

Can We Learn to Manage Uncertainty? Probably!



Robert Herbig
Lead Software Engineer



Session Details

Can We Learn to Manage Uncertainty? Probably!

Fri, 1/12, 8:30 AM - 9:30 AM ET

1 hour

Salon D

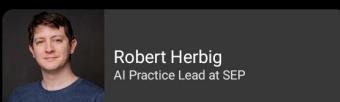
[View on floor plan](#)

[Remove session](#)

When we're asked when something will be done, it's tempting to answer the question. "It'll be done on March 32nd" or "it'll take 182.5 days" o...

[Show more](#)

Speakers



About this session

Teams & Collaboration

Survey >





@RobertHerbig

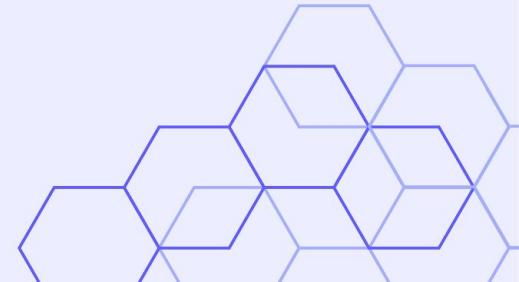
Image by [Pexels](#) from
[Pixabay](#)

	TUE	SUN	PROBABLY
	WED	CLOUD	OK
	THU	RAIN	MAYBE
	FRI	SUN CLOUD	IFFY
SAT	CLOUD	WHO CAN SAY	
SUN	SUN	NO IDEA	
MON	CLOUD SUN	RANDOM GUESS	

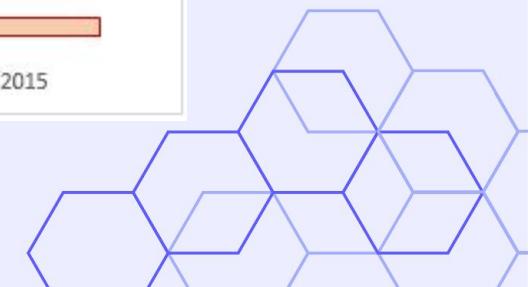
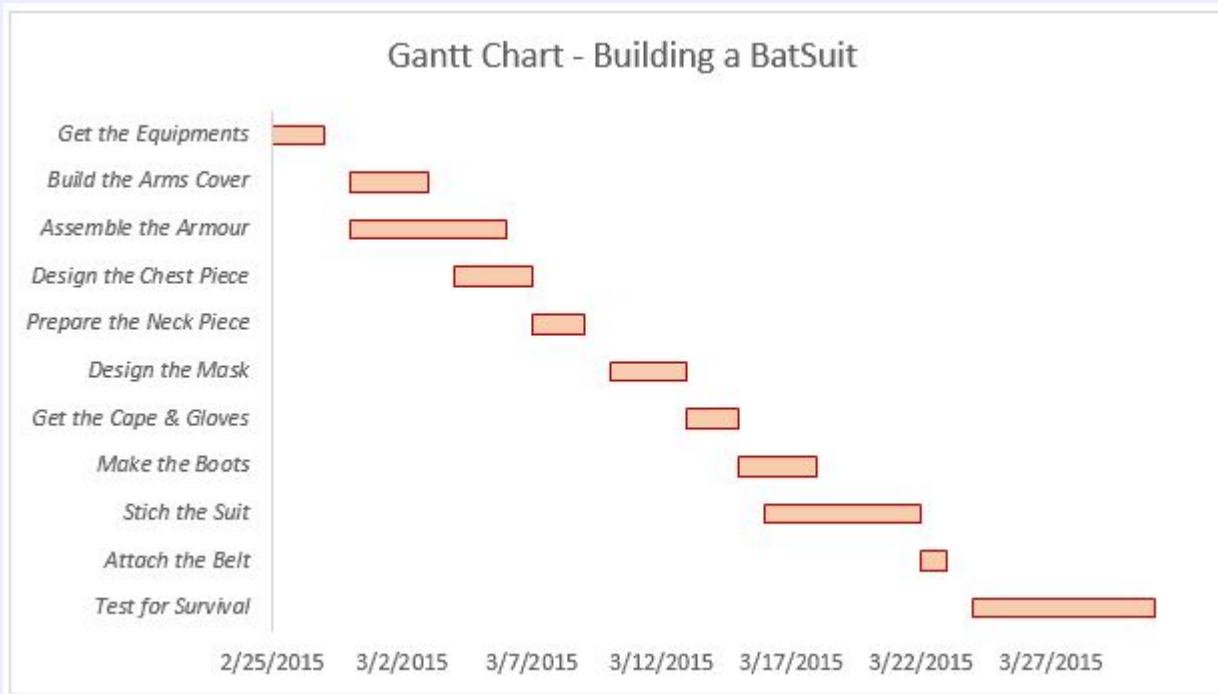
ANDERSON

"And now the 7-day forecast..."

“When Will It Be Done?”



“When Will It Be Done?”



Takeaways

Think probabilistically, not deterministically

-
-
-

Use probabilistic forecasting

-
-
-

Communicate the uncertainty

-
-
-

Case study

Takeaways

Think probabilistically, not deterministically

-
-
-

Use probabilistic forecasting

-
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-

Case study

“I don’t know”



Takeaways

Think probabilistically, not deterministically

- Luck and skill both contribute to the actual outcome
-
-

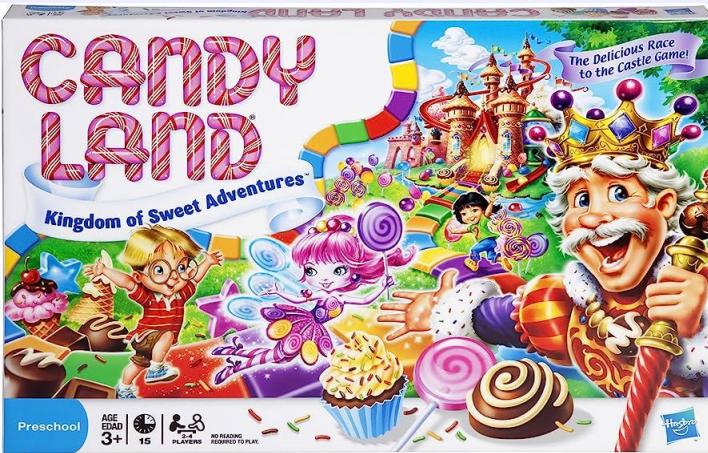
Use probabilistic forecasting

-
-
-

Communicate the uncertainty

-
-
-

Case study



Pure
Luck



Pure
Skill



Photo by [Randy Fath](#) on [Unsplash](#)

Photo by [Inês Ferreira](#) on [Unsplash](#)

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Takeaways

Think probabilistically, not deterministically

- Luck and skill both contribute to the actual outcome
- **There is more than one possible outcome**
- **Not all outcomes are equally likely**

Use probabilistic forecasting

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-
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Communicate the uncertainty

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-
-

Case study



@RobertHerbig



Smash Gotham City → Profit



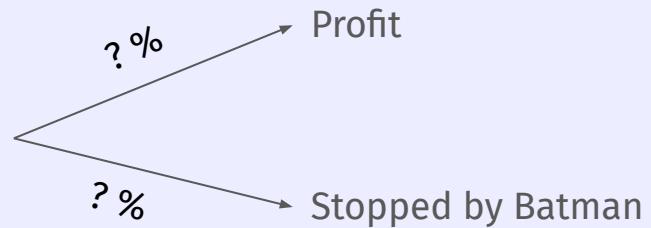
Smash Gotham City

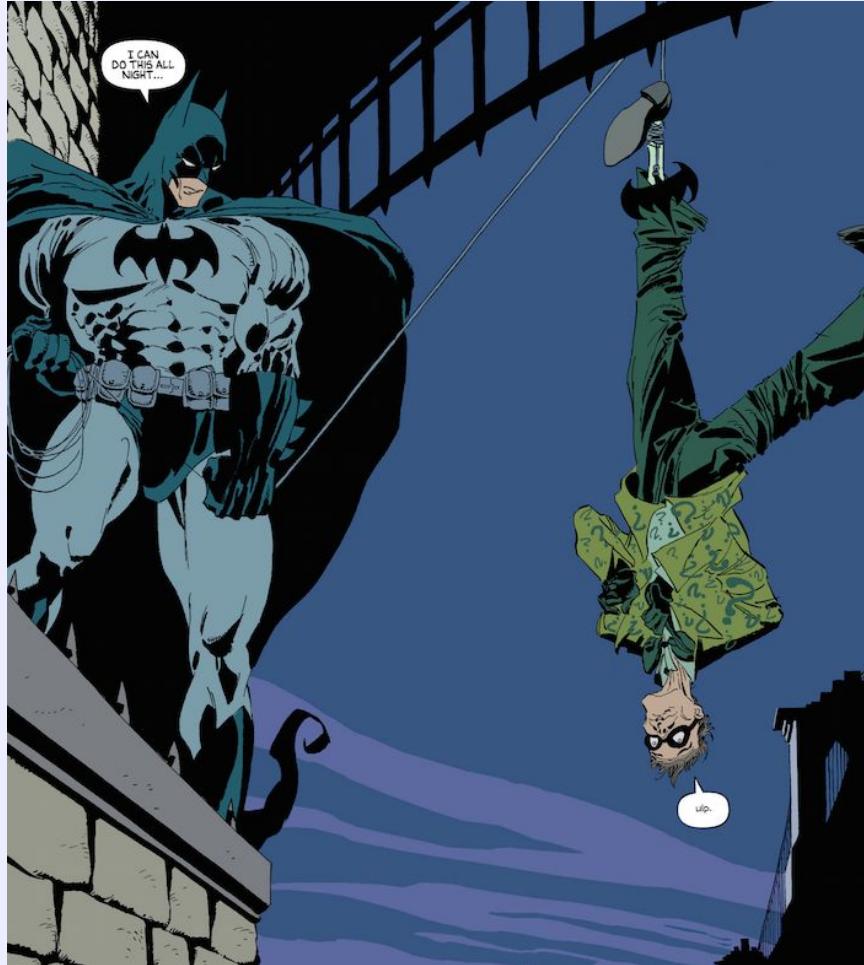
Profit

Stopped by Batman



Smash Gotham City





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Use probabilistic forecasting

