Opti-Goal!

USING OPTIMIZATION TO BEAT 99.995% OF MANAGERS WORLDWIDE

DISCLAIMER: RESULTS AS AT 7 DECEMBER 2023

Managed by Dilan SriDaran & Ethan Fahimi

Context

WHAT?

TO BUILD FRAMEWORK TO MAXIMIZE FANTASY PREMIER LEAGUE POINTS SCORED OVER 23/24 SEASON

WHY?

TO BEAT 10 MILLION OTHER USERS AND DEMONSTRATE POTENTIAL OF OPTIMIZATION IN SPORTS MANAGEMENT

HOW?

MIXED-INTEGER OPTIMIZATION USING EXPECTED POINTS PER PLAYER PER WEEK

GAME OVERVIEW

SELECT SQUAD OF 15 PLAYERS EACH WEEK

SQUAD MUST ADHERE TO SALARY CAP

SELECT STARTING XI EACH WEEK

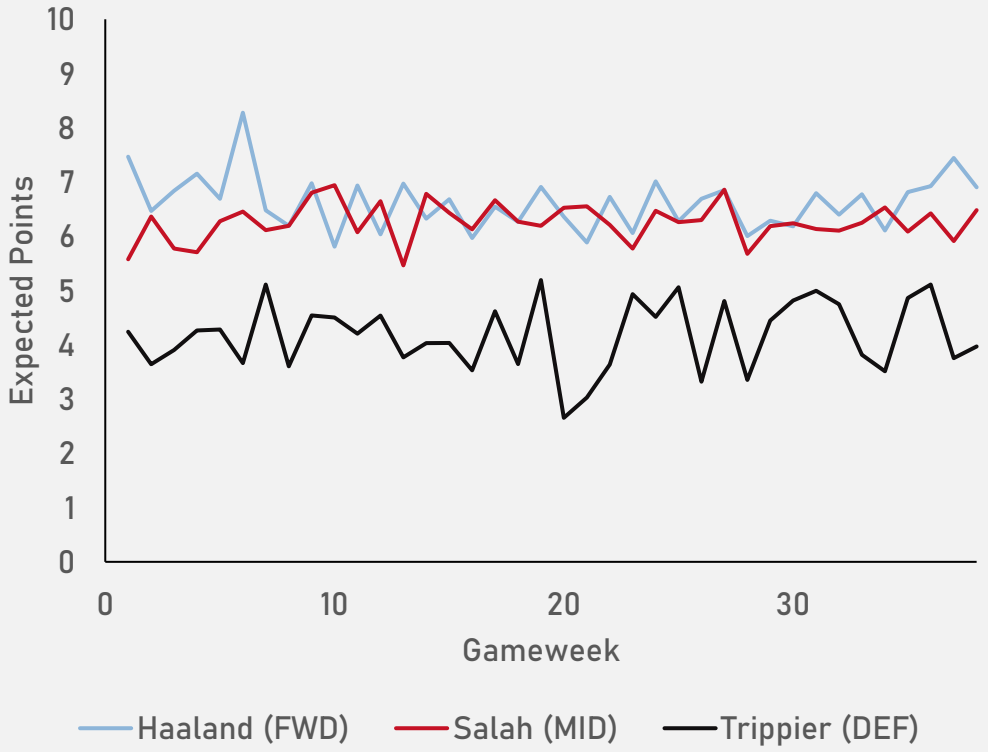
STARTING XI SCORES POINTS BASED ON ACTIONS

