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# **Uplift Modeling – Direct Marketing Case Studies**

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Predictive Analytics World

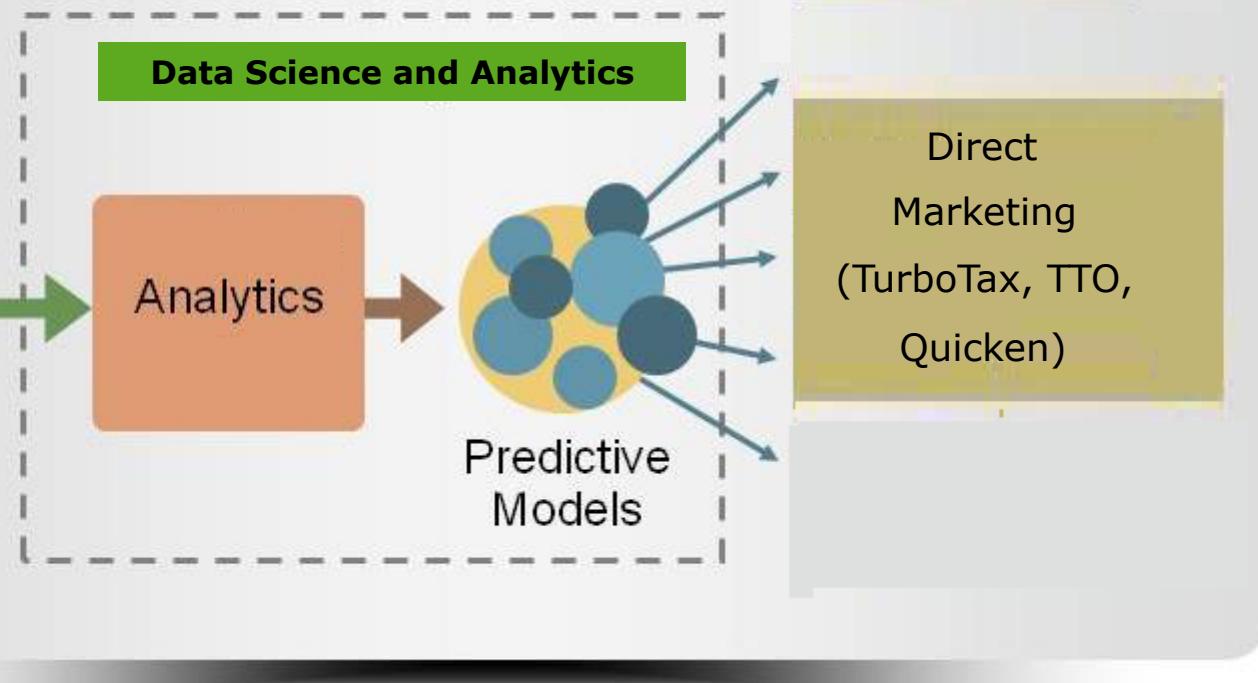
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Madhu Iyer