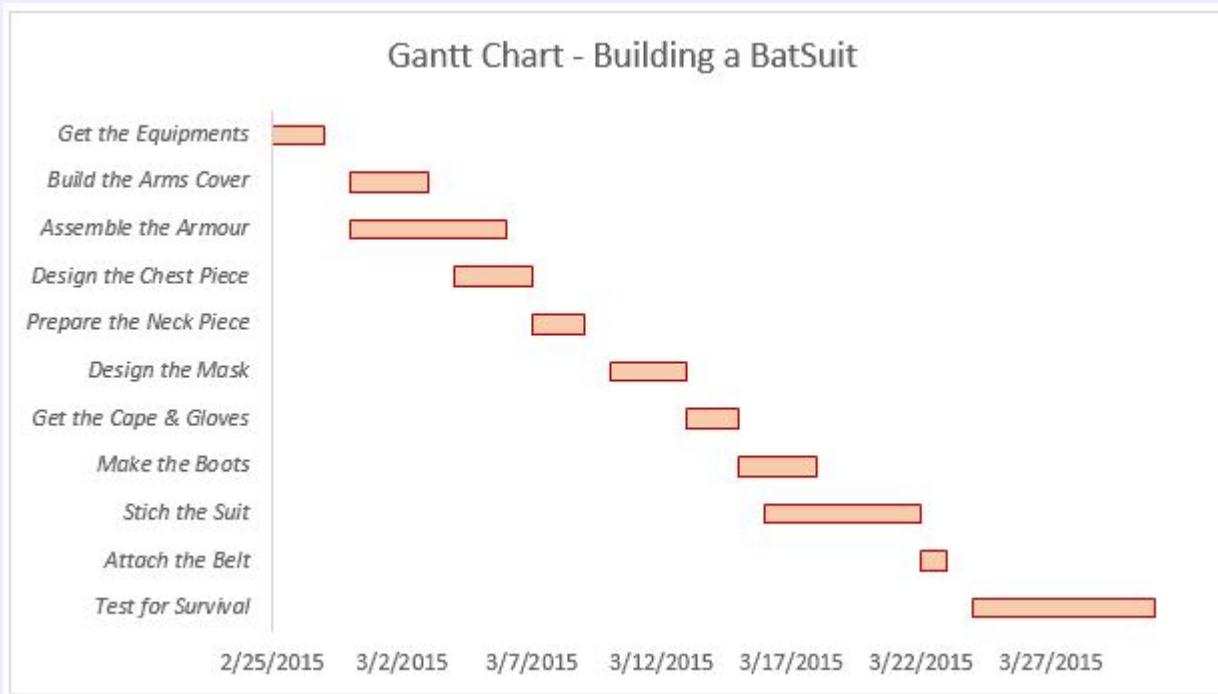
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Communicate the uncertainty

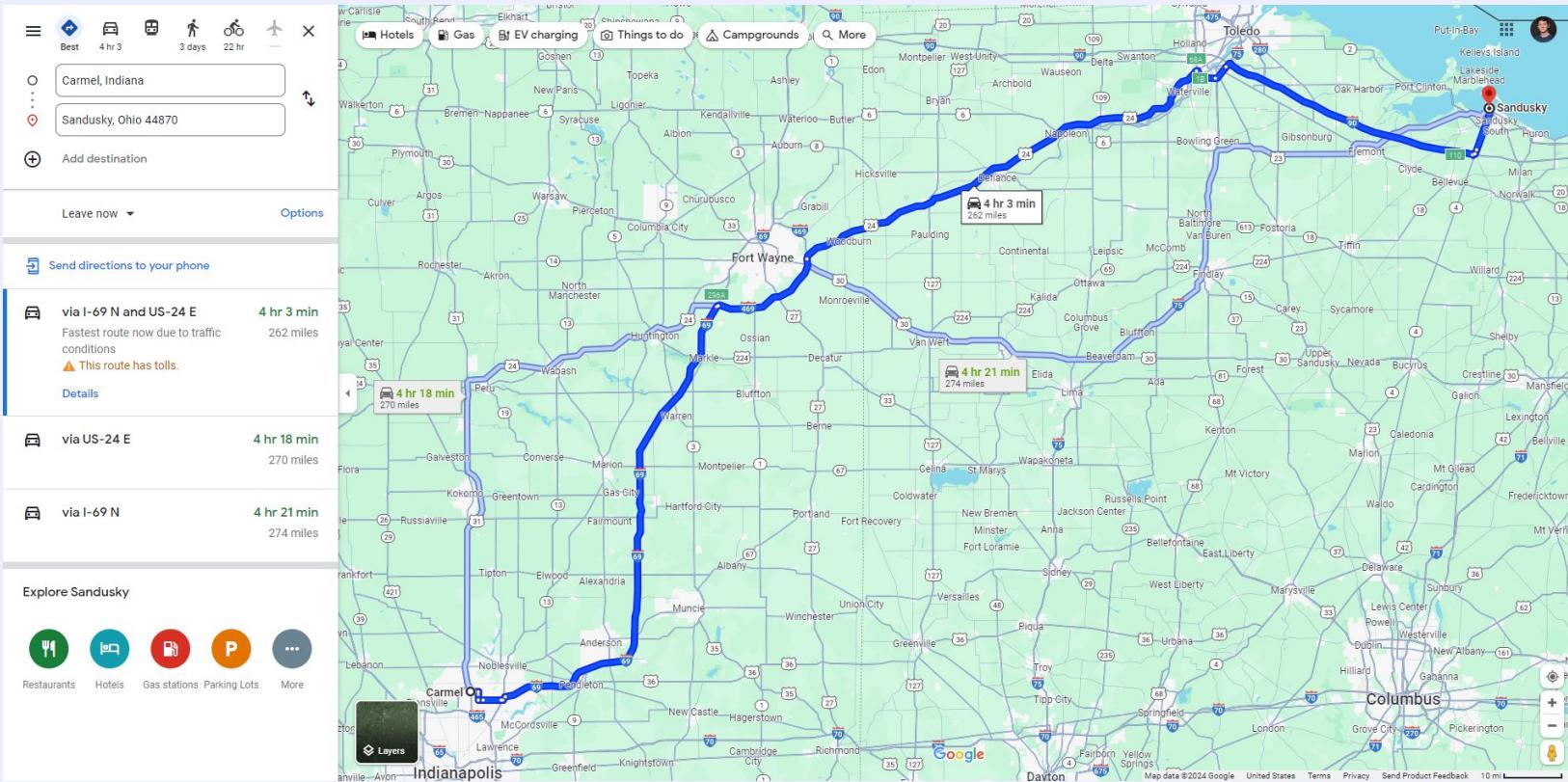
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Case study

“When Will It Be Done?”



Probabilistic Forecasting



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Probabilistic Forecasting



Probabilistic Forecasting

A good forecast:

1. Shows multiple options



Probabilistic Forecasting

A good forecast:

1. Shows multiple options
2. Is clear about the level of uncertainty (confidence)



Probabilistic Forecasting

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Probabilistic Forecasting

A good forecast:

1. Shows multiple options
2. Is clear about the level of uncertainty (confidence)
3. **Can be tested against the actual outcome**



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Probabilistic Forecasting

A good forecast:

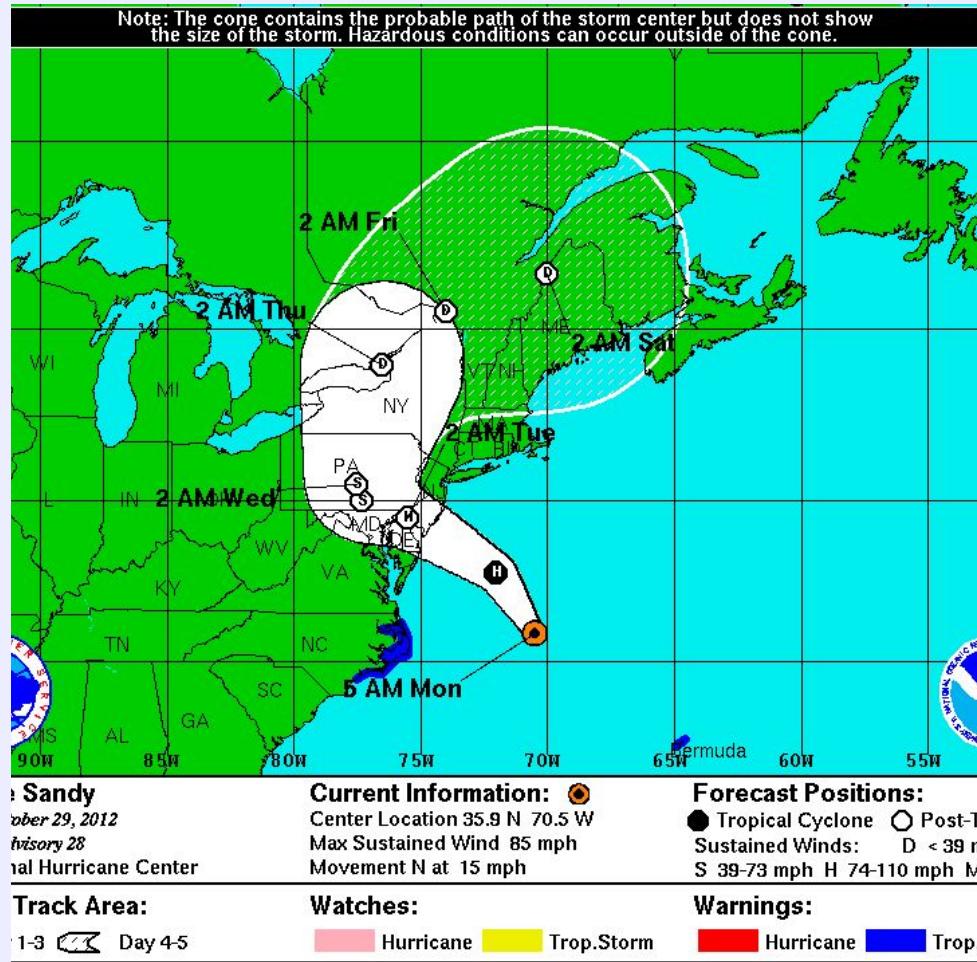
1. Shows multiple options
2. Is clear about the level of uncertainty (confidence)
3. Can be tested against the actual outcome
4. **Is updated as new information is received**



Probabilistic Forecasting

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Use probabilistic forecasting

- **Show multiple options (with their confidence)**
- **Test the actual outcome against the forecast**
- **Update the forecast with new info**

