Applied Researchers of Colcrane

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Founding Partner & Lead Behavioural Scientist

Doctoral Researcher in Behavioural Economics

Colcrane's applied researchers specialise in advanced customer analytics and behavioural science, with deep expertise in predictive customer base and behavioural modelling.

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Data Scientist

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Tuomas Leisti, PhD

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Lead Data Scientist

Mastering Customer Value: Predicting what Lasts, Deciding & Acting on What Matters

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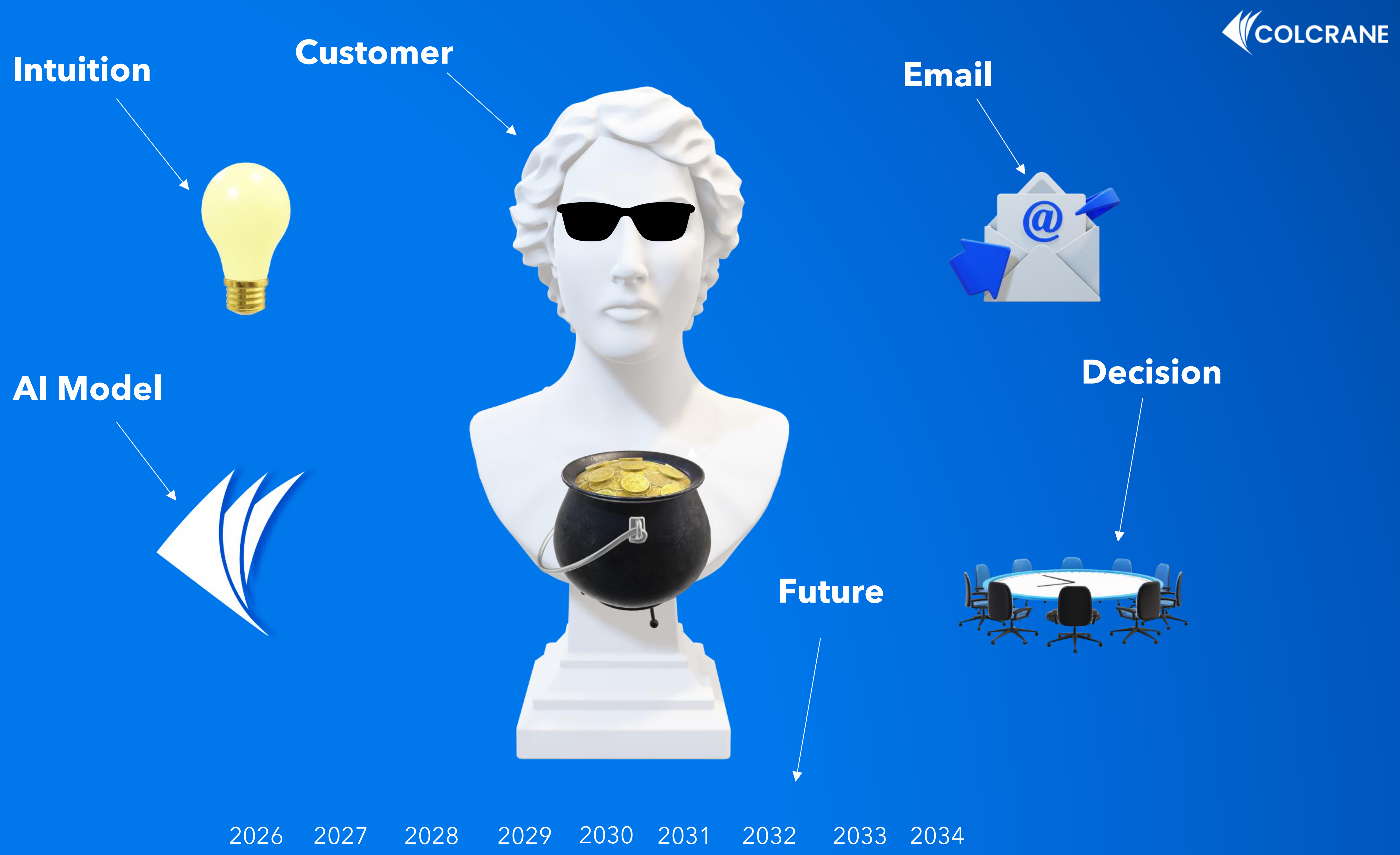
COLCRANE
Intuition
Customer
Email
AI Model
Decision
Future
2026
2027
2028
2029
2030
2031
2032
2033
2034

COLCRANE

Intuition

2026 2027 2028 2029 2030 2031 2032 2033 2034

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HOW MANY DIFFERENT PEOPLE WILL CLEO INTERACT WITH DURING HER LIFETIME?

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HOW STRONG WILL HER RELATIONSHIP BE WITH THESE PEOPLE?

