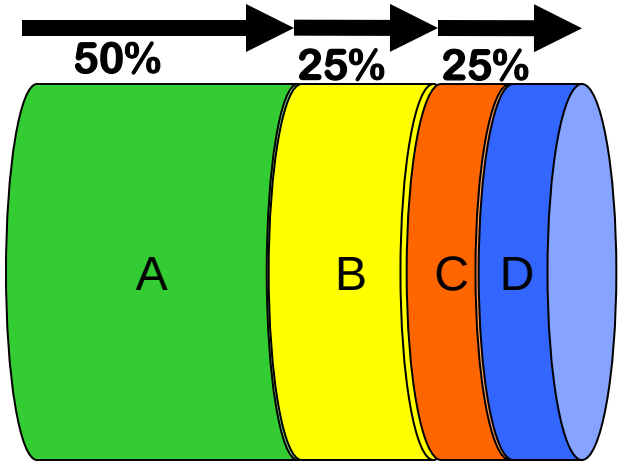
The A/B/C List sets proper expectations

A	MUST be completed in order to ship the product and the schedule will be slipped if necessary to make this commitment.
B	Is TARGETED to be completed in order to ship the product, but may be dropped without consequence.
C	Is NOT TARGETED to be completed prior to shipping, but might make it if time allows.

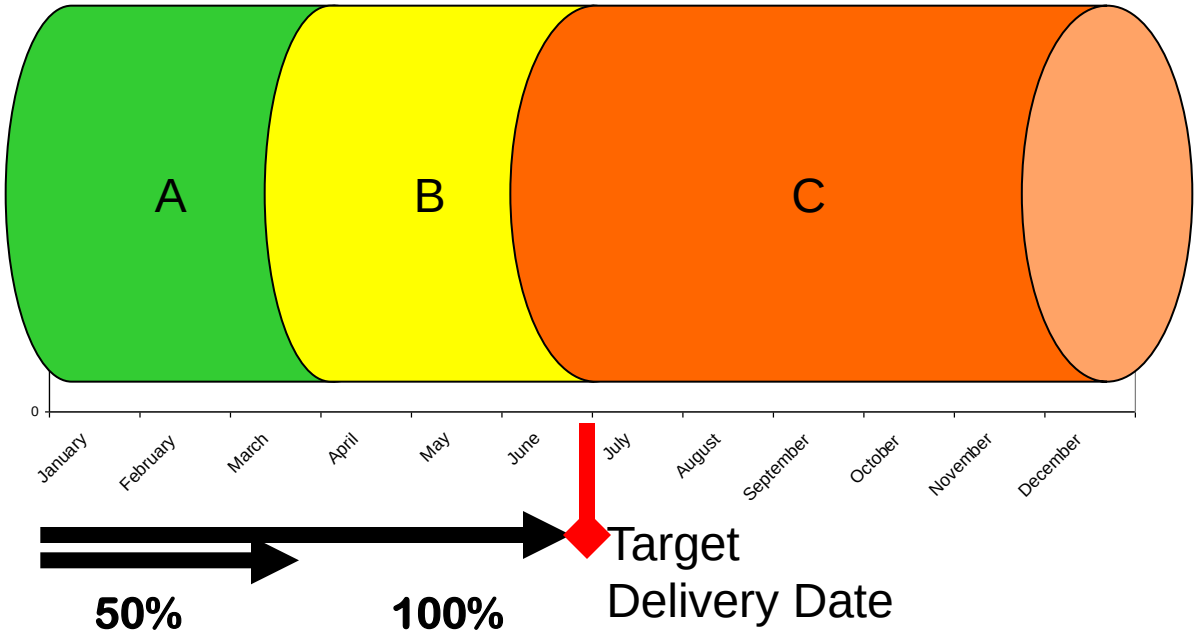
Only “A” features may be committed to customers.

If more than 50% of the planned effort is allocated to “A” items the project is at risk.

