Lifetime Value In The Time of Covid

Dylan Rogerson

Who am I?

- Dylan Rogerson
- Senior Data Scientist
- Business Intelligence
- Data Lab
- Long-Term Research & Prediction

WIZARDS OF THE COAST


ARENA
MTG ARENA
ON MOBILE

What is MTG: Arena

- Free to Play Collectible Card Game
- Released 9/27/18
- Around 4,500 unique cards
- Big Collections
- Long-Tailed Engagement

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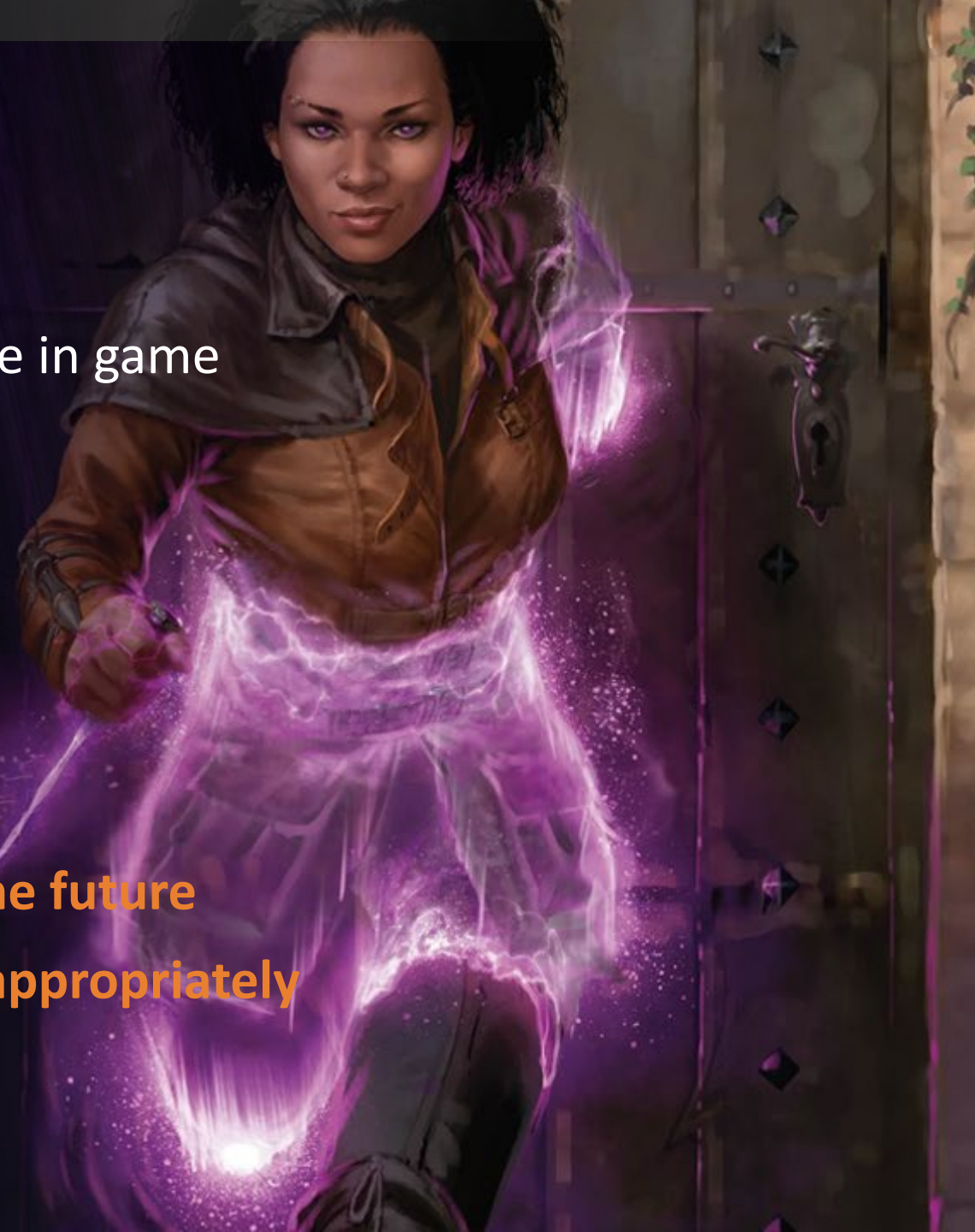
Lifetime Value

- LTV = Total spend of a player over their lifetime in game
- Acquire players through advertising
- Marketing channels (Facebook, Google Ads)
- Value of player > Cost to acquire
- LTV changes dramatically over channel / time
- **Need a predictive model that can estimate the future value of player asap to stay agile and spend appropriately**



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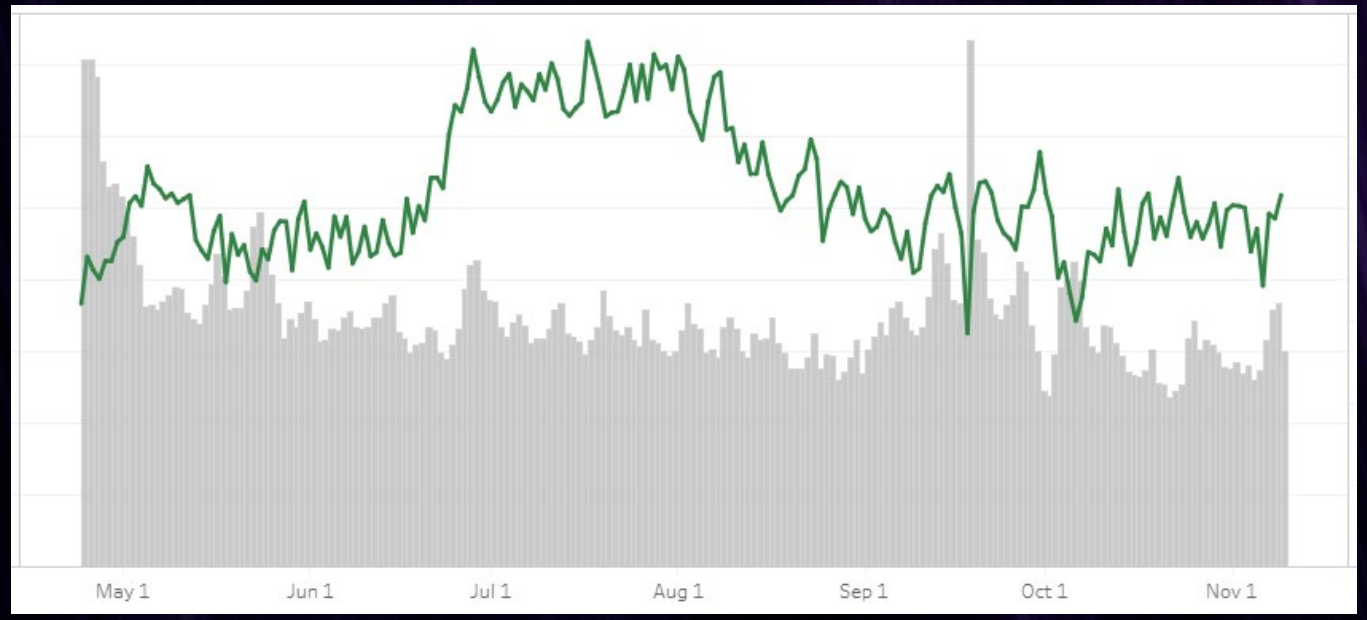
Where we ended up

- Predicted LTV for New Players During 2020
- We learned models that adapt are hard
- Three Major + One Minor Revision
- Model approach adapted to covid!



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Chapter 1: This Is Easy Right?

