UNICEF LIFETIME VALUE CONVERSION

QBUS3600 BUSINESS ANALYTICS IN PRACTICE | GROUP 14

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THE PROBLEM

UNICEF'S GOAL

- Grow donor retention and value
- Fund programs more reliably

OUR TASK (LTV)

- Predict each donor's 24-month value based on their first 90 days of activity

BUSINESS REASON

- Target high-ROI (TM/F2F/email); prevent leakage.

WHY THIS MATTERS?

- Strong early ties → loyal donors.
- Better LTV → less waste, higher retention.

Sargeant & Woodliffe, 2007, Neslin et al., 2006.

EXECUTIVE SUMMARY

WE IDENTIFY

- Solicitation Channel affects marketing
- Multiple Gifts matters more than High Gift Sum Donors to LTV

WE USE

- A Tuned XGboost model (282 RMSE)

WE PROPOSE

- LVT Based Donor Segmentation for targeted appeal
- LTV Based marketing budget
- Value based marketing strategy
- **Total Spend:** ≈ $187,310.10
- **Projected Return:** ≈ $2,645,136.88

1. EDA

- **Problem**

- **Data Analysis**

- **Important Relationships**

- **Implications**

2. MODEL

- **Results**

- **Selection Process**

- **Benefits to UNICEF**

- **Interpretation**

3. STRATEGY

- **Hypothesis**

- **Strategy Breakdown**

- **Persuasion**

- **Implementation**

- **Projected Impact**

- **Estimated Costs**

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- **Results**
- **Selection Process**
- **Benefits to UNICEF**
- **Feature Insights**
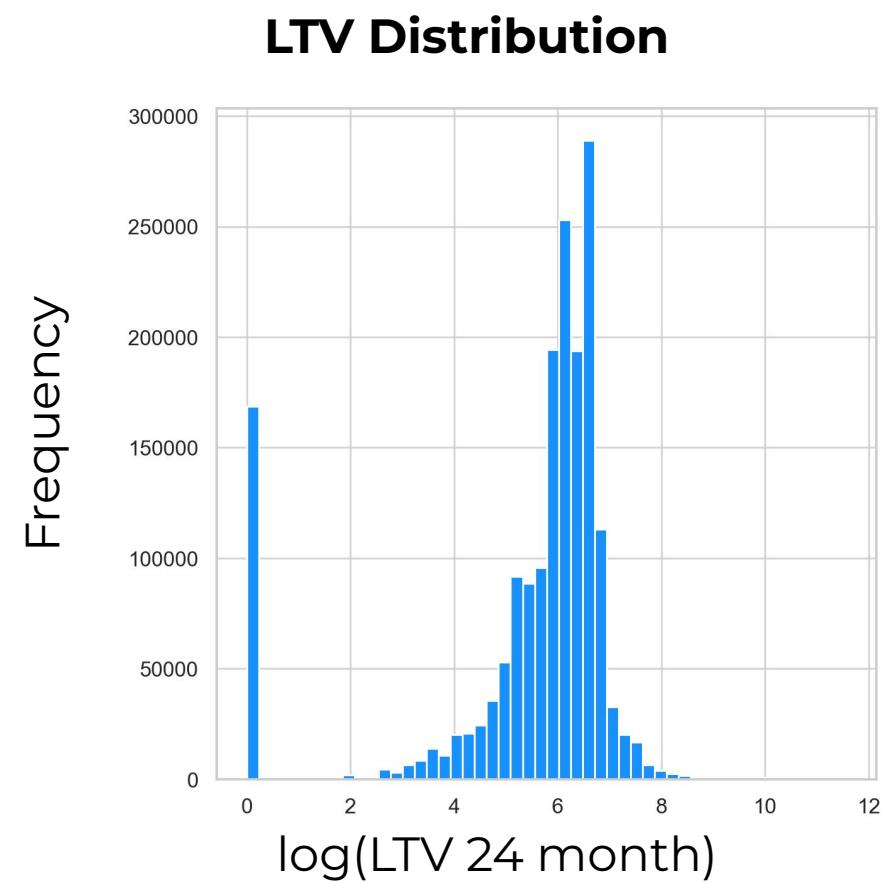
3. STRATEGY

- **Hypothesis**
- **Strategy Breakdown**
- **Rhetoric Appeals**
- **Implementation**
- **Projected Impact**
- **Estimated Costs**