VARIOUS OTHER CONSTRAINTS APPLY

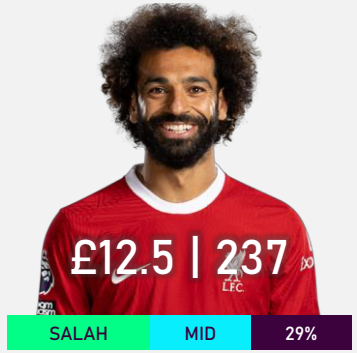
SQUAD CHANGES ALLOWED, BUT COST POINTS

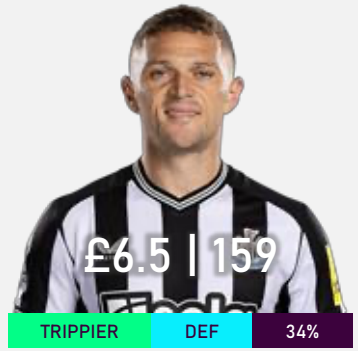
Data

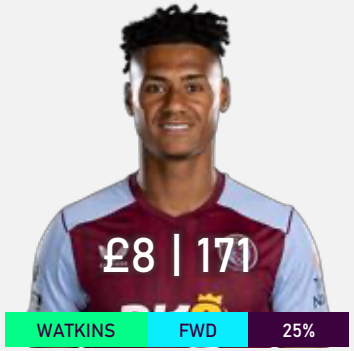
EXPECTED POINTS VARY BY WEEK

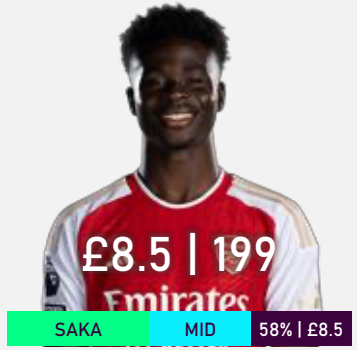


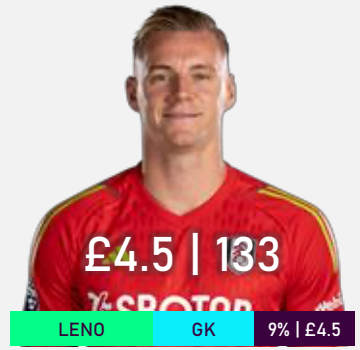
BETTER PLAYERS COST MORE











POTENTIAL TO CONSIDER COMPLEX DATA AND PRODUCE OPTIMAL SOLUTION ACROSS SEASON

Formulation

DECISION VARIABLES
714 PLAYERS. 38 WEEKS. 4 CHIPS.

Do we select Player p in Week w?	$s_{pw} \in \{0,1\}$
Do we play Player p in Week w?	$x_{pw} \in \{0,1\}$
Do we captain Player p in Week w?	$c_{pw} \in \{0,1\}$
Number of transfer hits in Week w?	$N_w \in [0,9]$
Do we "Wildcard" in Week w?	$q_w \in \{0,1\}$
Do we "Triple Captain" in Week w?	$t_w \in \{0,1\}$
Do we "Bench Boost" in Week w?	$b_w \in \{0,1\}$

OBJECTIVE
MAXIMIZE POINTS. MINIMIZE TRANSFERS.

$$\max \sum_{w=1}^{38} \sum_{p=1}^{714} z_{pw} \times (x_{pw} + c_{pw}) - 4 \sum_{w=2}^{38} N_w$$

CONSTRAINTS
FOLLOW THE RULES.

Salary Cap	$\sum_{p=1}^{714} b_p \times s_{pw} \leq 100, \forall w$
15-man Squad	$\sum_{p=1}^{714} s_{pw} = 15, \forall w$
Player Positions	$\sum_{p=1}^{714} g_p \times s_{pw} = 15, \forall w$
Point Scorers	$\sum_{p=1}^{714} x_{pw} = 11 + 4b_w, \forall w$

PLUS 17 MORE TYPES OF CONSTRAINTS

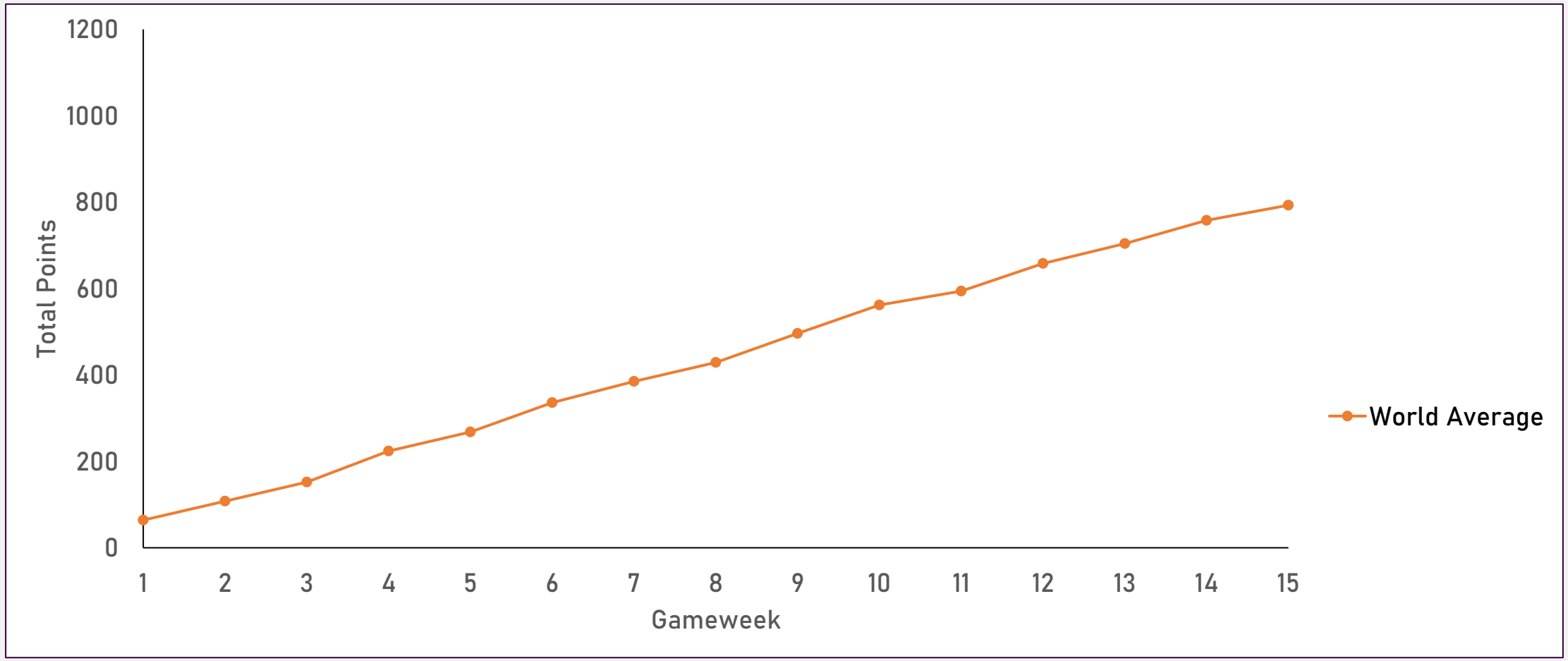
100,000+ decision variables. 25,000+ constraints.