Inna Shapotina

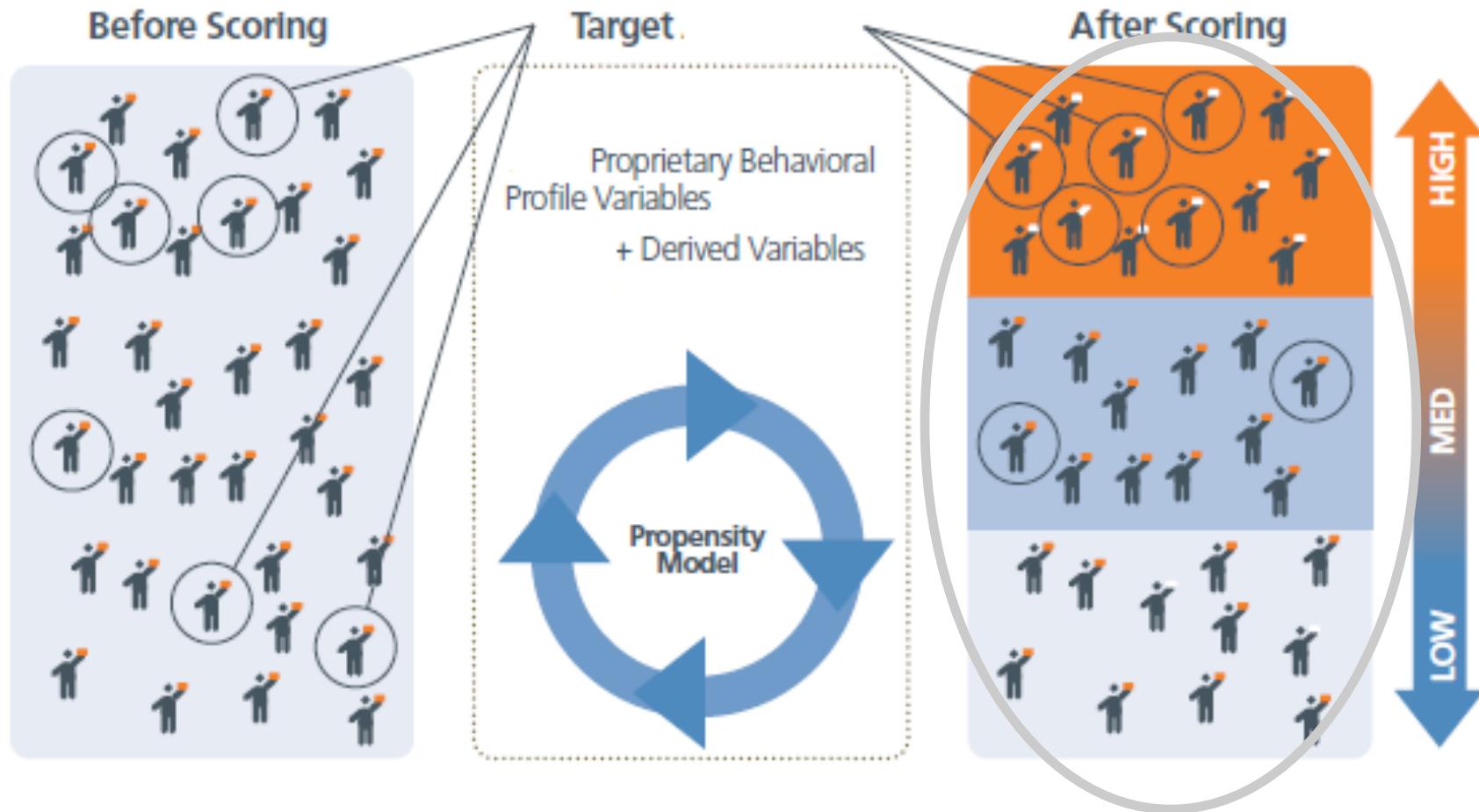
# Introduction

## Enterprise



**50 million customers entrust us with their data and expect us to be responsible stewards of their data and we take that responsibility seriously**

# Response Modeling for Direct Marketing...



Which of these respondents would have purchased anyway ?

# The method: Net Lift Model



Conceptual response segments. The lower-right segment is targeted with uplift modeling. Table derived from Vittal (2008) and Radcliffe (2007).

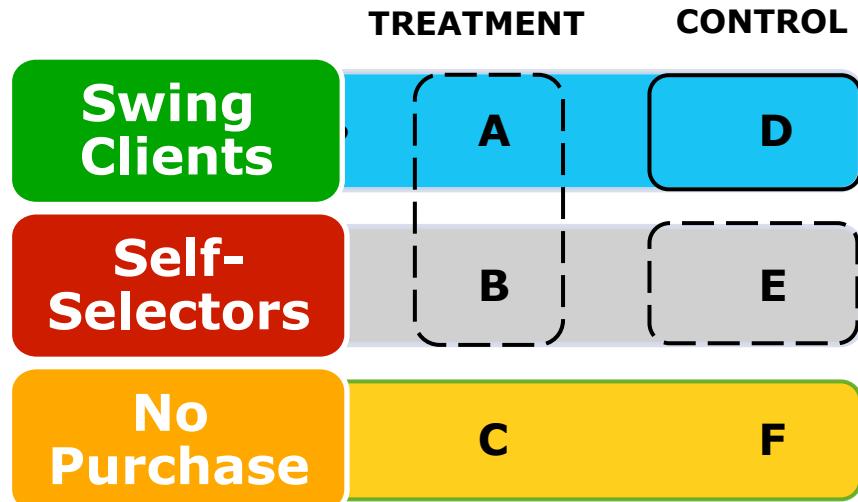
# Net Lift Solution: Asking the Right Question

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Targeting people who are likely to buy if  
they are included in a campaign

vs

Targeting people who are **only** likely  
to buy if they are included in a campaign



Purchase Due To Treatment =

$$P(A|A \cup B \cup C) =$$
$$= P(A \cup B | A \cup B \cup C) \times \frac{2 - 1/P(A \cup B | A \cup B \cup E)}{P(PURCHASE | TREATMENT) \quad P(TREATMENT | PURCHASE)}$$

