Agile + DevOps EAST

A TECHWELL EVENT

AW9

Agile Product Development
Wednesday, November 7th, 2018 1:30 PM

Financing Agile Delivery with Forecasts

Presented by:

Robert Pieper

Responsive Advisors

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Robert Pieper

Robb Pieper has taught and coached thousands of people on agile frameworks and methodologies. He's worked at all levels, from the team to the C-suite, as a champion of modern management, nimble thinking, and the benefits of business agility. Robb's developed a strong ability to communicate difficult-to-grasp ideas in his long career in software development and client-facing roles. He's a charismatic public speaker, inspiring business leaders and knowledge workers with new ideas to improve. He specializes in executive and management training and coaching but is also passionate about building solid relationships and teams, keeping first things first, and mistake-proofing.

Robb Pieper

- Passionate about solving ***big*** problems in building agile businesses
- Principal / CEO – Responsive Advisors – Chicago, IL
- National public speaker

Professional Scrum Trainer
Scrum.org

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About Responsive Advisors

- Organizational Agile transformation
- Advisory, consulting, coaching
- Private Agile and Professional Scrum courses
- Public Professional Scrum classes in Chicago, NYC, and Los Angeles

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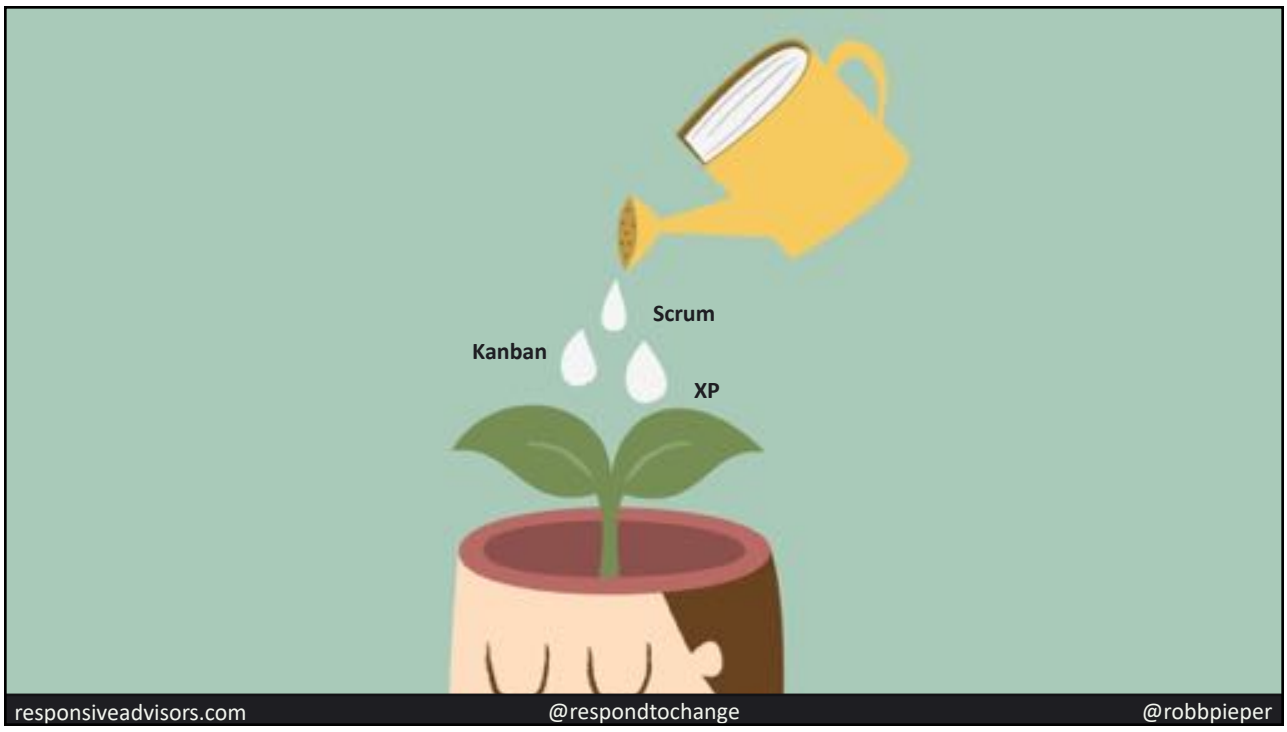
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Kanban
XP
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Practice
Practice
Practice
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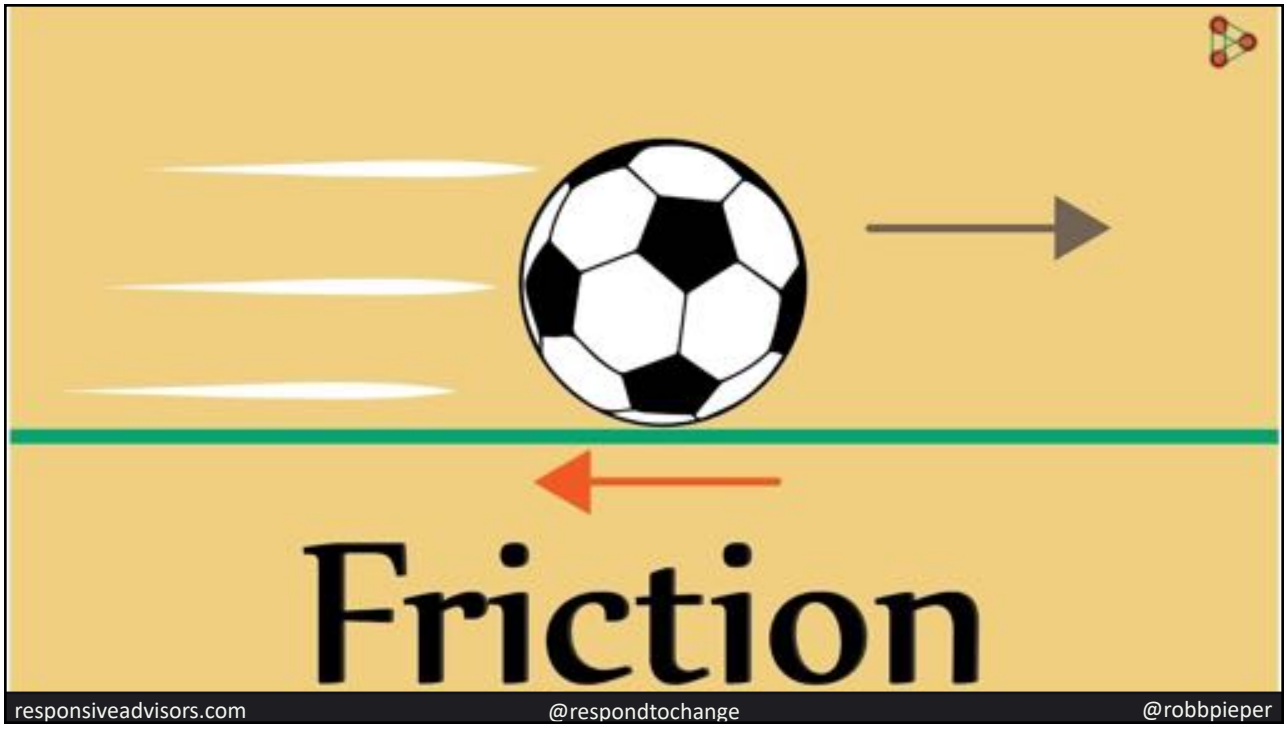
Friction
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LOST
CONFUSED
UNSURE
UNCLEAR
PERPLEXED
DISORIENTED
BEWILDERED
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Agile Delivery
Nimble Finance
Flexible Contracts
Adaptive HR
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1 min