The Goal

- Marketing: We need LTV!
- Predict $ LTV of each new player asap?
- You have 9 months of data
- 2 week eval, 90 day pLTV
- Solution = Fast + Cheap

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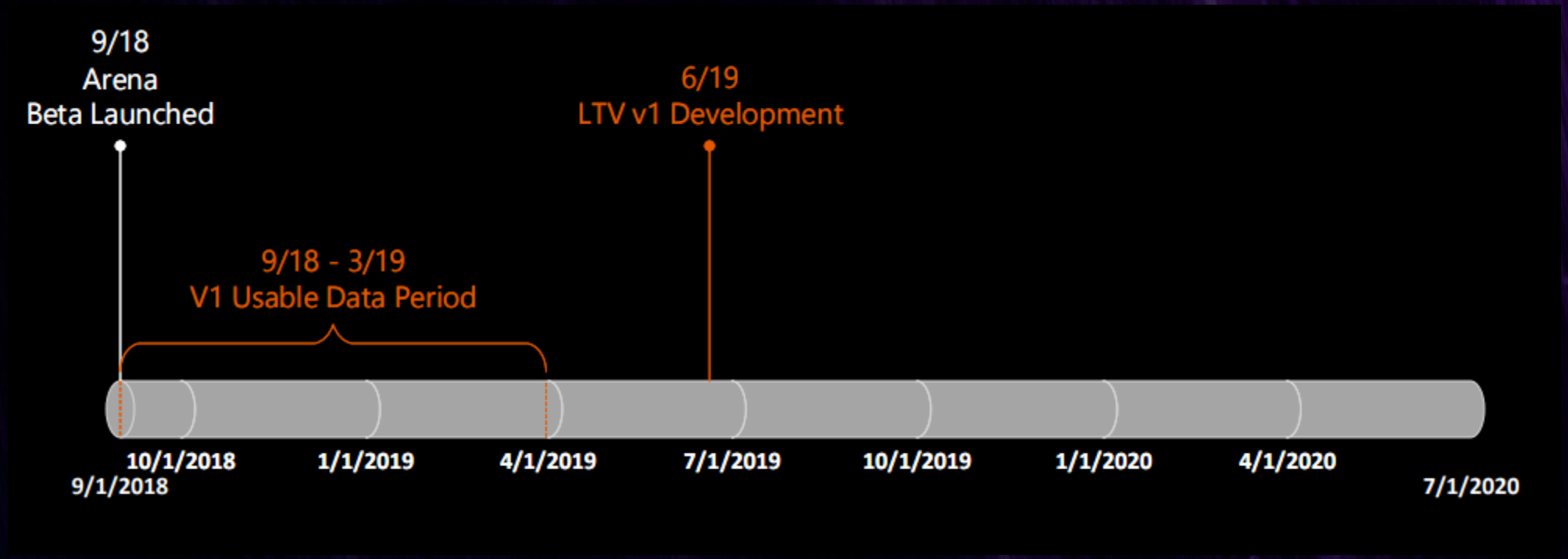
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The Goal

- Marketing: We need LTV!
- Predict $ LTV of each new player asap?
- You have ~~9~~ 6 months of data
- 2 week eval, 90 day pLTV
- Solution = Fast + Cheap

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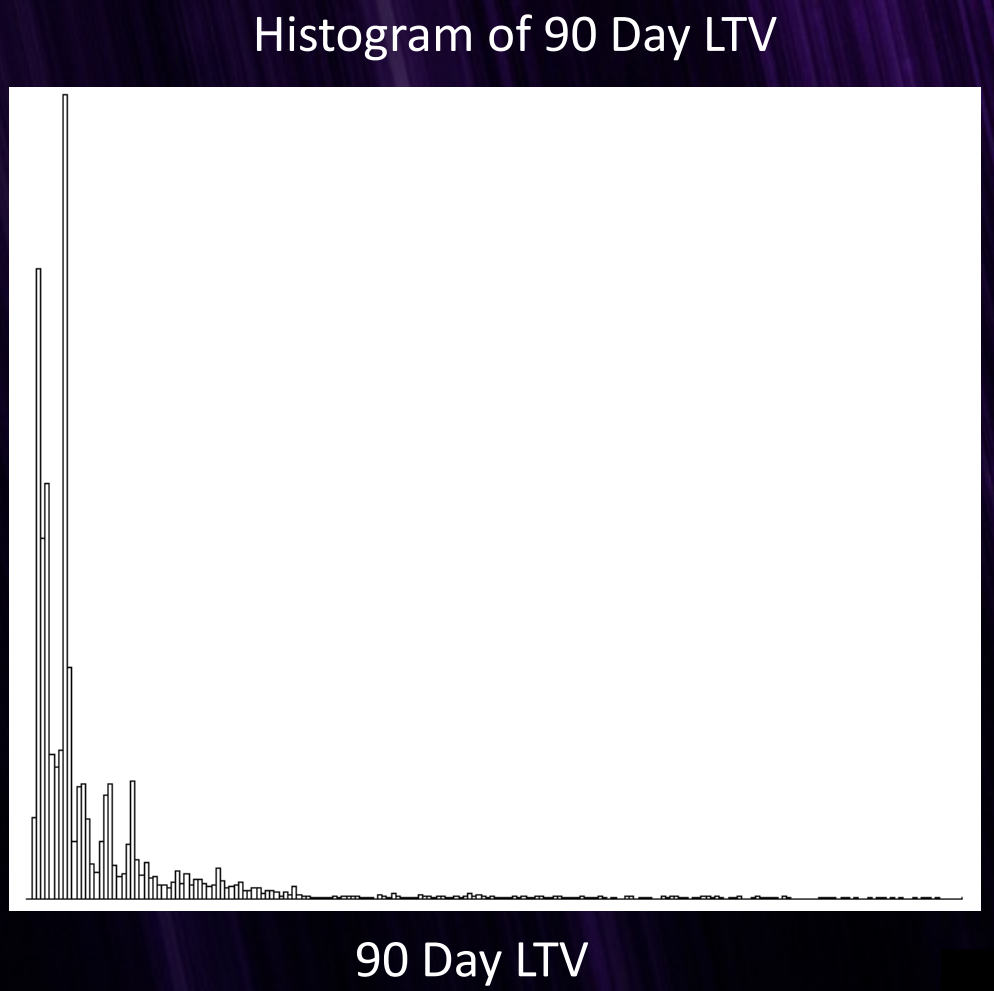
A First Attempt

- 2 week eval, 90 day pLTV
- Model: Gradient Boosting Machine (GBM in R)
- Predict individuals
- Roll up individuals into channels