A/B/C List

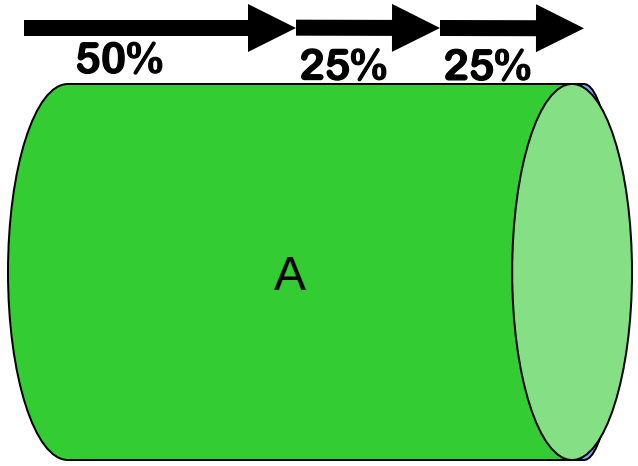


Typical Delivery

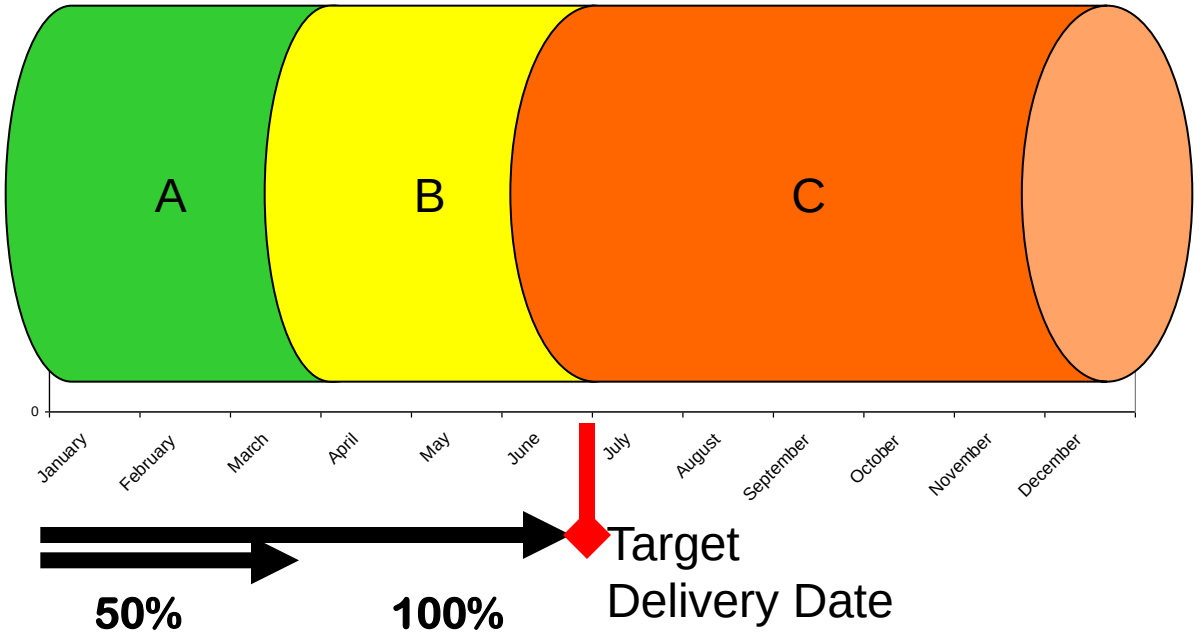


Backlog Plan

A/B/C List

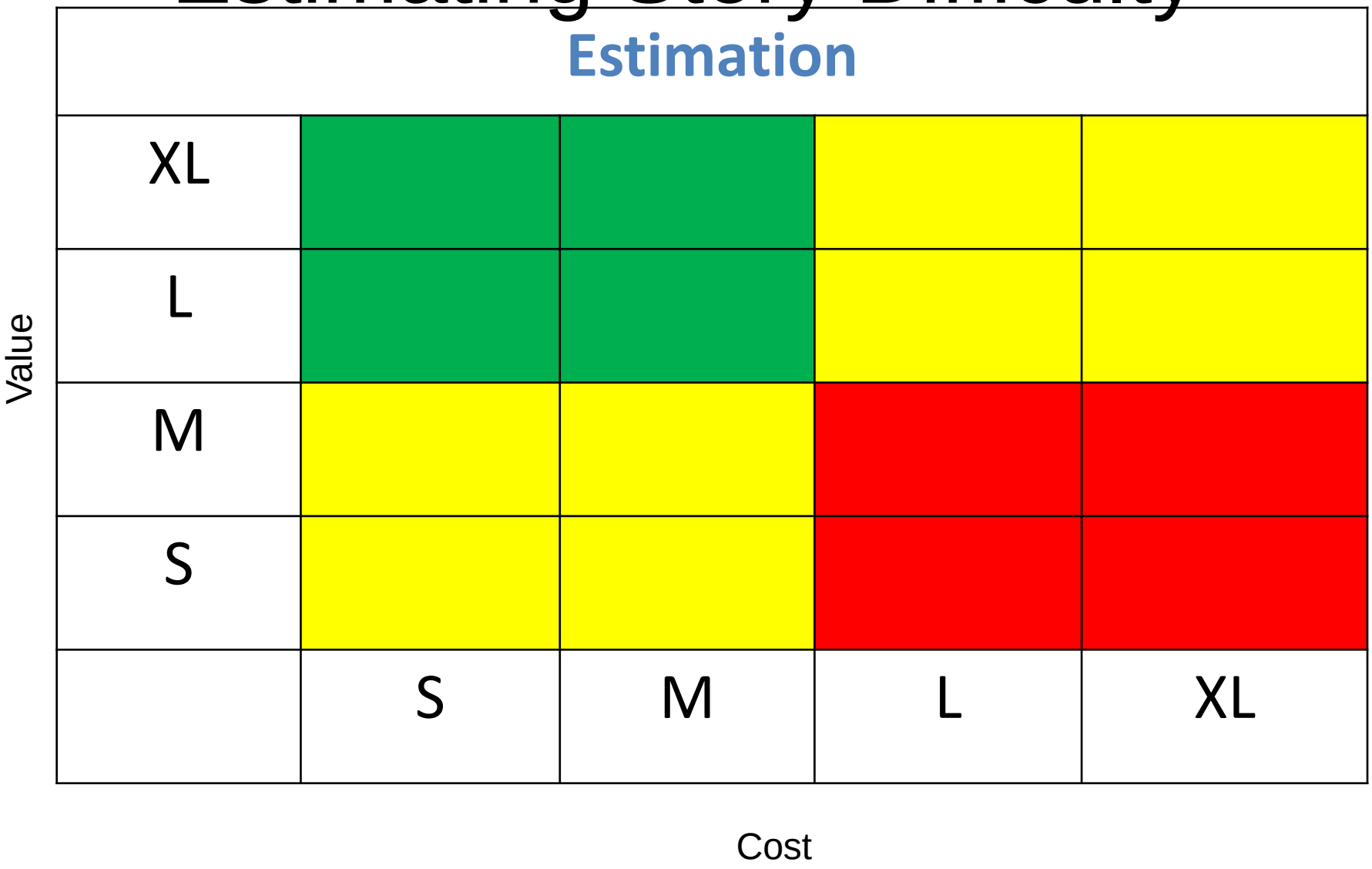


Uncertainty Risk

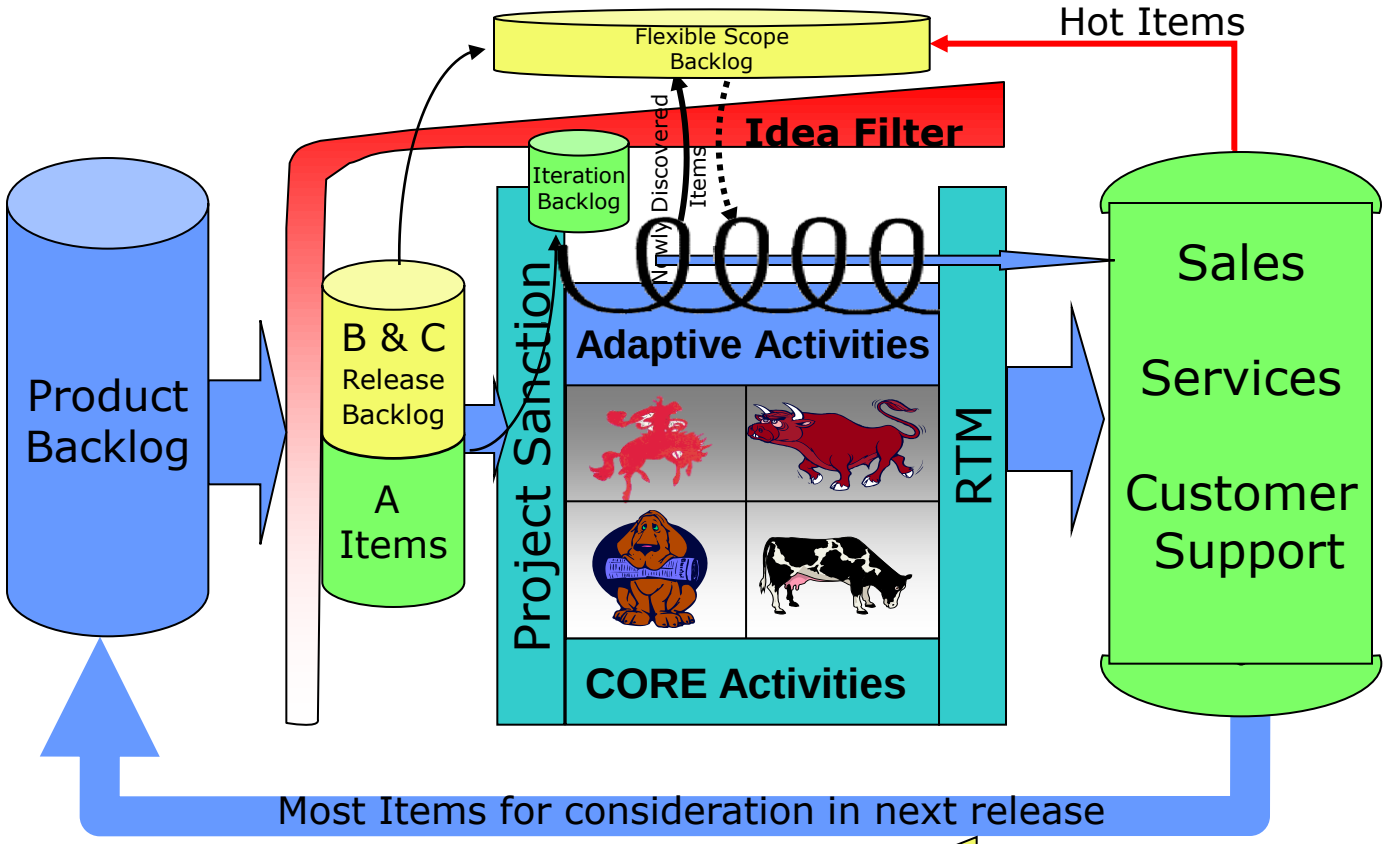


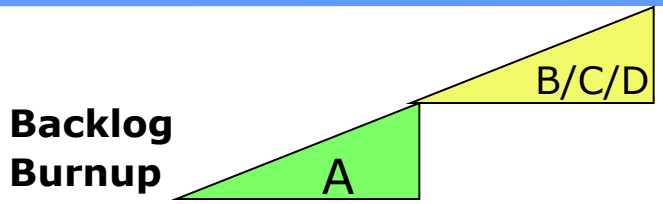
Backlog Plan

Estimating Story Difficulty



Product Innovation Flow





Risk Management = Expectation Management

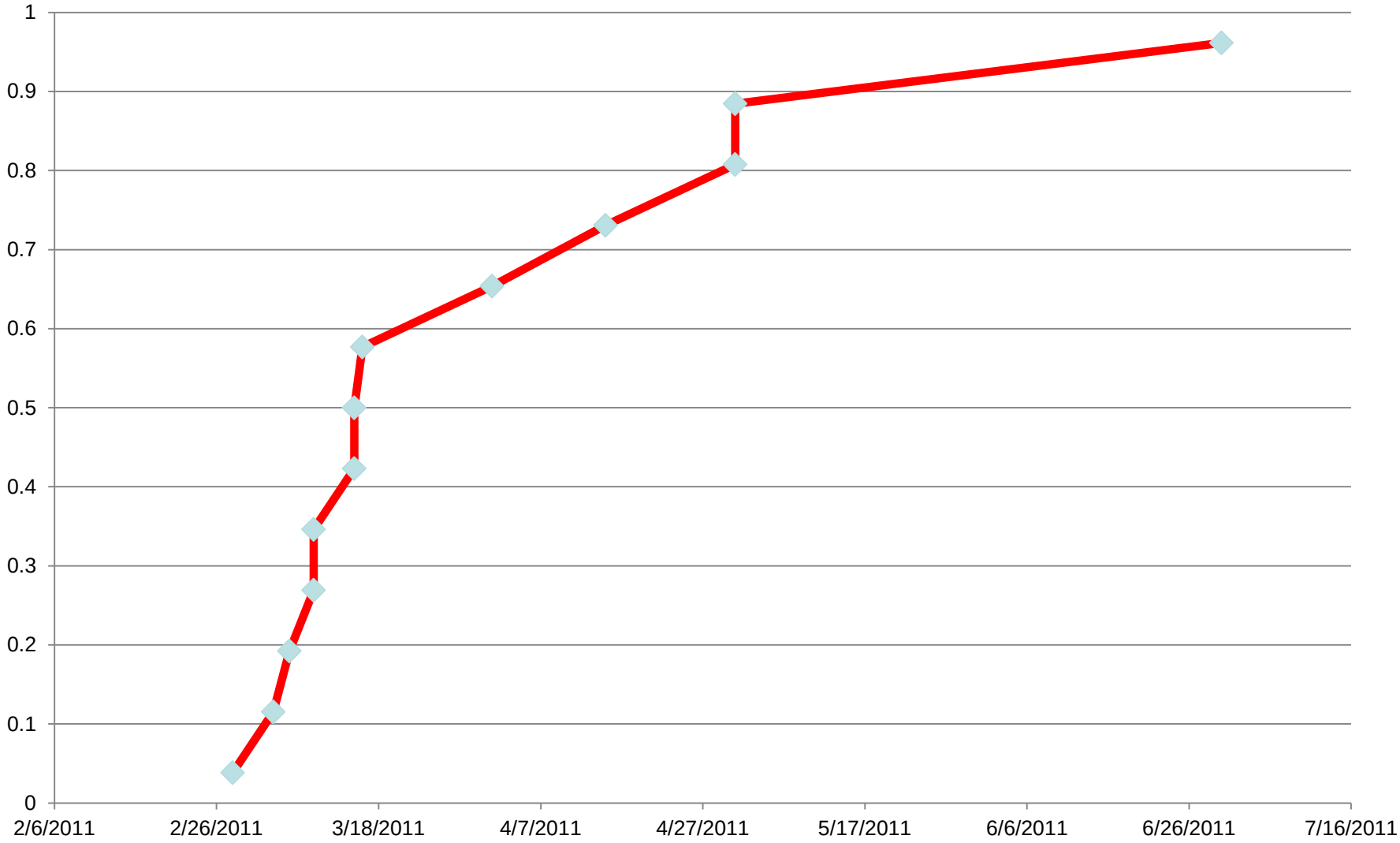
No Surprises!