DATA ANALYSIS
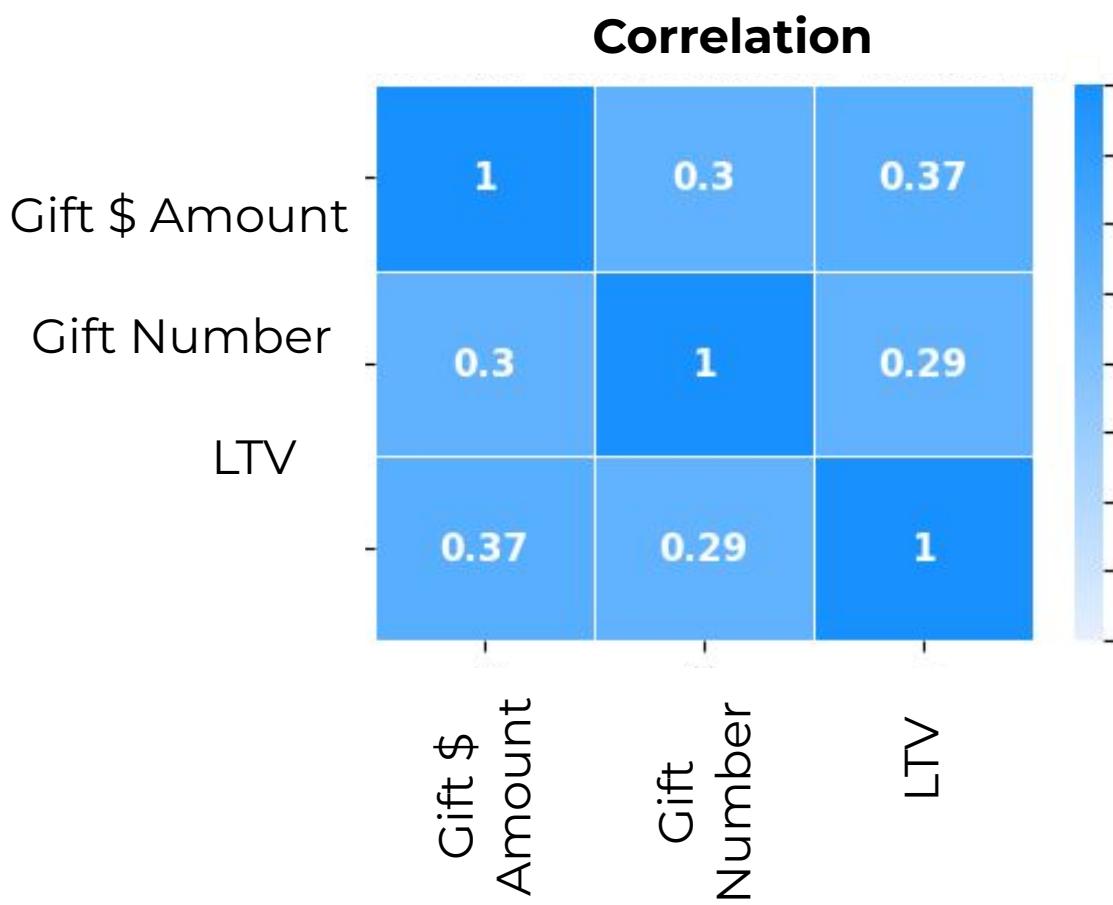
DISTRIBUTION

Highly zero-inflated, heavy-tailed LTV: median A$0.00, mean ≈ A$115, max ≈ A$105.7k; ~64% give nothing

LTV Distribution

CORRELATION

Strongest signals: total prior giving & frequency

Correlation

COMPLETENESS
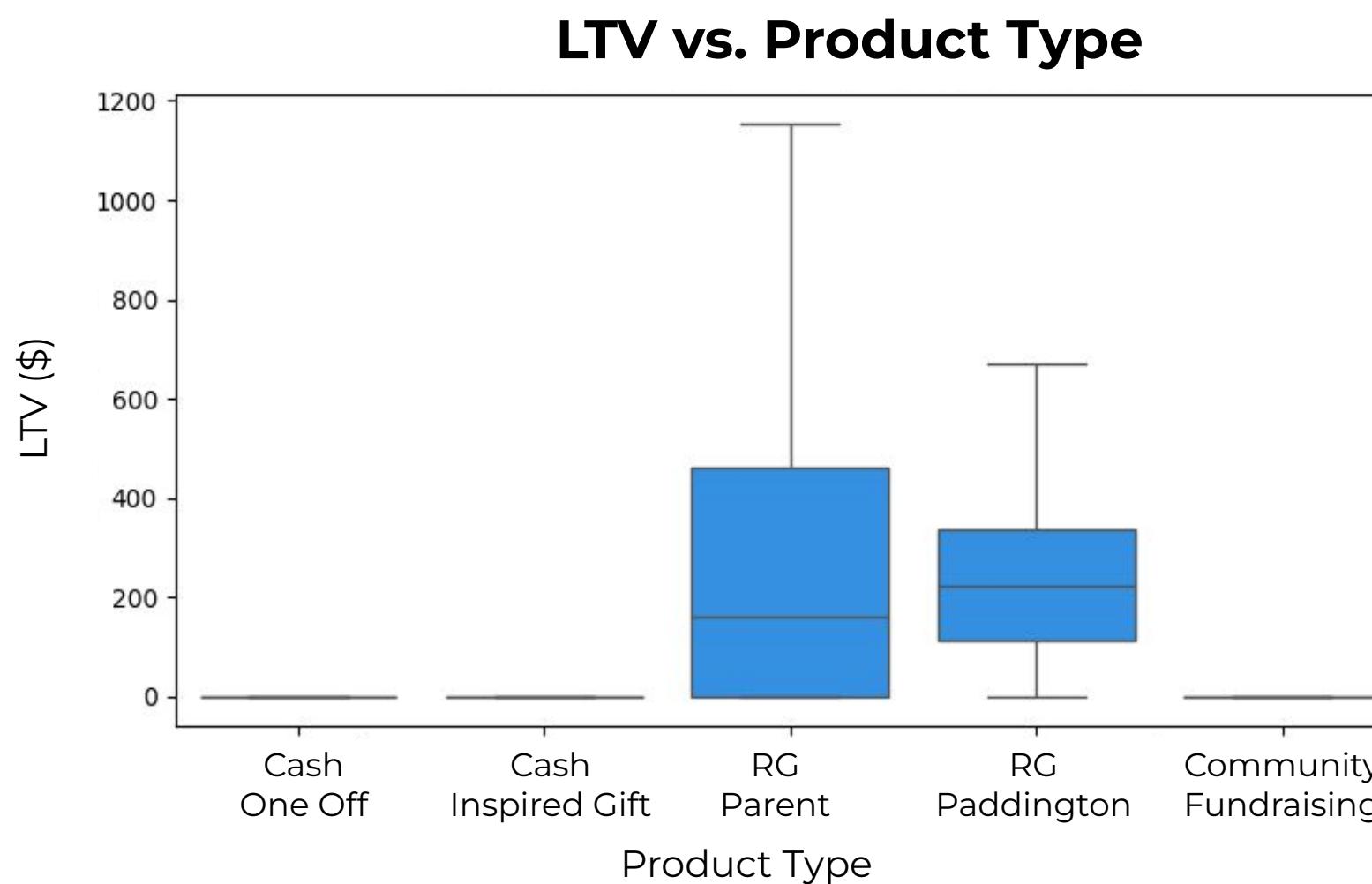
Outliers: Kept; 99th pct trim for viz; 2σ QA; 2 invalid gifts removed.