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115 739

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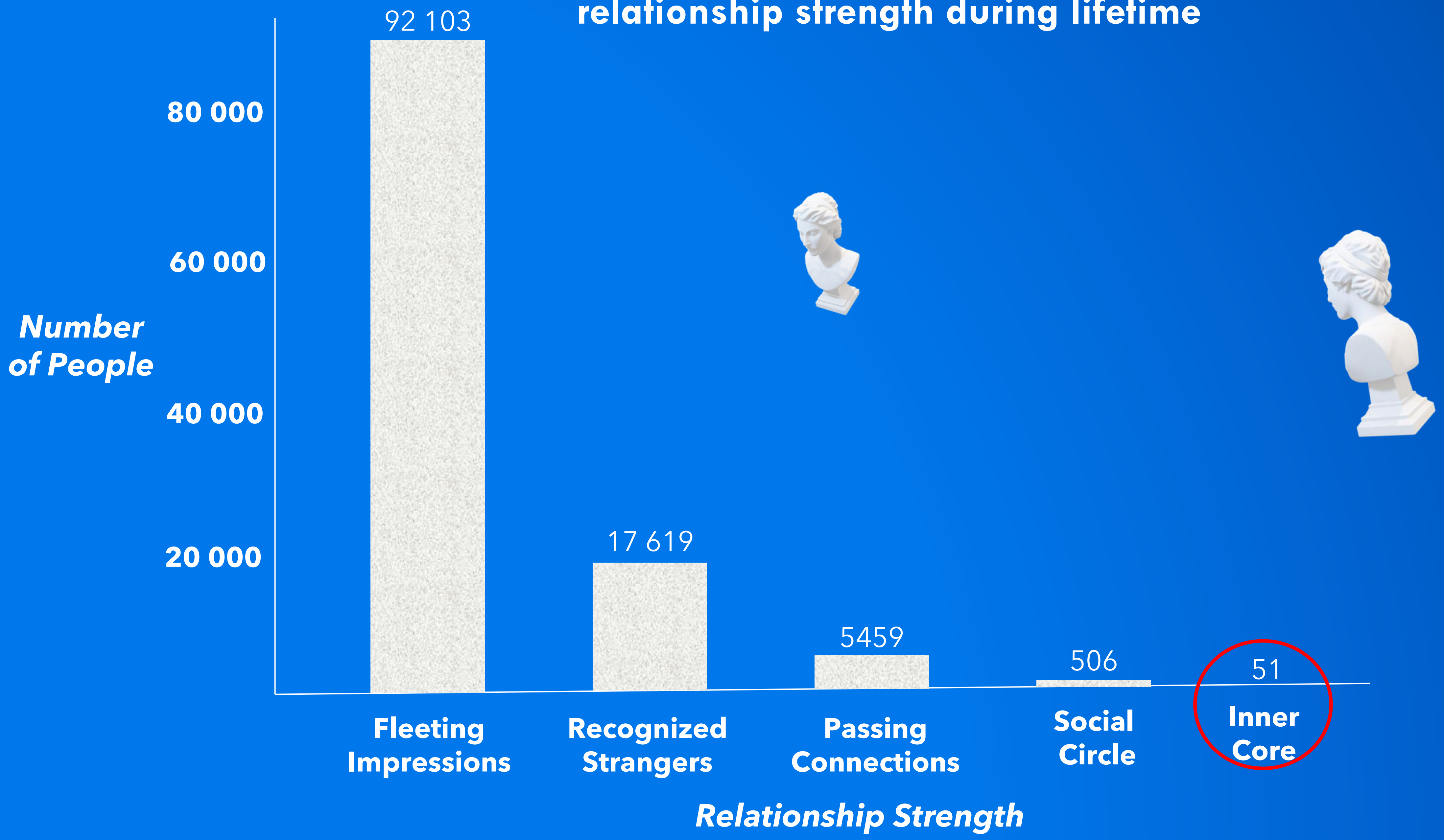
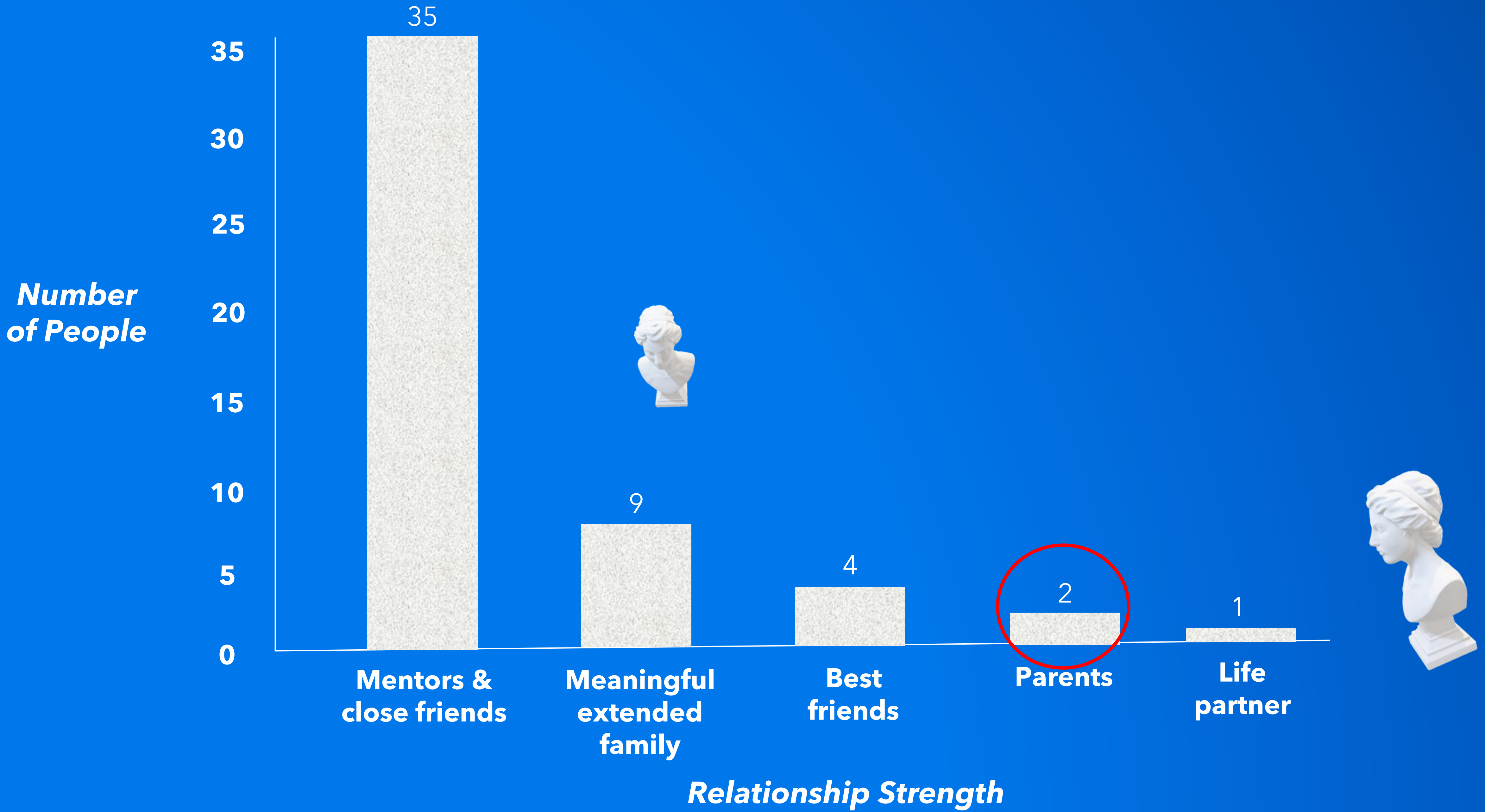
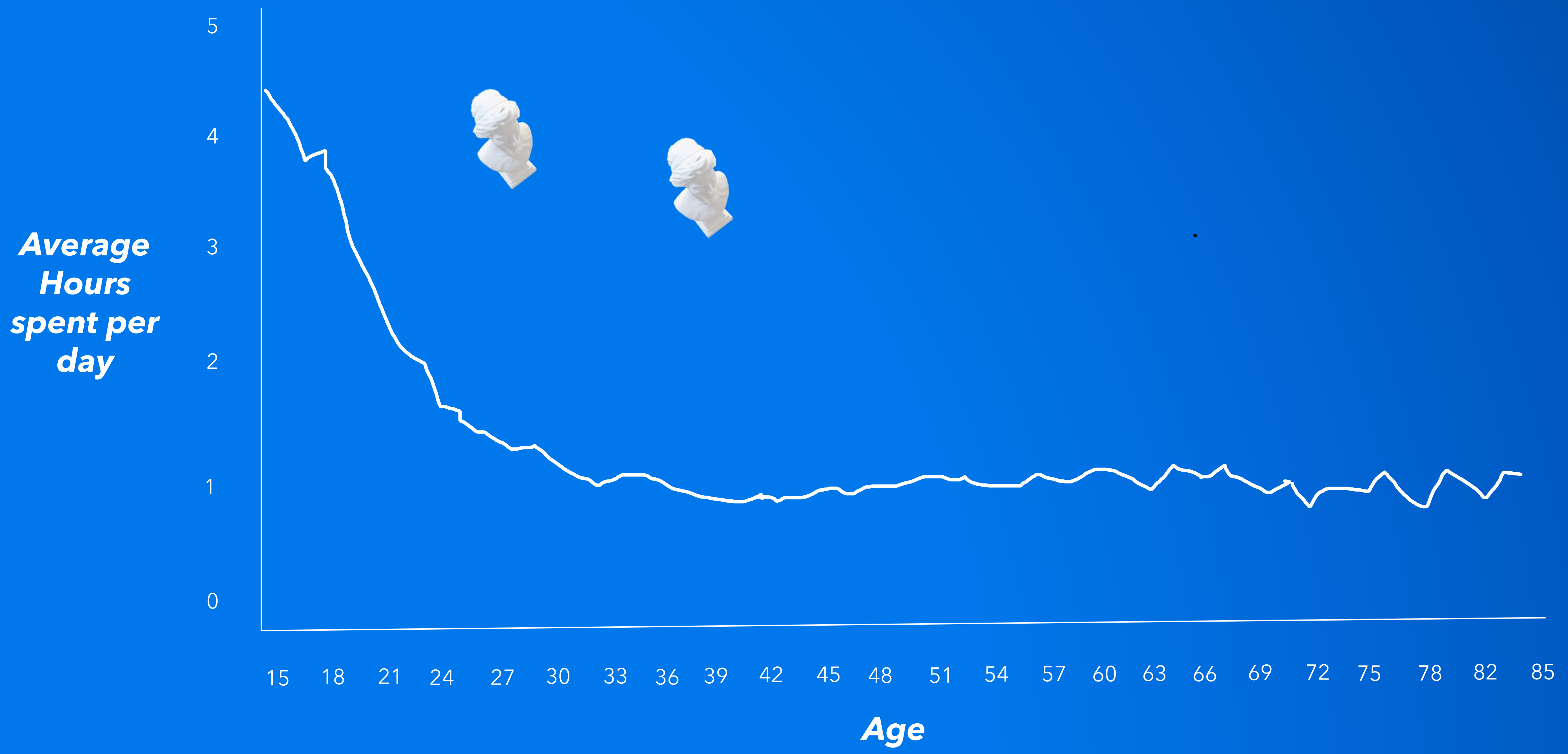
Number of people Cleo will interact with and relationship strength during lifetime