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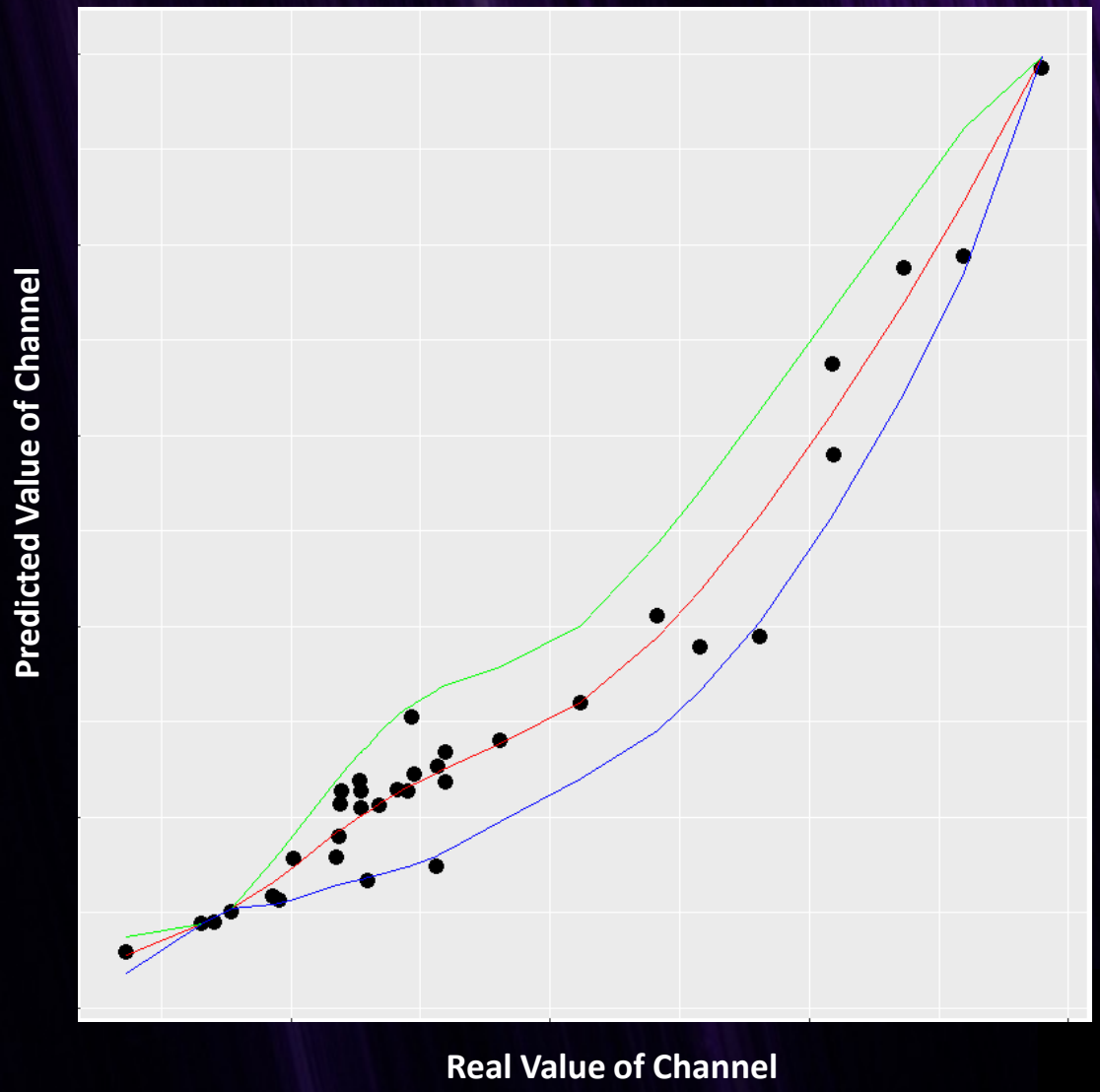
A First Attempt

- How well can we predict a new channel?
- ‘Leave one out’ channel training
- How well did we predict that ‘new’ channel?
- Boundary drawn for higher/lower predictions
- Confident predictions on new channels!



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Uh oh

- 3 months later…
- No one was using the model
- 2 weeks was too long to wait
- 90 Day LTV wasn’t helpful
- bias Bias BIAS

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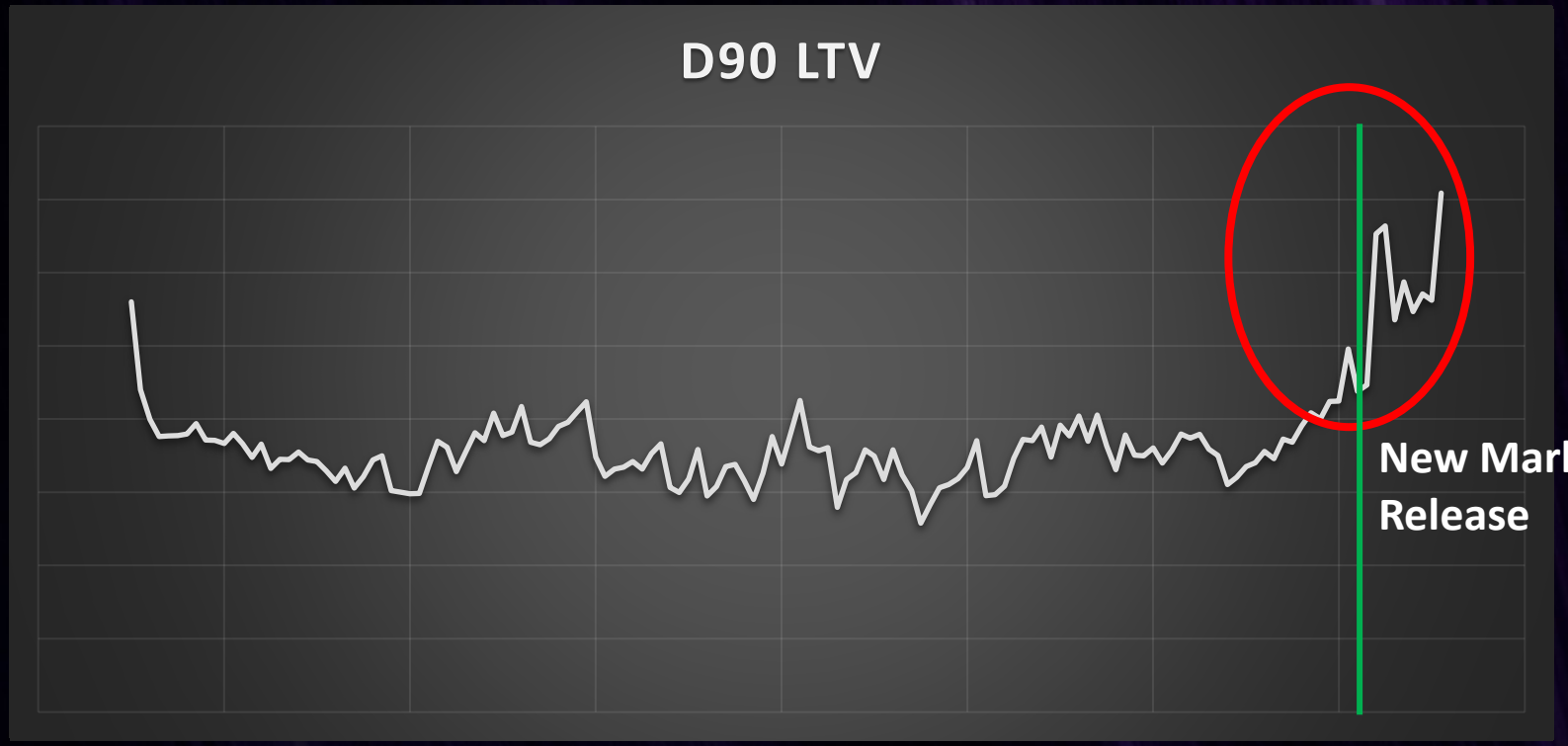
Bias creeping in…

- Avg D90 LTV Looks relatively flat after launch
- What's the spike?
- Bias emerging from early adopters