Missingness
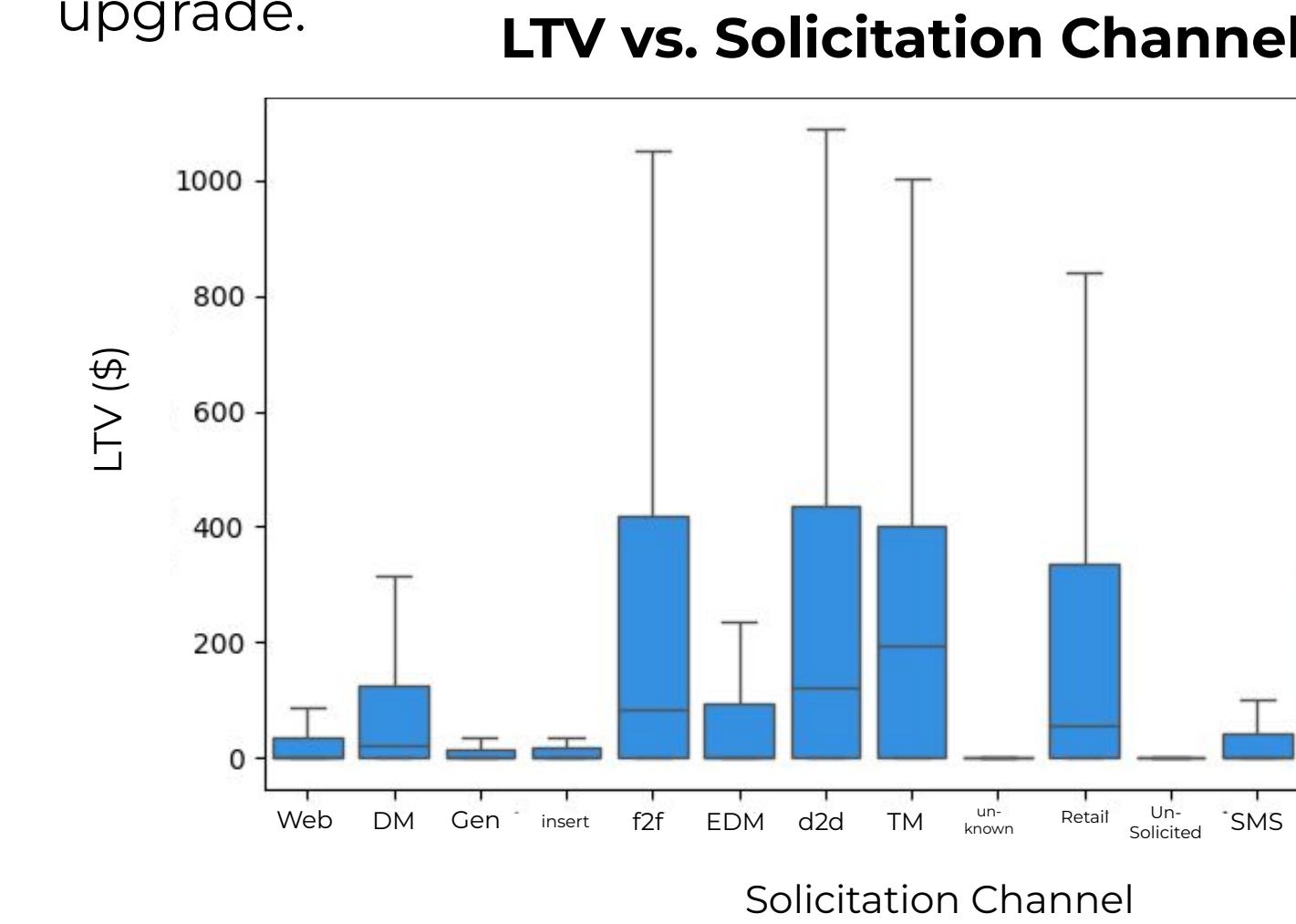
| Age	156k
Gender	114k
Dates	55–72%
IsEmergencyGift	92%
MOSAIC	5.8%