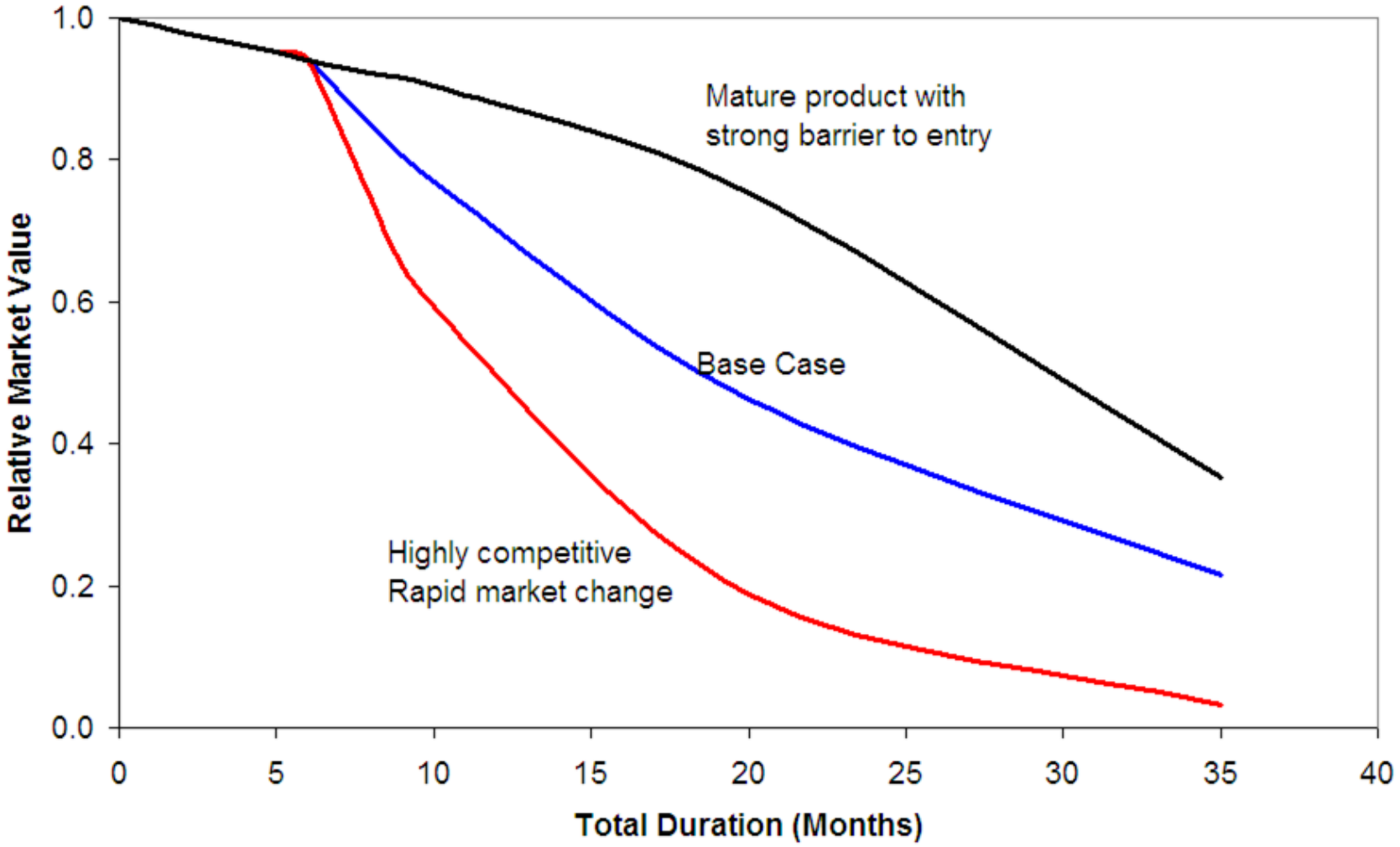
Iteration Review Questions

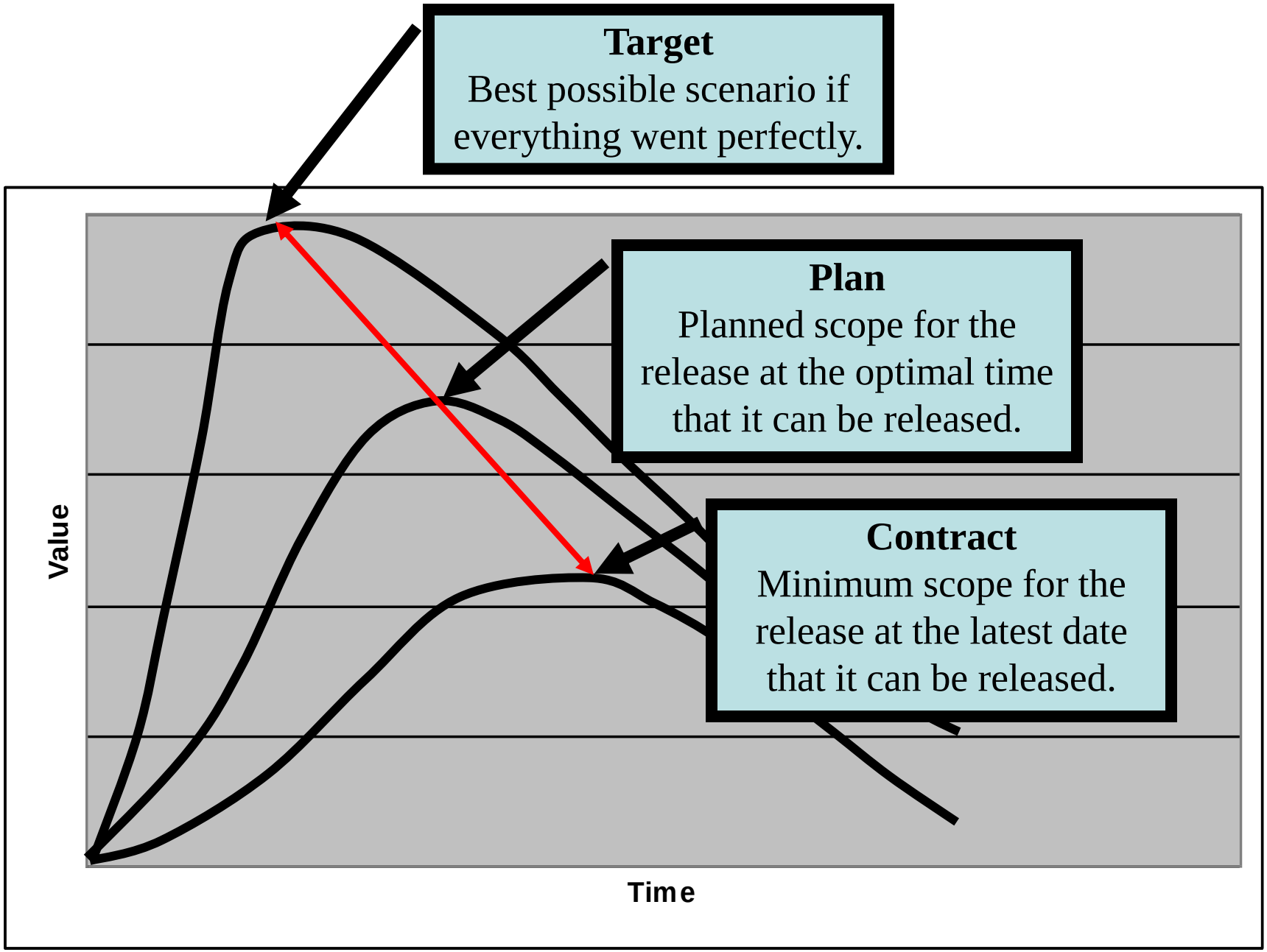
- What promises have been made, to whom were they made, and who made them?
- What key decisions or commitments might we have to make within the next 2 iterations?
- Questions to ask team anonymously
  - When will we be ready to ship?
  - Will we be able to keep our promises?
  - Is the team healthy and operating effectively?
  - Is the team on the right path?