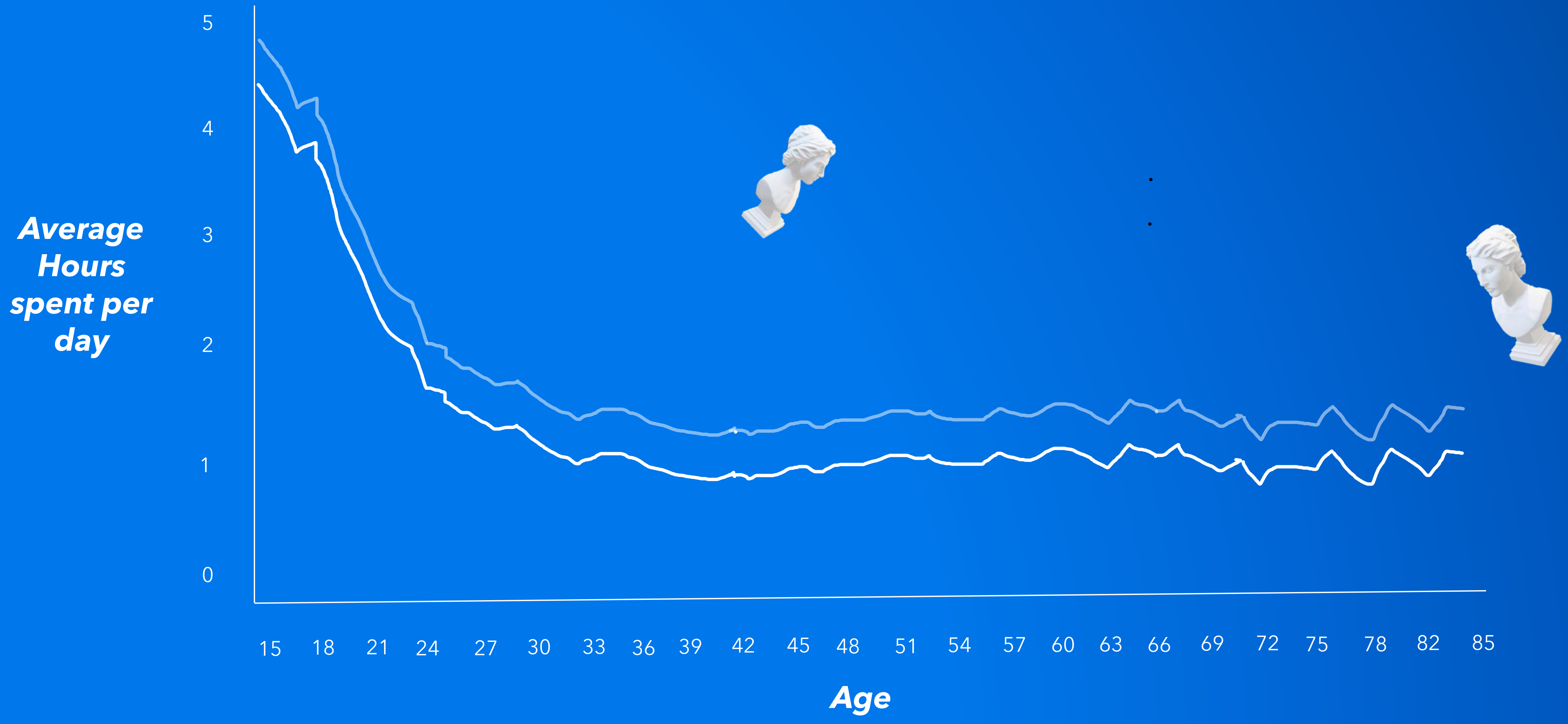
Cleo's "Inner Core"



The time Cleo will spend with me during her lifetime



The time Cleo will spend with me during her lifetime



Pace of new people interaction over Cleo's lifetime

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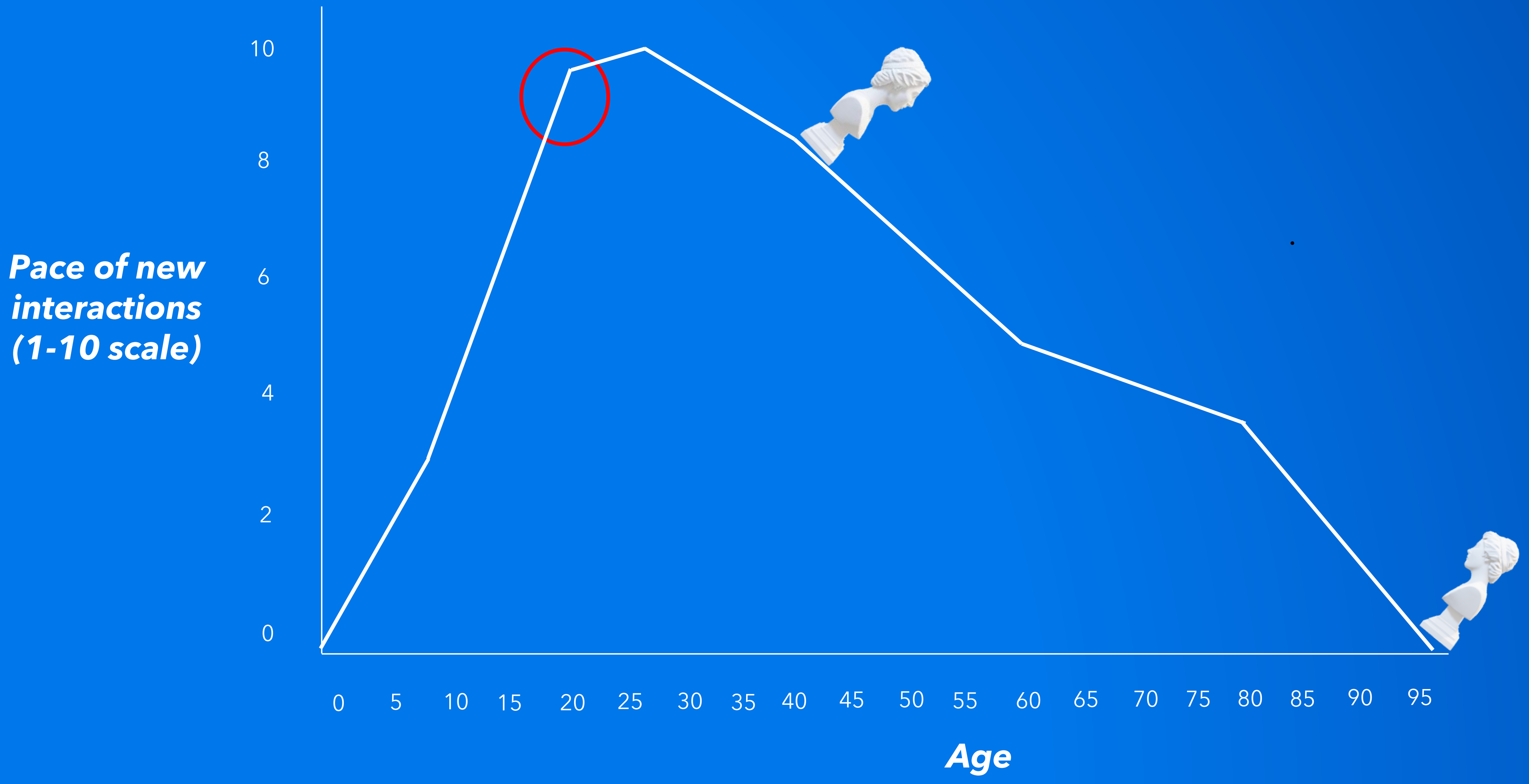
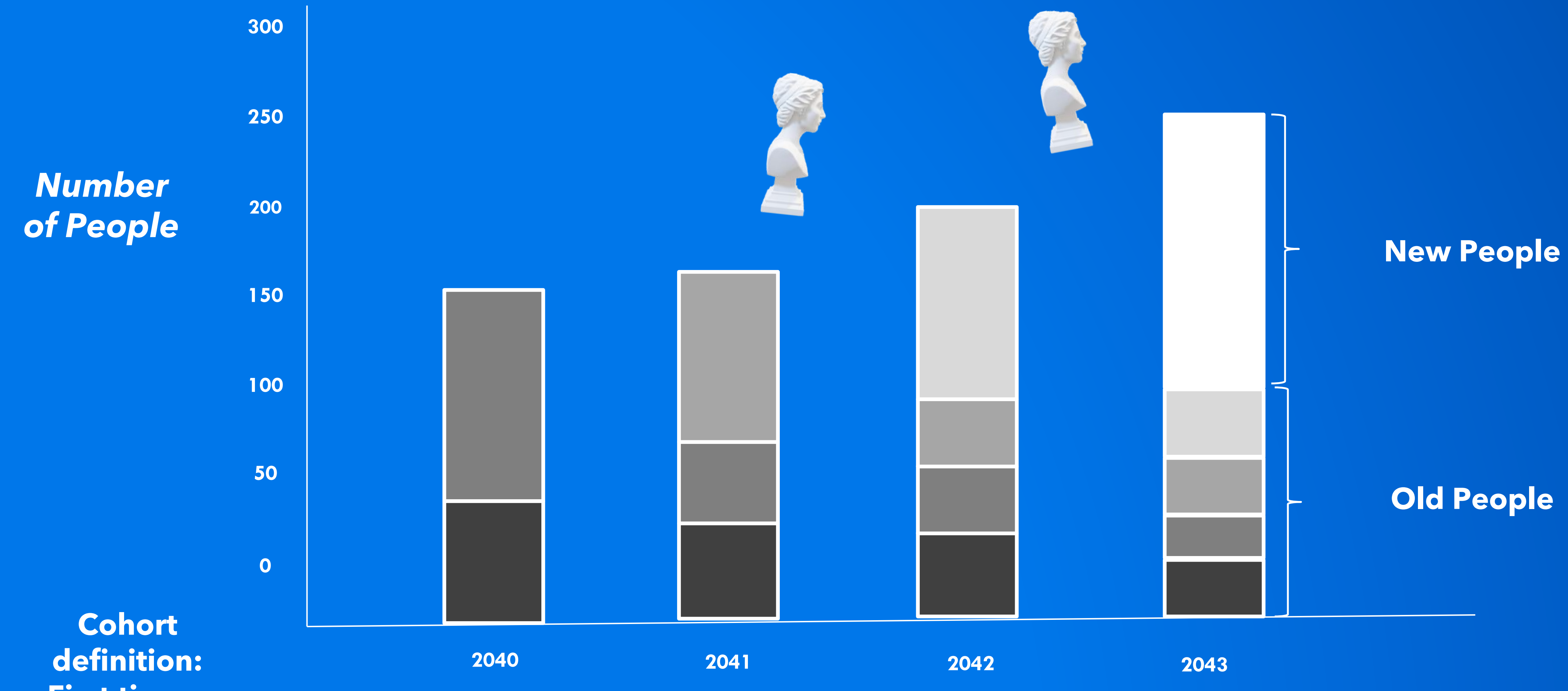


Cleo's people interaction during her (potential) higher education



Cohort definition: First time a person interacts with Cleo

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A person that Cleo interacts with during her lifetime

Invisible " coin" that either leans towards best friend or passing connection.