IMPORTANT RELATIONSHIPS

Product: Regular Giving products have much higher LTV (median ~$161–$224) vs $0 for one-off cash. Prioritise RG conversion.

Channel: (Outlier Adjusted) Personal channels (TM/D2D/F2F) outperform web (e.g., TM median ≈ $192.50). Use web for scale, follow with phone to upgrade.

LTV vs. Product Type

LTV vs. Solicitation Channel
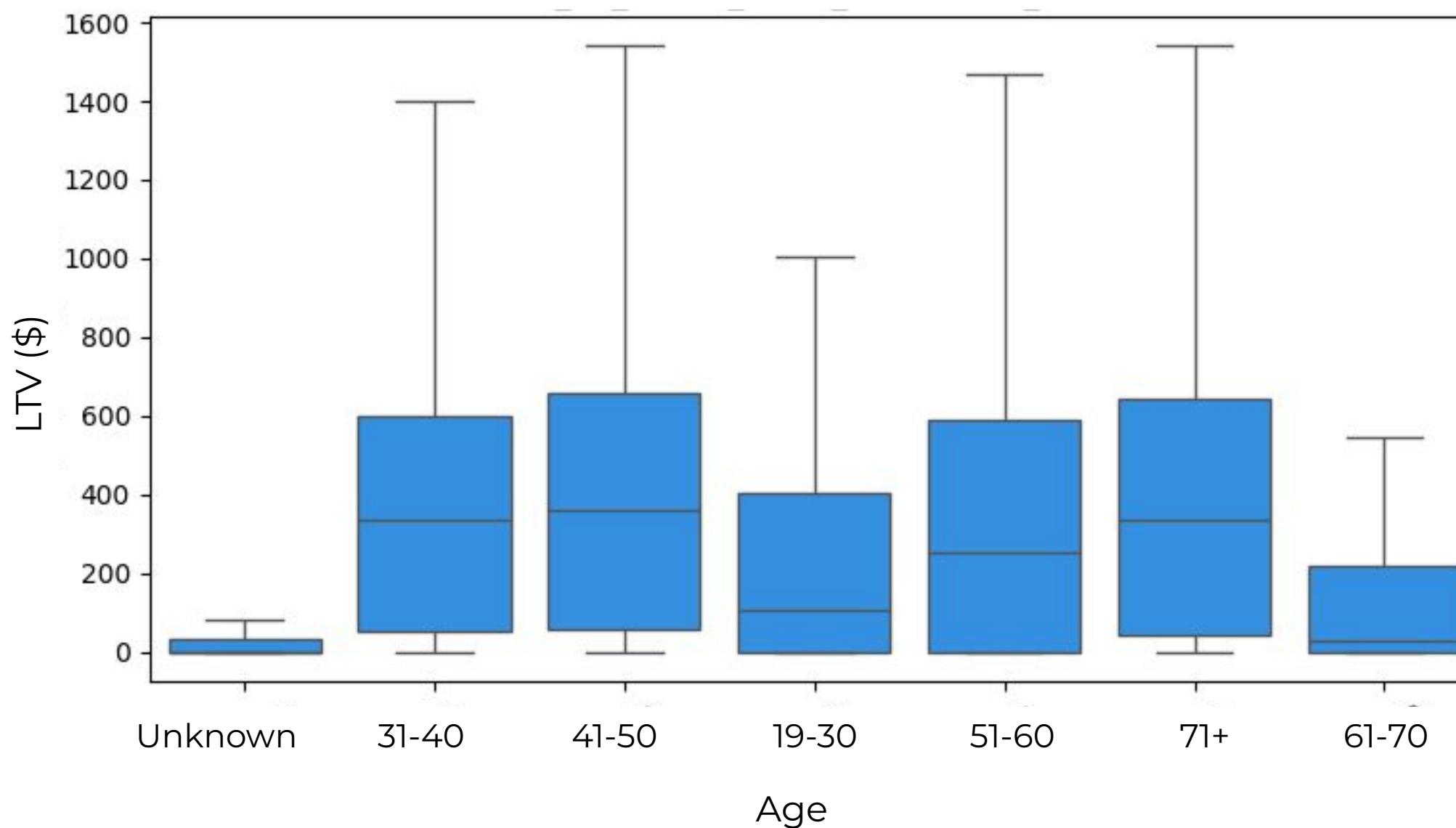
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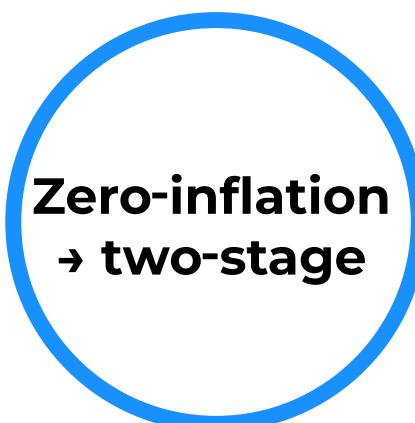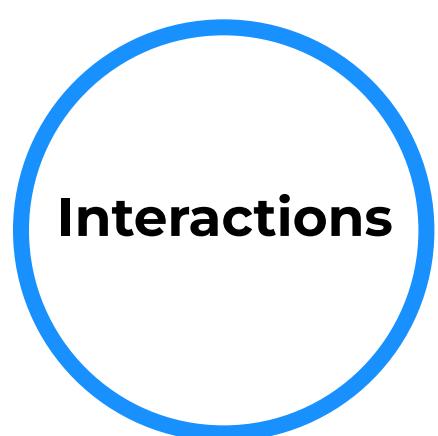
Demographics:

Older donors have, in general, higher LTV; MOSAIC adds minor nuance.

- 41–70 ↑ value vs under-30s; segment by age;
- Unknown = data-capture opportunity.
- Contactability matters
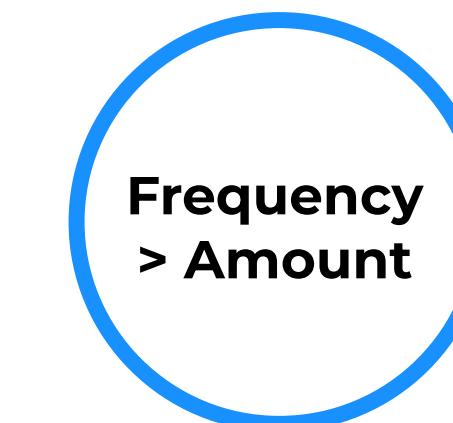
MODELLING IMPLICATIONS

Interactions ——— **Zero-inflation → two-stage** ——— **Frequency > Amount** ——— **Mosaic**
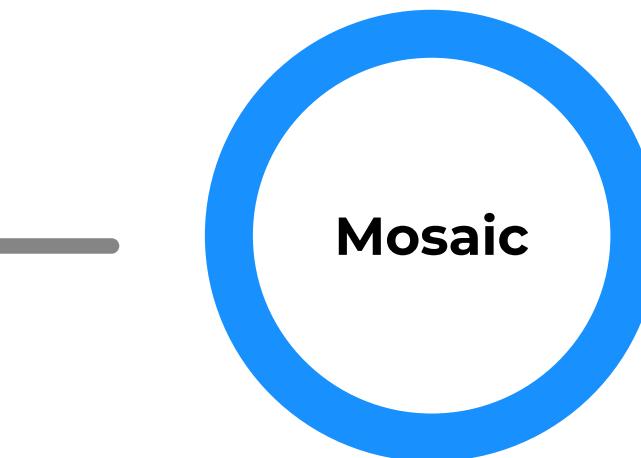
Channel×Product and **contactability** (phone) amplify outcomes; use for targeting and journey design.

First predict whether they will donate again or not, then predict amount for likely donors (hurdle setup).

num gifts correlates more strongly with LTV than **average gift**. Simplify amounts (keep sum + count; drop redundant stats).