Ask the Team

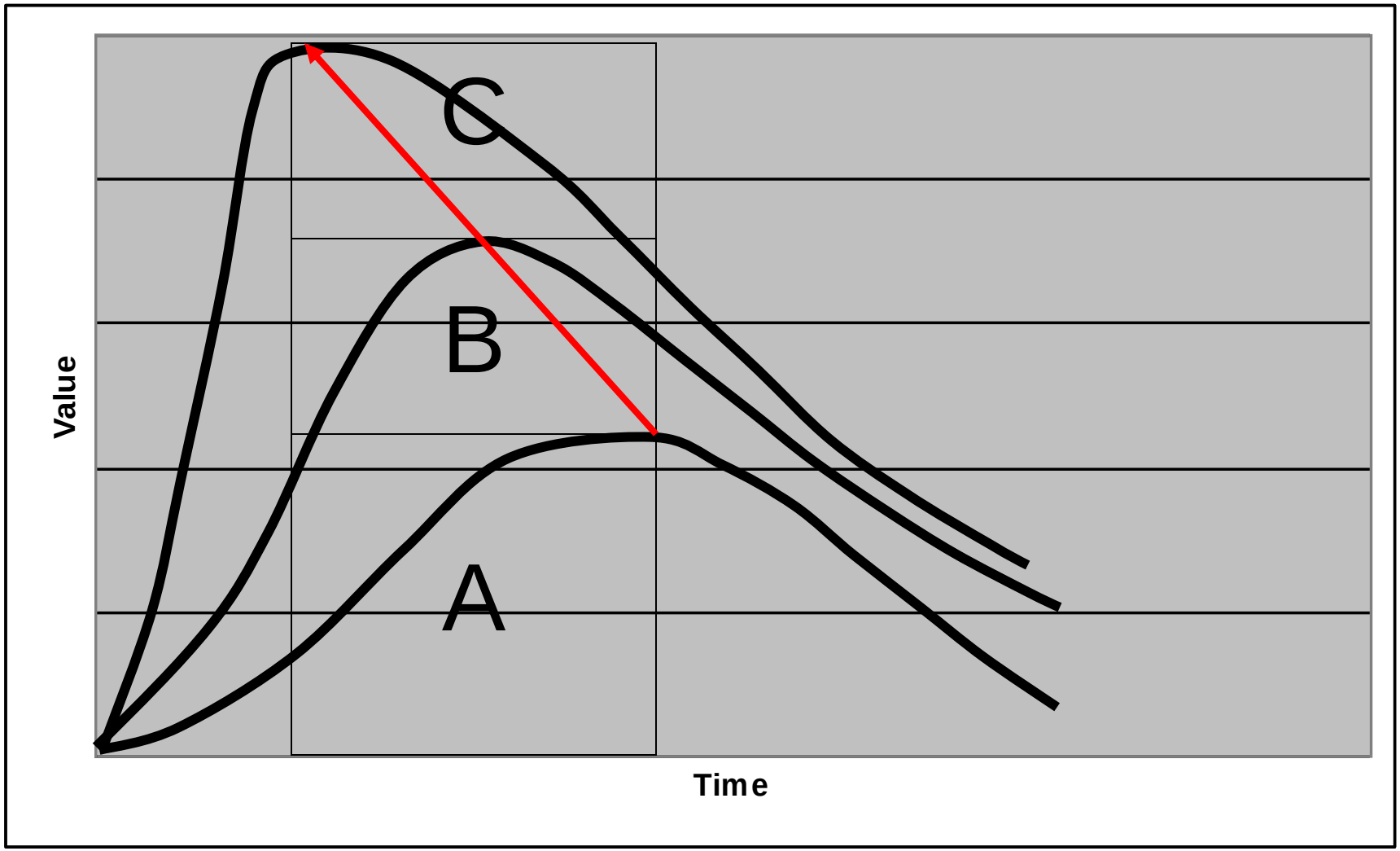

1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2/6/2011
2/26/2011
3/18/2011
4/7/2011
4/27/2011
5/17/2011
6/6/2011
6/26/2011
7/16/2011

Cost of Delay




Target
Best possible scenario if everything went perfectly.
Plan
Planned scope for the release at the optimal time that it can be released.
Contract
Minimum scope for the release at the latest date that it can be released.
Value
Time

Uncertainty



Tools for Delivery Risk



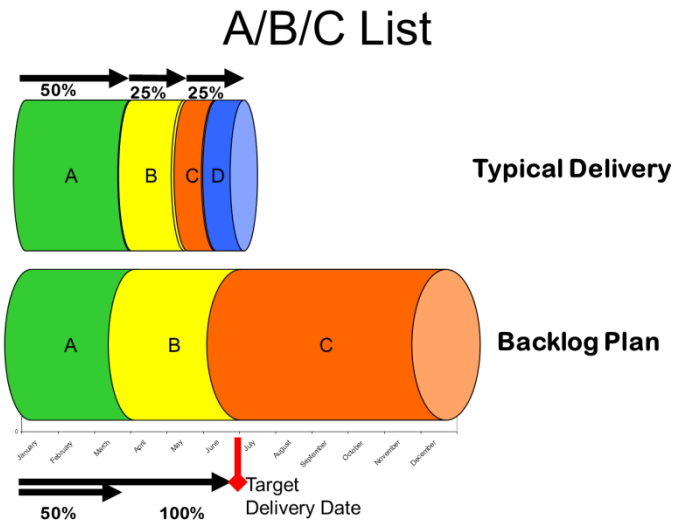
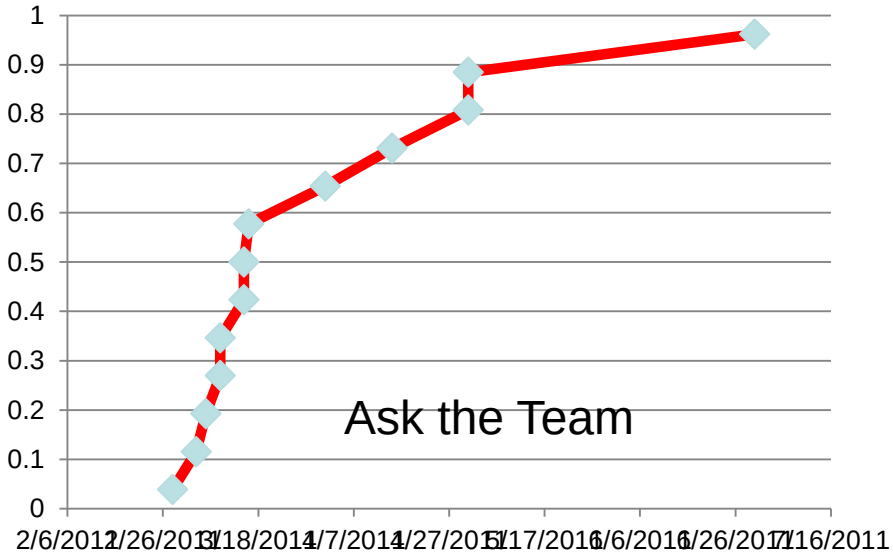
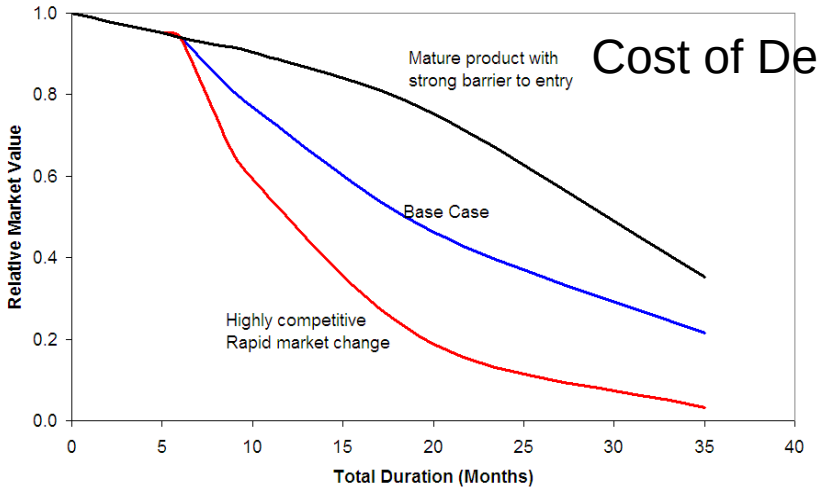


Figure 4: Relative Market Value Capture





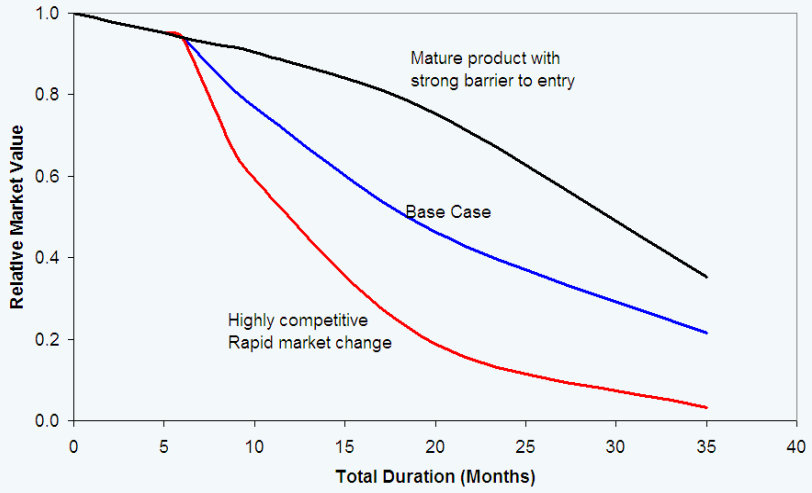


Delivery Risk



Business Perspective	Individual Perspective
Cost of Delay Business Credibility	Personal Credibility