DISCLAIMER: RESULTS AS AT 7 DECEMBER 2023

Results

Current Rank:
(Based on Actual Points)

??? / 10,336,438



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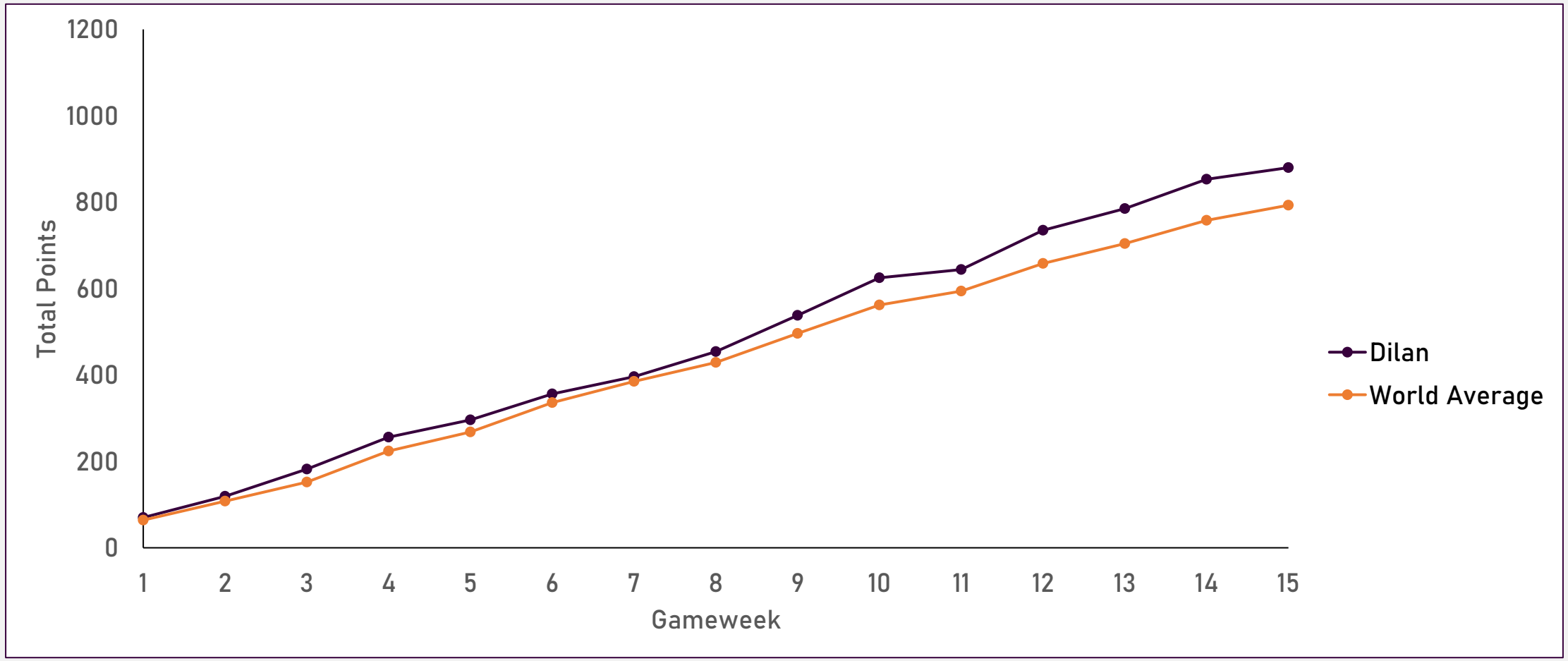