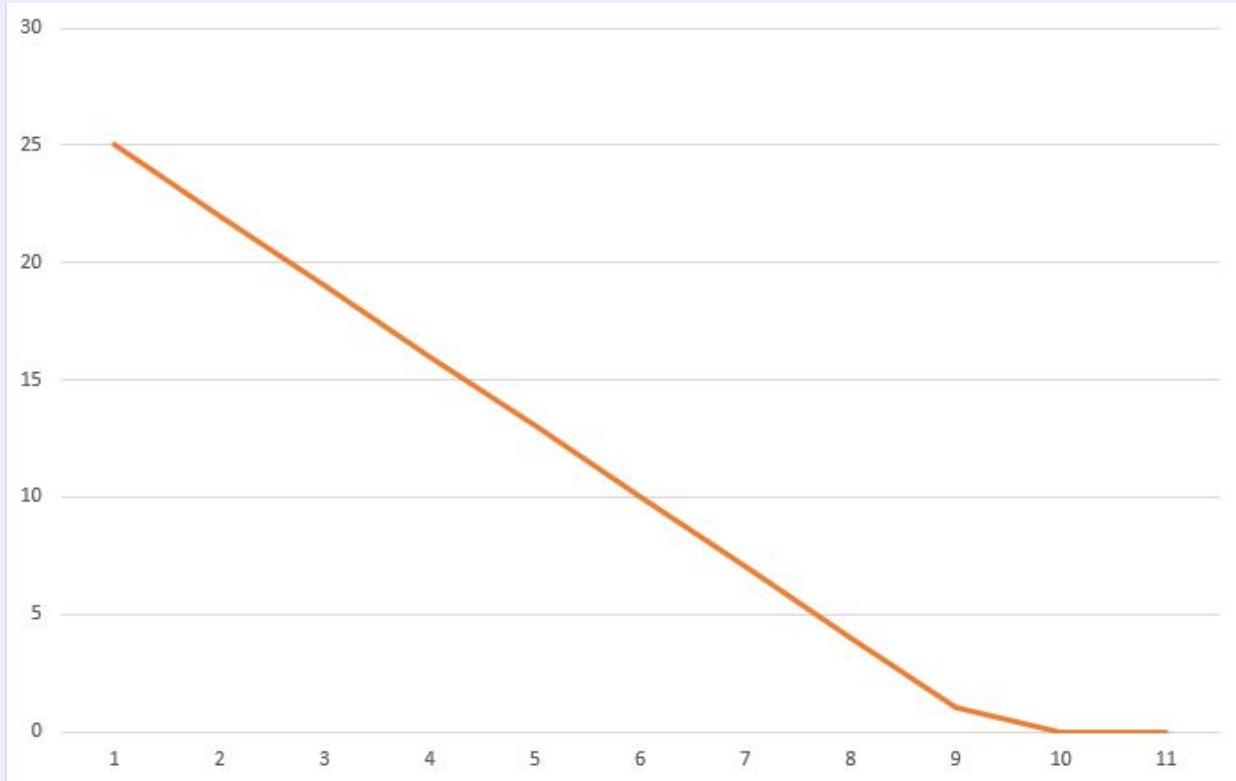
Communicate the uncertainty

-
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-

Case study

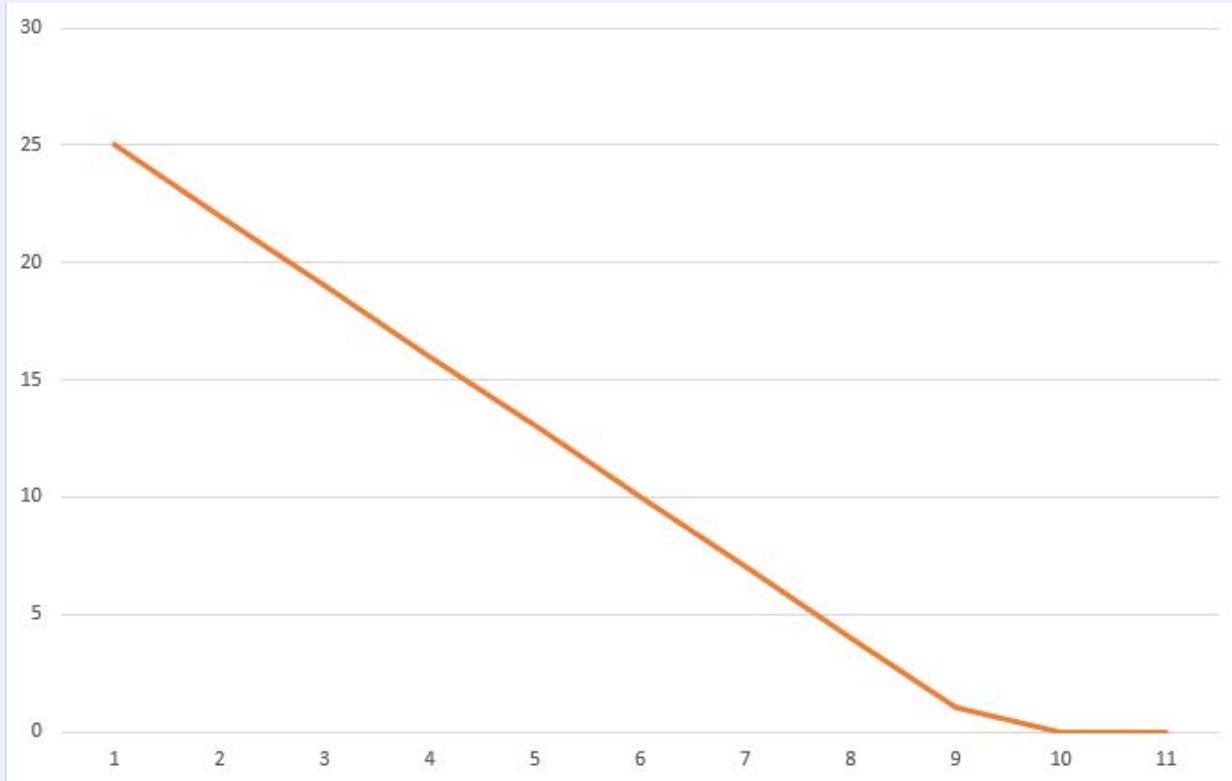
Initial backlog =
25 stories

Velocity =
3/sprint



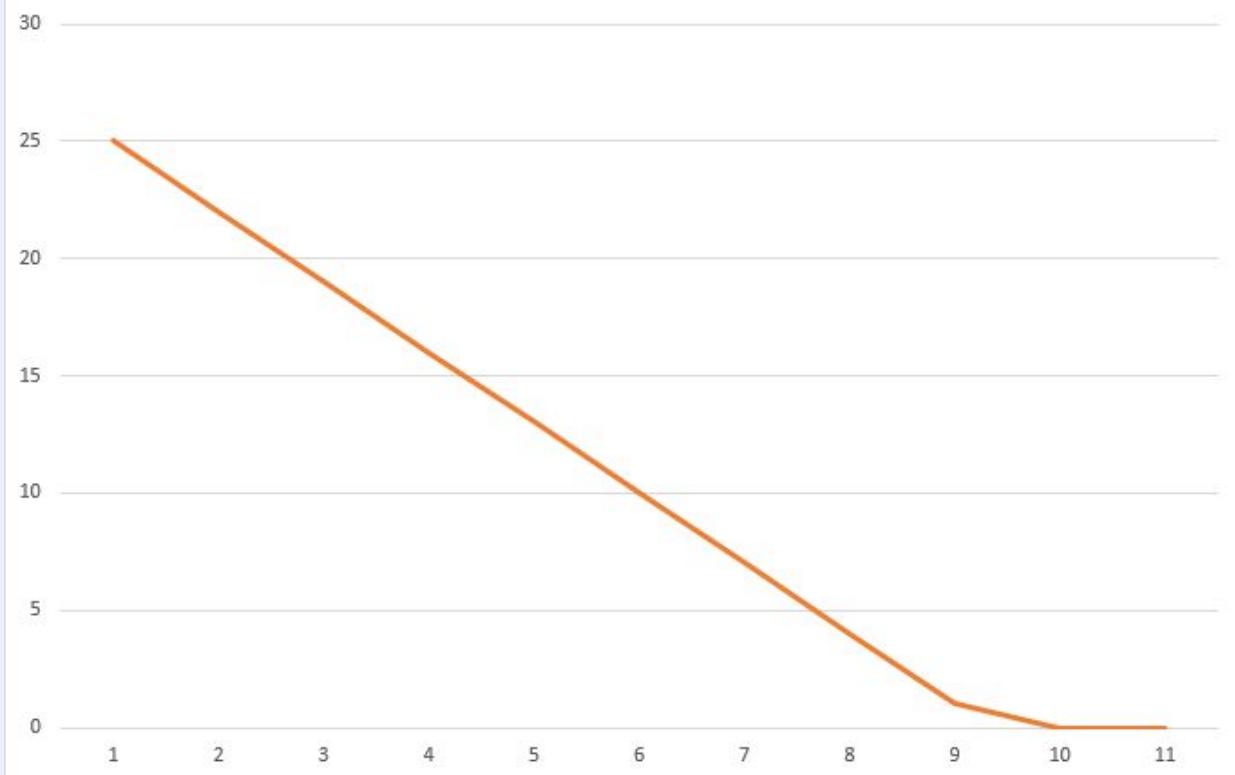
Initial backlog
= **20-30 stories**

Velocity =
2-4/sprint



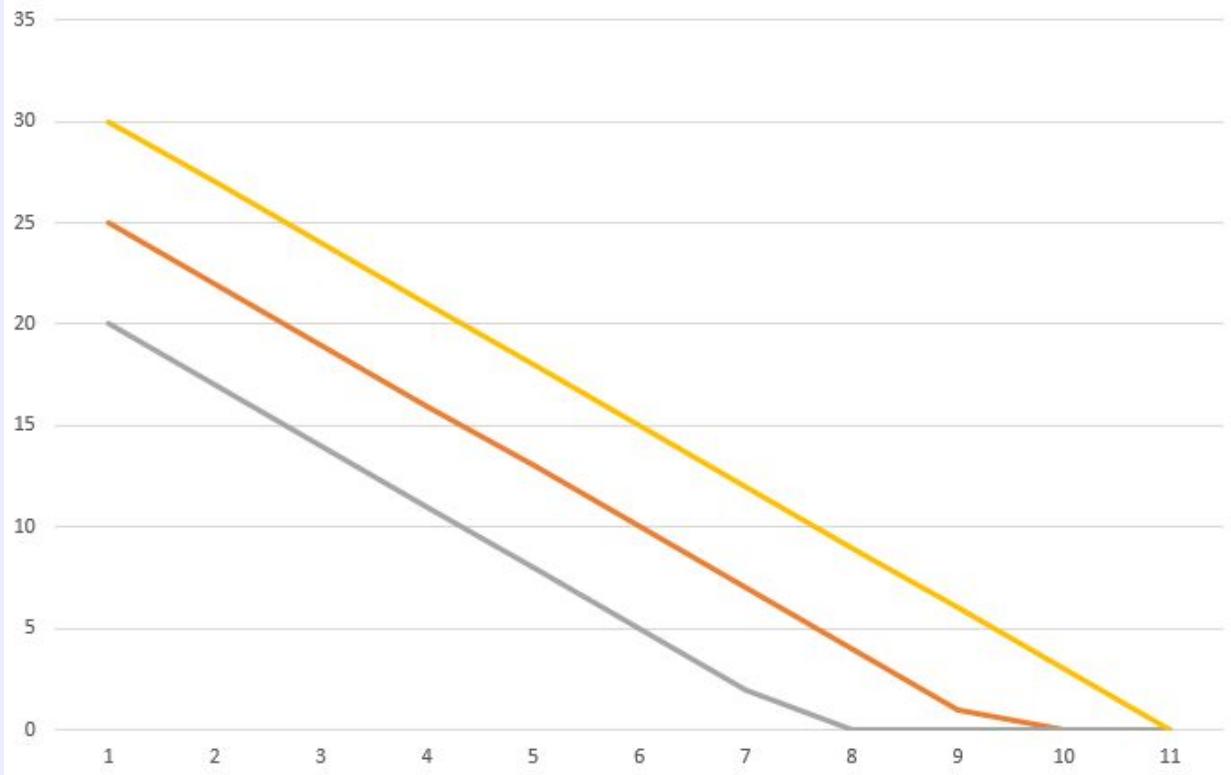
**Initial backlog
= 20-30 stories**

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2-4/sprint**



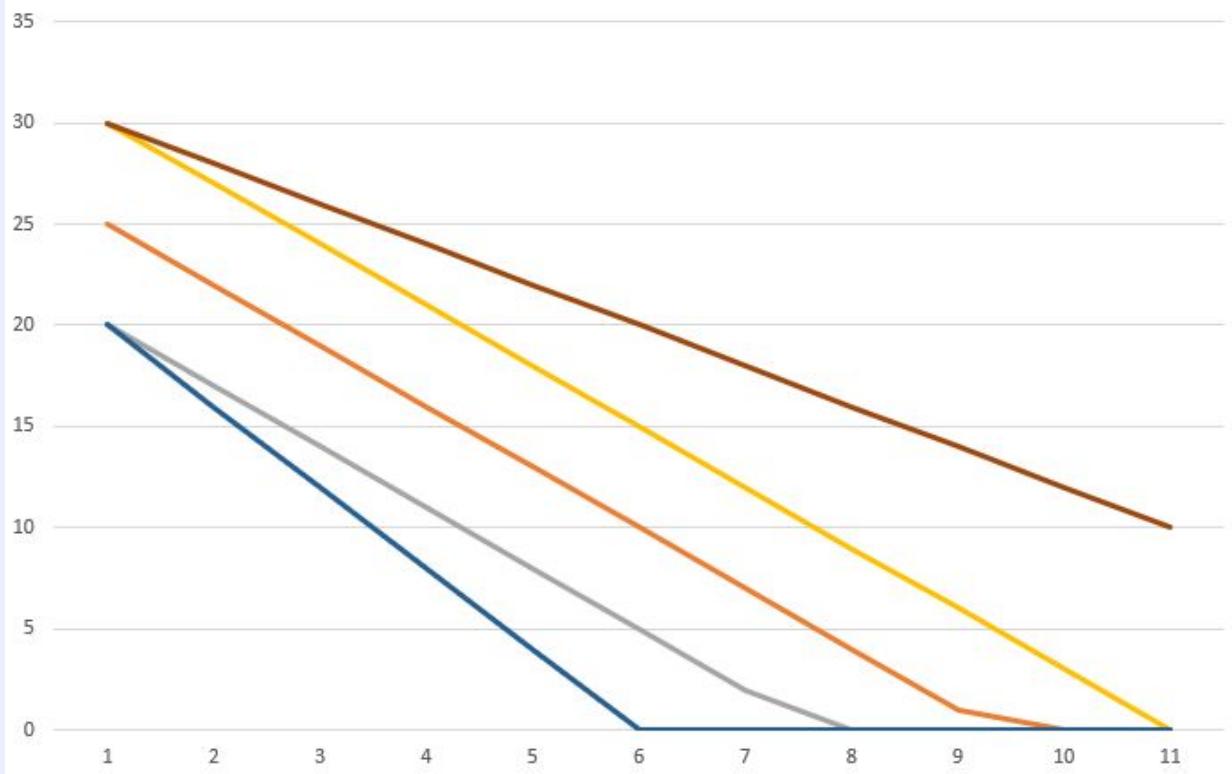
**Initial backlog
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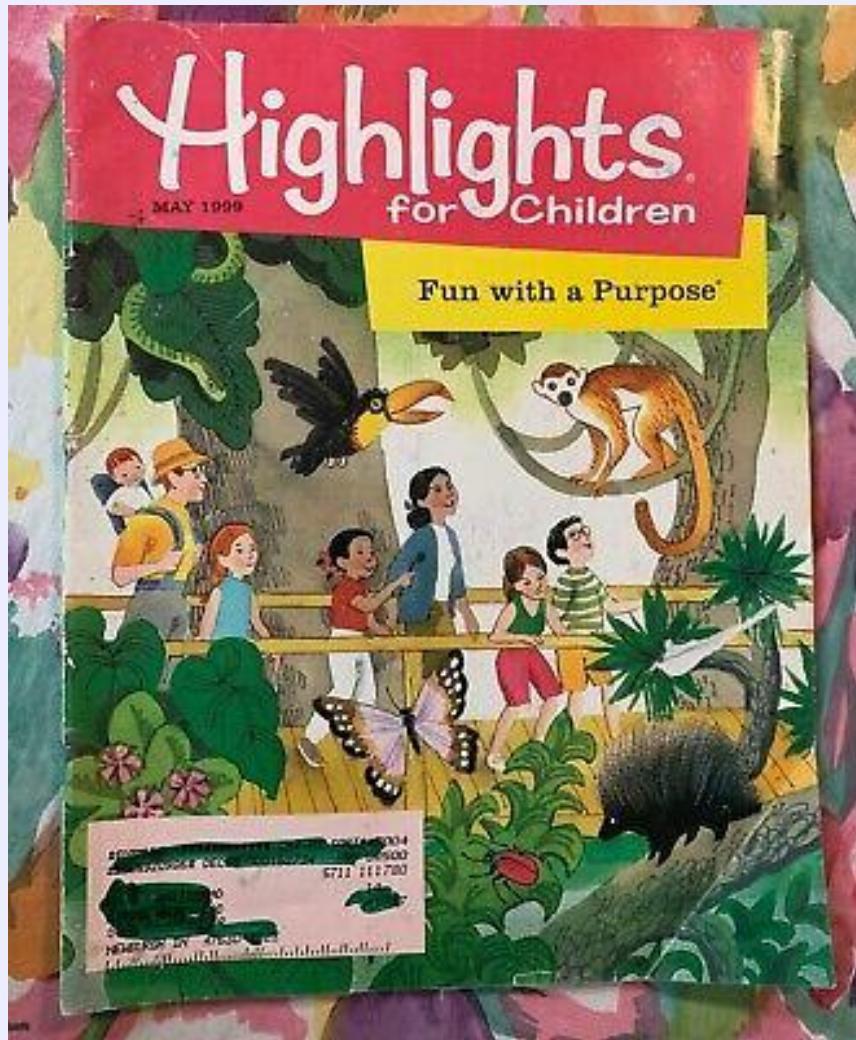
**Velocity =
2-4/sprint**



Initial backlog
= 20-30 stories

Velocity =
2-4/sprint





Goofus and Gallant

By Gerry Cleveland Myers
Illustrated by Marion Hall Nammel



Goofus and Gallant

By Gerry Cleveland Myers
Illustrated by Marlo Hall Hammel



Goofus has poor code quality and therefore erratic sprint velocity