Figure 4: Relative Market Value Capture





Market Acceptance

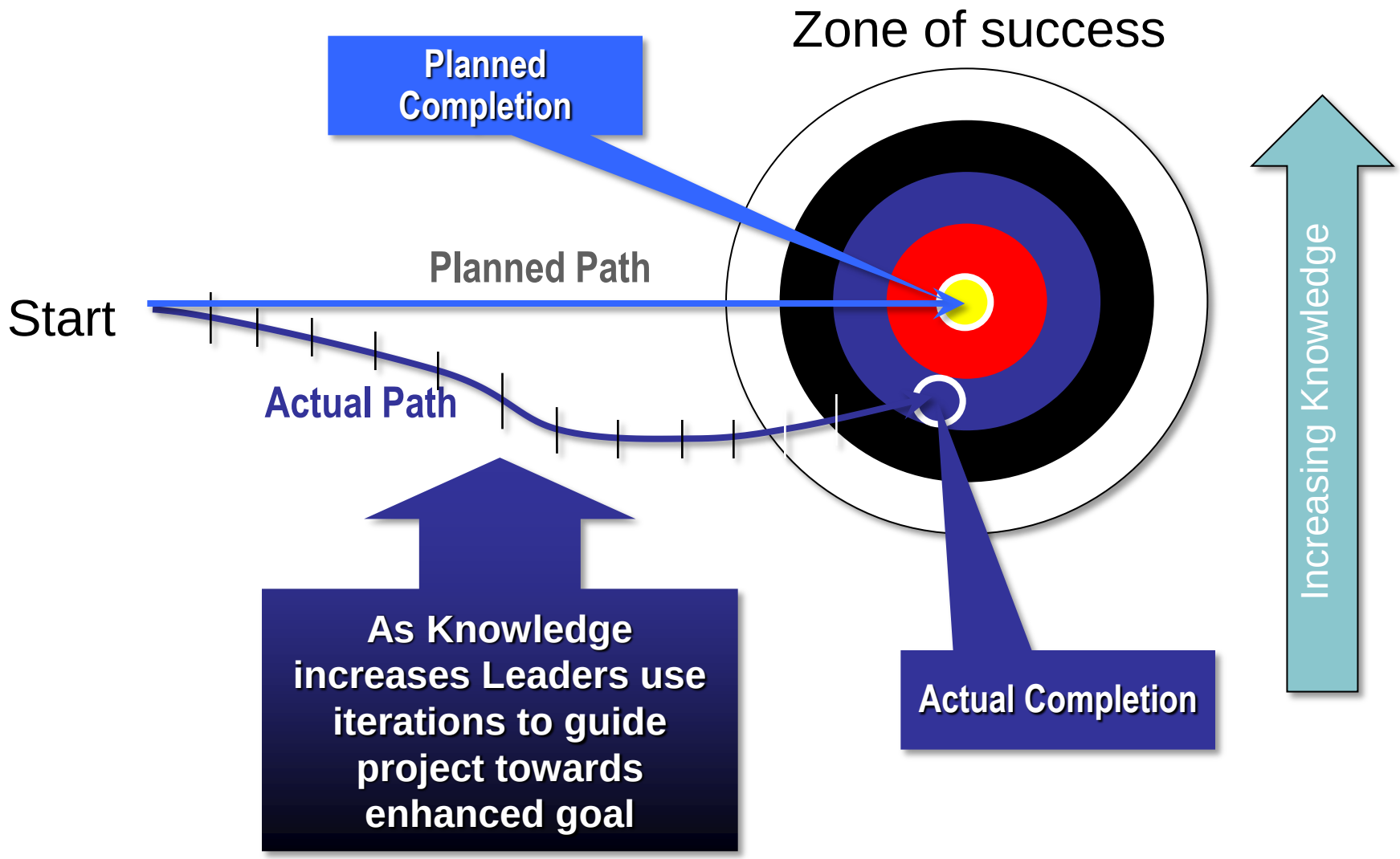


Features and Quality



“I skate to where the puck is going to be, not where it has been.”

Allow Mid Course Corrections

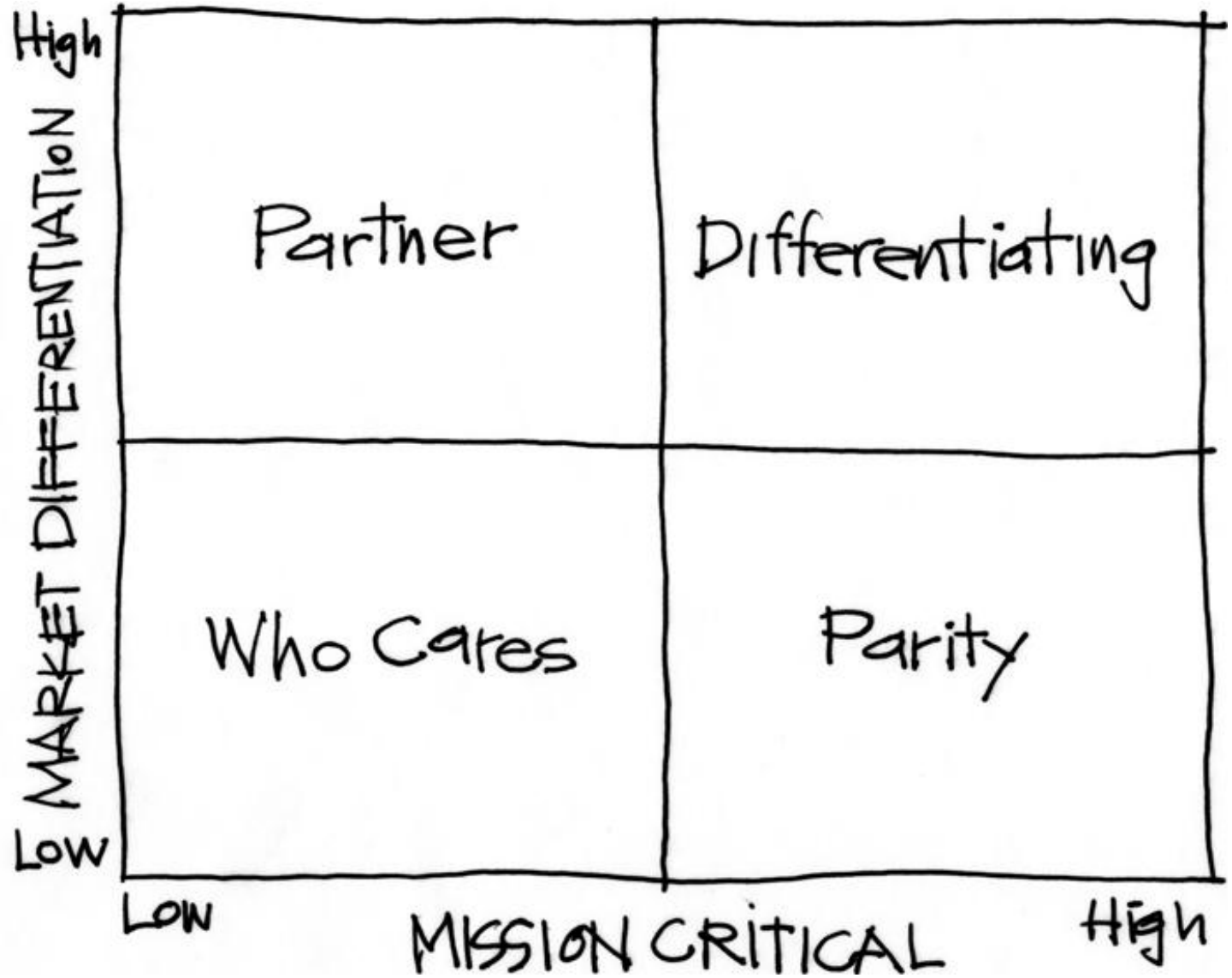


The Cone of Uncertainty

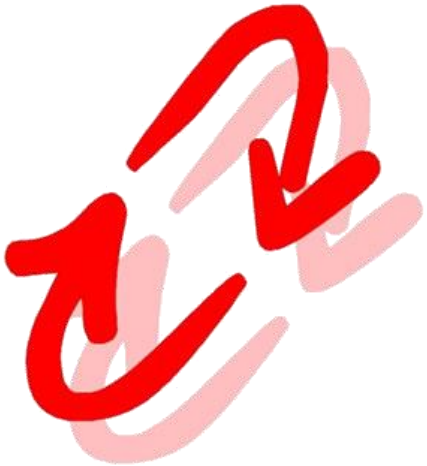


We expect **uncertainty** and manage for it through iterations, anticipation, and adaptation.

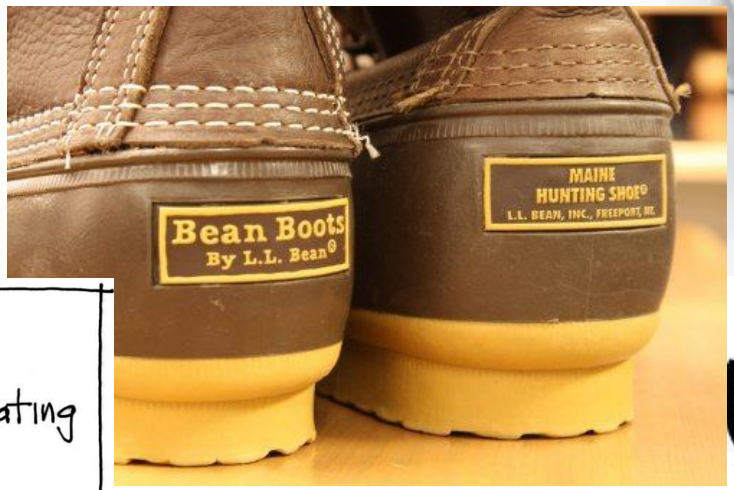
The Purpose Alignment Model



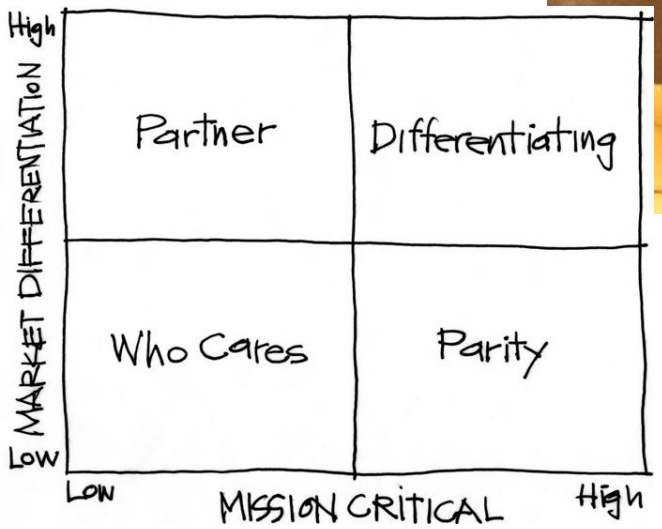
Quality and Market Acceptance Strategies