- **Channel × MOSAIC:** Match affluent areas to TM/F2F/D2D; others via web + follow-up.
- **Season × MOSAIC:** Weak effect; stay always-on RG, use tax-time & post-appeal boosts.
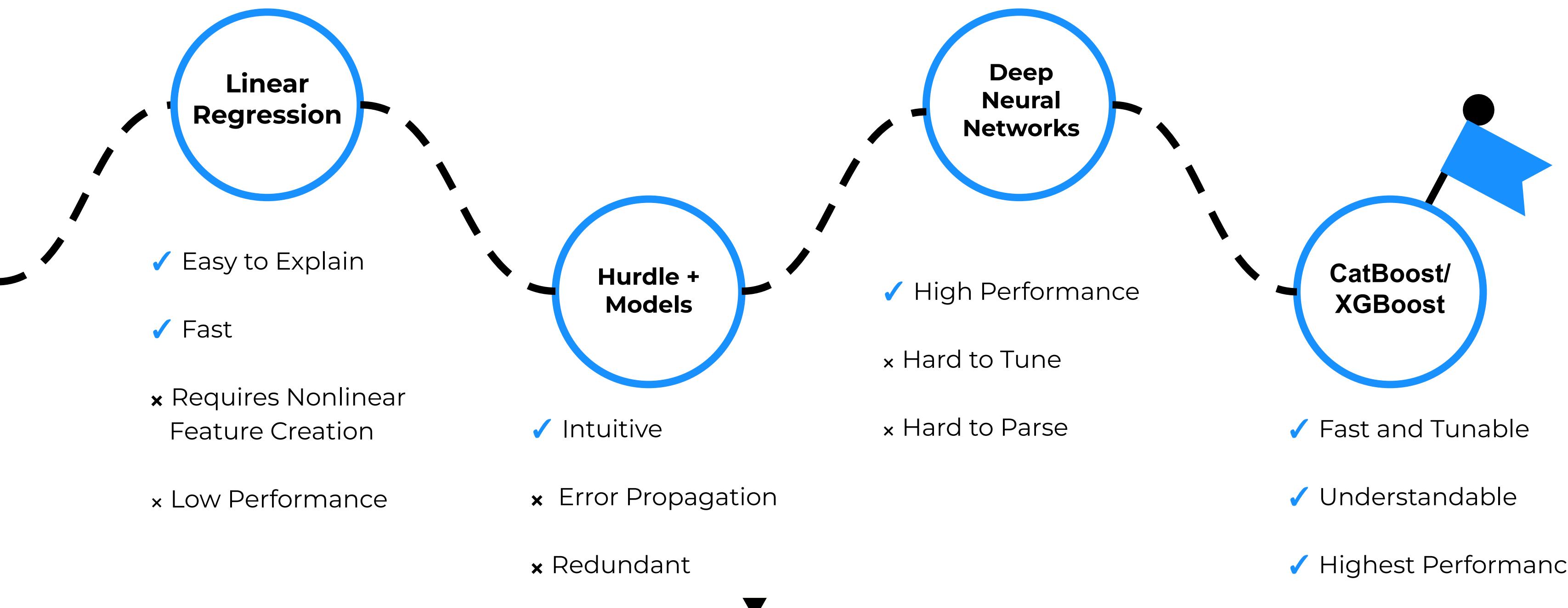
MODELLING RESULTS

Model	Variables	Train R Adjusted	Train CV RMSE	Test RMSE
Best - XGBoost + RMSE Loss	**192**	**0.74**	**307**	**282**
Elastic Net	52	0.23	303	390
DNN + XGBoost*	192	0.69	316	301
Tuned CatBoost	52	0.54	324	308
XGBoost	192	0.54	311	373
Baseline Mean Prediction	None	-	459	444

MODEL SELECTION

XGBOOST AND CATBOOST WERE SELECTED AS THE MAIN MODELS

Linear Regression

✓ Easy to Explain

✓ Fast

✗ Requires Nonlinear Feature Creation

✗ Low Performance

Hurdle + Models

✓ Intuitive

✗ Error Propagation

✗ Redundant

Deep Neural Networks

✓ High Performance

✗ Hard to Tune

✗ Hard to Parse

CatBoost/ XGBoost

✓ Fast and Tunable

✓ Understandable

✓ Highest Performance

EDA   MODEL   STRATEGY

WHAT DOES XGBOOST MEAN FOR UNICEF?

QUICK TO TRAIN AND EASY TO IMPLEMENT

INTERPRETABLE DECISION MAKING

IMPORTANT FEATURES

NUMBER OF DONATIONS/DID THEY DONATE ONLY ONCE?