Do estimates help or hurt agile teams?

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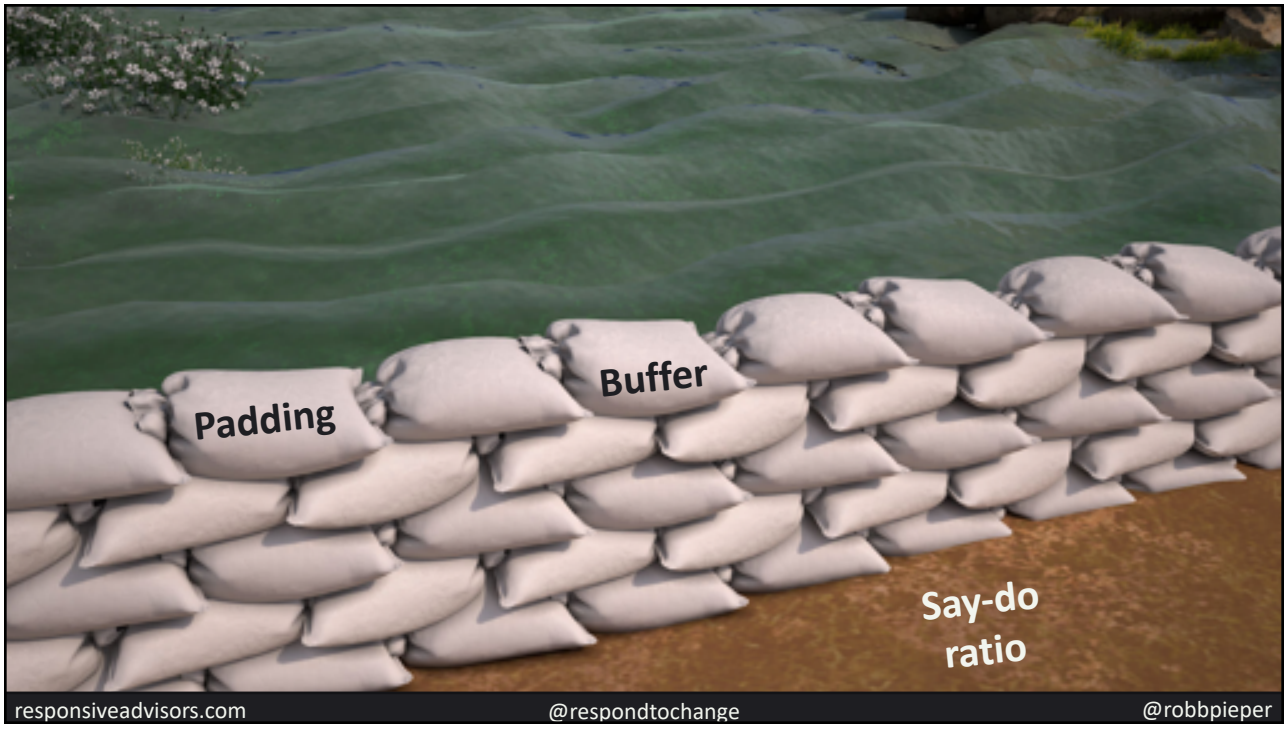