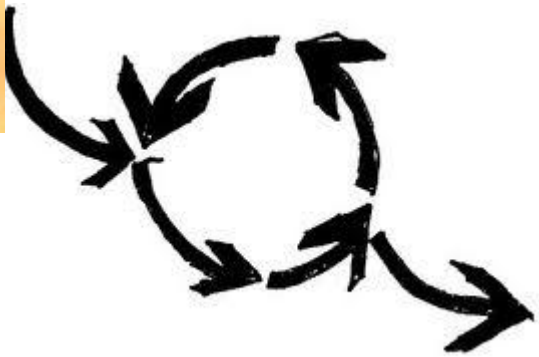


Seek and honor feedback









Incremental Delivery

CAUTION

THIS SIGN HAS

SHARP EDGES

DO NOT TOUCH THE EDGES OF THIS SIGN



ALSO, THE BRIDGE IS OUT AHEAD



Wrong Priorities

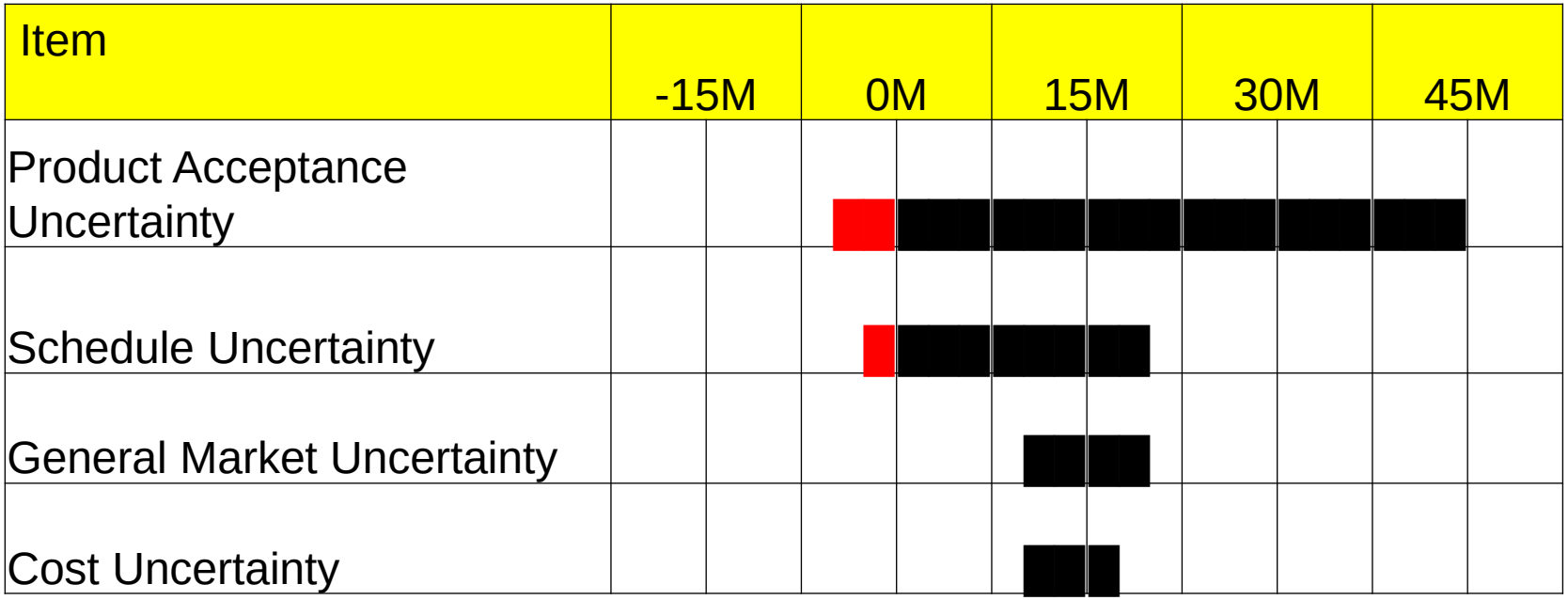


Compute This

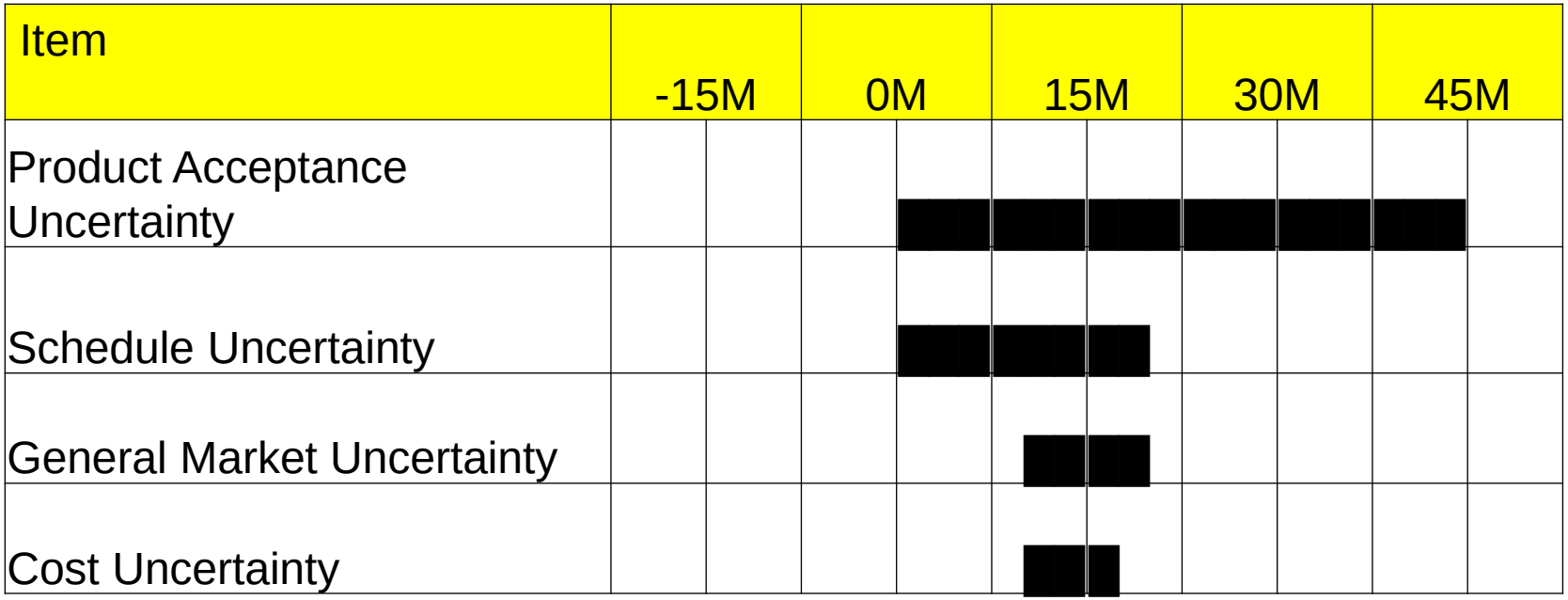
"I recently asked a colleague [CIO] whether he would prefer to deliver a project somewhat late and over-budget but rich with business benefits or one that is on-time and underbudget but of scant value to the business. He thought it was a tough call, and then went for the on-time scenario. Delivering on-time and within budget is part of his IT department's performance metrics. Chasing after the elusive business value, over which he thought he had little control anyway, is not."

Cutter Sr. Consultant Helen Pukszta

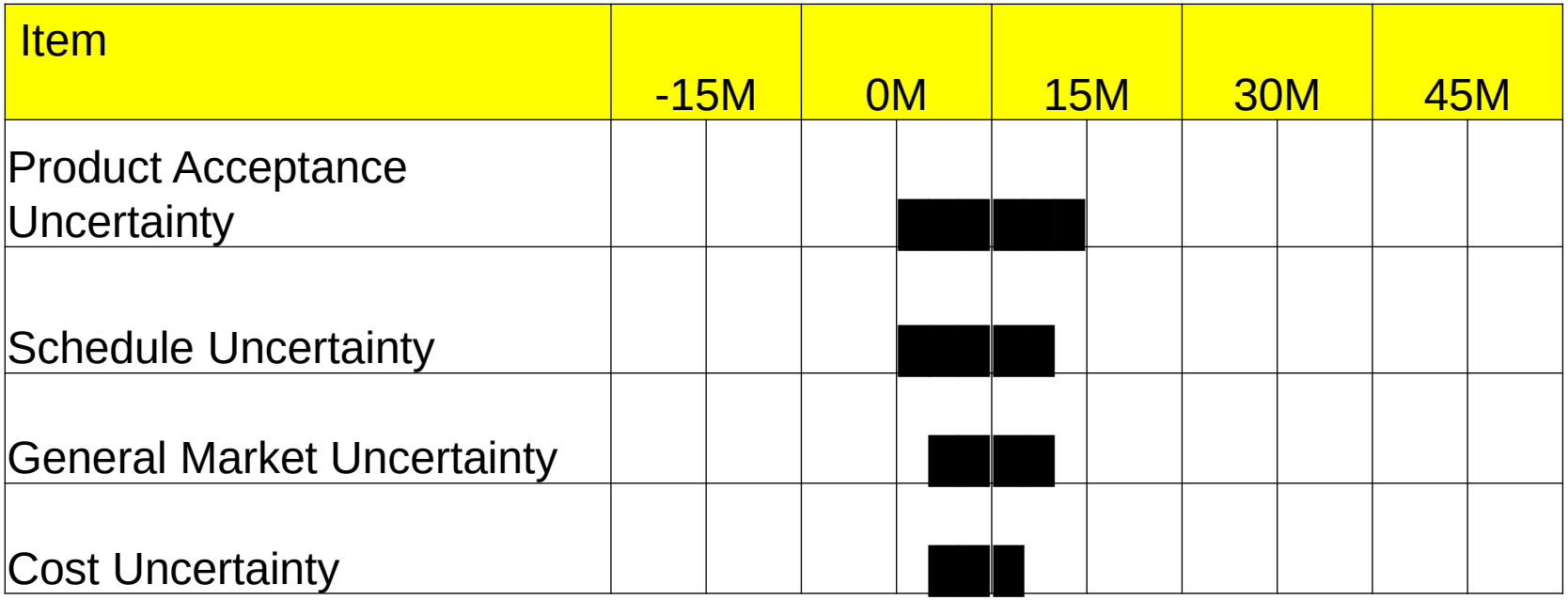
Software Tornado Example



Software Tornado Example



Software Tornado Example



The Measurement Inversion

In a business case, the economic value of measuring a variable is usually inversely proportional to the measurement attention it typically gets.