Goofus and Gallant

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Historical data:

- 4, 5, 10, 11

Average: 7.5



Goofus has poor code quality and therefore erratic sprint velocity

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Gallant uses best practices to minimize rework and defects

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By Gerry Cleveland Myers
Illustrated by Marlo Hall Hammel

Historical data:

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Average: 7.5



Goofus has poor code quality and therefore erratic sprint velocity



Gallant uses best practices to minimize rework and defects

Historical data:

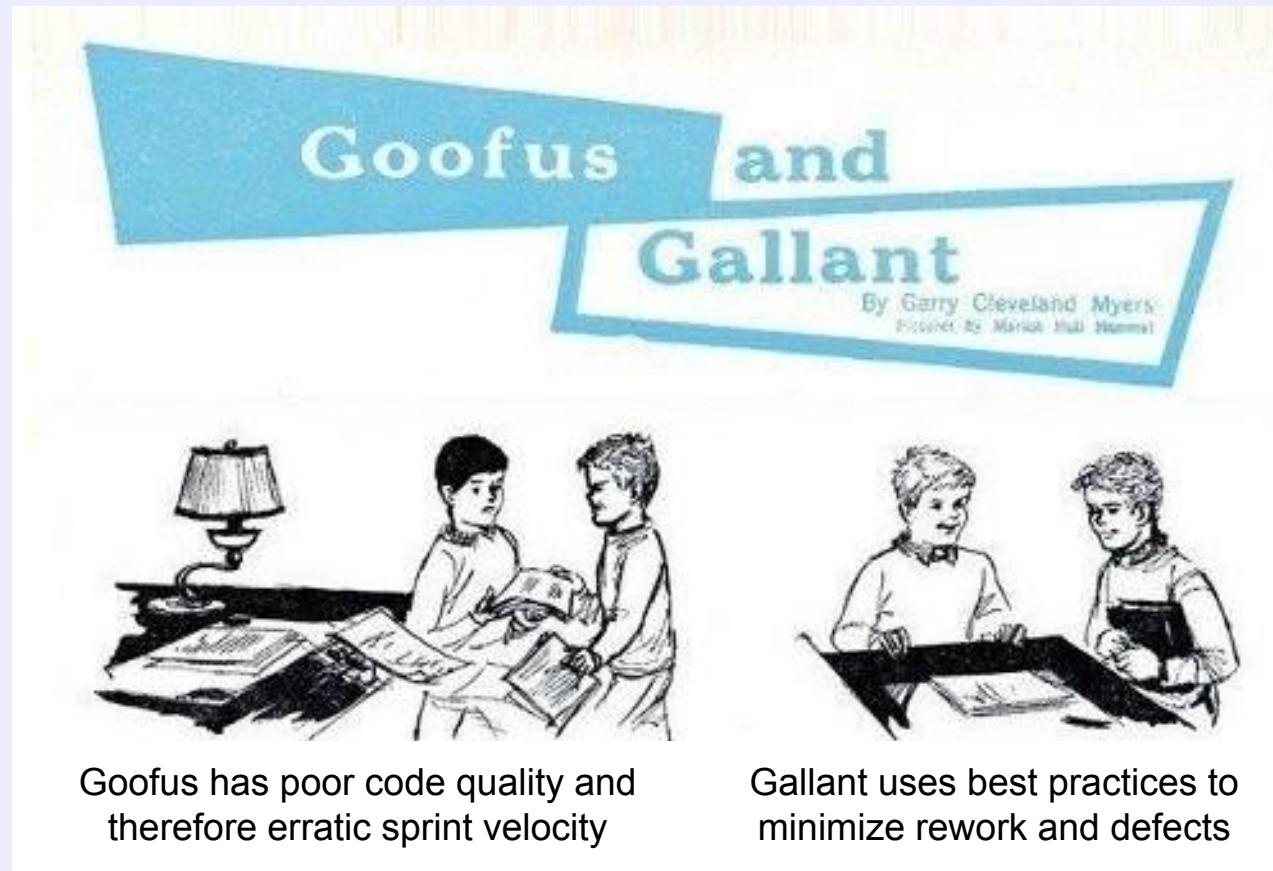
- 6, 7, 8, 9

Average: 7.5

Historical data:
• 4, 5, 10, 11

Average: 7.5

Standard deviation: 3.5



Historical data:
• 6, 7, 8, 9

Average: 7.5

Standard deviation: 0.5

In order to use an average...