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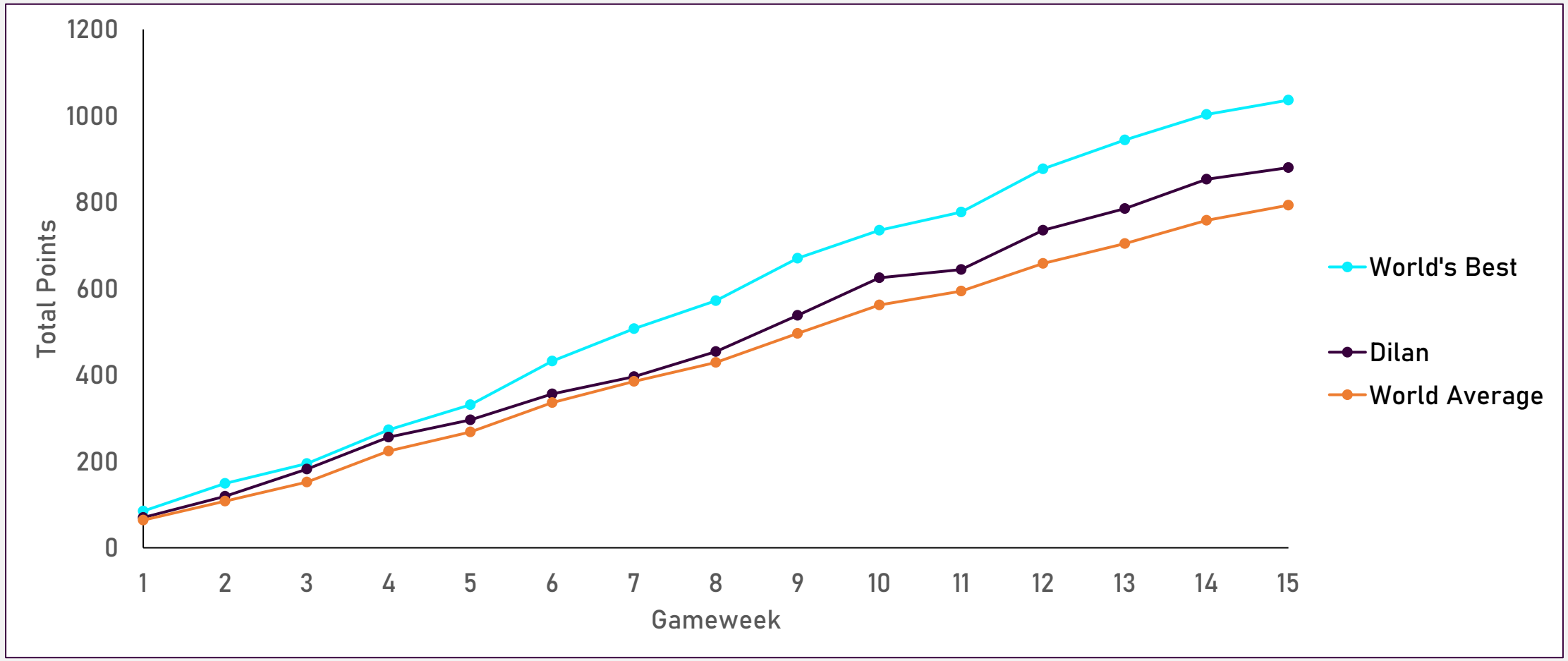