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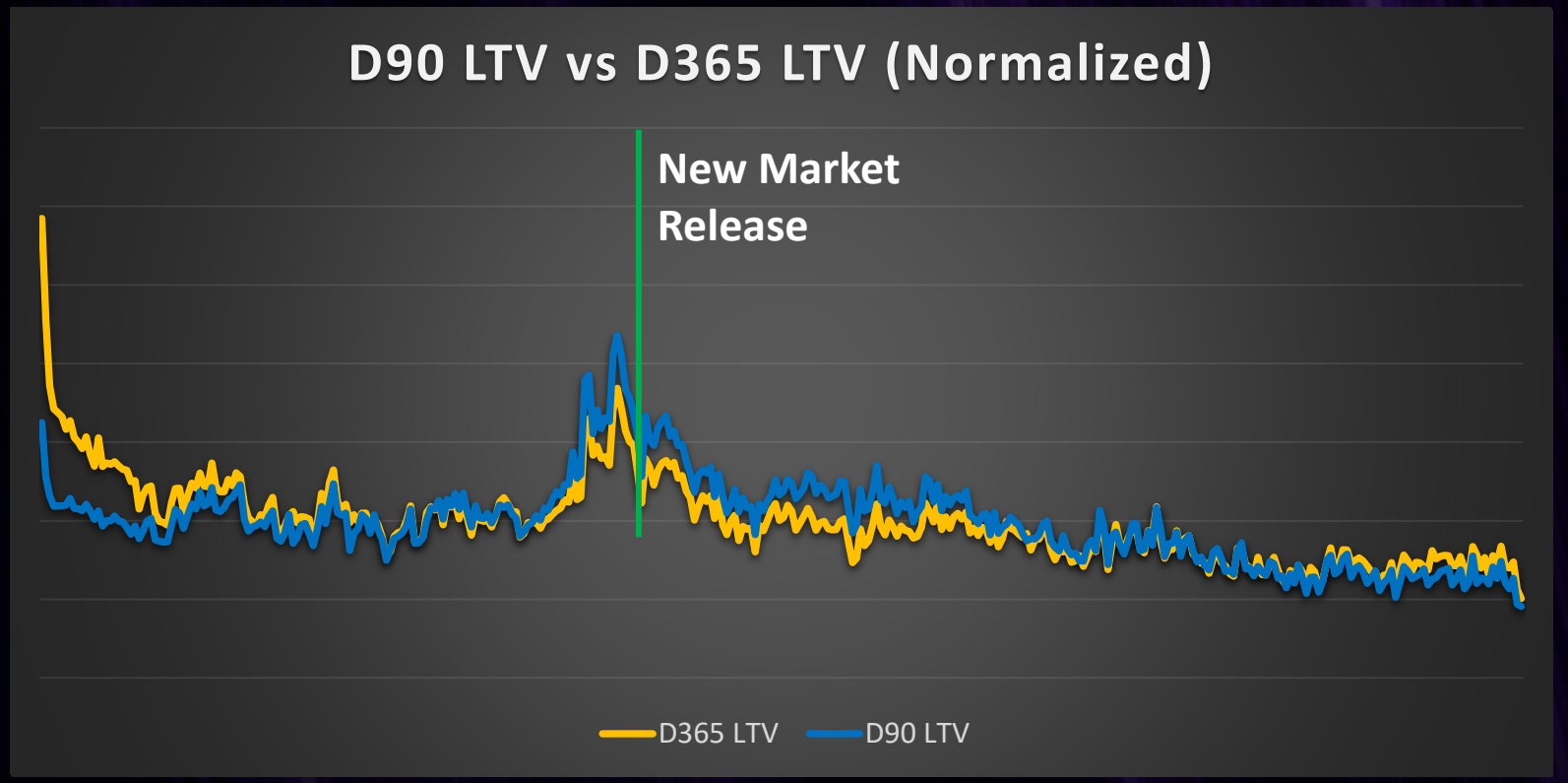
Looking Forward

- D365 LTV has more pronounced spikes early on
- Long-term monetization takes time to develop
- Give players time to churn



V1 Lessons

- Nothing is ‘steady state’
  - Early adopter behavior
  - Players need time to naturally churn
- Next time: Long timeframe + short eval – 365 Day LTV in 1 week
- Fitting to the dataset isn’t good enough
- **Must fight bias and anticipate future changes!**

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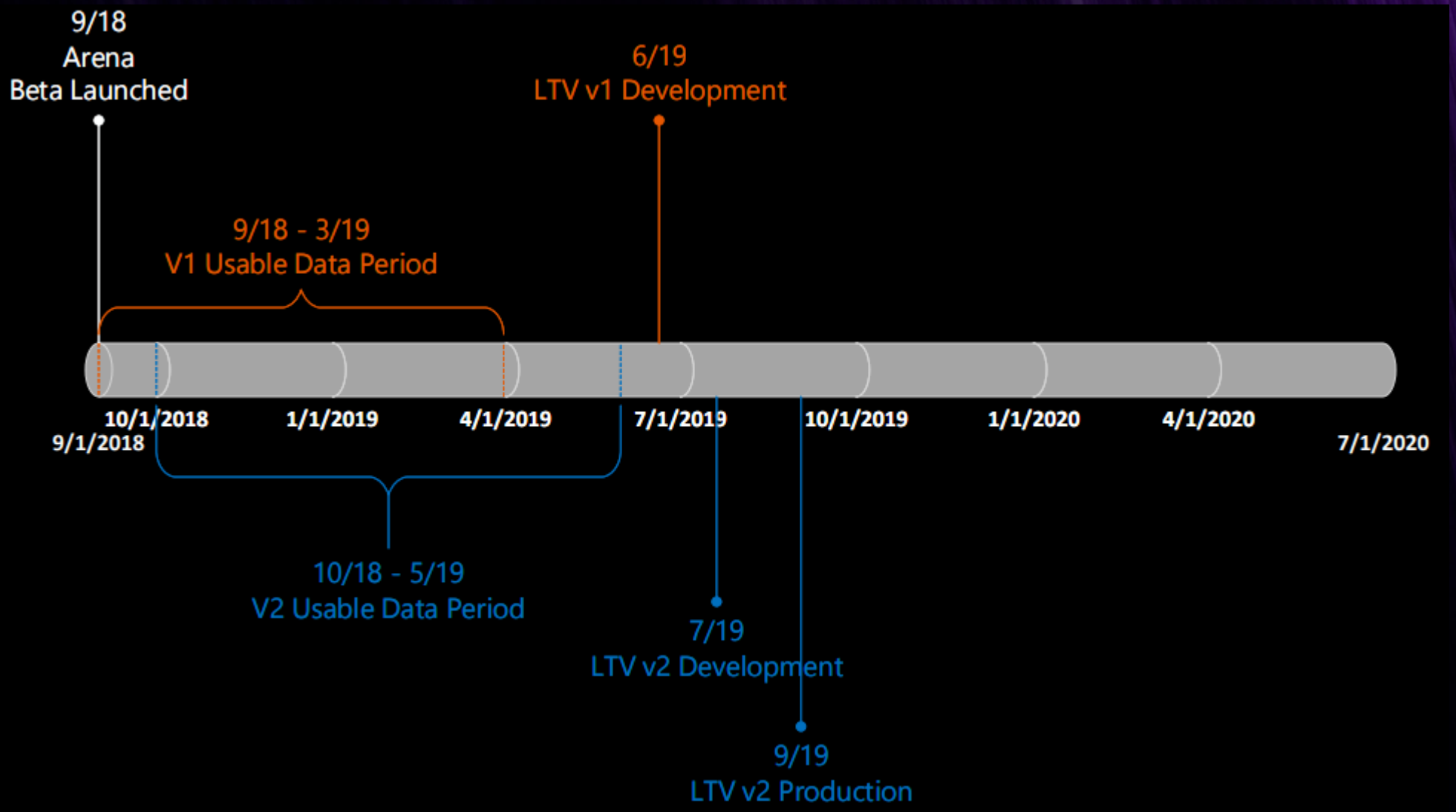
Chapter 2: Nerding Out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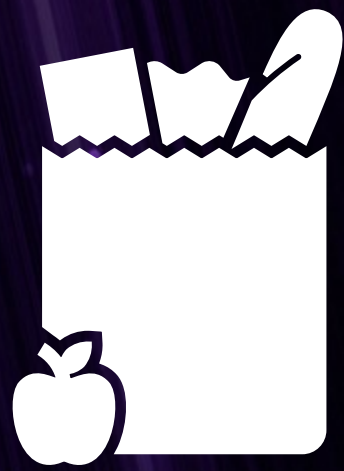
Industry Research



Contractual

Non - Contractual

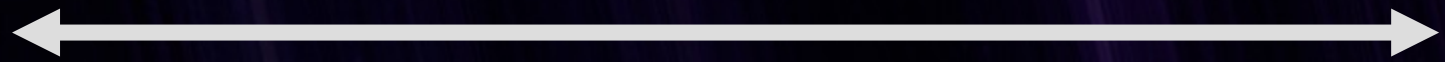
Player Spend Habits

- Spend / Engage around content drops / events
- Multiple content drops /events per year
- Releases dates vary
- Semi-contractual?