Lowest Information Value



Highest Information Value

- Initial cost
- Long-term costs
- Cost saving benefit other than labor productivity
- Labor productivity
- Revenue enhancement
- Technology adoption rate
- Project completion

Most Measured



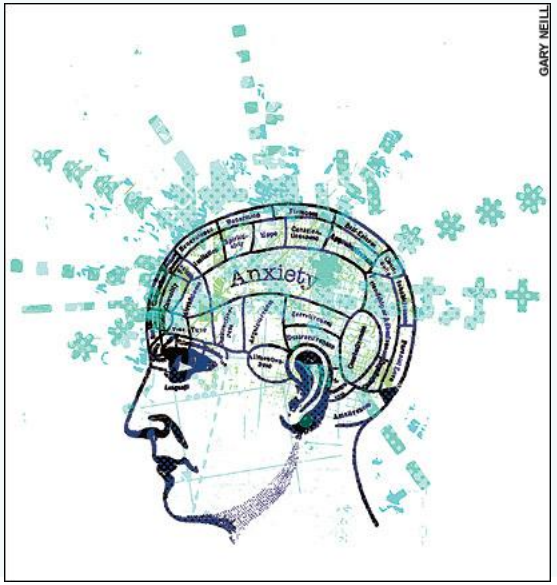
Least Measured

Hubbard Decision Research



Market Acceptance



Business Perspective	Individual Perspective
Impact to revenue Impact to credibility Cost of rework	Priorities are often guided by other perceived constraints
	

Political Risk



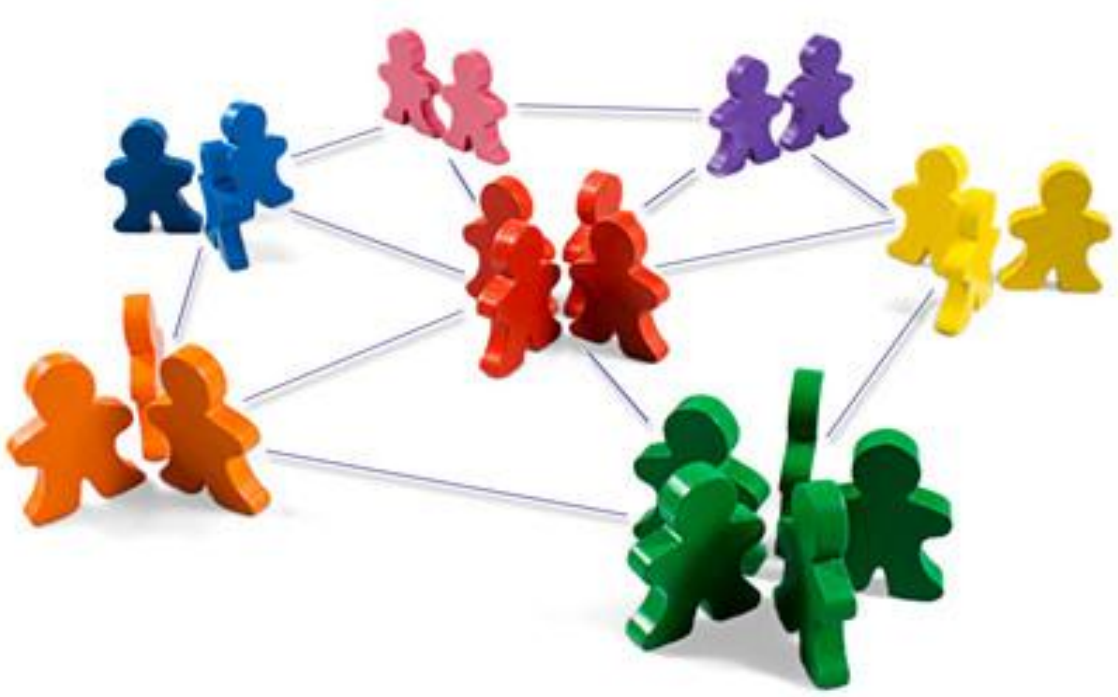
Change
or
Maintain



Political Challenges

Boss and above	Boss's Peers	Boss's Indirect Peers
You	Peers	Indirect Peers
Direct Reports	Peers' Reports	Indirect

Network

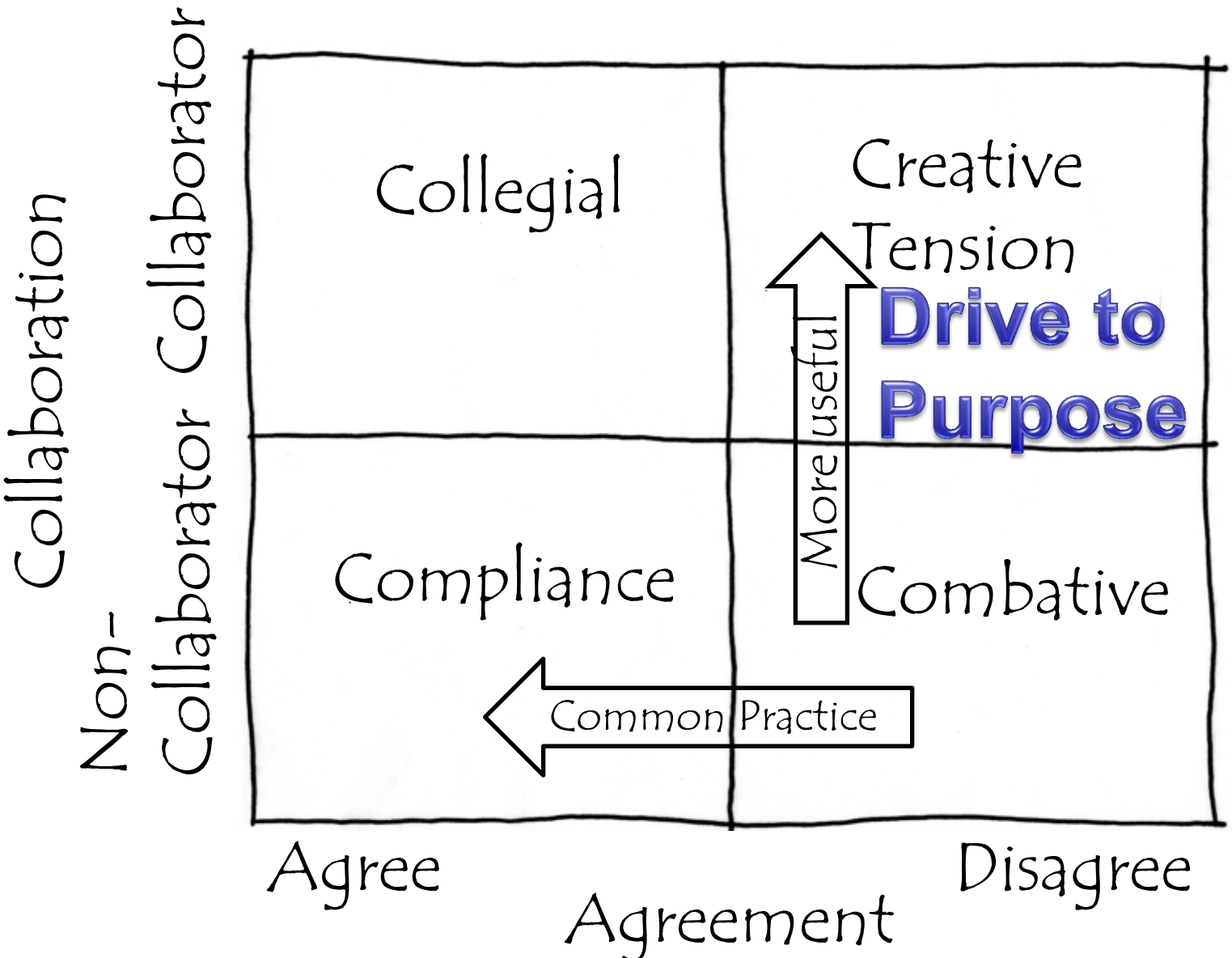


What's in it for them for everyone to succeed?
What do they worry about losing if you are successful?