Elliot

Best Friend

Passing Connection

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Molly

Passing Connection

Best Friend

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AI Model

2026 2027 2028 2029 2030 2031 2032 2033 2034

General Generative Statistical Models for Predictive Customer Analytics

Peter Fader
Professor of Marketing
Wharton School of Business

Daniel McCarthy
Associate Professor of Marketing
Maryland University

Bruce Hardie
Professor of Marketing
London Business School

After the gym, I had a ________

Probability:	**Shower**	Meal	**Walk**
	90%	7%	**3%**

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I hadn't eaten all day, so after the gym I went for a ______

	Shower	Meal	Walk
Probability:	12%	83%	5%

Will the customer purchase or not?

Yes	No	No	?	?	?
2022	2023	2024	2025	2026	2027

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Will this customer have a yes or no coin?

No
75%

Yes
35%

Probability:

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2022	2023	2024	2025	2026	2027
Yes	No	No	No 75% / Yes 25%	No 84% / Yes 16%	No 95% / Yes 5%

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Yes	No	Yes	No 77% Yes 23%	No 35% Yes 65%	No 54% Yes 46%
2022	2023	2024	2025	2026	2027

Sophisticated model mathematics but no black box

$$L(r,\alpha,s,\beta \,|\, x,tx,T) = \frac{\Gamma(r+x)\alpha^r\beta^s}{\Gamma(r)}\left\{\frac{1}{(\alpha+T)^{r+x}(\beta+T)^s} + \left(\frac{s}{r+s+x}\right)A_0\right\}$$

where for $\alpha \geq \beta$

$$A_0 = \frac{F_1\left(r+s+x, s+1; r+s+x+1; \frac{\alpha-\beta}{\alpha+tx}\right)}{(\alpha+tx)^{r+s+x}} - \frac{F_1\left(r+s+x, s+1; r+s+x+1; \frac{\alpha-\beta}{\alpha+tx}\right)}{(\alpha+T)^{r+s+x}}$$

where for $\alpha \leq \beta$

$$A_0 = \frac{F_1\left(r+s+x, s+1; r+s+x+1; \frac{\beta-\alpha}{\beta+tx}\right)}{(\beta+tx)^{r+s+x}} - \frac{F_1\left(r+s+x, s+1; r+s+x+1; \frac{\beta-\alpha}{\beta+T}\right)}{(\beta+T)^{r+s+x}}$$

The data we need

Customer transaction data

Customer_ID	Purchase_date	Sales/Contribution margin
0001	22/10/01	£22
0001	22/11/01	£554
0002	22/10/01	£309
0003	22/11/01	£46
0004	22/10/01	£104

Test drive: Travel

- For illustrative purposes we focus on the **2022 customer cohort**
- A customer cohort is defined here based on the time-period when the customer made their **first purchase** ever
- There are **76 493** customers who made their first purchase in 2022
- Born during **Covid** so not the best one
- **But it gives us just enough years** to work with → even **more difficult** to predict due to potential behavioural irregularities!

Purchase Behavior of the 2022 Customer Cohort

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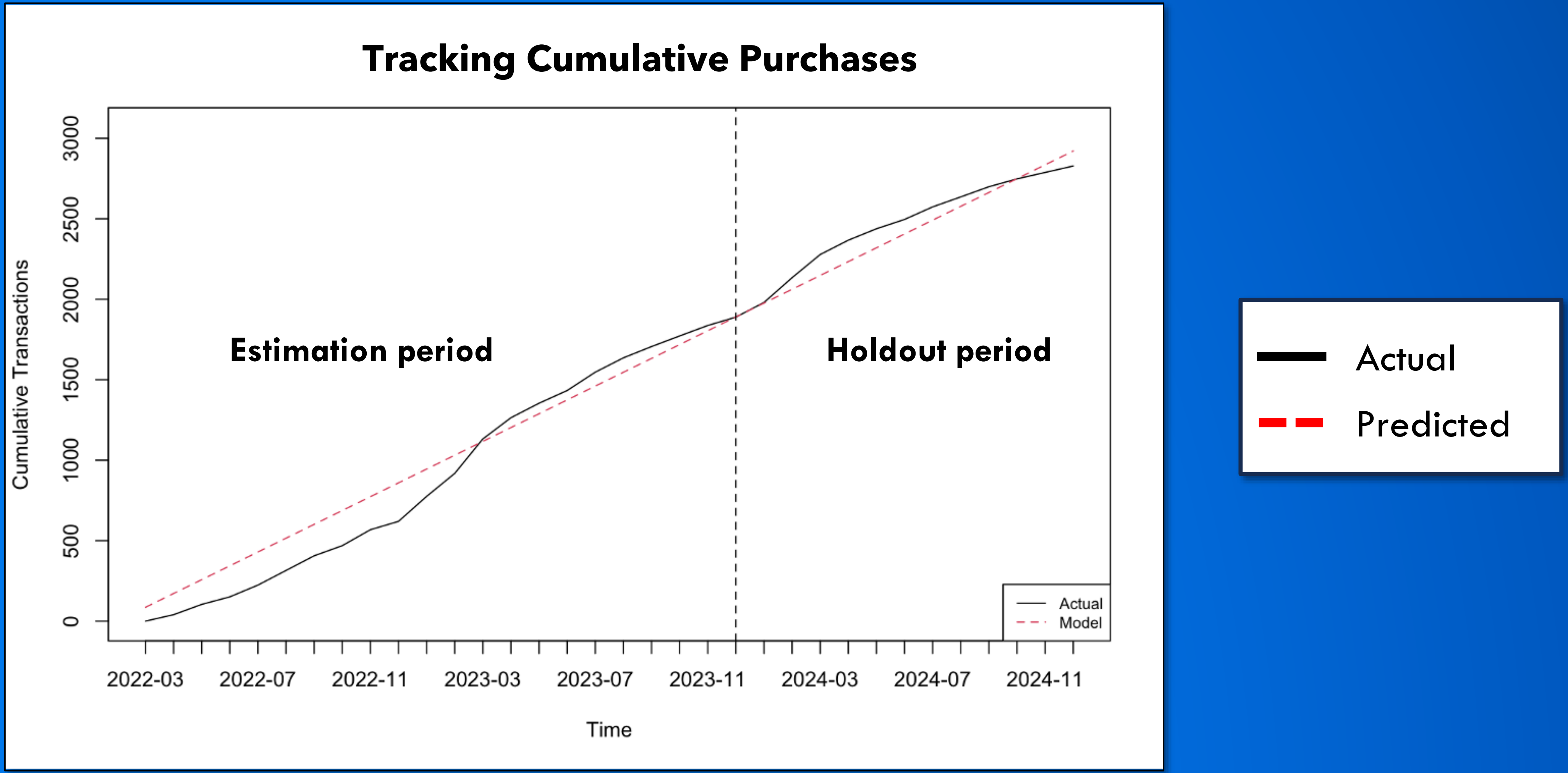
2022	2023	2024	Customers	Customers %
Y	Y	Y	4244	6%
Y	Y	N	8073	11%
Y	N	Y	5704	7%
Y	N	N	58472	76%

Y = Purchase   *N = No Purchase*

Model validation – How well can the model predict? (2022 cohort)



Model validation – How well can the model predict? (2022 cohort)