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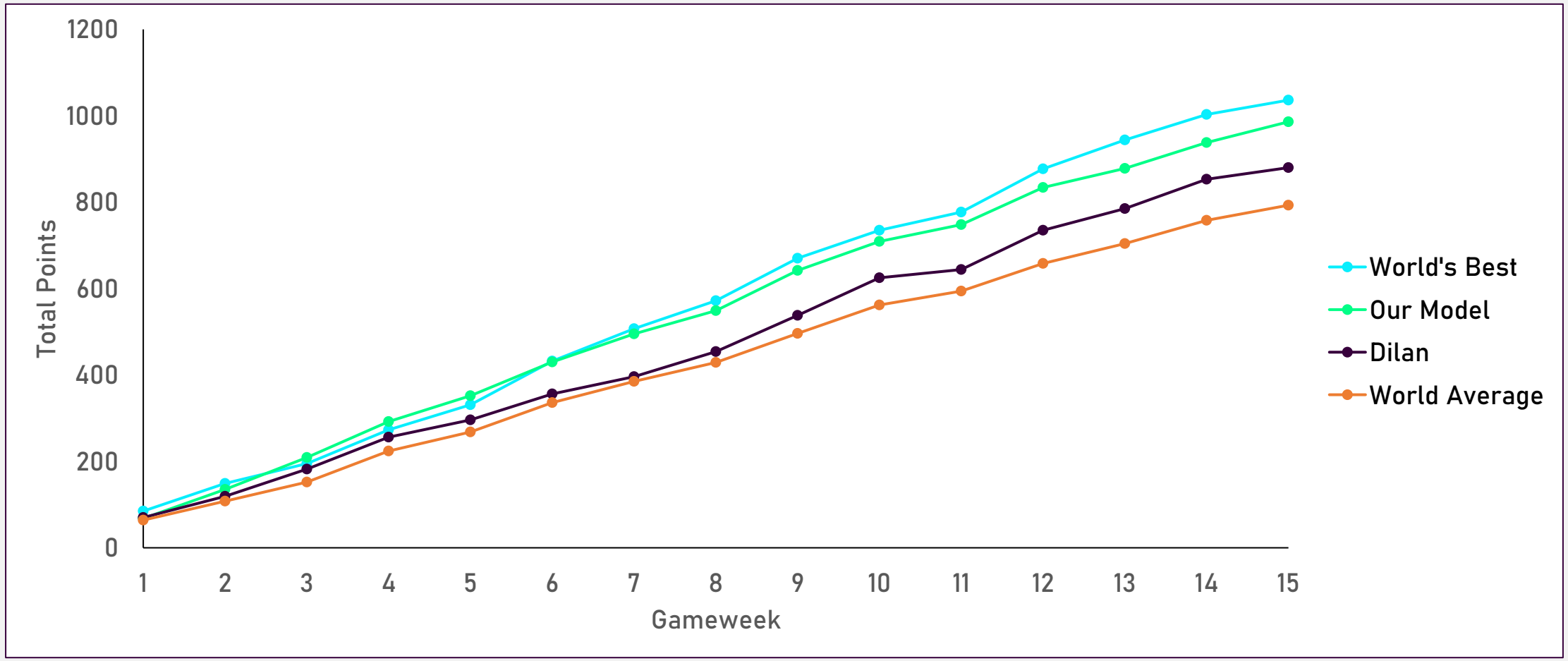
Results

Current Rank: **463**
(Based on Actual Points)
/ 10,336,438

Chip-adjusted Rank: **87**

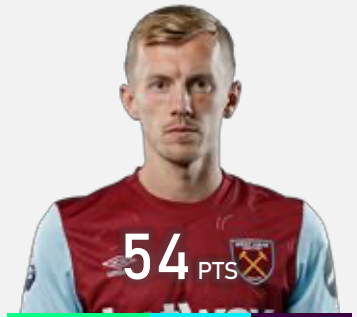


Strategy Examined

BIG HITTERS

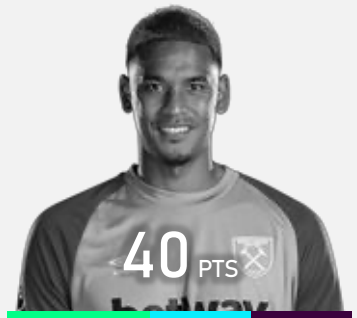
SALAH | MID | 29% | £12.5

VALUE DIFFERENTIALS



PROWSE | MID | 1% | £6

BUDGET ENABLERS



AREOLA | GK | 22% | £4

BLENDED SQUAD OF HIGH, MEDIUM, & LOW COST PLAYERS

ALTERNATE CAPTAIN (SALAH & HAALAND) BASED ON FIXTURES

LONG-TERM TRANSFER PLANNING MEANS NO POINTS PENALTIES

TARGET PLAYERS, ESPECIALLY DEFENDERS, FOR GOOD FIXTURES

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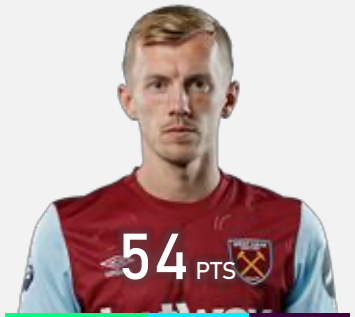

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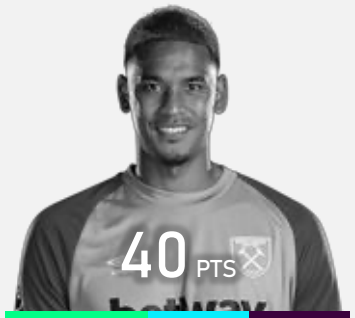