Long Ago and Far, Far Away…


Management
Project
Review

Collaborating with Non-Collaborators



Agile Leadership





Politics

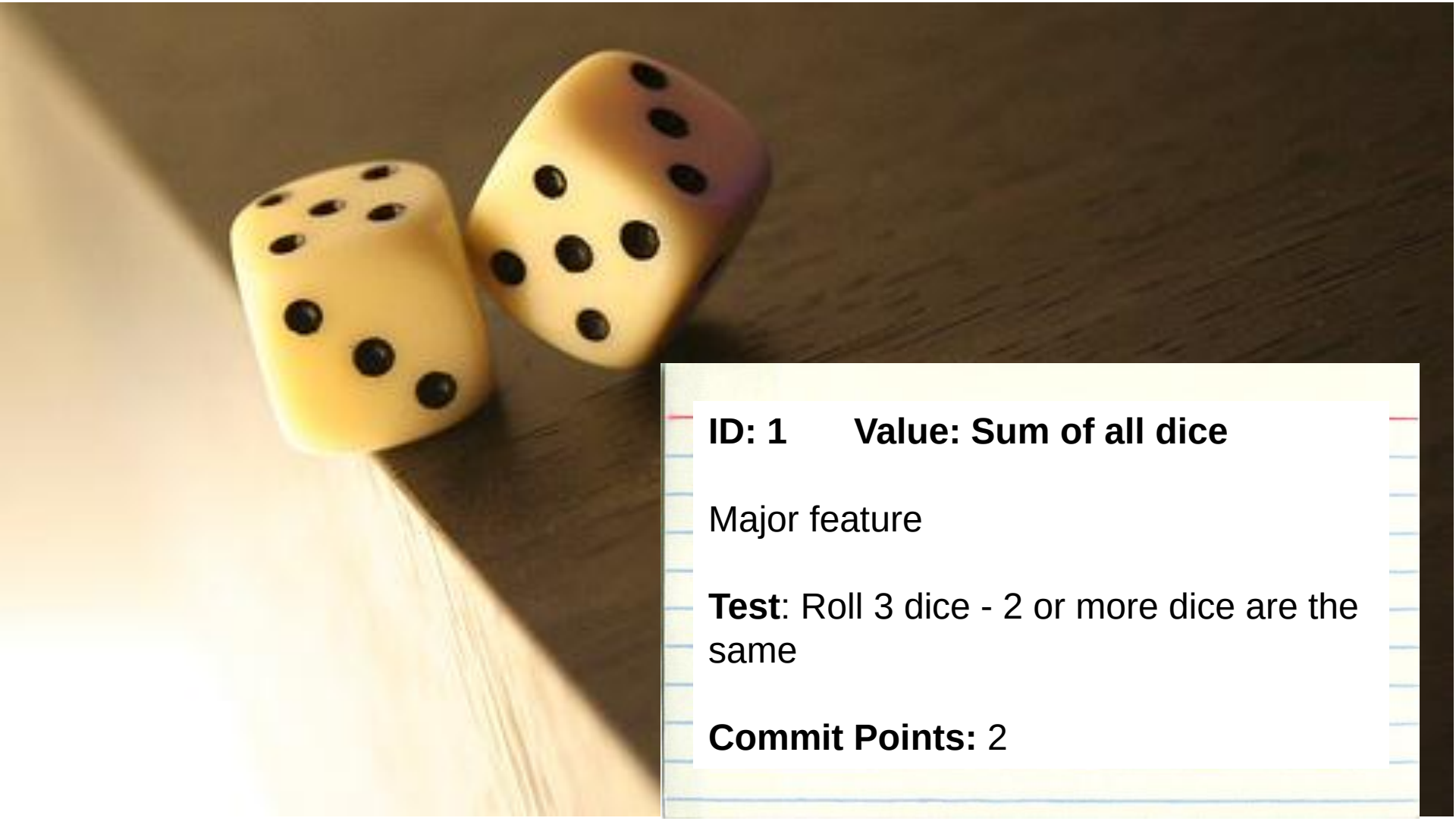


Business Perspective	Individual Perspective
Politics do not add to business value other than by luck	Perception trumps Reality Politics forms Perception
	

Final Summary

Risk	Business Perspective	Individual Perspective	Tools
Business Case	Strategic alignment with market need	Demonstrate Confidence	• Purpose Alignment Model
Collateral Damage	Could be catastrophic	Make or Break career. Individuals may be willing to take more risk than the organization	• Build quality in • Feedback loops
Delivery of Market/ Quality Need	Impact to revenue Impact to credibility Cost of rework	Depends on the individual - Priorities are often guided by other perceived constraints	• Customer Feedback
Delivery on Time or within Budget	Cost of Delay Reduction of ROI Business Credibility	Personal credibility	• Cost of Delay • Tornado Charts
Politics	Markets only care if politics influence external perception.	Perception trumps Reality Politics forms Perception	• Networking & Transparency • Collaborating with Non-Collaborators

Simulation Exercise



ID: 1 **Value: Sum of all dice**

Major feature

Test: Roll 3 dice - 2 or more dice are the same

Commit Points: 2

Stories and Scoring

We will run 3 iterations, with 10 rolls of the dice per iteration

WIP limit of one story in progress

Must commit to 15 pts for the release, and 5 pt per iteration

ID: 1 **Value: Sum of all dice**

Major feature

Test: Roll 3 dice - 2 or more dice are the same

Commit Points: 2

- Points (Value pts and Commit pts) are scored for accepted stories.
- Total points are Value + 10*Commit Points Made.

- Value is just an estimate…the market will decide

Special Actions

- Information
  - At the cost of one roll, you may pre-roll your next turn prior to selecting the story to work on.
- Flexibility
  - At the cost of one roll, you may designate that the story that you will be working on can be refactored at a future date, i.e. you first accept the story, but if a future roll gives an improved result, you may use that roll for the new value
- It is ok abandon a story
- It is ok to redo a story

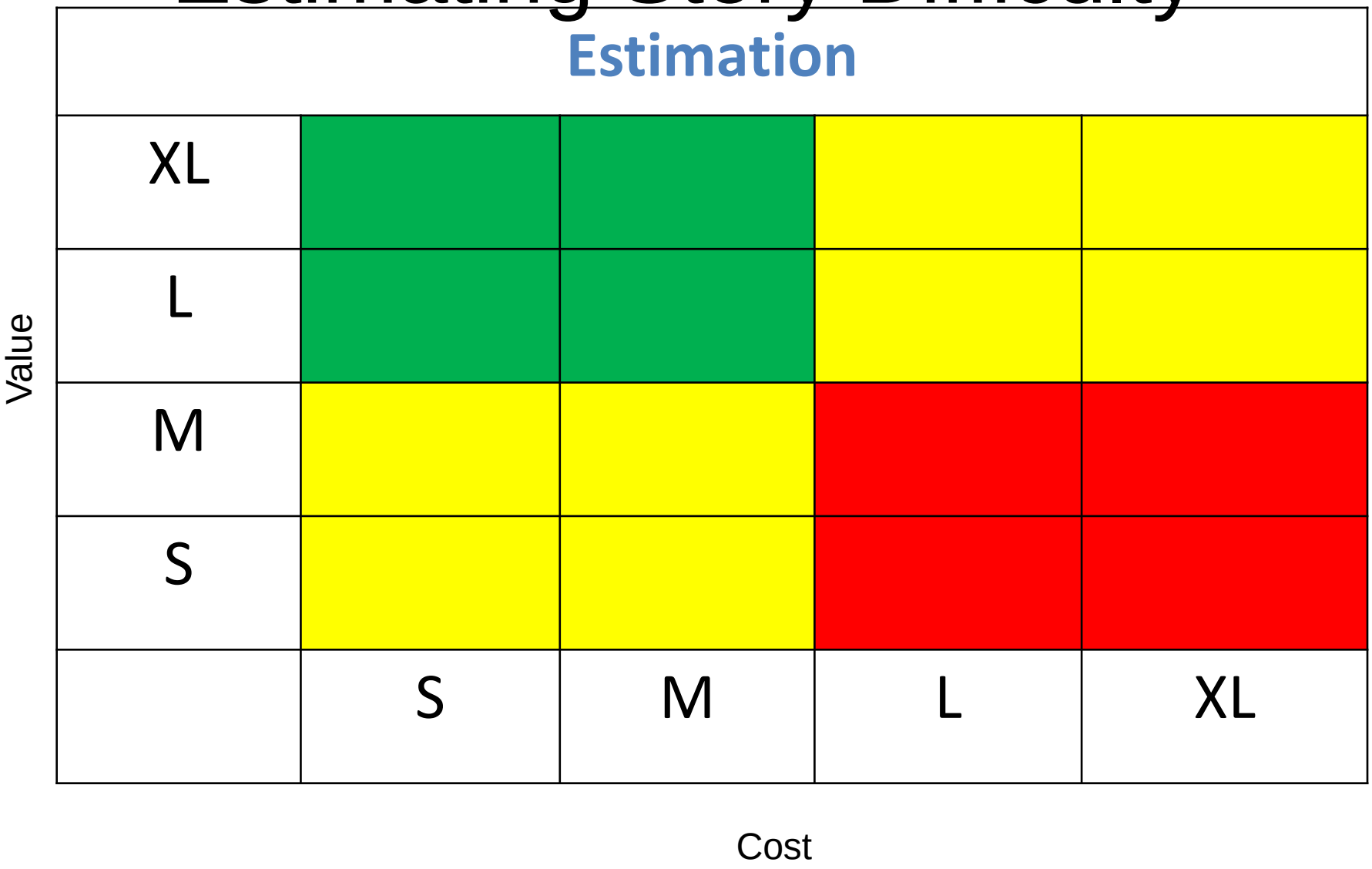
The Progress Board

Backlog	Committed	In Work	Accepted
Committed for this release (A) Cutline Potential stories	Committed for this iteration	In Development	Passes test criteria

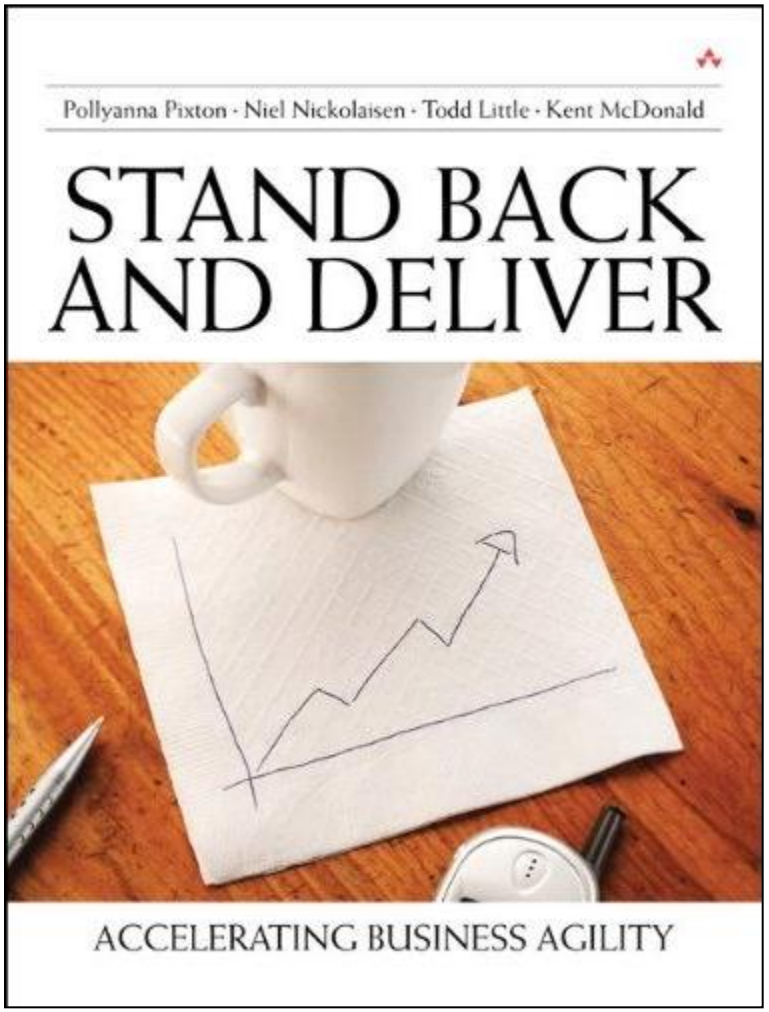
Risk Management is not Risk Aversion



Estimating Story Difficulty



Contact



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