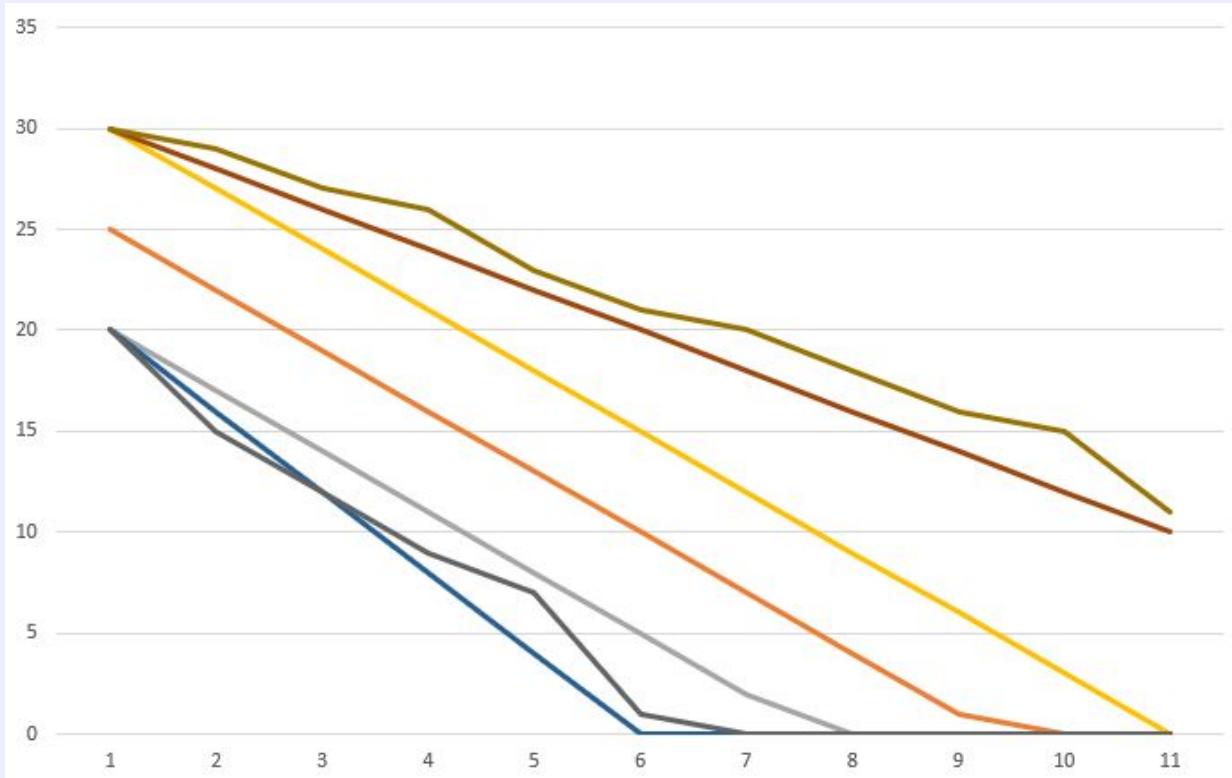
“The members of the population must be statistically independent - rarely is this the case in engineering or software development.”



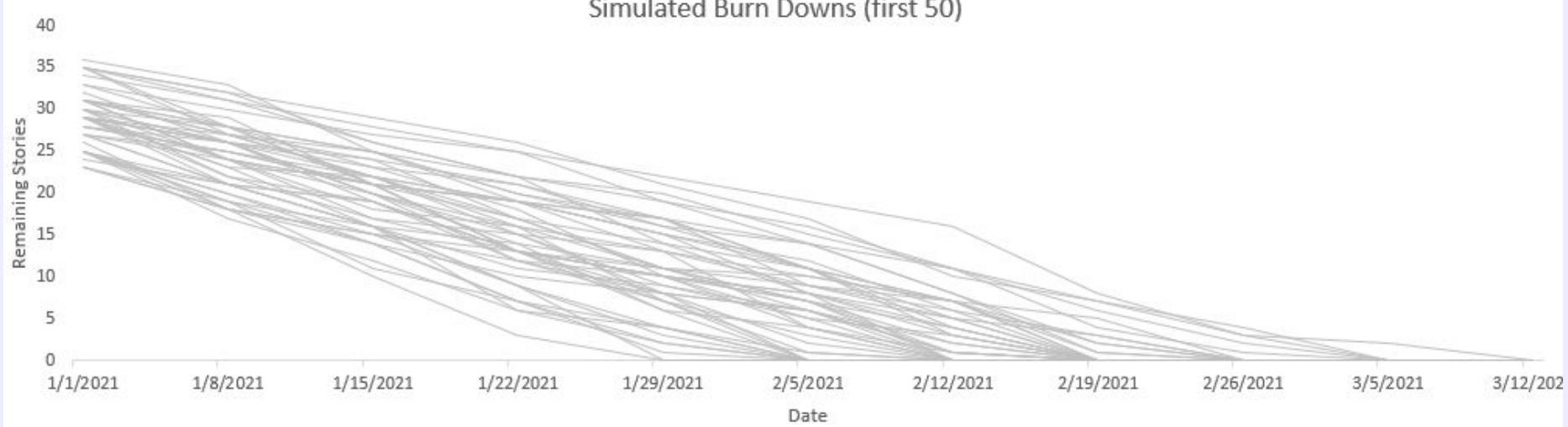
Glen Alleman
*Increasing the Probability of
Project Success*

Initial backlog =
20-30 stories

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2-4/sprint



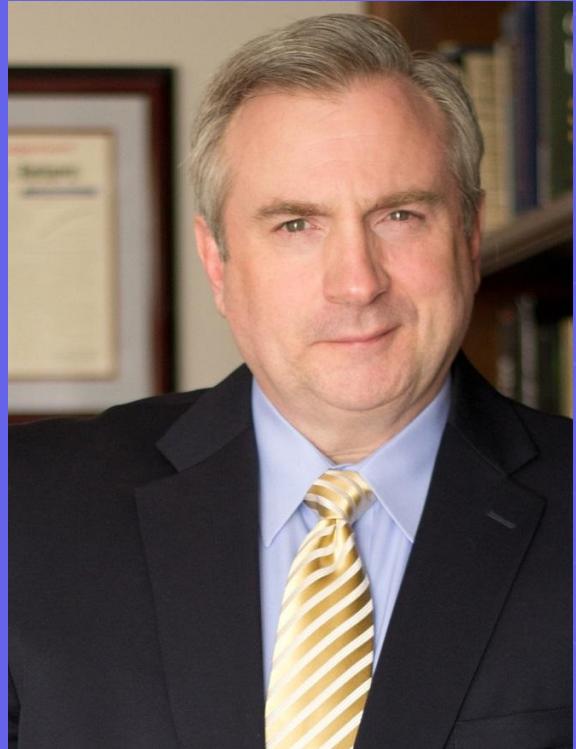
Simulated Burn Downs (first 50)



The Monte Carlo method



“Running Monte Carlo is the only way to analyze big uncertain decisions.”



Douglas Hubbard
How to Measure Anything



^ Forecasting and Metric Spreadsheets

To be honest, you probably know us because of our spreadsheet tools.
That's OK, but now consider training :)

[Throughput Forecaster: I want to forecast how long a single feature may take](#)

[Multiple Feature Cut Line Forecaster: I want to forecast multiple features at once](#)

[Team Dashboard: I want to quickly create an team dashboard](#)

[Skill and Capability Survey and Matrix: I want to quickly survey teams to understand skill constraints](#)

[Time Series Forecasting for Demand](#)

[MORE - A lot more on our GitHub repo](#)

^ Simulation Application

<https://www.focusedobjective.com/pages/free-spreadsheets-and-tools>



Troy Magennis

2. How many stories are remaining to be completed?

low guess

20

high guess

25

scope complexity

Clear and understood

(change this list and growth factors in the "Settings" worksheet)

adjusted scope

20

25

3. Stories are often split before and whilst being worked on. Estimate the split rate low and high bounds.

Often the throughput/velocity in the backlog is pre-split, but captured completed stories post-splitting by the dev team making forecasts optimistic.

low split guess

1.00

highest split guess

1.50

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

Throughput/velocity data or estimate is for

1 week

7 days

Use historical throughput/velocity data OR enter a low and high estimate below. Use [Estimate](#)

worst case

1

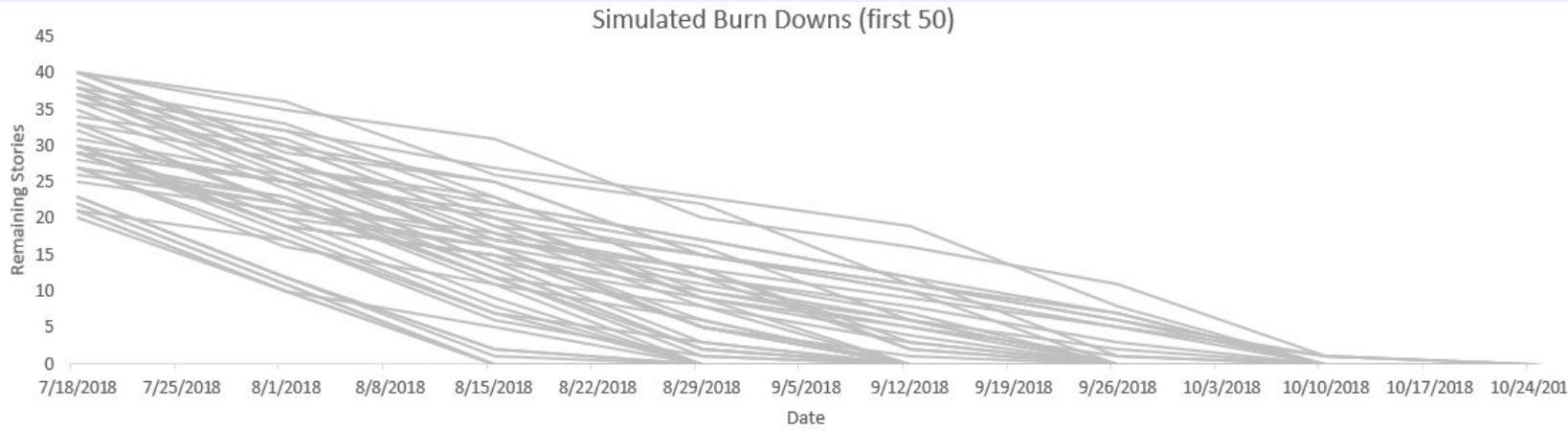
most often

3 (optional)