Industry Research

Continuous

Discrete



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Pareto/NBD

- ‘Buy Till You Die’
- Continuous + Non-contractual
- Daily: Do you churn?
- Daily: How much do you buy?
- Doesn’t utilize deeper features

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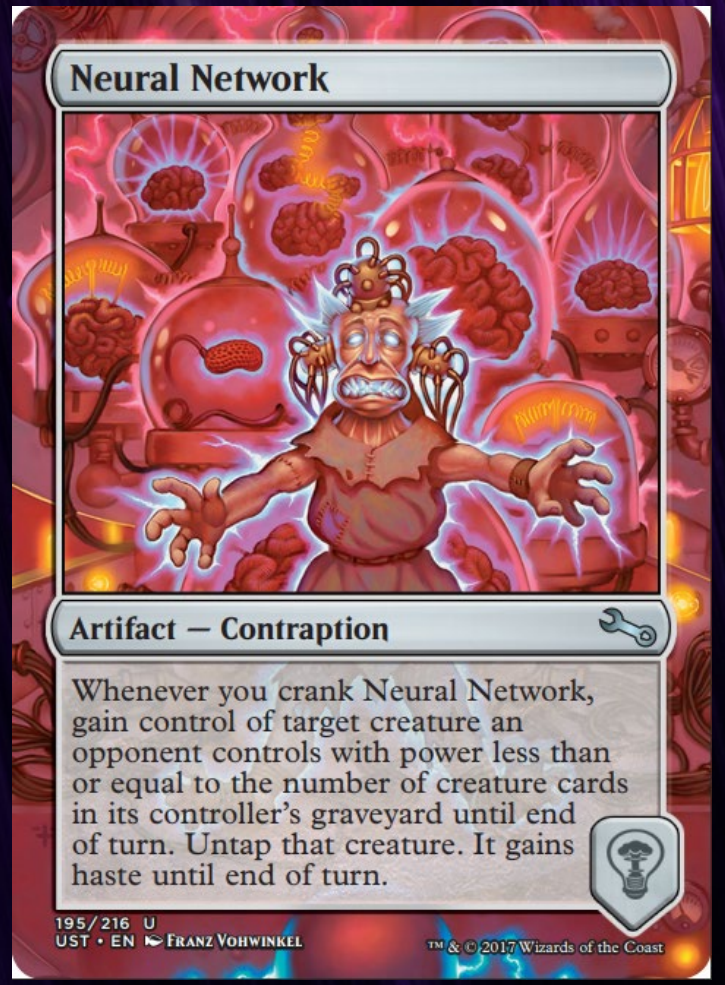
Neural Networks / AI

- Mining Player Purchase Patterns
- Architecture is pain
- More accurate on individual players
- As accurate on channels
- Not worth the extra effort



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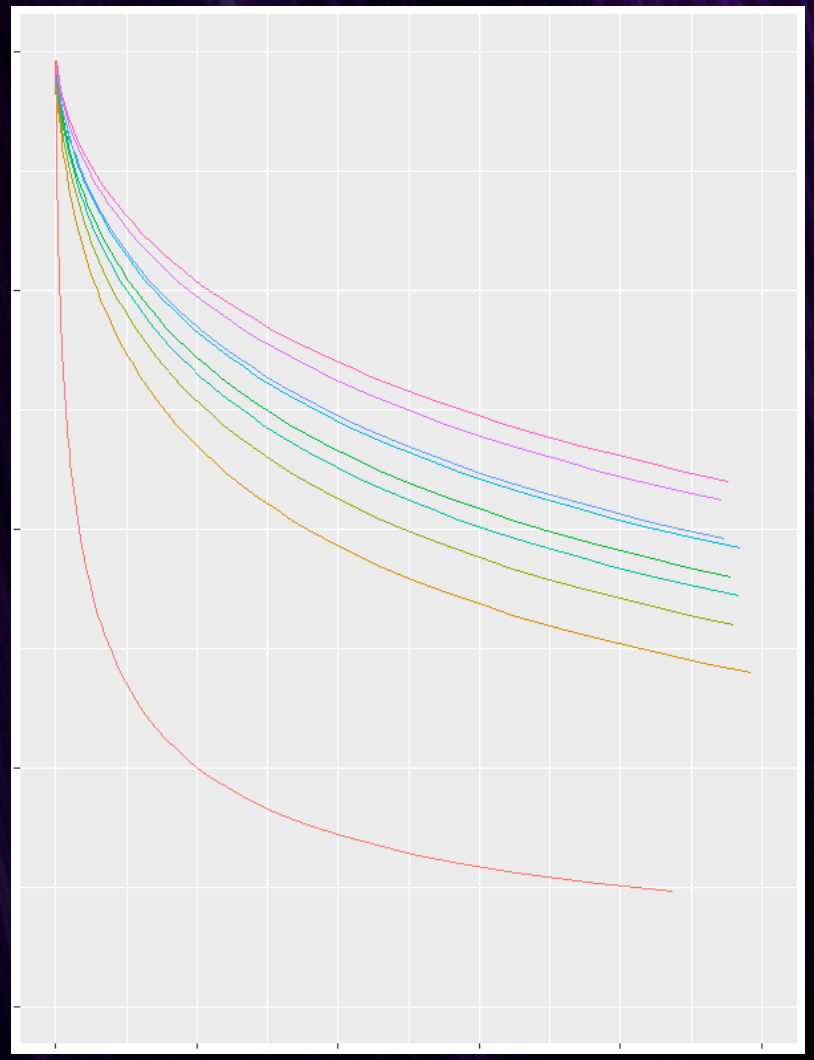
Survival Models

- Projects how long a player will live
- Estimating Player Lifetime
- Easy to understand
- Extends reasonably well
- Well established in other fields

Survival Rates for Levels of Spend in First 7 Days



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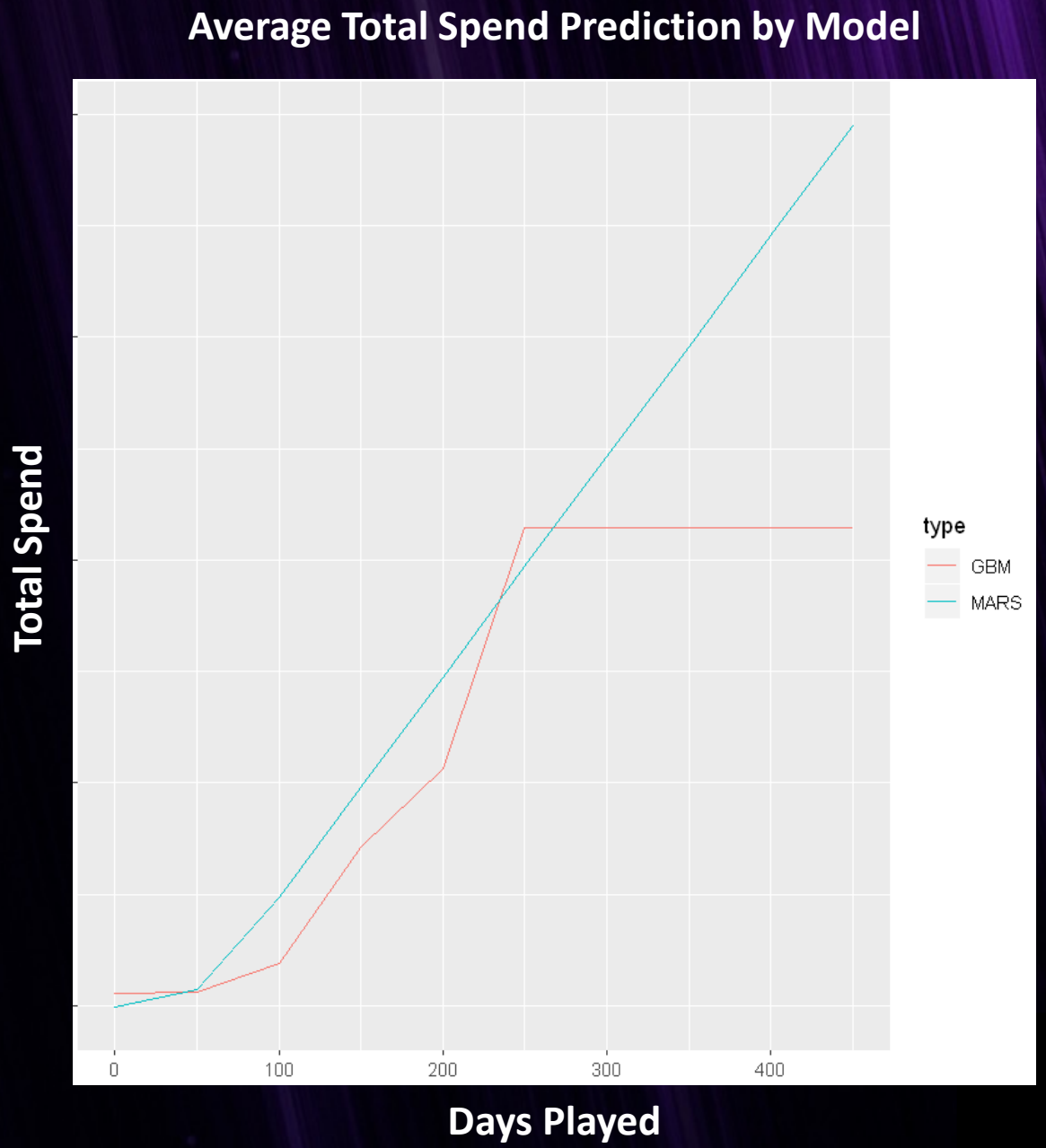
MARS