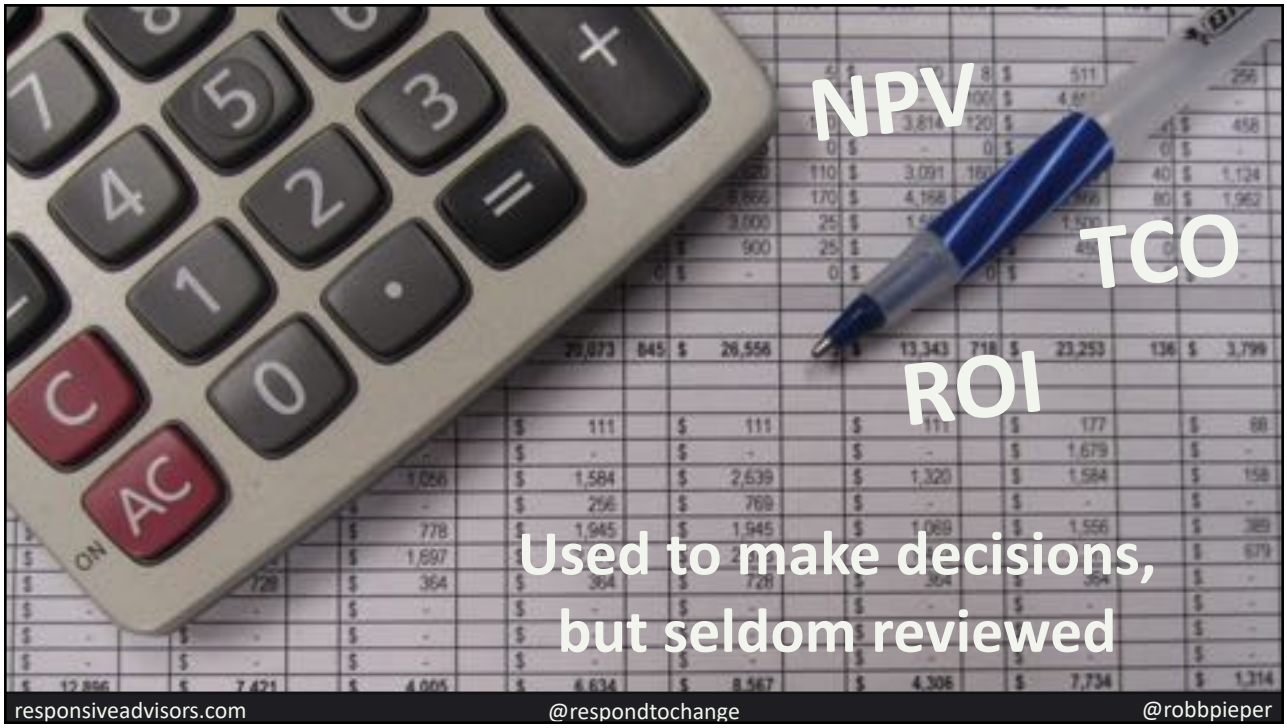

Deterministic

- Each activity has planned value
- Project duration is a fixed value
- Total cost is the sum of activity costs
- Risk defined and handled as static

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Probabilistic

- Elements are random variables drawn from probability distribution
- Total duration is a random variable
- Total cost is a random number
- Risks are stochastic processes that have probabilistic outcomes

1 min

True or false:

We're "agile" so, we shouldn't have to do estimates or commit to dates.

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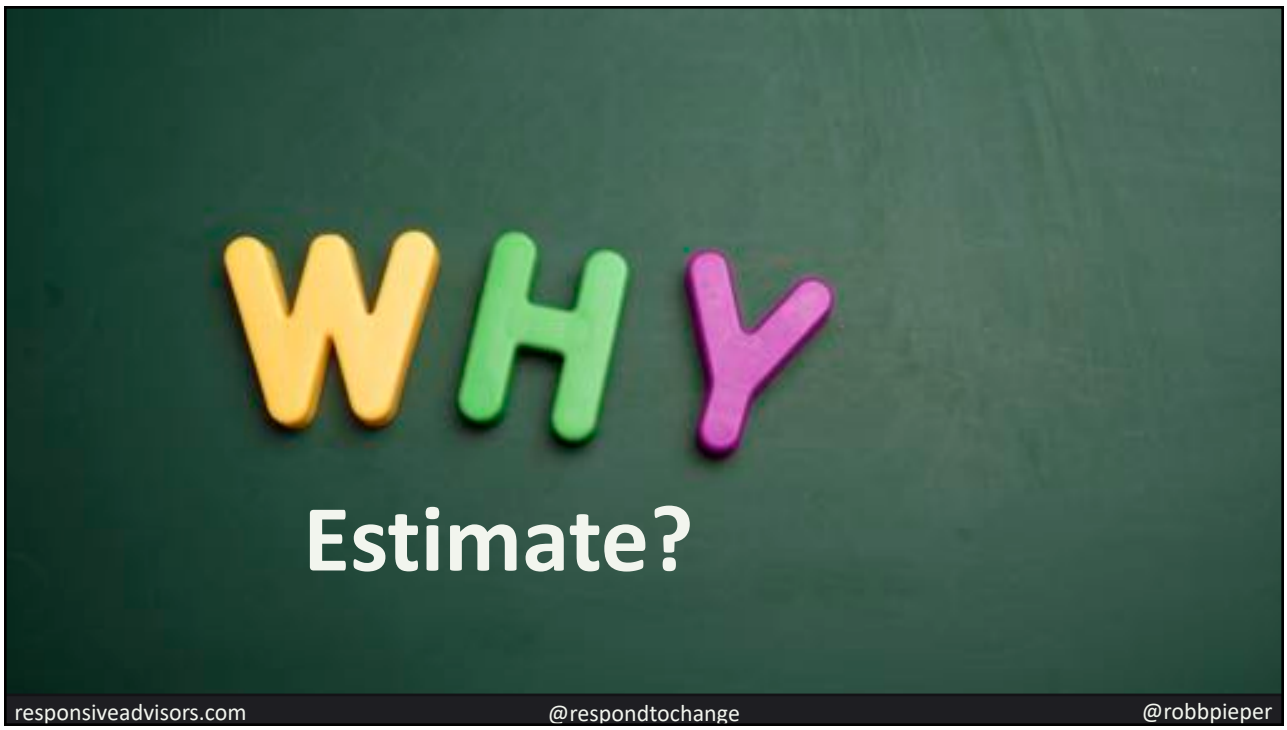
WHY
Estimate?
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1 min

What can change while doing a large project?