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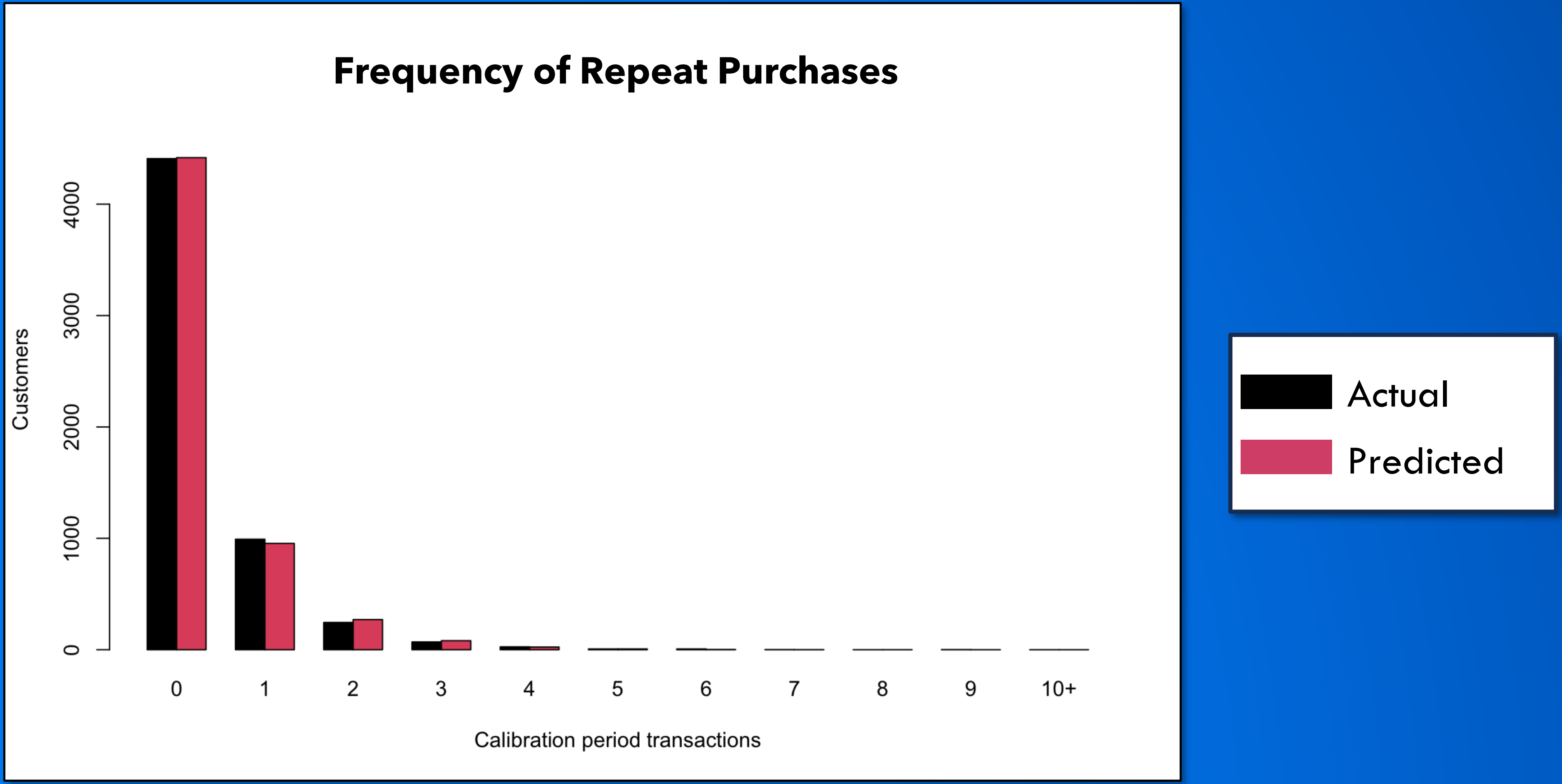

Test drive: Online retail

Purchase Behavior of the (Feb) 2022 Customer Cohort

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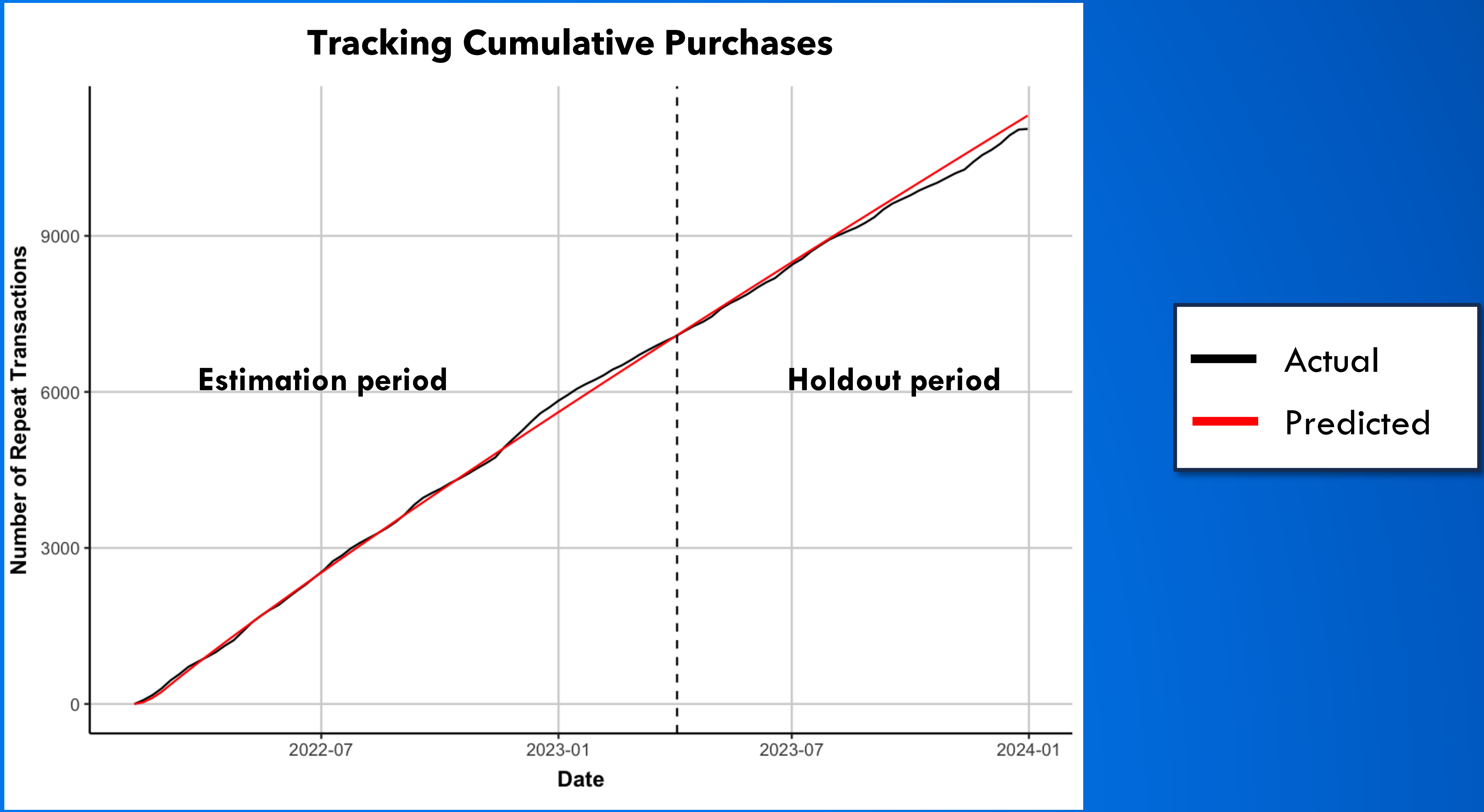
2022 (H1)	2022 (H2)	2023 (H1)	2023 (H2)	Customers	Customers %
Y	Y	Y	Y	567	8%
Y	Y	Y	N	353	5%
Y	Y	N	Y	355	5%
Y	Y	N	N	709	9%
Y	N	Y	Y	226	3%
Y	N	Y	N	493	7%
Y	N	N	Y	522	7%
Y	N	N	N	4255	57%

Y = Purchase *N = No Purchase*

Model validation – How well can the model predict? (2022 cohort)



Model validation – How well can the model predict? (2022 cohort)