- Multiple Adaptive Regressive Splining
- Estimating Spend
- Easy to understand
- Extends reasonably well
- Reminder: Still don’t have a year of data!



The Good

- MARS + Survival
- Predict Lifetime -> Predict Spend
- Only 9 months of data
- Extends to a year!
- **People started using it!!!**

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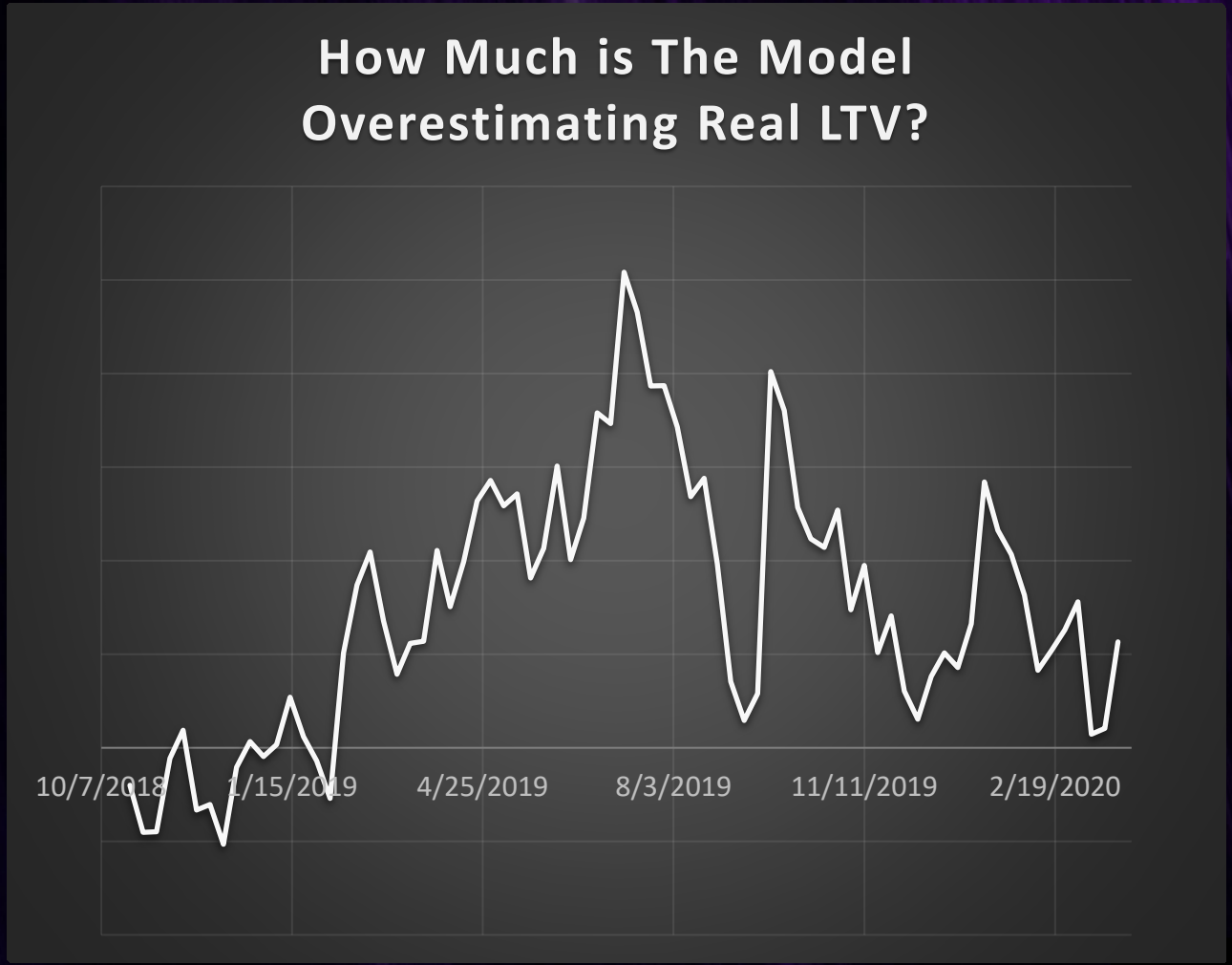
The Bad

- Bias: Early Adopters
- Confirmed by model refresh (v2.5)
- Impactful Content
- Stability 10 months into product
- Survival + Mars projection

  assumes smooth continuity



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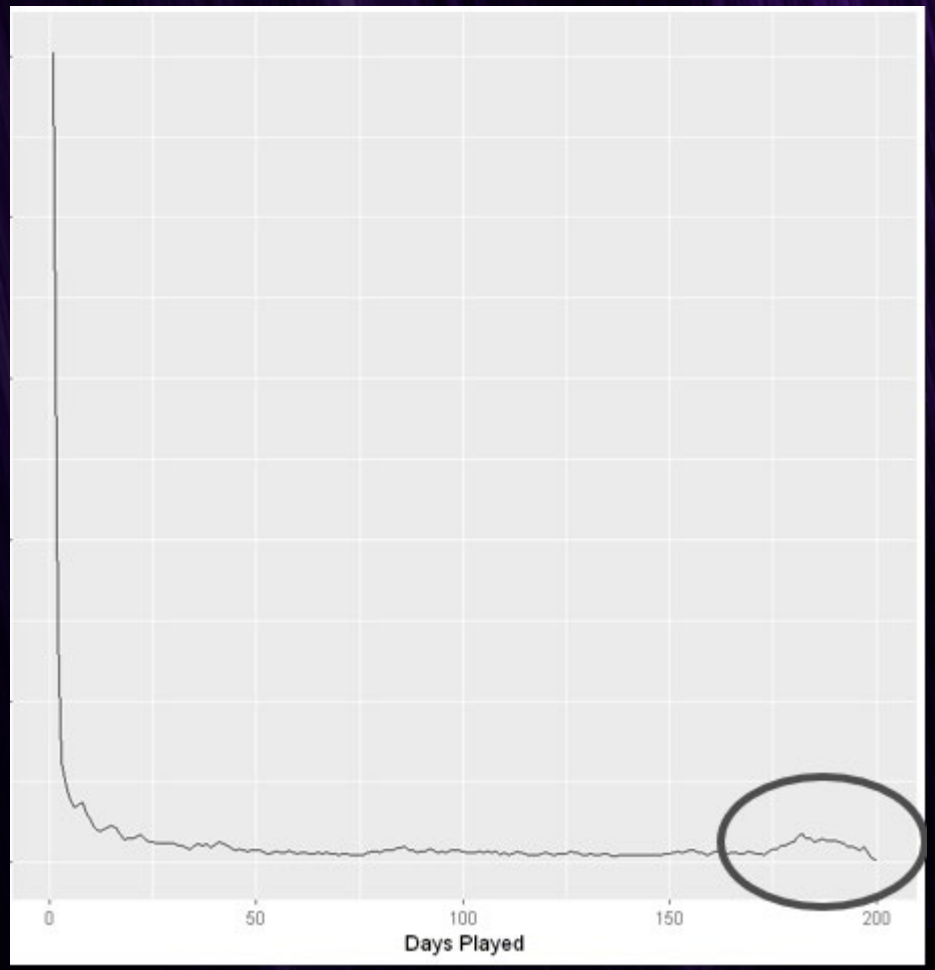
Hazard Function (Likelihood to churn the next day)