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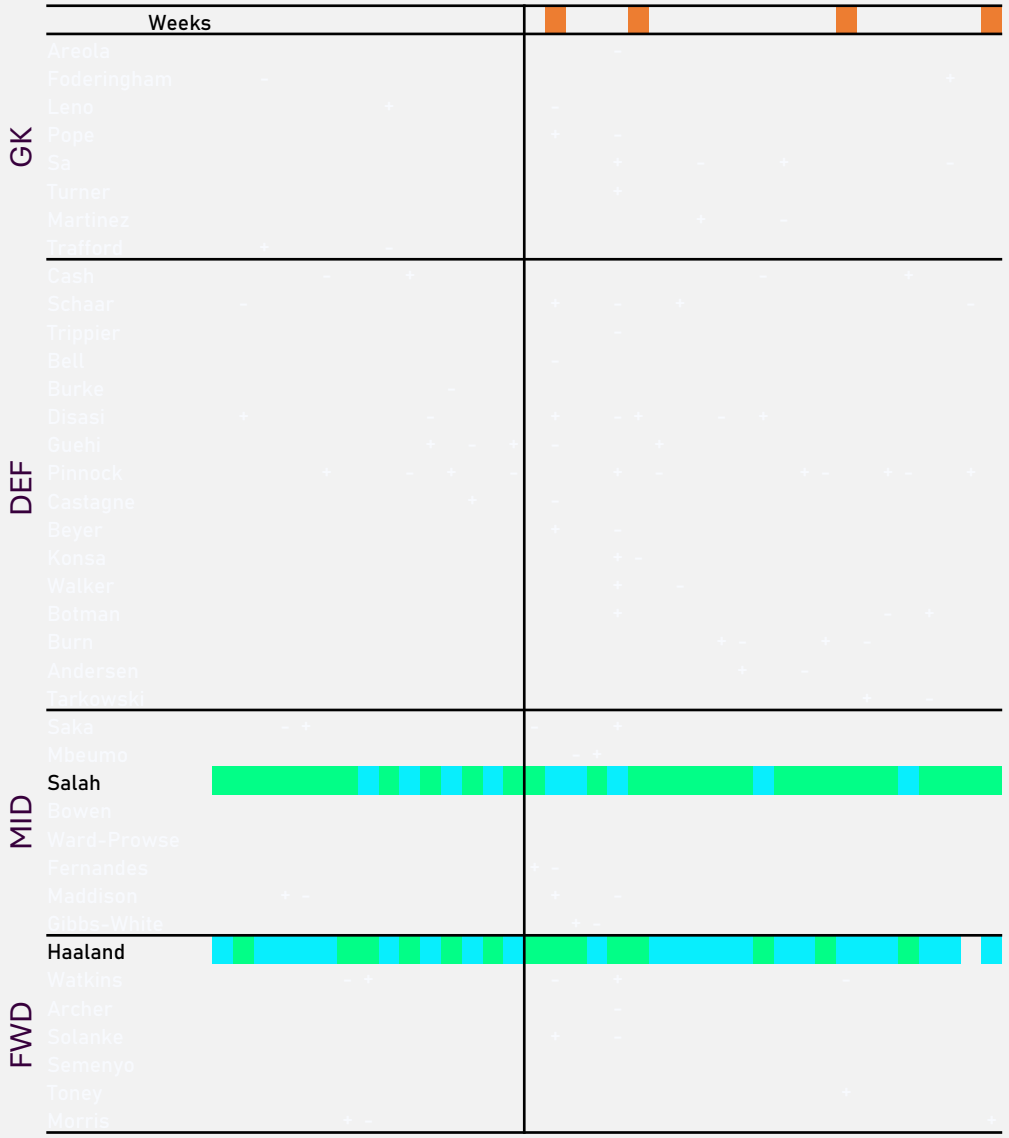

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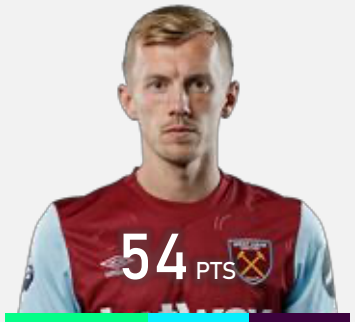

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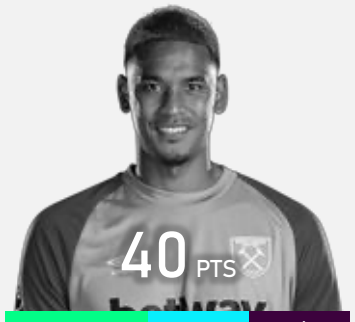