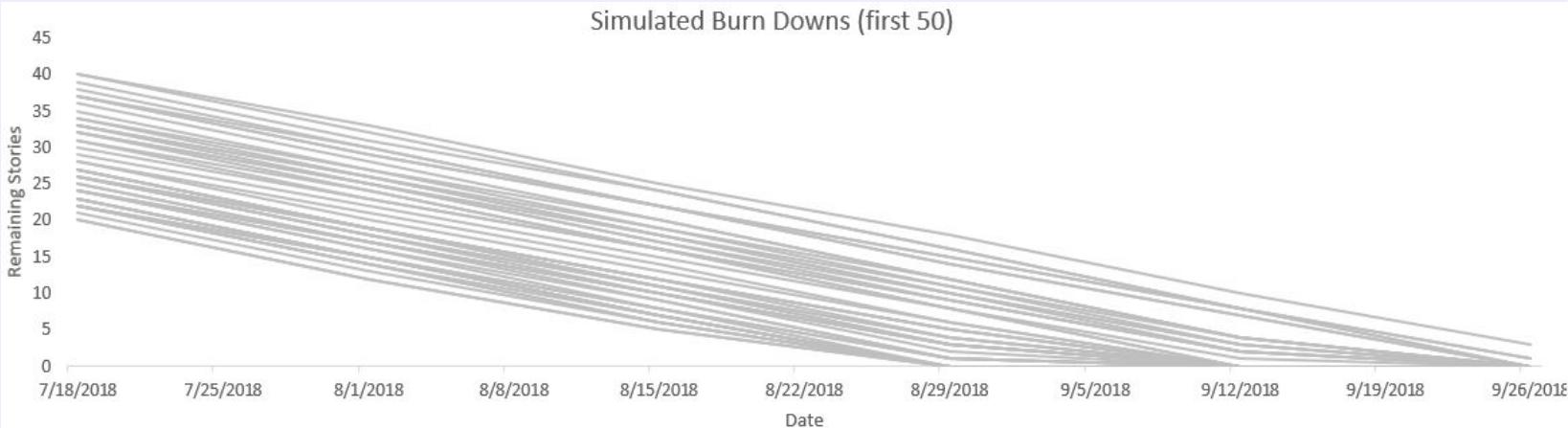
best case

10

Simulated Burn Downs (first 50)

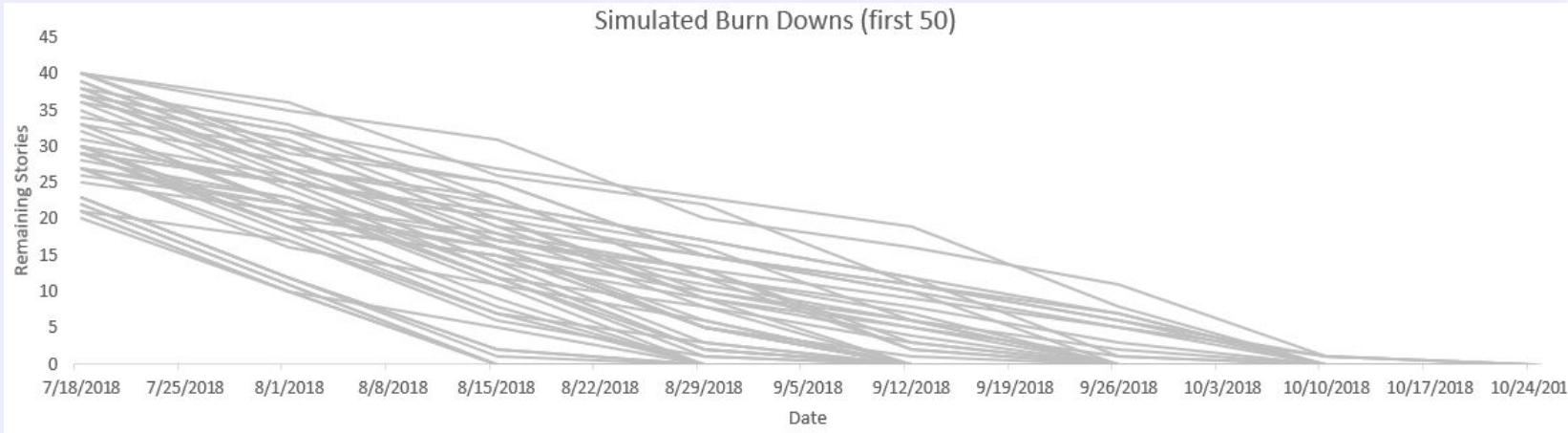


Simulated Burn Downs (first 50)



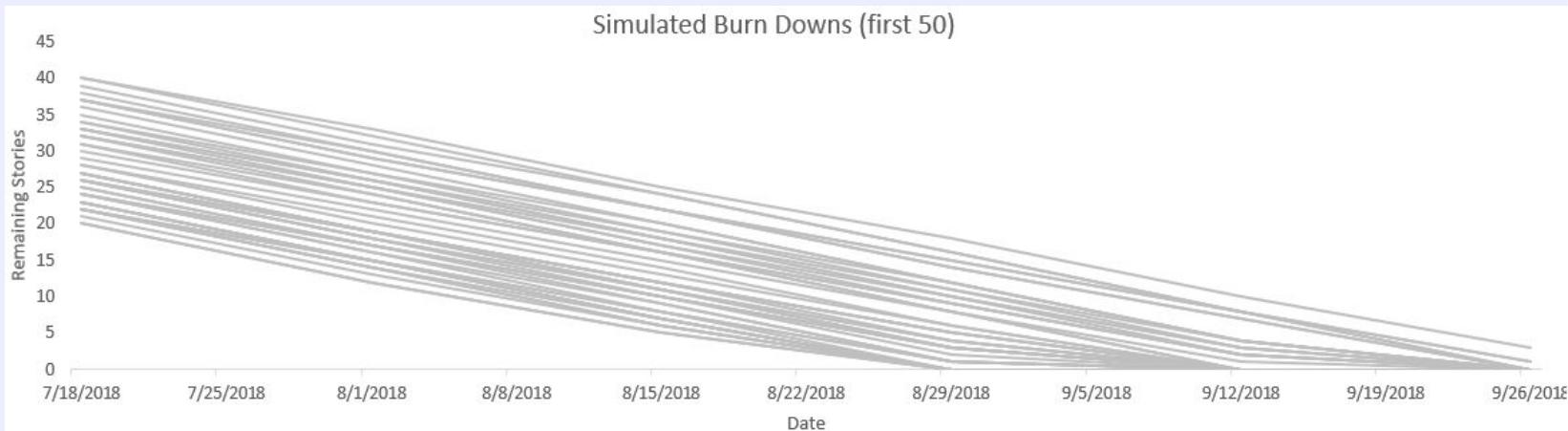
Team Goofus

Average: 7.5
StdDev: 3.5



Team Gallant

Average: 7.5
StdDev: 0.5



Takeaways

Think probabilistically, not deterministically

- Luck and skill both contribute
- There is more than one possible outcome
- Not all outcomes are equally likely

Use probabilistic forecasting

- **Show multiple options (with their confidence)**
- Test the actual outcome against the forecast
- Update the forecast with new info

Communicate the uncertainty

-
-
-

Case study

Results

No. of 1 week intervals		
Likelihood	Duration	Date
100%	11	3/19/2021
95%	9	3/5/2021
90%	9	3/5/2021
85%	8	2/26/2021
80%	8	2/26/2021
75%	8	2/26/2021
70%	7	2/19/2021
65%	7	2/19/2021
60%	7	2/19/2021
55%	7	2/19/2021
50%	6	2/12/2021
45%	6	2/12/2021
40%	6	2/12/2021
35%	6	2/12/2021
30%	6	2/12/2021
25%	6	2/12/2021
20%	5	2/5/2021
15%	5	2/5/2021
10%	5	2/5/2021
5%	5	2/5/2021
0%	4	1/29/2021

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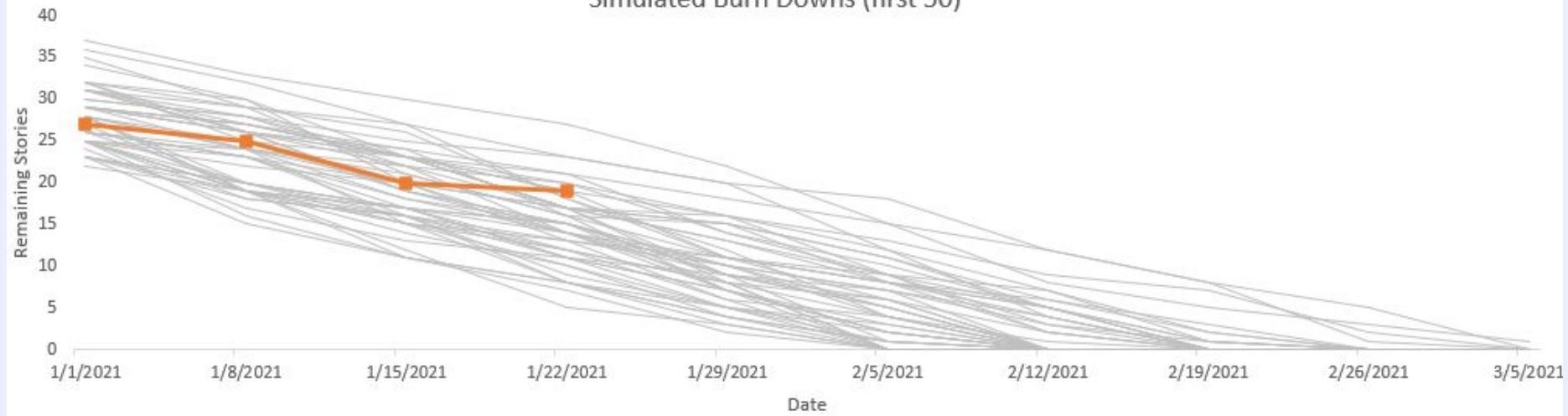
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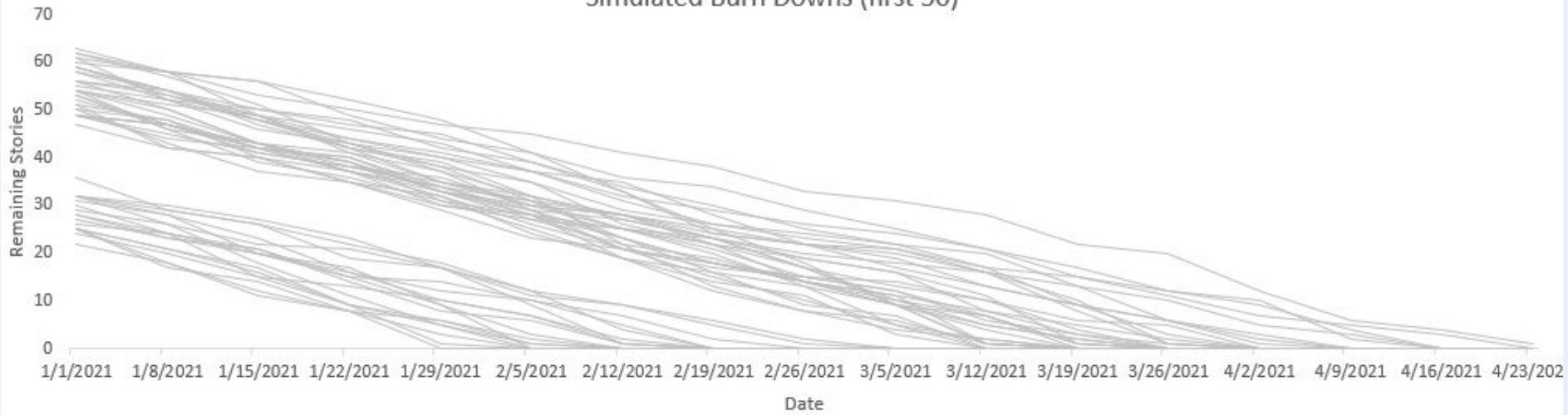
Communicate the uncertainty

-
-
-

Case study

Likelihood	Impact Low	Impact High	Description
50%	20	30	Rewrite the front-end in a new framework

Simulated Burn Downs (first 50)



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Case study

“Bet”



“Bet”

- Cost

“Bet”

- Cost



“Bet”

- Cost



“Bet”

- Cost
- Odds



“Bet”

- Cost
- Odds
- Outcome



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Communicate the uncertainty

- Use “bet” language
- Bets have: cost, odds, and outcome
-

Case study

“Bet”

A good bet:

1.