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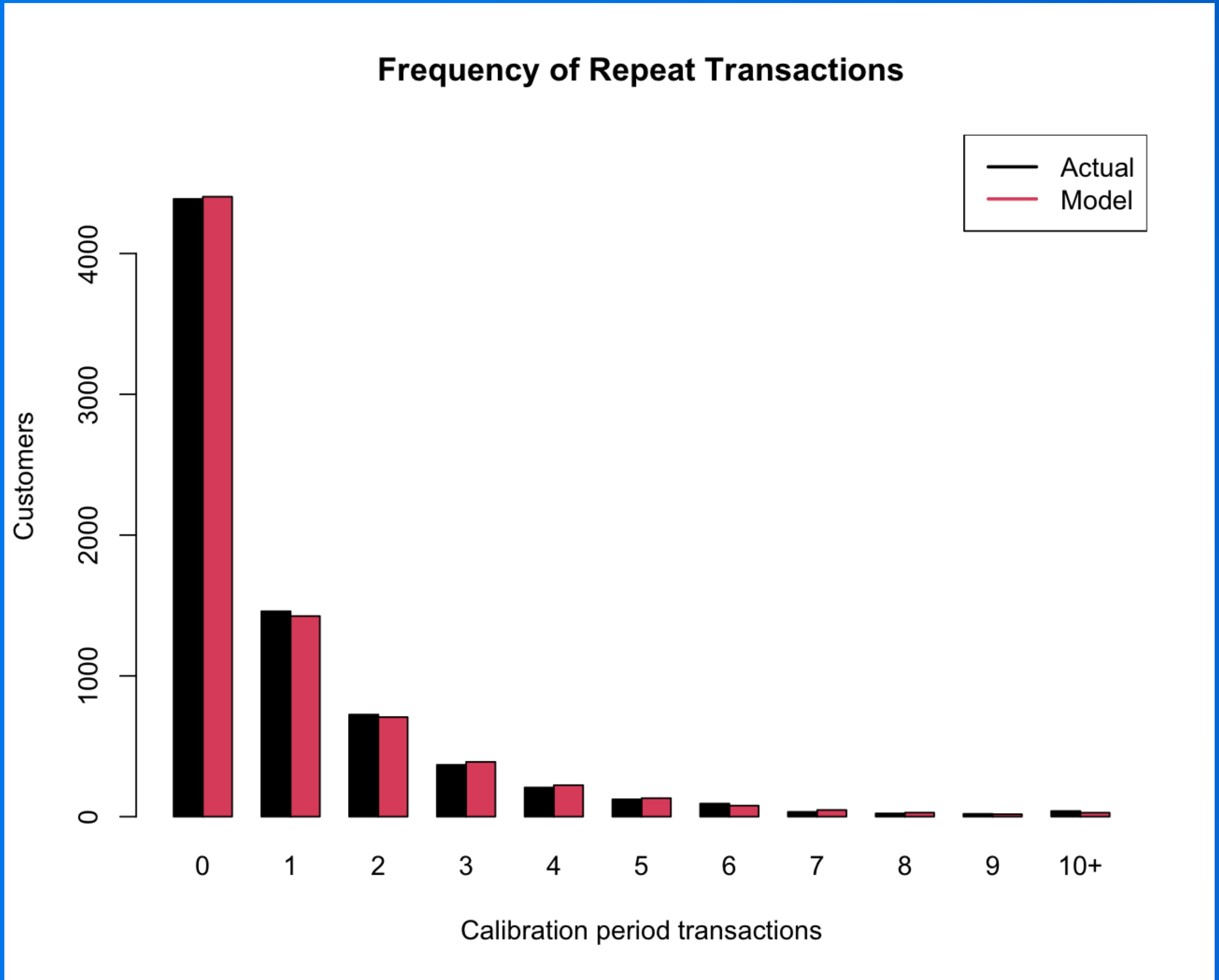

Actual

Predicted

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Email

2026 2027 2028 2029 2030 2031 2032 2033 2034

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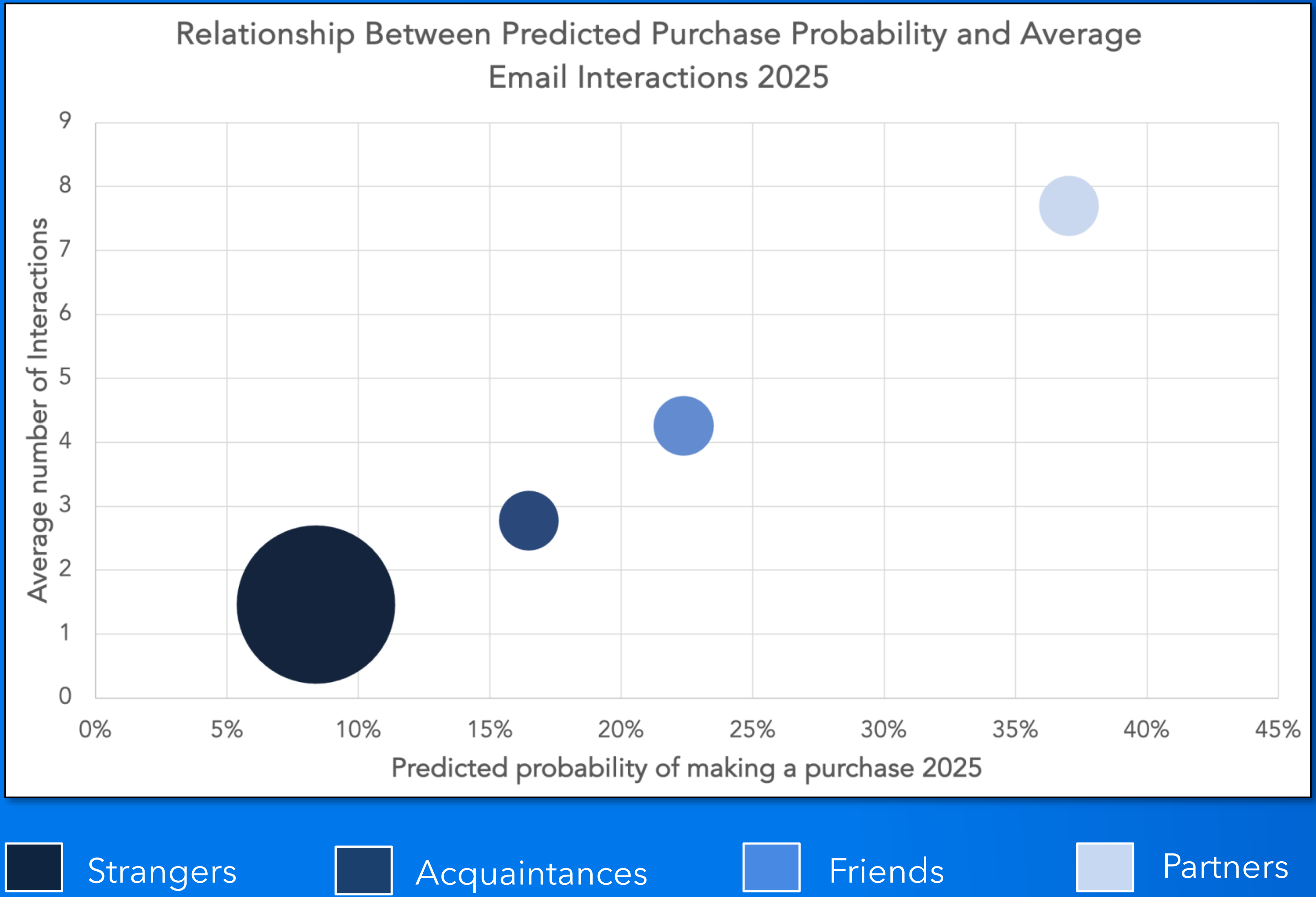
Who should we nudge with emails to drive value?