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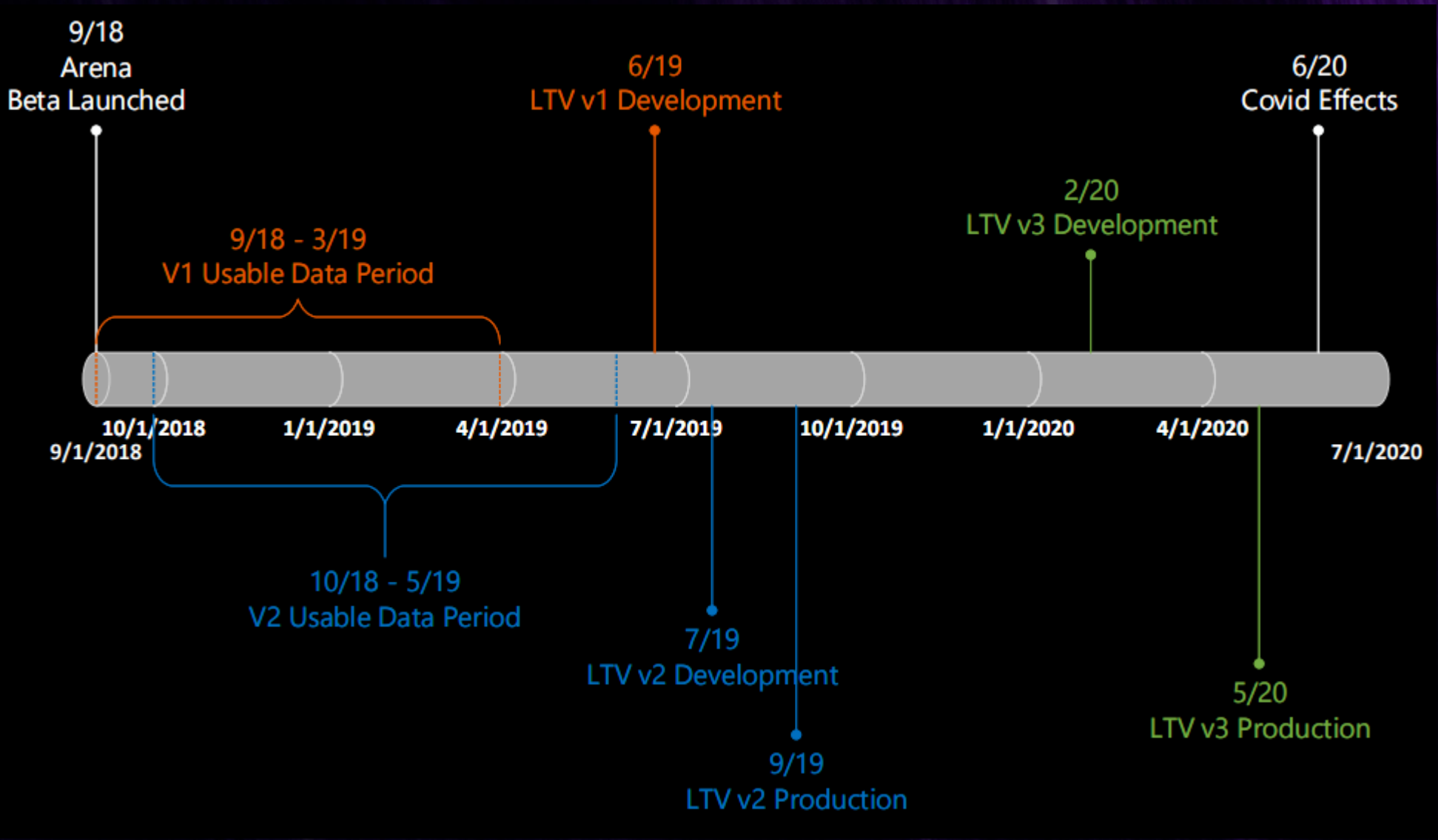
Chapter 3: Glorious Victory!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LTV v2 Production
5/20
LTV v3 Production

Time to Improve!

- A year of data!
- Move away from biased populations ASAP
- Update the model constantly
- Industry standards won't cut it

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The Method To Our Madness

D365 LTV Model

- 1 - D7 Spend
- 5 - 90 Day LTV
- 10 - 365 Day LTV

12 months ago

- A year of data!
- Early adopters
- Old Content

D90 LTV Model

- 2 - D7 Spend
- 5 - 90 Day LTV
- ??? - 365 Day LTV

3 months ago

- Only 3 months
- No early adopters
- Recent content

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The Method To Our Madness

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The Leapfrog Method

- 3 Models:
  - Train New D90 LTV Model: 3-6 months old data
  - Train Old D90 LTV Model: 12-15 months old data
  - Train Old D365 LTV Model: 12-15 months old (using Old D90 LTV as predictor)
- Predict New D365 LTV by using New D90 LTV Predictions in Old D365 LTV Model
- Still bias from relationship between D90 and D365 changing over time, but this is minimal