“Bet”

A good bet:

1. Is outcome focused



“Bet”

A good bet:

1. Is outcome focused
2. **Acknowledges that “losing” is a possibility**



“Bet”

A good bet:

1. Is outcome focused
2. Acknowledges that “losing” is a possibility
3. **Has odds (sometimes known, sometimes not)**



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A good bet:

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4. **Forces us to explore our assumptions and beliefs**



“Bet”

A good bet:

1. Is outcome focused
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4. Forces us to explore our assumptions and beliefs
5. **Frames conversations around risk, information, learning, validation, and outcomes**



“Bet”

A good bet:

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3. Has odds (sometimes known, sometimes not)
4. Forces us to explore our assumptions and beliefs
5. Frames conversations around risk, information, learning, validation, and outcomes
6. **If small, can “buy” learning to inform larger bets**





In the not-so-distant future we will see the commodification of [some customer/user need, technology service, etc.]. There will be a lowering of prices, and a focus on scale and reliability. This will present the following opportunities: [ways to exploit this shift to commodification], but also trigger the following challenges: [threats to mitigate].

We believe that by focusing on [some intervention] we will make it possible for customers to [achieve some outcome] more [efficiently, accurately, joyfully, effectively], which we believe will benefit the business by [some business benefit, or causal chain].

Operationally, we know we have been deprioritizing [some process, system, activity]. We realize this causes pain and frustration to our people by [some observable pain points, frustration]. The important bet that we hope will offset this short-term pain is that we are [some larger, valuable bet].

We are betting that customers will continue to use our product because [some value proposition] despite the fact that other products are more [positive attributes of competitive products].

You could call [some set of interventions, or class of interventions] as our “safe bet”. We put time/money in, and get outcomes out. For example, [a scenario described with inputs and outputs]. As with all good things, this could come to an end. The most likely threats are [some list of threats to this predictability].

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- **It's all about the assumptions & conversations**

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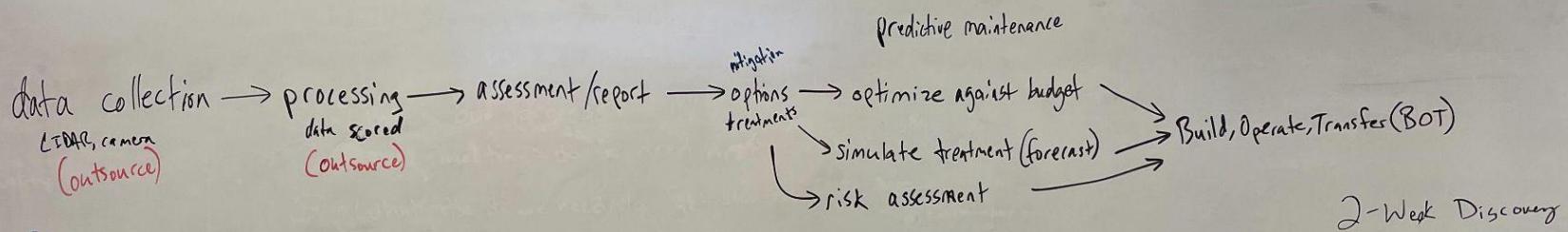
Case study



@RobertHerbig

Bet #1: Business Model

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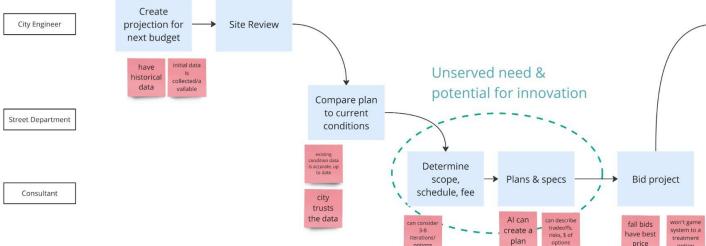
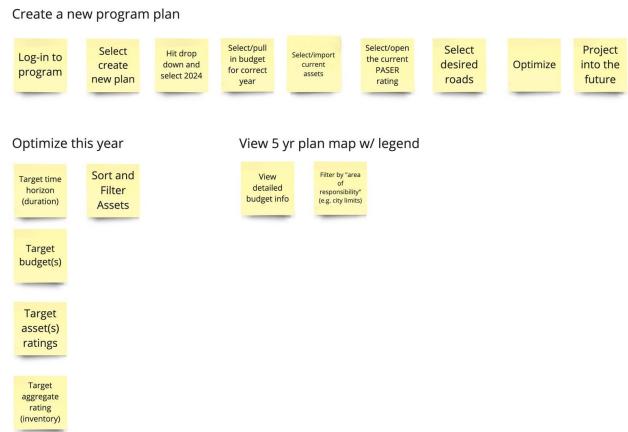
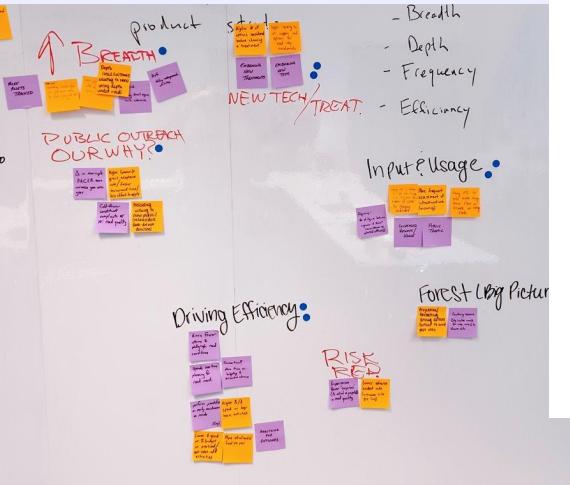
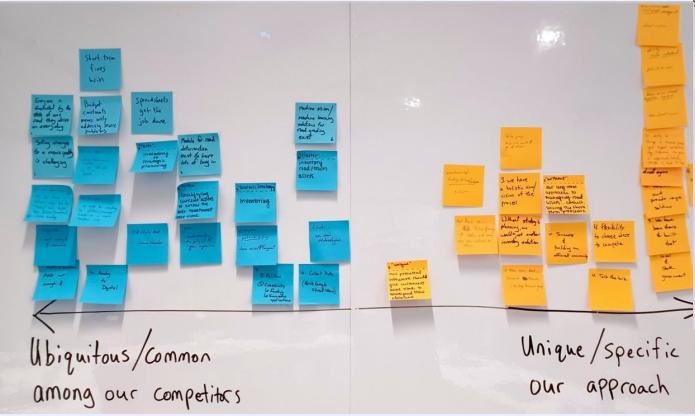


Bet #2: One week of Discovery

Bet #2: One week of Discovery



Bet #2: One week o



Bet #3: Two Feasibility Studies

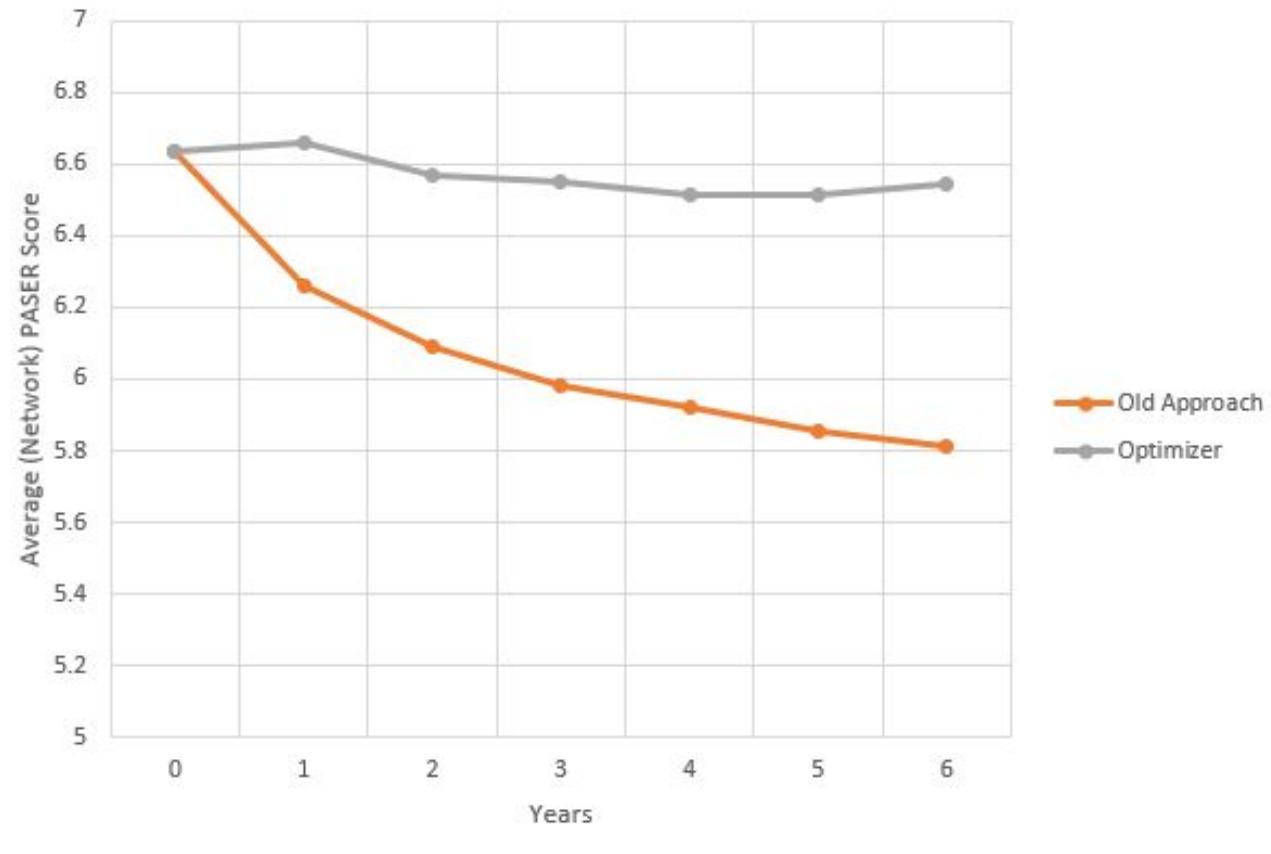
Bet #3: Two Feasibility Studies

Bet 3A: Technical Feasibility:

“Can AI produce good enough budgets
in a short enough time-frame?”