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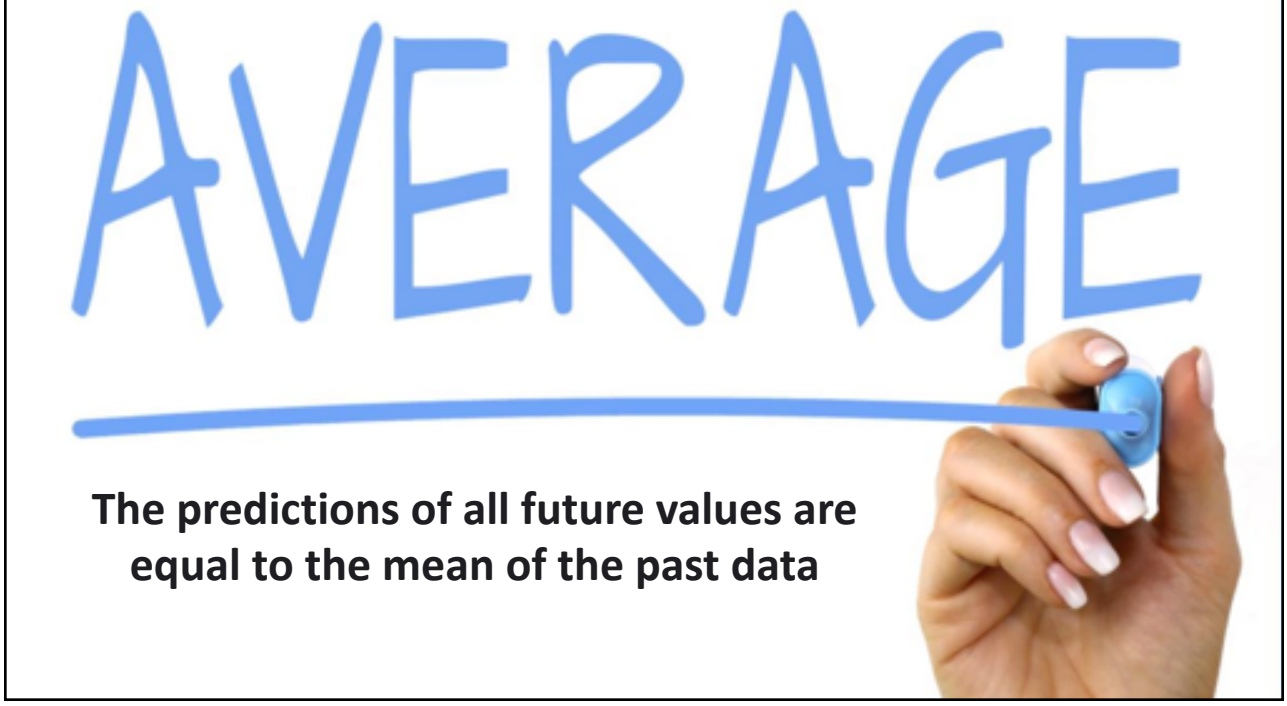
What could change while doing a project?

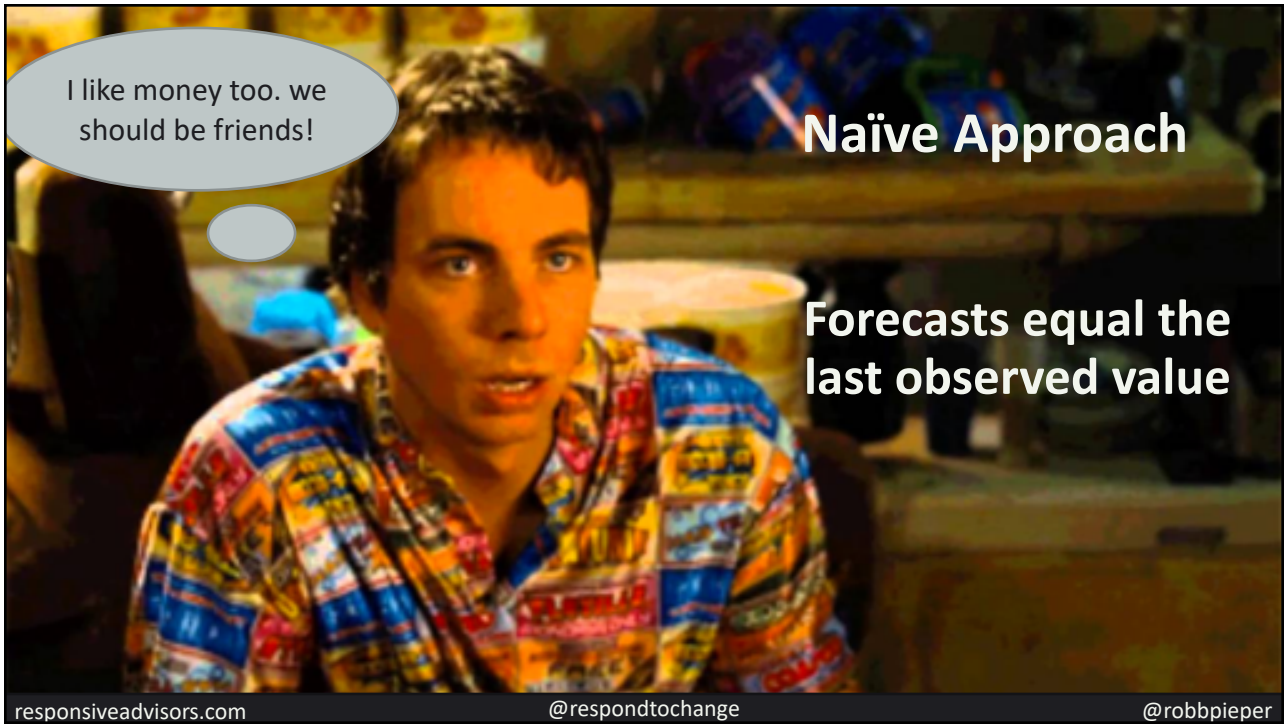
- Sick days
- Requirements change
- Security patch required
- Employees leave
- Personal life problems
- Requirements incorrect
- New priorities
- Merger or acquisition
- People pulled off project
- Customer changes
- Executive leadership changes
- Company vision changes
- Infrastructure upgrade
- Vendor produces wrong thing
- Customer finds a bug
- Architecture didn't scale
- Budget changes
- Sales slow
- Layoffs
- People get promotions
- Maternity leave
- Etc…