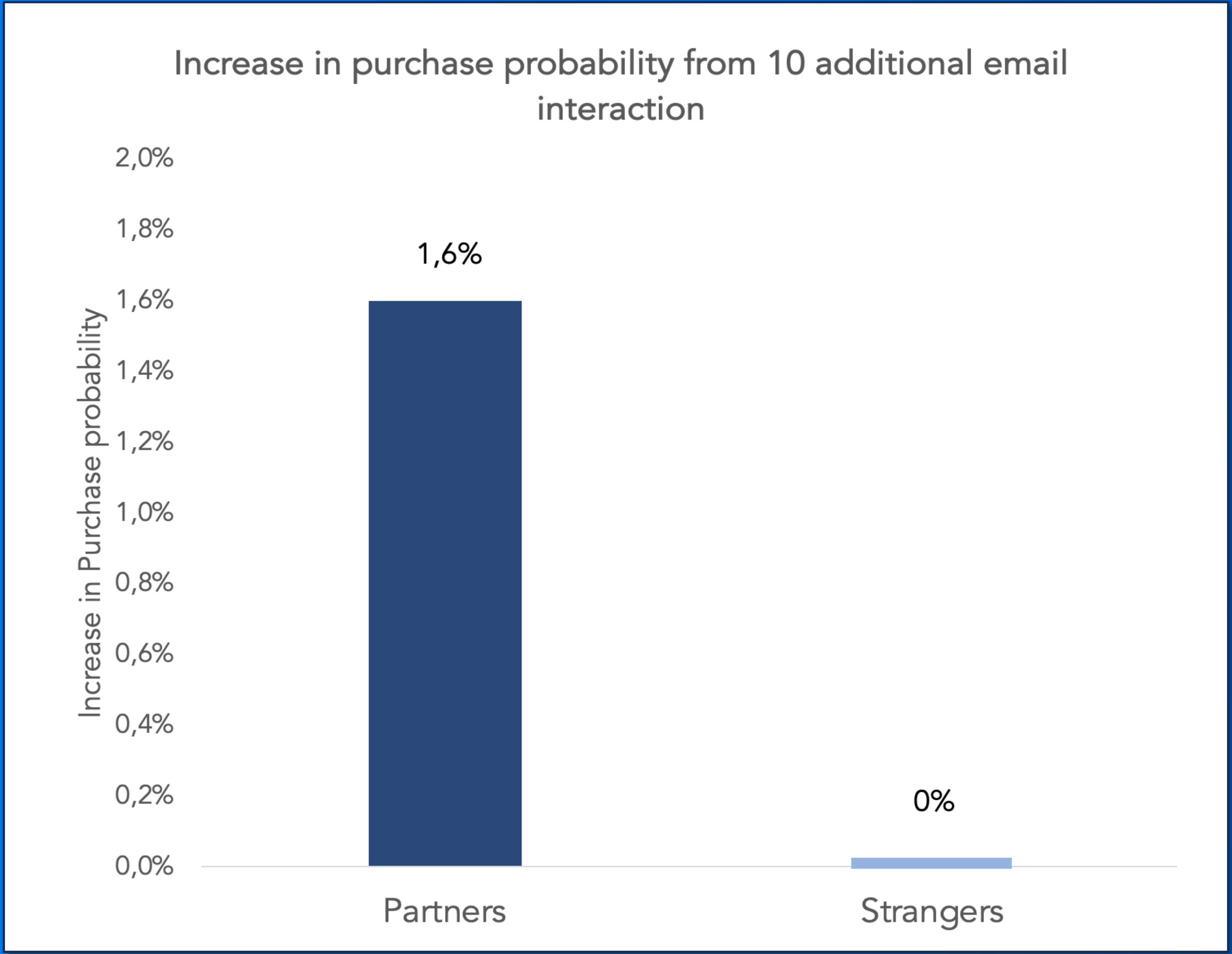
Four repeat purchase readiness tiers

High readiness = **Partners**
Medium-High readiness = **Friends**
Medium readiness = **Acquaintances**
Low readiness = **Strangers**

Travel: Relationship between email engagementand purchase probability in 2025 (2022 cohort)



Difference in the effect of email engagement on purchase probability between Partners and Strangers



Partners respond

Increasing email engagement by 10 interactions lifts purchase probability by **1.6 points among Partners**

At cohort scale, that's **around 120 extra purchases**.

Using a typical UK travel order value of about **£1,700**, that's **roughly £200k in incremental revenue** - or **about 3–4% more value from that 2022 cohort alone**.

Scaled across all cohorts that is some **real value gain**

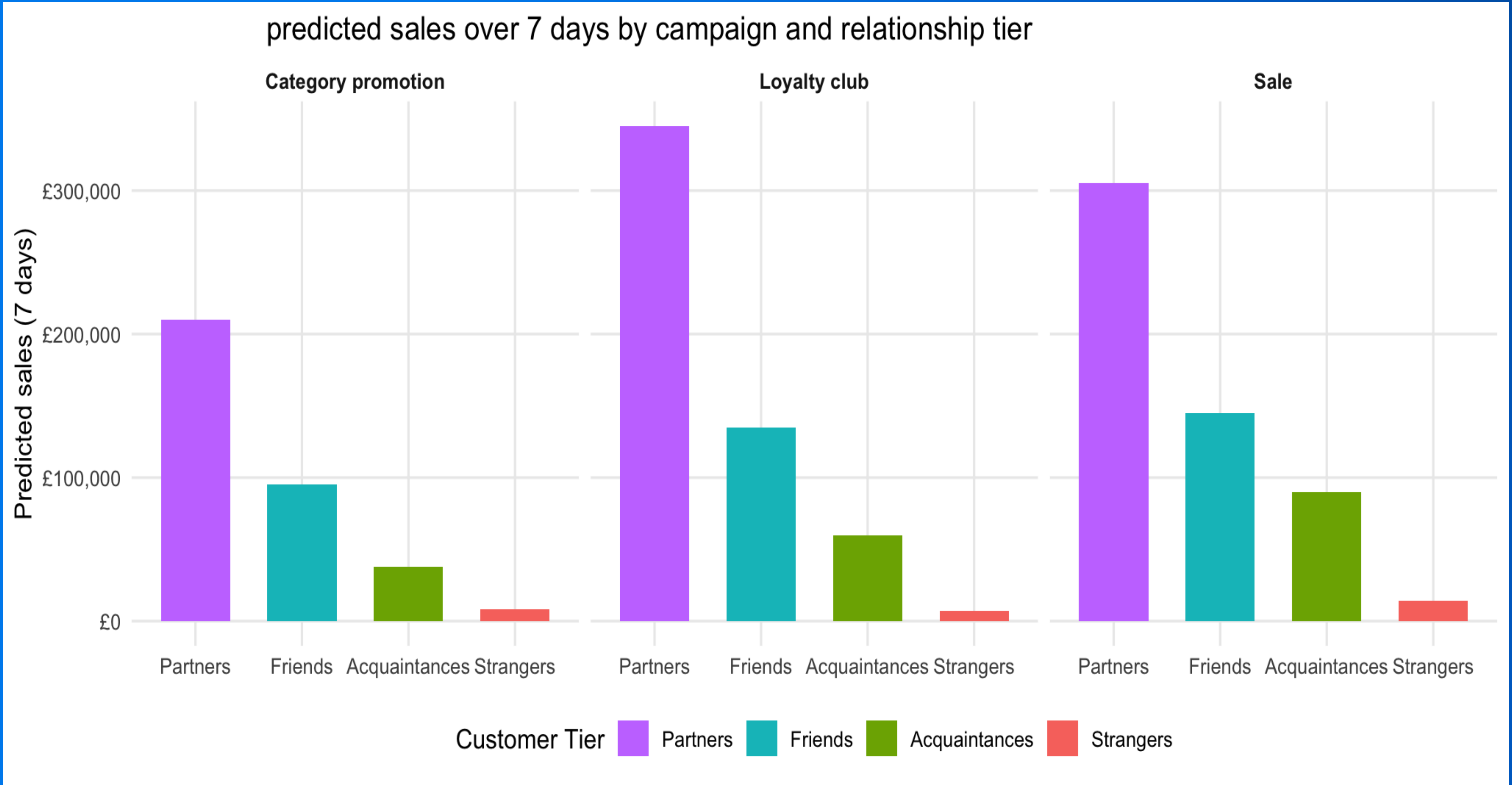
Most customers don’t respond to better email.

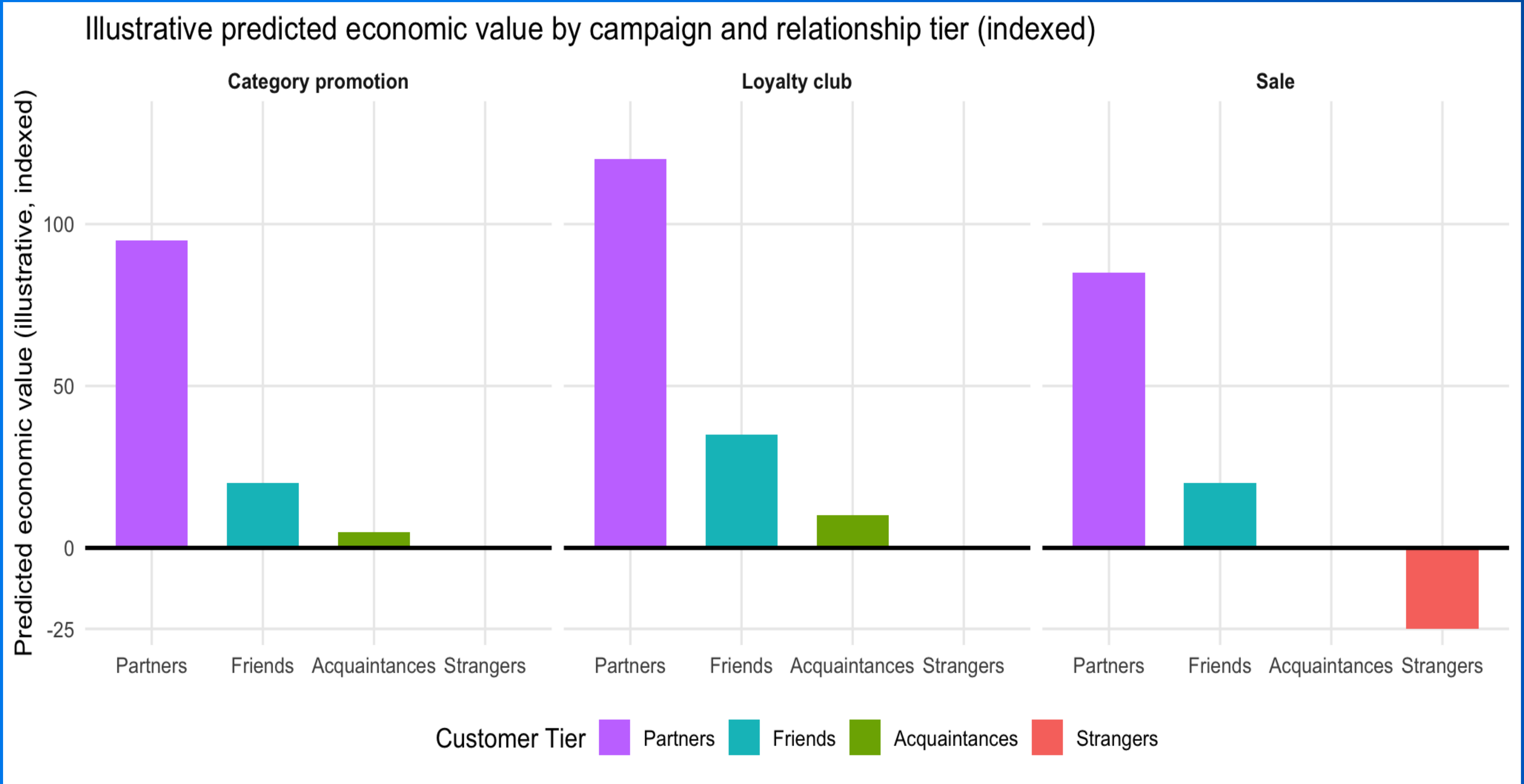
The right customers can respond massively - and that’s where the value often is.