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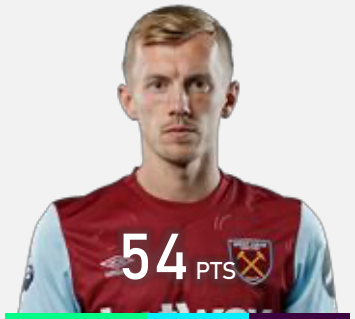

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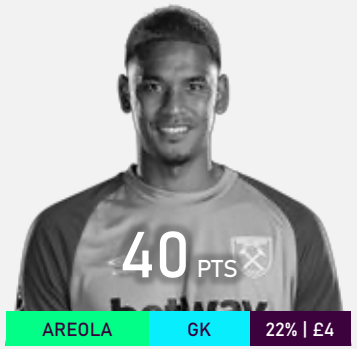

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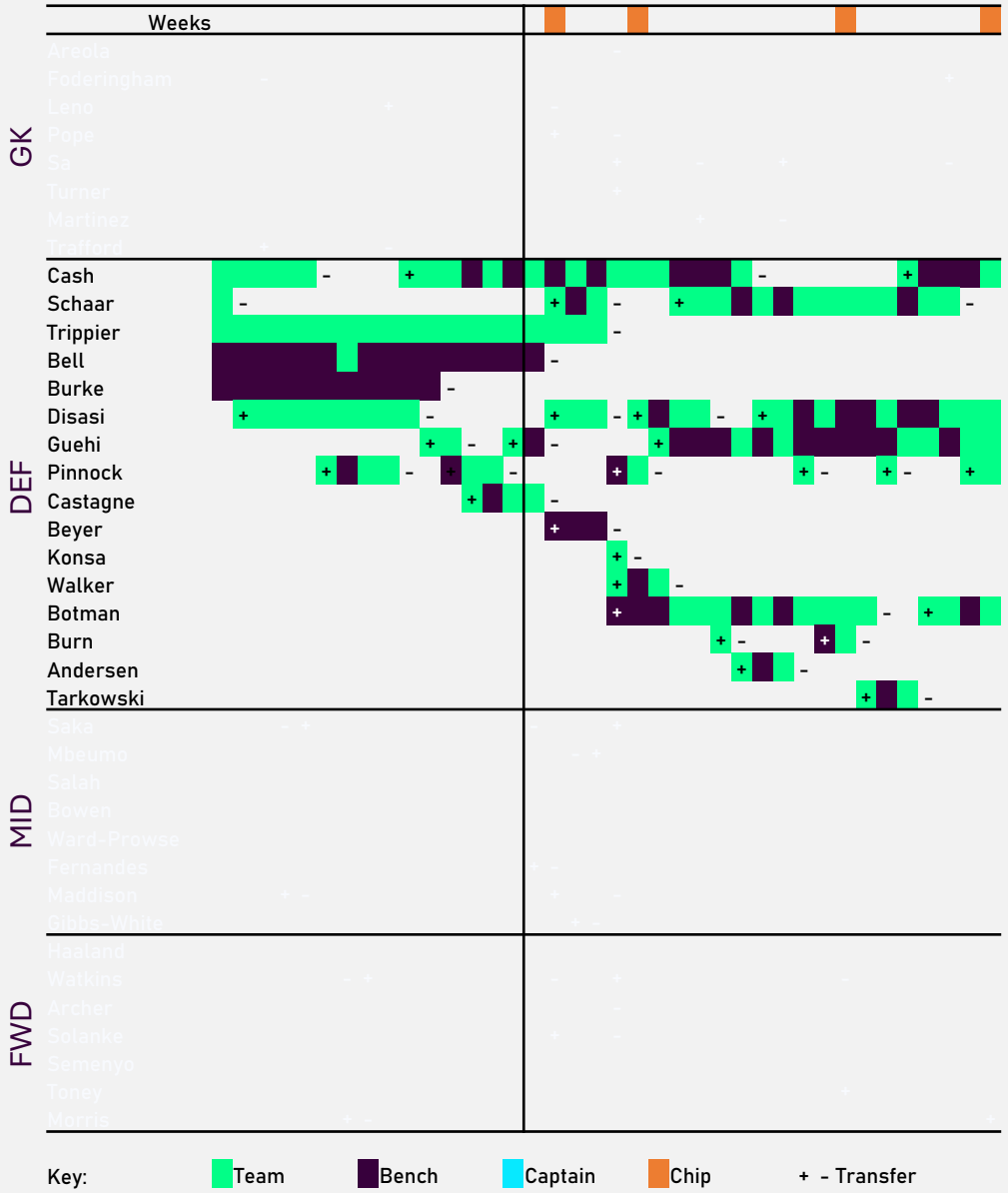