Bet #3

Bet 3A:
“Can All
in a short
time?”



Bet #3: Two Feasibility Studies

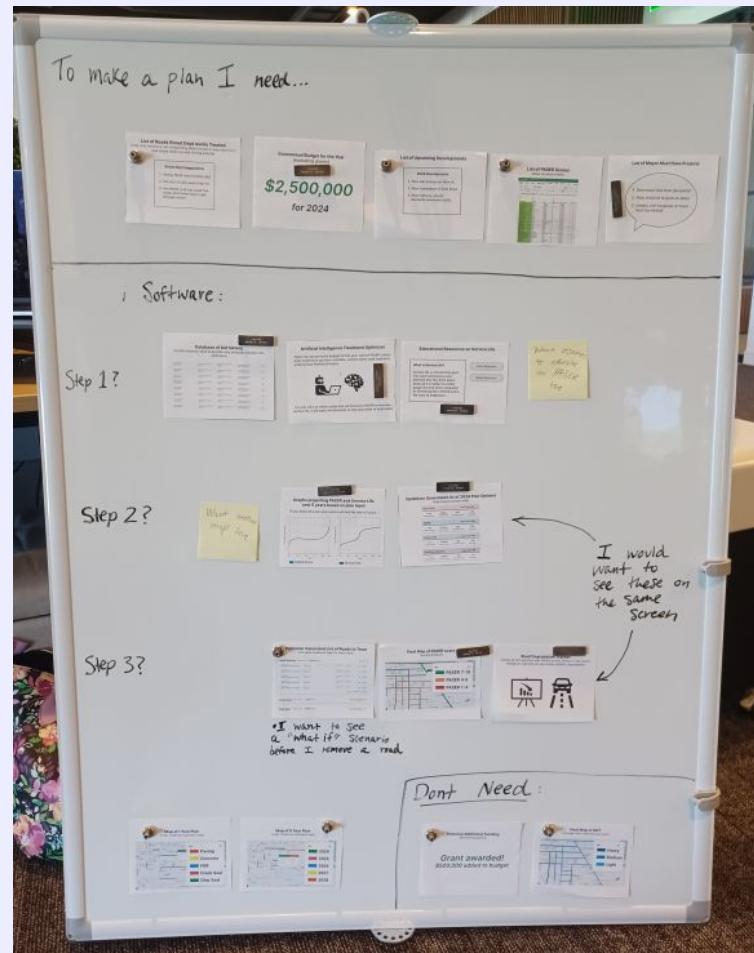
Bet 3B: Market Feasibility:

“Does the market want this product
and how would they use it?”

Bet #3: Two Feasibility Studies

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“Does the market want this product
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Bet #3: Two Feasibility Studies

Bet 3A: Technical Feasibility:

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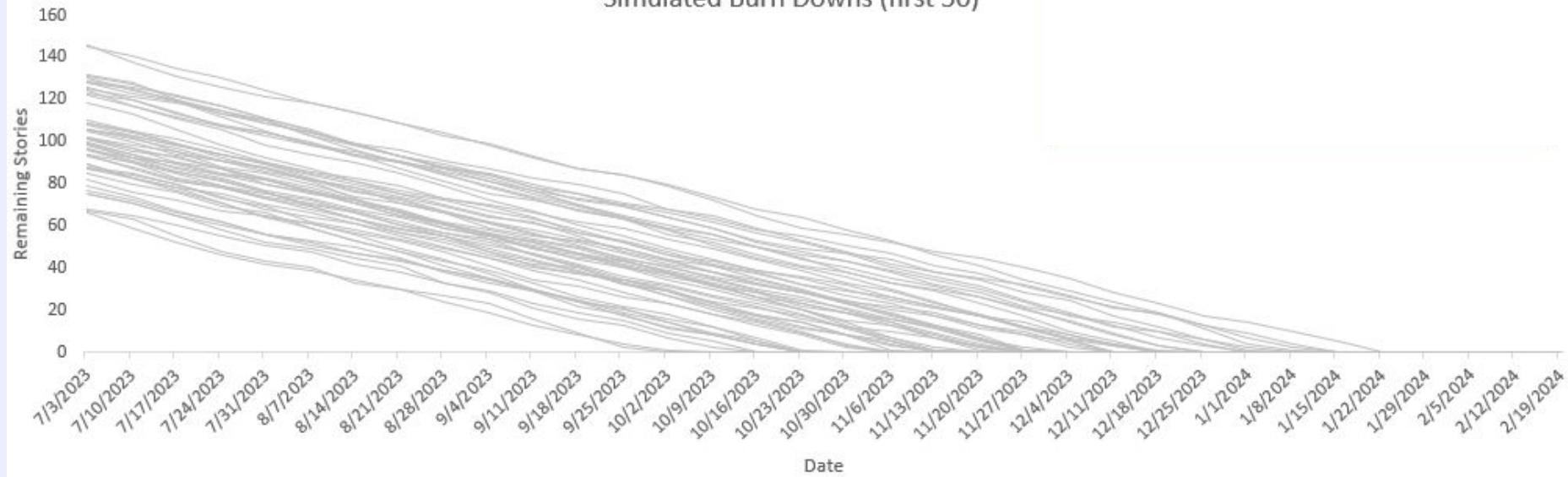


Bet 3B: Market Feasibility:

“Does the market want this product and how would they use it?”



Simulated Burn Downs (first 50)



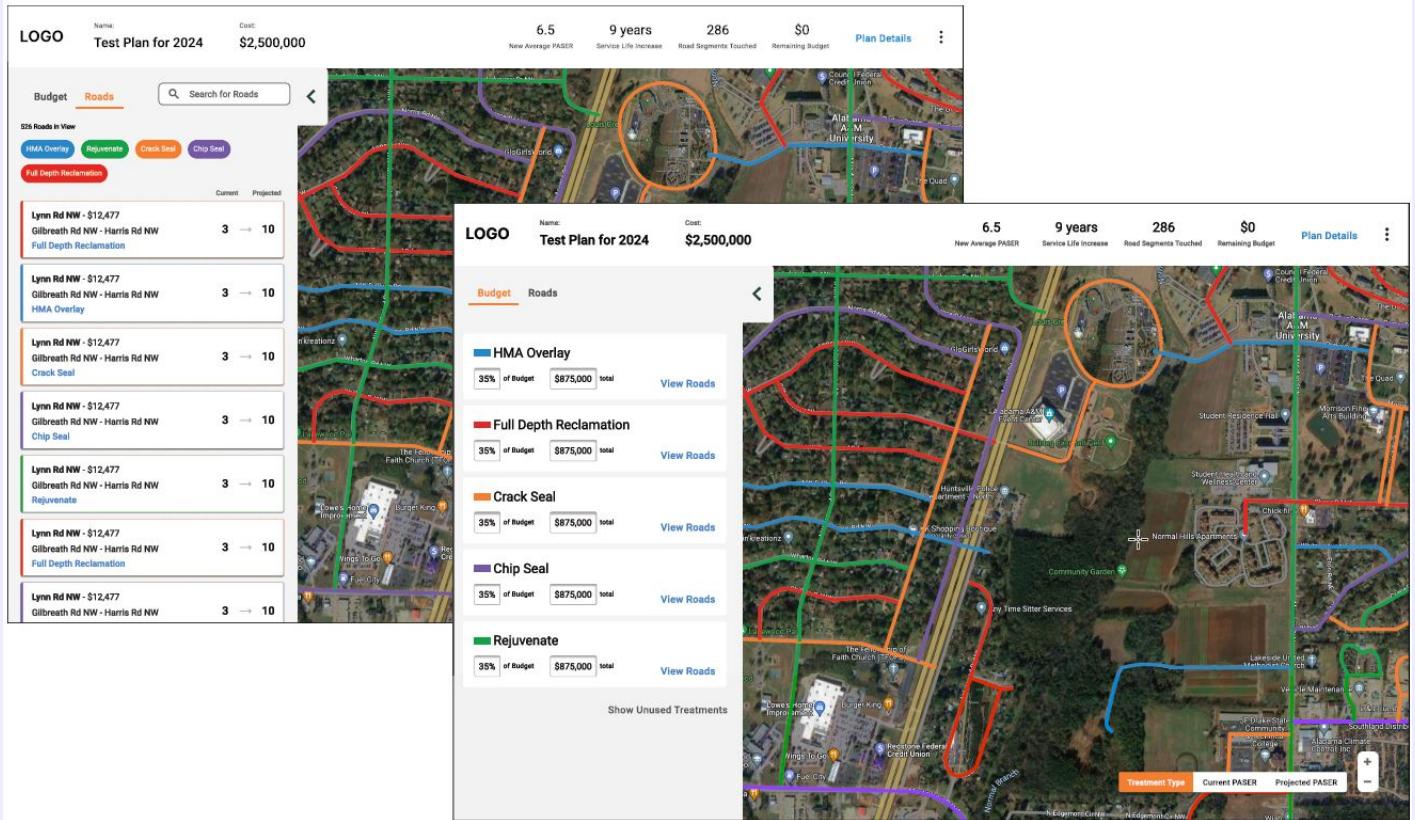
What would it take to bring [product name] to life?



Results

Likelihood	Duration	Date	
100%	34	2/26/2024	Almost certain
95%	28	1/15/2024	
90%	27	1/8/2024	
85%	26	1/1/2024	
80%	25	12/25/2023	Somewhat certain
75%	24	12/18/2023	
70%	23	12/11/2023	
65%	23	12/11/2023	
60%	22	12/4/2023	
55%	21	11/27/2023	Less than coin-toss odds. But if you are
50%	21	11/27/2023	
45%	20	11/20/2023	
40%	19	11/13/2023	
35%	19	11/13/2023	
30%	18	11/6/2023	
25%	17	10/30/2023	
20%	17	10/30/2023	
15%	16	10/23/2023	
10%	15	10/16/2023	
5%	14	10/9/2023	
0%	12	9/25/2023	

Bet #4: Professional Services



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Communicate the uncertainty

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Case study

Bibliography

1. Riddler Hat <https://www.pinterest.com/pin/435371488974838348/>
2. Weather Cartoon <https://andertoons.com/>
3. BatSuit Gantt Chart <https://trumpexcel.com/gantt-chart-in-excel/>
4. Candyland
5. Blockbuster [https://batman.fandom.com/wiki/Blockbuster_\(Mark_Desmond\)](https://batman.fandom.com/wiki/Blockbuster_(Mark_Desmond))
6. Dangling Riddler <https://comicvine.gamespot.com/riddler/4005-3718/>
7. Hurricane Sandy 1 <https://www.npr.org/2012/10/31/164046039/high-def-storm-models-yielded-accurate-predictions>
8. Hurricane Sandy 2 <https://metofficenews.files.wordpress.com/2012/10/nhc-hurricane-sandy-forecast-track-29-october-20121.gif>
9. Highlights for Children <https://www.ebay.com/itm/285201209609>
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