MODE SOLICITATION CHANNEL GENERAL/WEB

MOSAIC GROUP J/STATE VIC

ACTIONABLE INSIGHTS

EARLY DONATION BEHAVIOUR > DEMOGRAPHIC INFORMATION

SOME DEMOGRAPHICS HAD MORE RIGID OUTCOMES

COMMUNICATION CHANNELS ARE INFLUENTIAL
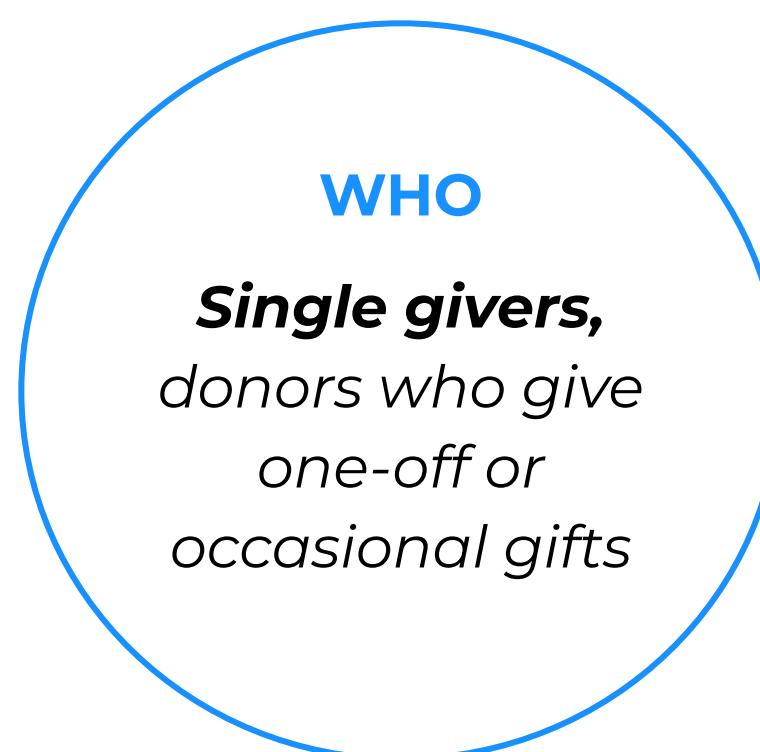
HYPOTHESES

1. Return on investment **(ROI) differs** according to each donor group's **classification** by lifetime value **(LTV)**

2. The **delivery** of marketing campaigns, such as channel type, frequency, and personalisation, **directly impacts** donors' lifetime value **(LTV)**
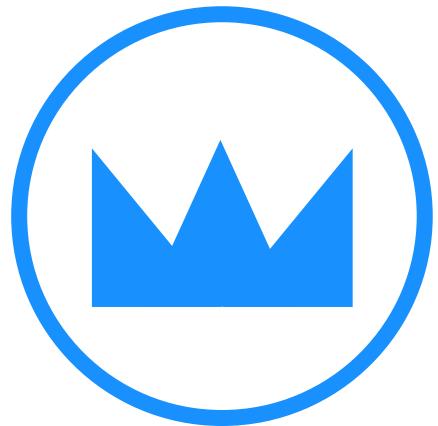
OUR STRATEGY

Implement a **budget-capped, LTV-guided marketing strategy** that targets _all donor segments_ through **value-based marketing,** but adjusts investment levels based on predicted LTV. This ensures UNICEF continues to engage every donor while maximising ROI through smarter budget allocation.

WHO

Single givers, donors who give one-off or occasional gifts

WHY

Strong potential to convert into RG when engaged through the **right channel and timing**

GOAL

Increase **conversion efficiency** and reducing **marketing waste**

PERSUASION

VALUE CONGRUENCE SHOULD INFORM CHANNEL AND MESSAGE WHEN POSSIBLE

ETHOS - AUTHORITY
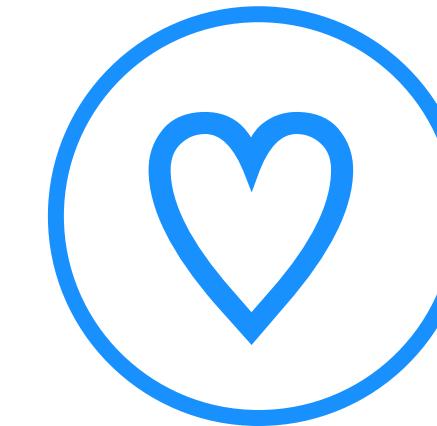
"We have a **proven record** of getting aid to children **quickly and responsibly.**"

LOGOS - REASON

"UNICEF uses **tested, cost-effective** programs that **measurably improve** child health."
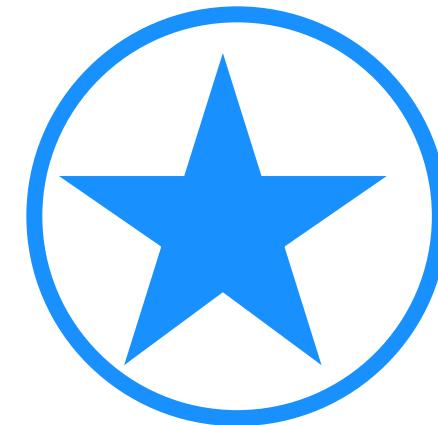
PATHOS - EMPATHY

"**Right now,** a child is displaced by **crisis. Your help** can change that **tonight**."

KAIROS - TIMING
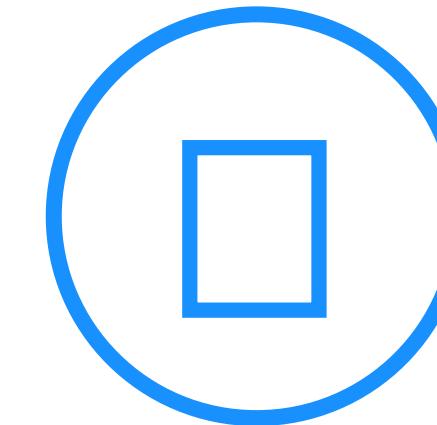
"This is a **crucial window**. A gift now moves lifesaving aid **when it matters most**."

TELOS - PURPOSE

"Because **you care** about **practical, lasting impact...**"
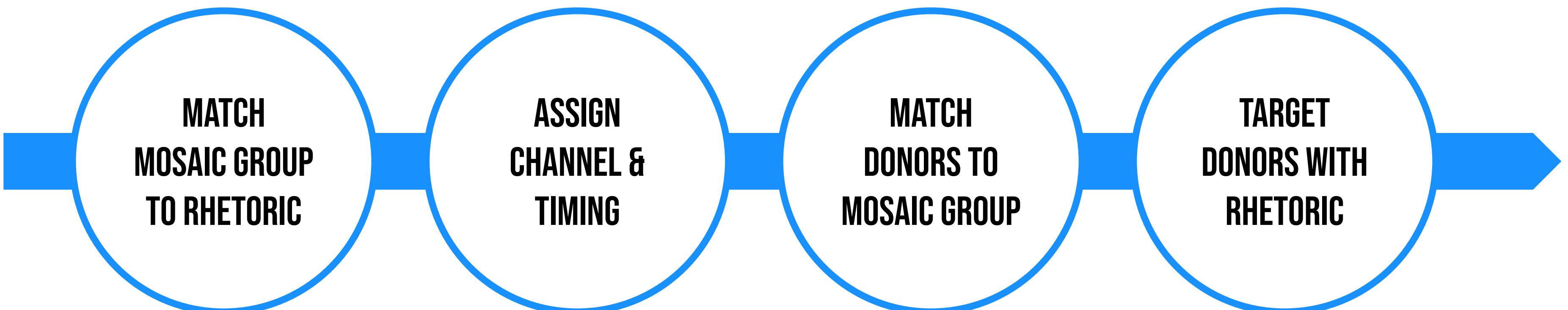
MYTHOS - STORY