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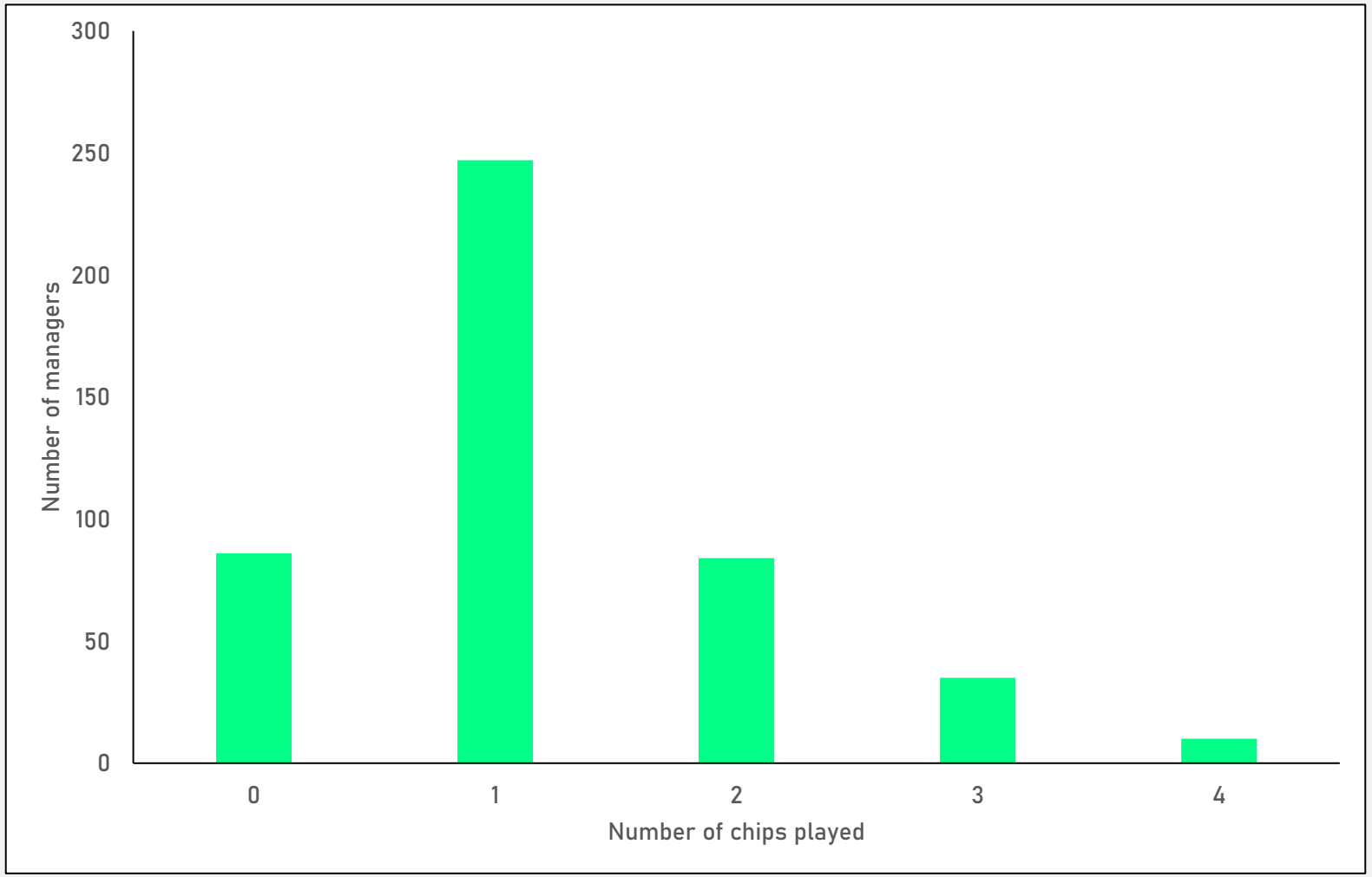
Summary

DEVELOPED A TRACTABLE APPROACH TO HANDLE PROBLEM WITH 100,000+ BINARY VARIABLES

IMPLEMENTED STRATEGY, AND CURRENTLY RANKED 463 OUT OF 10 MILLION PLAYERS (TOP 0.005% OF PLAYERS)

FUTURE WORK TO BUILD OUR OWN POINTS PREDICTION ENGINE AND ITERATIVELY UPDATE SOLUTION EACH WEEK

Appendix A: Distribution of Chip Usage