Can We Learn to Manage Uncertainty? Probably!

Robert Herbig
Lead Software Engineer
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"... Show more

Speakers

Robert Herbig
All Practice Lead at SEP

About this session
Teams & Collaboration

Survey
“And now the 7-day forecast...”
“When Will It Be Done?”
“When Will It Be Done?”
Takeaways

Think probabilistically, not deterministically

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- 
- 

Use probabilistic forecasting

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Communicate the uncertainty

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Case study
Takeaways

Think probabilistically, not deterministically

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- 
- 

Use probabilistic forecasting

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Communicate the uncertainty

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Case study
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
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

<table>
<thead>
<tr>
<th>Communicate the uncertainty</th>
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Case study
Smash Gotham City → Profit
Smash Gotham City

Profit

Stopped by Batman
Smash Gotham City

Profit

? %

Stopped by Batman

? %
Takeaways

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Communicate the uncertainty

Case study
“When Will It Be Done?”

Gantt Chart - Building a BatSuit

- Get the Equipments
- Build the Arms Cover
- Assemble the Armour
- Design the Chest Piece
- Prepare the Neck Piece
- Design the Mask
- Get the Cape & Gloves
- Make the Boots
- Stich the Suit
- Attach the Belt
- Test for Survival
Probabilistic Forecasting
Probabilistic Forecasting
Probabilistic Forecasting

A good forecast:

1. Shows multiple options
 Probabilistic Forecasting

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

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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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4. Is updated as new information is received
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Communicate the uncertainty

Case study
Initial backlog = 25 stories

Velocity = 3/sprint
Initial backlog = 20-30 stories

Velocity = 2-4/sprint
Initial backlog = 20-30 stories

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

* = 20-30 stories

**Velocity**

= 2-4/sprint
Initial backlog = 20-30 stories

Velocity = 2-4/sprint
Goofus has poor code quality and therefore erratic sprint velocity
Goofus has poor code quality and therefore erratic sprint velocity

@RobertHerbig
Goofus has poor code quality and therefore erratic sprint velocity

Gallant uses best practices to minimize rework and defects

Historical data:
● 4, 5, 10, 11

Average: 7.5
Goofus has poor code quality and therefore erratic sprint velocity

Gallant uses best practices to minimize rework and defects

Historical data:
- 4, 5, 10, 11

Average: 7.5

Historical data:
- 6, 7, 8, 9

Average: 7.5
Goofus has poor code quality and therefore erratic sprint velocity

Gallant uses best practices to minimize rework and defects

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.”
Initial backlog = 20-30 stories

Velocity = 2-4/sprint
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 a 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....
2. How many stories are remaining to be completed?

- **low guess**: 20
- **scope complexity**: Clear and understood
- **adjusted scope**: 20
- **high guess**: 25

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

- **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
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
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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

Case study
<table>
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<tr>
<th>Likelihood</th>
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Takeaways

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- Luck and skill both contribute
- There is more than one possible outcome
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Communicate the uncertainty

-
Simulated Burn Downs (first 50)

@RobertHerbig
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Communicate the uncertainty
- Case study
<table>
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<th>Impact Low</th>
<th>Impact High</th>
<th>Description</th>
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<tr>
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<td>20</td>
<td>30</td>
<td>Rewrite the front-end in a new framework</td>
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Case study
“Bet”

@RobertHerbig

Photo by Michał Parzuchowski on Unsplash
“Bet”

- Cost
“Bet”

- Cost

@RobertHerbig
“Bet”

- Cost
“Bet”

- Cost
- Odds

@RobertHerbig
“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)
“Bet”

A good bet:

1. Is outcome focused
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3. Has odds (sometimes known, sometimes not)
4. **Forces us to explore our assumptions and beliefs**

@RobertHerbig
“Bet”

A good bet:

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

A good bet:

1. Is outcome focused
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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**

@RobertHerbig
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*

Case study

@RobertHerbig
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Case study
Bet #1: Business Model
Bet #1: Business Model

data collection → processing → assessment/report

- Predictive maintenance
- Options treatment
- Optimize against budget
- Build, Operate, Transfer (BOT)
- Simulate treatment (forecast)
- Risk assessment

2-Week Discovery

@RobertHerbig
Bet #2: One week of Discovery
Bet #2: One week of Discovery
Bet #2: One week of...
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: Technical Feasibility: "Can AI produce good enough budgets in a short enough time-frame?"
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

Bet 3B: Market Feasibility:
“Does the market want this product and how would they use it?”
Bet #3: Two Feasibility Studies

Bet 3A: Technical Feasibility:
“Can AI produce good enough budgets in a short enough time-frame?”

Bet 3B: Market Feasibility:
“Does the market want this product and how would they use it?”
What would it take to bring [product name] to life?

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Almost certain
Somewhat certain
Less than coin-toss odds. But if you are
Bet #4: Professional Services
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Case study

@RobertHerbig

https://sep.com/
Bibliography

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