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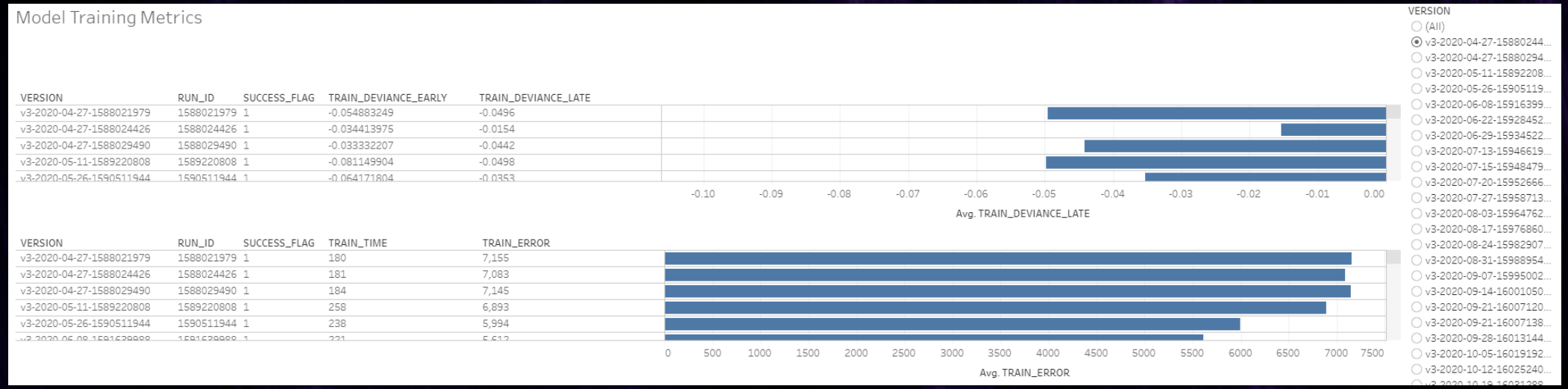
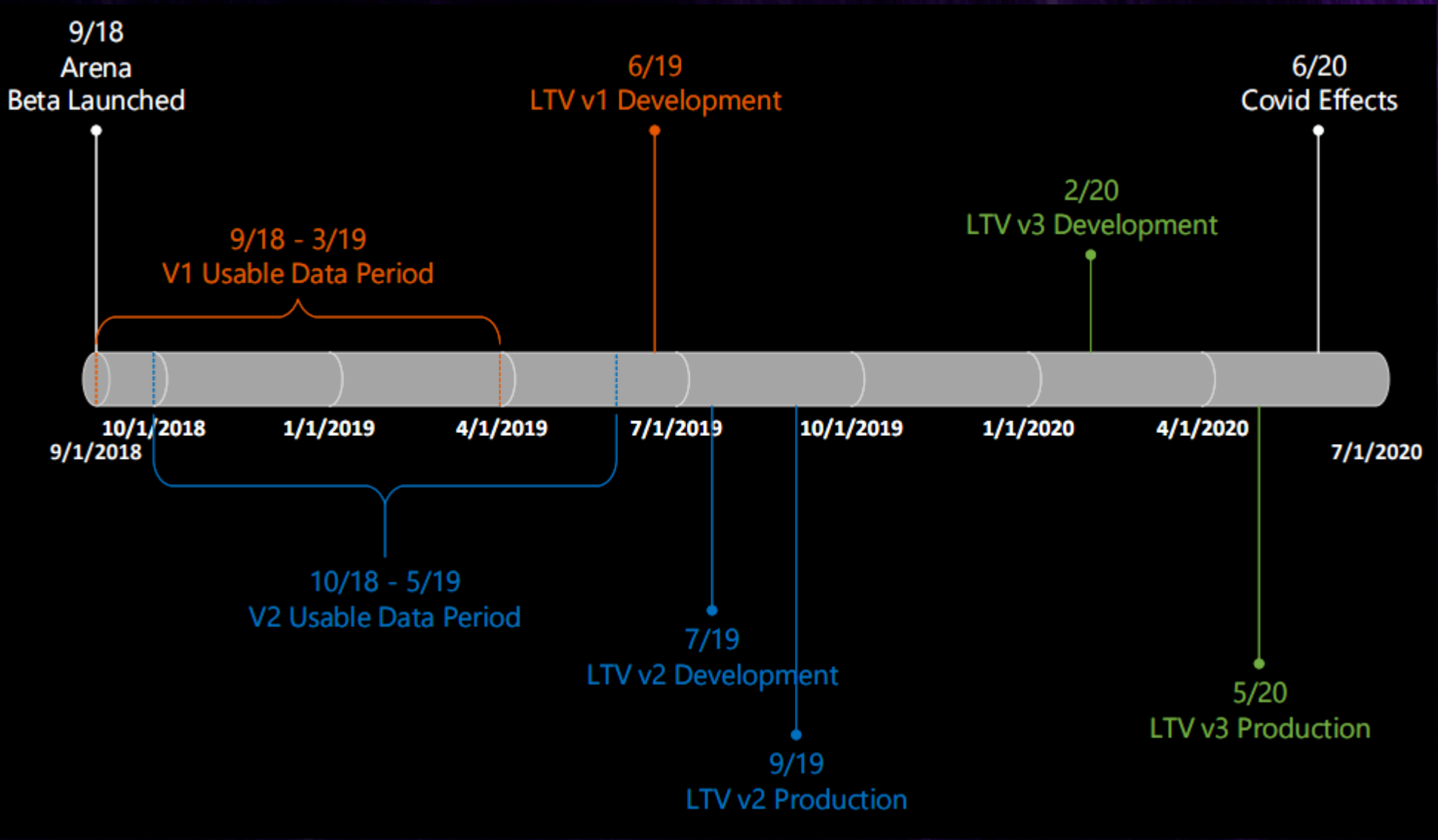
The Backend

- Trains Weekly, Score Daily
- Automated Model Build
- Accept or Reject on Fitness
- Build output in Data Lake
- Monitoring and approval process in Tableau



Chapter 4: Covid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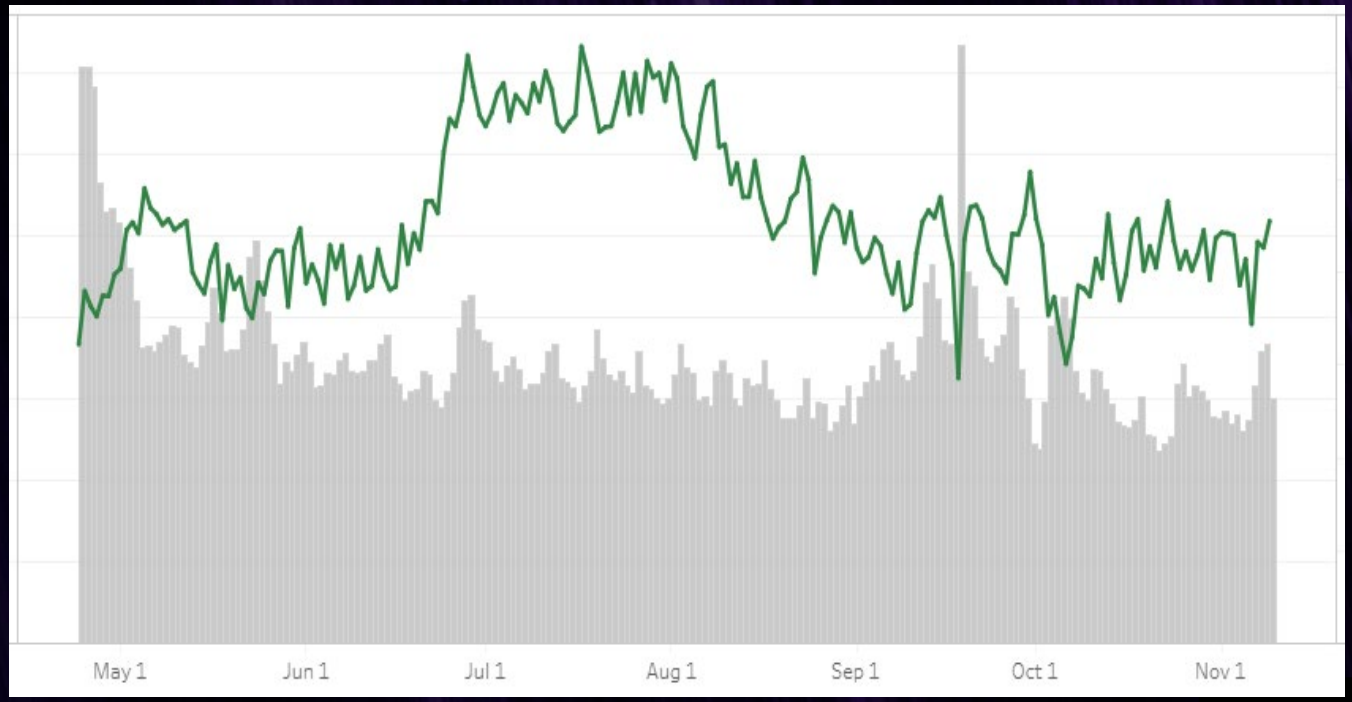
The Summer Bump

- LTV for New Players During 2020
- Coincides with product release
- Primary - First 7 days
- Secondary - D90 Behavior
- Secondary - Higher Outliers
- Strong gains for one month



Lessons

- LTV takes time – 3 versions + 11 months
- Traditional models fail when dealing with games
- Model Accuracy <<< Bias
- Constant monitoring is key
- Covid's change on our player base was short lived

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Thank You!

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