Uplift is the Difference Between Purchase  
Probability With and Without Treatment

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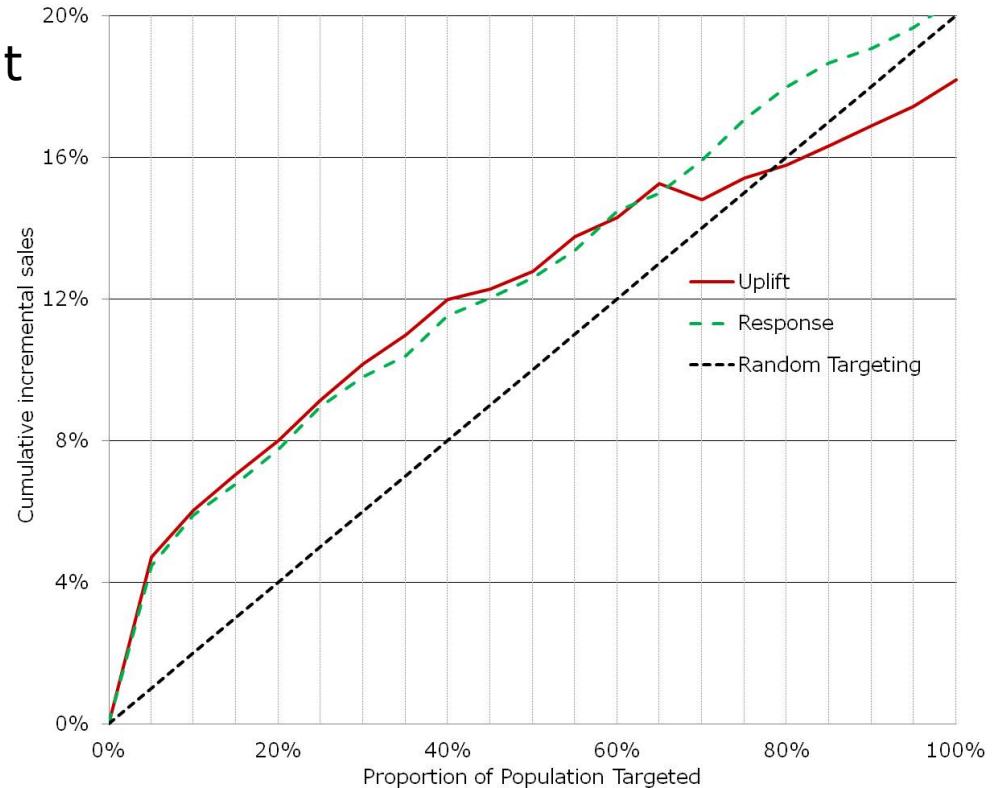
# **Application: QBDT Upgrades - Direct Marketing Campaign**

- Used mailing to drive upgrades amongst active customers.
- Some of the targets were chosen by a traditional response model ,and some by uplift modeling
- Models built on approximately 1.7M existing active customers.
- The campaign identified customers likely to be “high responders”, neutral and not so likely to respond.
- Approximately 10% were to be held back in each decile as control group.

# Results – Response Vs. Uplift Model

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- Both approaches led to significant incremental sales in the higher deciles, and significantly outperformed an untargeted approach.
- At most higher deciles, the uplift model slightly outperformed the traditional response approach.
- The last few deciles of the uplift model exhibit very unstable behavior because the volumes were much smaller increasing noise...



# Evaluating Uplift

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- We recognize three problems:

1. Model complexity and noise

- Uplift models are harder to build and fit than conventional models, because they predict a second-order effect— the difference between two probabilities. The error bars tended to be larger

- In our case the biggest problem was the *size of the control group*. We had initially planned on 10% control group of the size of the treated group, but in practice this turned out to be much lower. (~2-3%) This impacted our model and results greatly.

2. High Marketing Spend in Intuit

- The purchase probability without treatment for our products perhaps is negligible? Therefore the uplift models reduce to response models?

3. Sales correlated with incremental sales

- We used rank ordering from the model with a fixed targeting volume. Therefore, targeting customers with both higher background purchase rate, and a high incremental purchase rate.

# Conclusion

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## What feels good...

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- Intuit has ability to test uplift models and evaluate the results of those campaigns in a more robust way.
  - Experience with building and evaluating uplift modeling has led to a shift in business prioritizing – reallocation of marketing spend/budget.

## Growth opportunities...



- Evaluation needs to lead to more **actionable** outcomes - increase control group size across all product marketing campaigns to meaningfully measure campaign impact.

# Questions?

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