What we do is more complex than changing a tire

How to Forecast



The predictions of all future values are equal to the mean of the past data


I like money too. we should be friends!
Naïve Approach
Forecasts equal the last observed value
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Drift Method
RedBull
This is equivalent to drawing a line between the first and last observation, and extrapolating it into the future.
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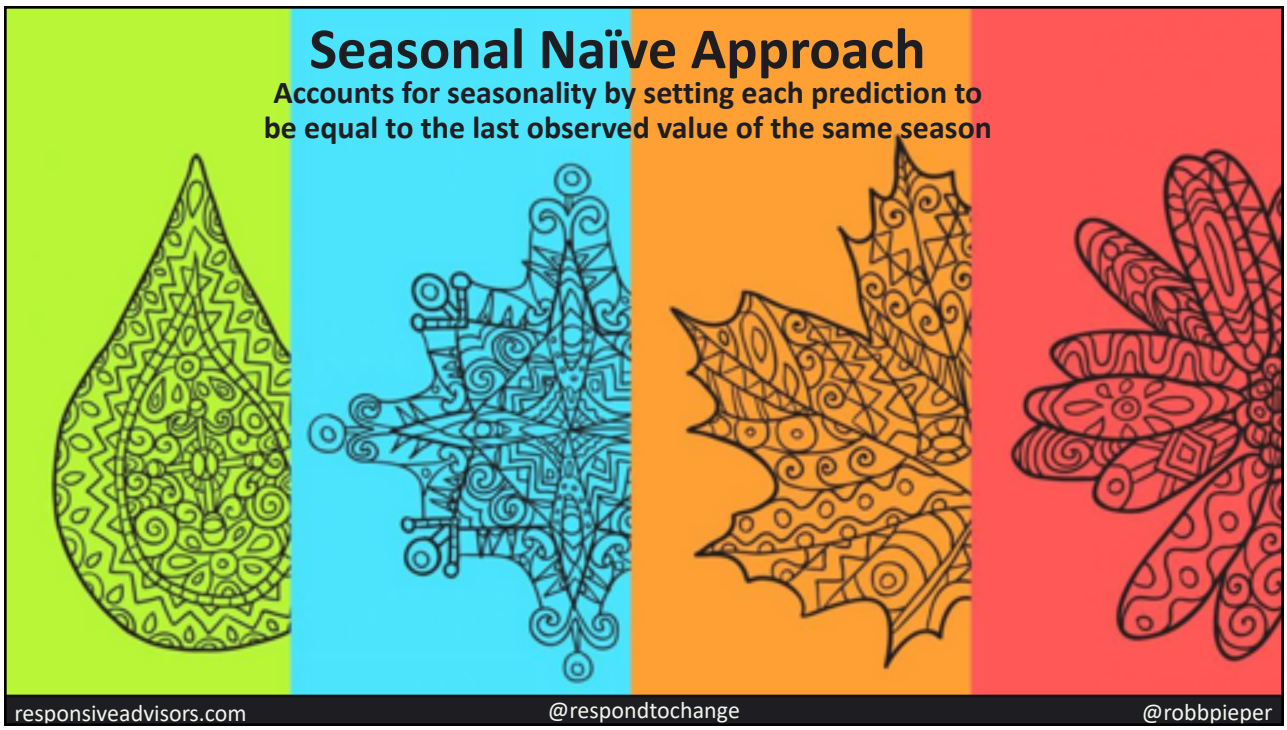
Seasonal Naïve Approach
Accounts for seasonality by setting each prediction to be equal to the last observed value of the same season
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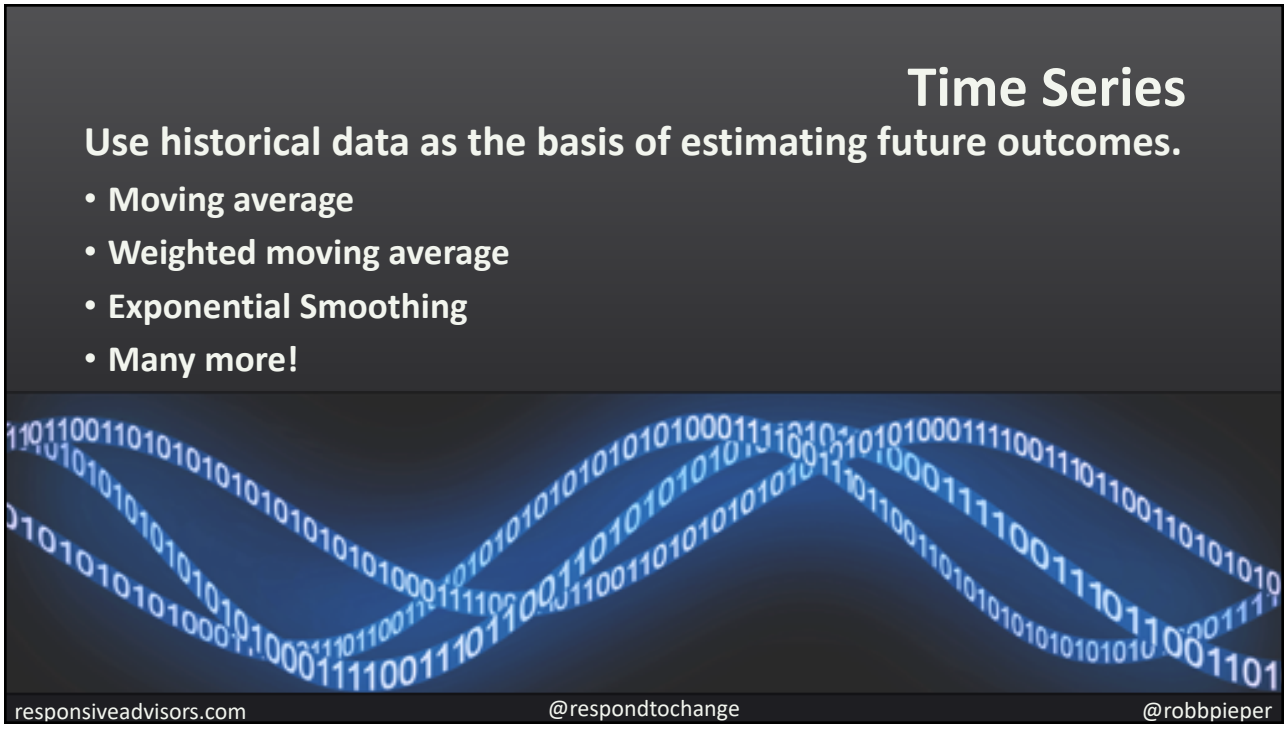
Time Series
Use historical data as the basis of estimating future outcomes.
• Moving average
• Weighted moving average
• Exponential Smoothing
• Many more!
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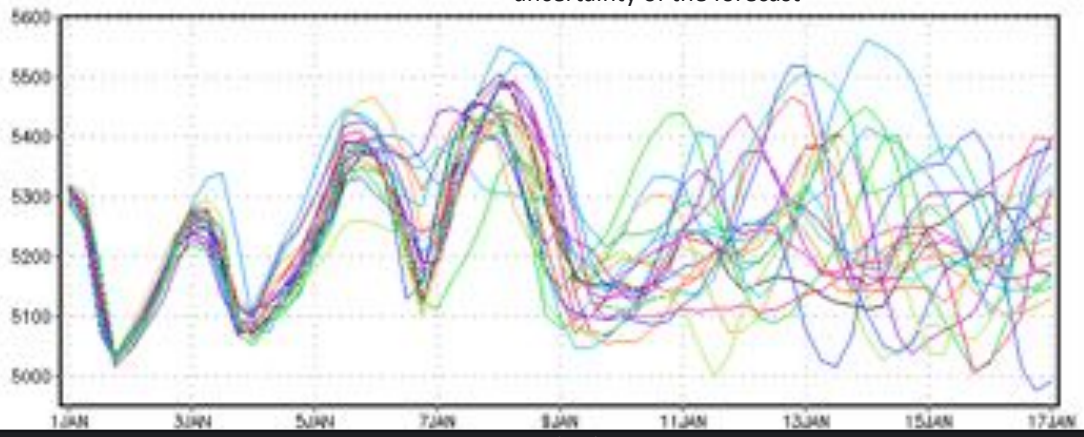
Ensemble forecast