"Our **community** believes every child deserves a fair start in life. Lets **live that value** together."

Aristotle, trans. Kennedy, 2007; Rapp, 2010; Crowley & Hawhee, 2012; Corbett & Connors, 1999.

EDA   MODEL   STRATEGY

CHANNEL CHOICE

USE DOMINANT MOSAIC TRAITS TO MAKE SPECIFIC, TIMED APPEALS TO DONORS.

MATCH MOSAIC GROUP TO RHETORIC

ASSIGN CHANNEL & TIMING

MATCH DONORS TO MOSAIC GROUP

TARGET DONORS WITH RHETORIC

IMPLEMENTATION

1. **Model Deployment**
   - Score all donors monthly using the trained LTV model
   - Classify into **Top / High / Medium / Low** tiers based on donation brackets

2. **Channel Allocation**

Segment	Predicted LTV	Resource Cap	Typical Cost	Messaging Focus
Top	≥ $1000	In-person Marketing	$100.00	Recognition and Loyalty
High	$300 - $1000	Telemarketing and Follow-up	$10.00	Stewardship and Acknowledgment
Medium	$50 - $300	Direct Mail, Digital	$2.50	Reactivation
Low	≤ $50	Email, SMS	$0.10	Awareness

EDA   MODEL   STRATEGY

IMPLEMENTATION

3. Content Personalisation and Campaign Matching

- All donor segments will be targeted but **marketing spend per donor** will be **depend according to predicted LTV**
- Use existing **post-processing pipeline** to decide _which content_ and _when_ to send for each individual

4. Evaluation

- A/B test each tier against control groups
- Measure **Regular Giving conversion**, **cost per converted donor**, and **ROI**
- Retrain model quarterly

PROJECTED IMPACT

- **Regular Giving conversions** projected to increase **≈ 15–25 %** through targeted, high-value engagement (Sargeant & Jay, 2014)
- **Cost per converted donor** expected to fall **≈ 30 %** via channel realignment (Sargeant & Woodliffe, 2007)
- Estimated **net uplift ≈ $120 000 per year** from improved ROI

Segment	Conversion Uplift	Cost Change	ROI Impact
Top	+20%	+10% spend	+40% uplift
High	+20%	+10% spend	+40% uplift
Medium	+10%	Neutral	+15% uplift
Low	stable	-30% spend	Budget Reallocated

Assumptions based on predictive LTV separation and published donor-marketing uplift ranges (Sargeant & Jay, 2014; Sargeant & Woodliffe, 2007).

EDA   MODEL   STRATEGY

ESTIMATED COSTS

Channel	Yearly Cost	Donors Targeted	Est. Spend	Adjusted Avg Return
Face to Face	$100	145	$14,500.00	$2421.83
Telemarketing (x4)	$40.00	2891	$115,640.00	$513.72
Direct Mail (x3)	$7.50	5619	$42,142.50	$148.97
Email/SMS (x12)	$1.20	12523	$15,027.60	$15.34

Extra Spend: ≈ $187,310.10 **Projected Return:** ≈ **$3,052,810.75** after uplift ($2,645,136.88 without)

ROI Improvement: 13.12 → 15.3

Cost assumptions from UNICEF Australia Q&A brief (2025); uplift and ROI ranges supported by industry reports (Blackbaud Institute, 2023; Salesforce.org, 2022).

FUTURE RESEARCH

- MODEL RESULTS HIGHLIGHT IMPACTFUL PREDICTORS, BUT NOT WHY THEY MATTER

- CORRELATION ANALYSIS DURING EDA IDENTIFIED KEY BASE VARIABLES DRIVING LTV AND THEIR DIRECTION OF EFFECT. SHIFTS BETWEEN MOSAIC GROUPS (E.G., G → A & B) SUGGEST CHANGING DONOR IDENTITIES AND THE VALUE CONGRUENCE HYPOTHESIS.

- UNICEF SHOULD TEST THESE BEHAVIOURAL MECHANISMS THROUGH A/B EXPERIMENTS TO VALIDATE OUR ASSUMPTIONS.

- LONG-TERM GOAL: LINK MARKETING INTERVENTIONS TO MEASURABLE CHANGES IN DONOR LIFETIME VALUE AND RETENTION.