What if online retail email campaigns were more profit-centred?

Three common email campaign types

- Category promotion
- Loyalty club
- Sale


predicted sales over 7 days by campaign and relationship tier
Category promotion
Loyalty club
Sale
Predicted sales (7 days)
£300,000
£200,000
£100,000
£0
Partners
Friends
Acquaintances
Strangers
Customer Tier
Partners
Friends
Acquaintances
Strangers


Illustrative predicted economic value by campaign and relationship tier (indexed)
Category promotion
Loyalty club
Sale
Predicted economic value (illustrative, indexed)
100
50
0
-25
Partners
Friends
Acquaintances
Strangers
Customer Tier
Partners
Friends
Acquaintances
Strangers

What this could look like to users of your CRM or CDP

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Customer name: Laura Greenwood

Customer value

Individual-level predicted CLV: 3 years
Value tier (derived): Partner, Friend, Acquaintance, Stranger

Demand

Purchase likelihood 3 / 6 / 12 months: 0-100 %
Purchase readiness score: 0-100
Purchase readiness state: Cold/Warm/Hot

Channel

Email interaction score: 0-100
Email interaction state: Cold/**Warm**/Hot
Email interaction state transition probability:

- Warm ➡ Hot 0-100 %
- Warm ➡ Cold 0-100 %

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Customer

Decision

Future

2026 2027 2028 2029 2030 2031 2032 2033 2034

Decision-Driven Analytics

“The Diver”

“The Runner”

The Decision-Driven Analytics Cycle

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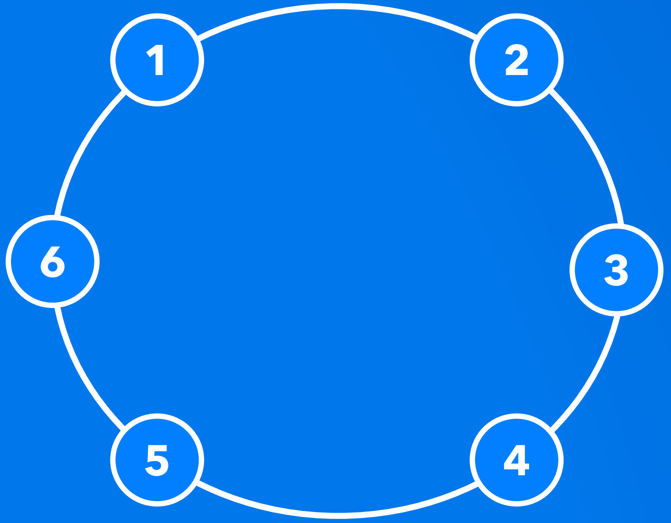


1. What is the decision we want to make?

- Prioritize decision-to-be-made based on business impact and opportunity

2. Can we make that decision?

- Assess if organisational silos are blocking us to make the decision

3. What information do we need to make the decision

- Ask as many What Do I Wish I Knew (WDIWIK) questions as possible

4. What data can we use?

- What data helps us answer our questions
- How easy is the data to access - reasonable time investment?
- Can we set up a randomized experiment to get causal data of real impact of action?

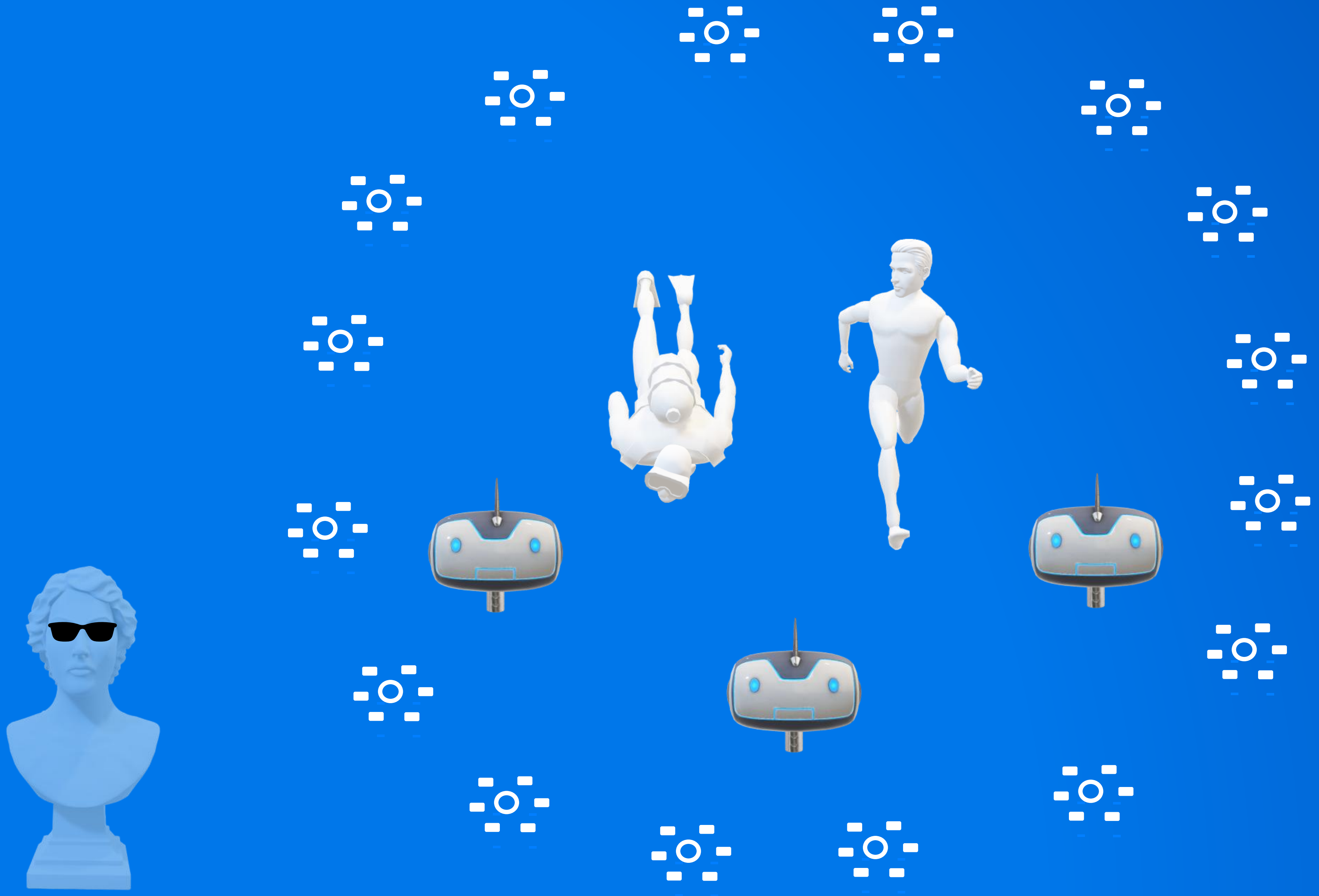
5. What is the best way to analyze the data?

- How can we analyze the data so that is helps us answer our questions?
- What is the investment required?

6. Extract insight and decide

- What do we learn?
- combine data with intuition and decide/act

Decision-Drive Potential with Productive AI Agent Collaboration



Garbage in garbage out!

Human + AI Agent need robust future gazing customer signals to base their automated actions on!