- Instead of one forecast, several are produced
- Helps produce range of possible future states
- It's a form of *Monte Carlo Analysis*
- Ideally, the verified future state should fall within the predicted ensemble spread
- the amount of spread should be related to the uncertainty of the forecast



Forecasting Weather


WGN9 WEATHER
SEVEN DAY FORECAST
wgntv.com/weather
MON
BREEZY
40
29
TUE
BREEZY
35
24
WED
43
20
THU
49
30
FRI
50%
PM
52
33
SAT
53
40
SUN
40%
Eve
54
43
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WGN9 WEATHER
SEVEN DAY FORECAST
wgntv.com/weather
SAT
SNOW EARLY
SNOW
32
20
SUN
38
WINDY
27
MON
SNOW
37
20
TUE
COLD
24
13
WED
32
23
THU
30
21
FRI
34
22
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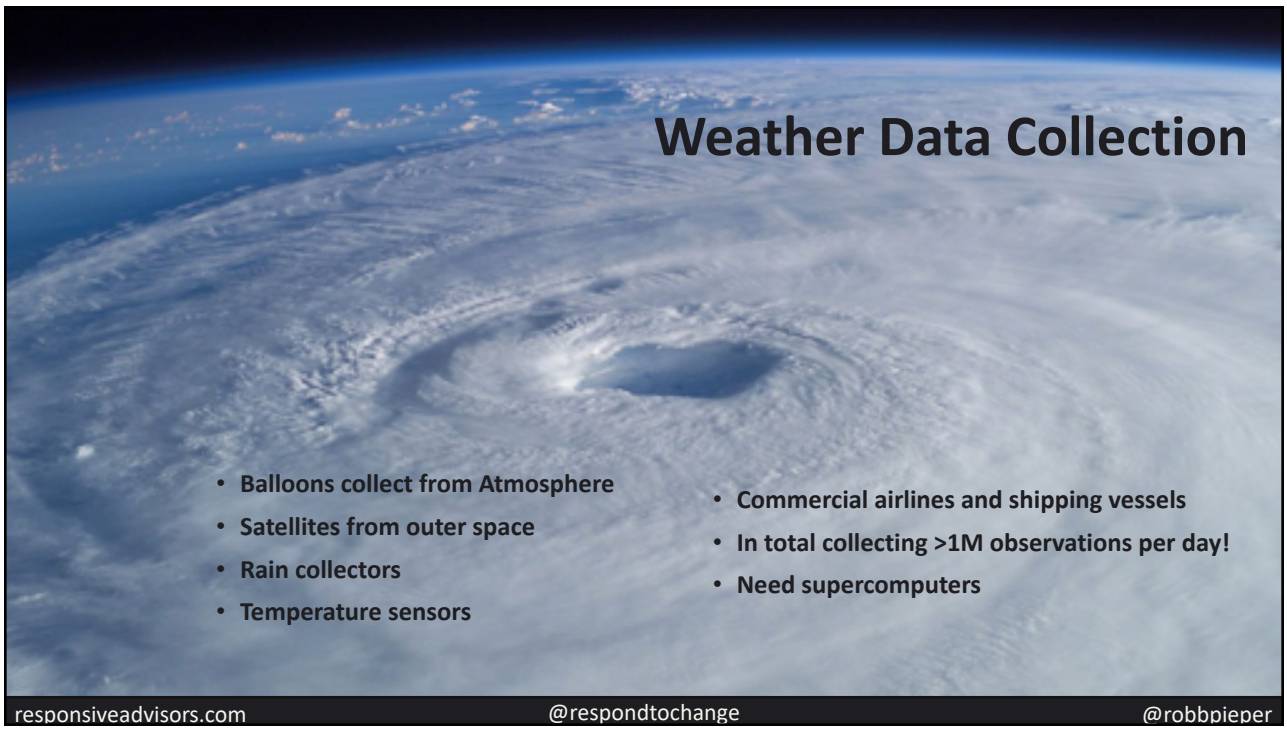
Weather Data Collection
• Balloons collect from Atmosphere
• Satellites from outer space
• Rain collectors
• Temperature sensors
• Commercial airlines and shipping vessels
• In total collecting >1M observations per day!
• Need supercomputers
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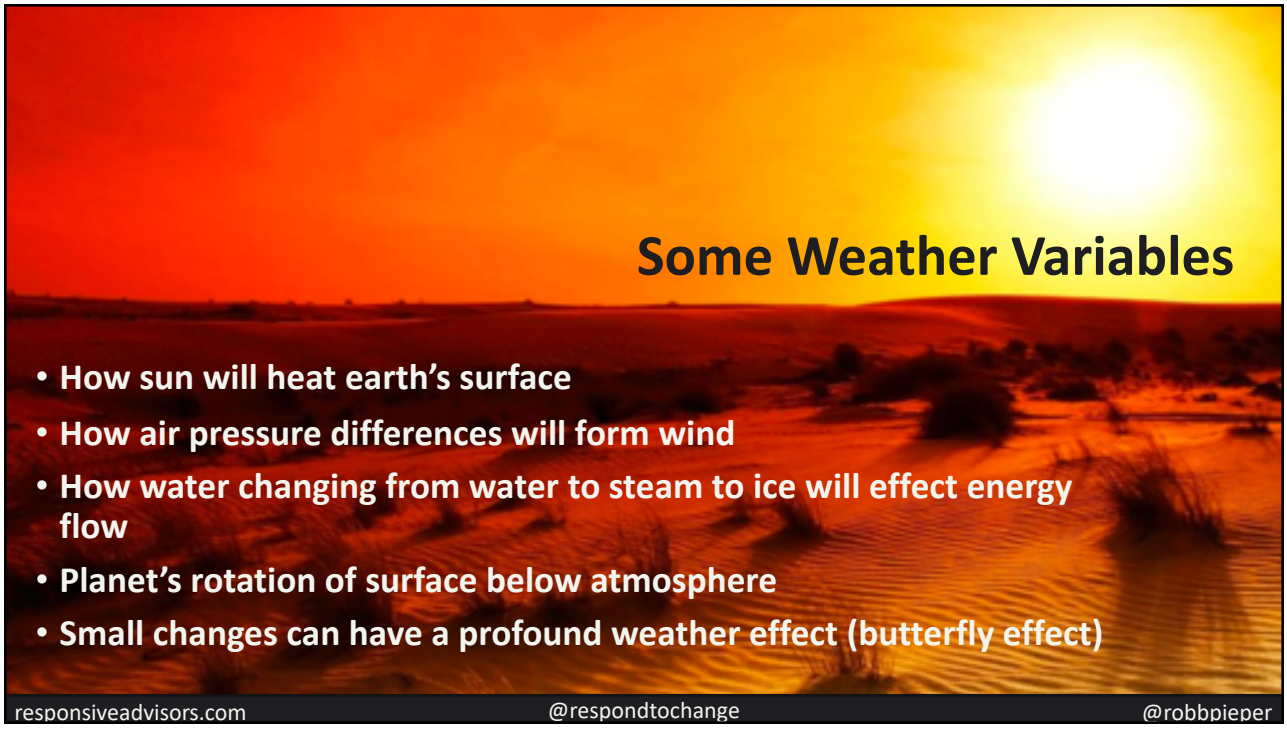
Some Weather Variables
• How sun will heat earth's surface
• How air pressure differences will form wind
• How water changing from water to steam to ice will effect energy flow
• Planet's rotation of surface below atmosphere
• Small changes can have a profound weather effect (butterfly effect)
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Yes or No:

Is it possible to use a Gannt Chart to predict the weather this Christmas?

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Forecasting Stock Prices

Fundamental Analysis

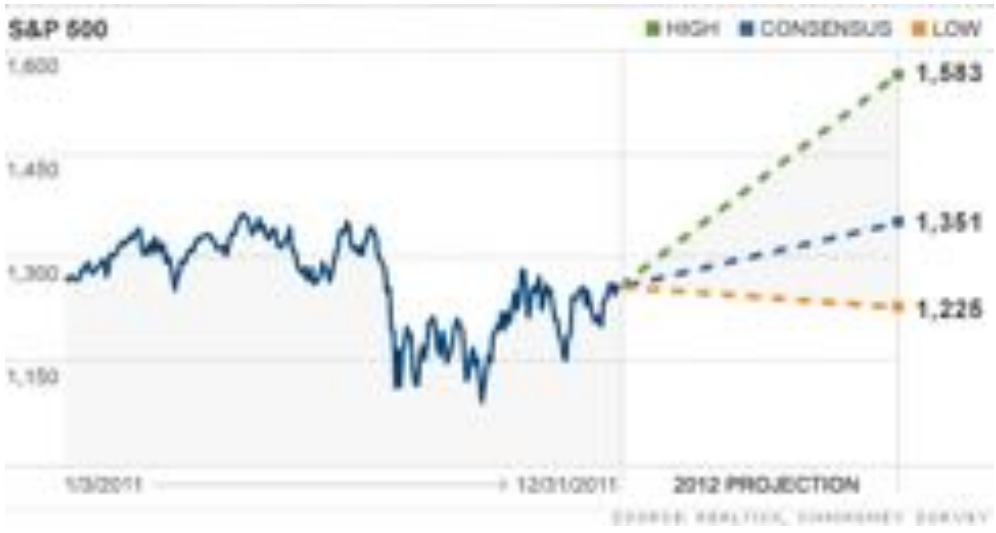
	A	B	C	D	E	F	G	H
83								
84	x	**BALANCE SHEET**						
85		*Fiscal year*		**2012A**	**2013A**	**2014A**	**2015A**	**2016A**
86		Fiscal year end date		9/29/12	9/28/13	9/30/14	9/30/15	9/30/16
87		Cash & equivalents ST & LT market. securities		121,251	146,761	152,456	161,000	167,912
88		Accounts receivable		10,930	13,102	13,454	14,318	14,959
89		Inventory		791	1,764	1,805	1,887	1,971
90		Deferred tax assets		2,583	3,453	3,453	3,453	3,453
91		Other current assets (inc. non-trade receivables)		14,220	14,421	14,421	14,421	14,421
92		Property, plant & equipment		15,452	16,597	19,467	23,655	28,031
93		Acquired intangible assets (inc. Goodwill)		5,359	5,756	4,706	3,721	2,888
94		Other assets		5,478	5,146	5,146	5,146	5,146
95		**Total assets**		**176,064**	**207,000**	**214,908**	**227,600**	**238,781**
96								
97		Accounts payable		21,175	22,367	22,905	24,412	25,506
98		Accrued expenses & def rev. (current & non-current)		20,015	23,916	23,858	23,925	23,816
99		Revolver		0	0	0	0	0
100		Long term debt		0	16,960	16,960	16,960	14,460
101		Other non-current liabilities		16,664	20,208	23,208	26,208	29,208
102		**Total liabilities**		**57,854**	**83,451**	**86,930**	**91,505**	**92,990**
103								
104		Common stock / additional paid in capital		16,422	19,764	21,978	24,191	26,616
105		Treasury stock		0	0	(23,968)	(47,936)	(71,904)
106		Retained earnings / accumulated deficit		101,289	104,256	130,439	160,311	191,549
107		Other comprehensive income / (loss)		499	(471)	(471)	(471)	(471)
108		**Total equity**		**118,210**	**123,549**	**127,978**	**136,095**	**145,791**
109								
110		*Balance check*		*0*	*0*	*0*	=ROUND(G95-G102-G108,3)	

They examine

- Financial performance
- The management team
- The product(s)
- The industry
- The overall economy
- Typically the method of choice for investors

Technical Analysis

- Believe prices follow identifiable trends and patterns
- Use forecasting techniques to predict prices
- Much like electrical signal analysis
- Typically the method of choice for traders


S&P 500
HIGH
CONSENSUS
LOW
1,600
1,450
1,300
1,150
1,583
1,351
1,226
1/3/2011
12/31/2011
2012 PROJECTION


End of current bull market cycle may be nearing (5th wave of clean Elliot-wave cycle), BUT we will continue to give the trend the benefit of the doubt...
Confluence of top-side trend-line, ~2600 (+/- 20)
5?
Key to keeping 2/2016-current trend intact
1
2
3
4
2010
2011
2012
2013
2014
2015
2016
2017
2018

Applying forecasting to Product Development

Project - Initial Conditions Uncertainty

- Current code base quality
- Time estimates
- Cost estimates
- Requirements quality
- Actual skills of people involved

- Requirements accuracy
- commitment of stakeholders
- Do customers really want it
- Many more!

Project - Forecast Uncertainty

- Will the solution meet the need?
- Will technology change?
- Will anyone get sick?
- Will people quit?
- Will alternatives or competition emerge?
- Will solution quality be high or low?
- How long will regression tests take?
- Many, *MANY* more!

It's a Multivariable equation

$$3x^2-8x+2=\sum_{n=0}^{\infty}\frac{f^{(n)}(2)}{n!}(x-2)^n$$
$$=\frac{f^{(0)}(2)}{0!}+\frac{f^{(1)}(2)}{1!}(x-2)+\frac{f^{(2)}(2)}{2!}(x-2)^2+\frac{f^{(3)}(2)}{3!}(x-2)^3+\cdots$$
$$=-2+4(x-2)+\frac{6}{2}(x-2)^2+0$$
$$=-2+4(x-2)+3(x-2)^2$$

- Sick days
- Requirements change
- Security patch required
- Employees leave
- Personal life problems
- Requirements incorrect
- New priorities
- Merger or acquisition
- People pulled off project
- Customer changes
- Executive leadership changes
- Company vision changes
- Infrastructure upgrade
- Vendor produces wrong thing
- Customer finds a bug
- Architecture didn't scale
- Budget changes
- Sales slow
- Layoffs
- People get promotions
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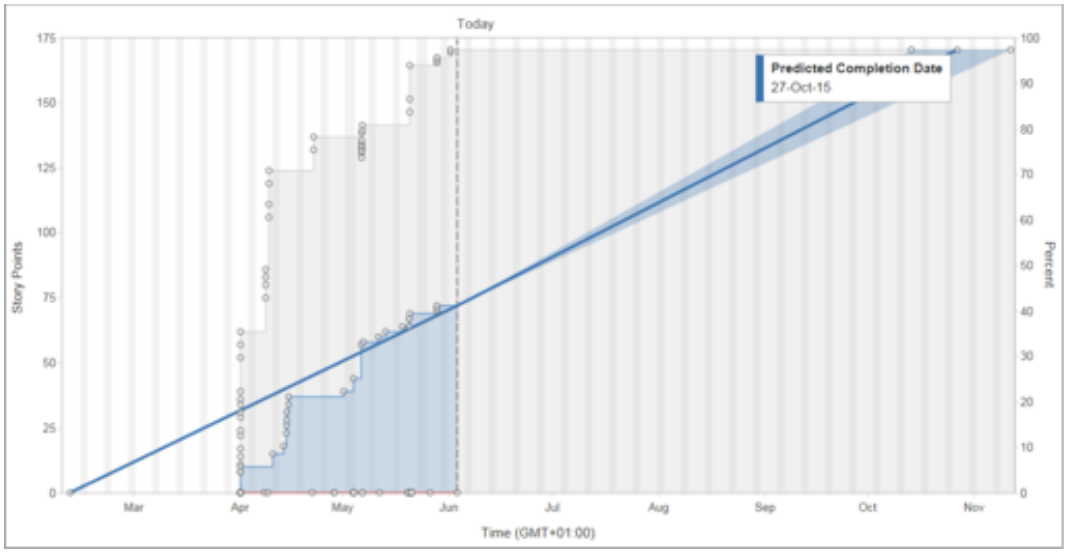
- Etc…

Forecasting in Jira – Version Report



Monte Carlo Analysis – Case study

Constants	values	Computed	Values
Lowest Velocity	23 / week	Min	$527,178.75
Highest Velocity	40 / week	Max	$916,832.61
Remaining work	453	Mean	$687,661.68
Simulated runs	1001	Standard Deviation	$118,297.41
Blended team rate	$46,550 / Week	Total team size	32 people / 4 teams

Probability	Cost	Time
Within 84%	$805,959.09	17.3 weeks
Within 97.5%	$924,256.50	19.9 weeks
Within 99.7%	$1,042,553.91	22.4 weeks

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- We wont stop estimating
- We can reduce variability in estimates
- Increased stability can reduce variability
- Smaller batches can reduce variability
- Better forecasting methods can set more transparent expectations

How frequently to update forecasts?

- Every week?
- Every release?
- Every quarter?
- Every year is way too long to wait
- Costs are the easy part. Look at value delivered too

Adaptable teams require adaptable funding

Forecast the Future

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