

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

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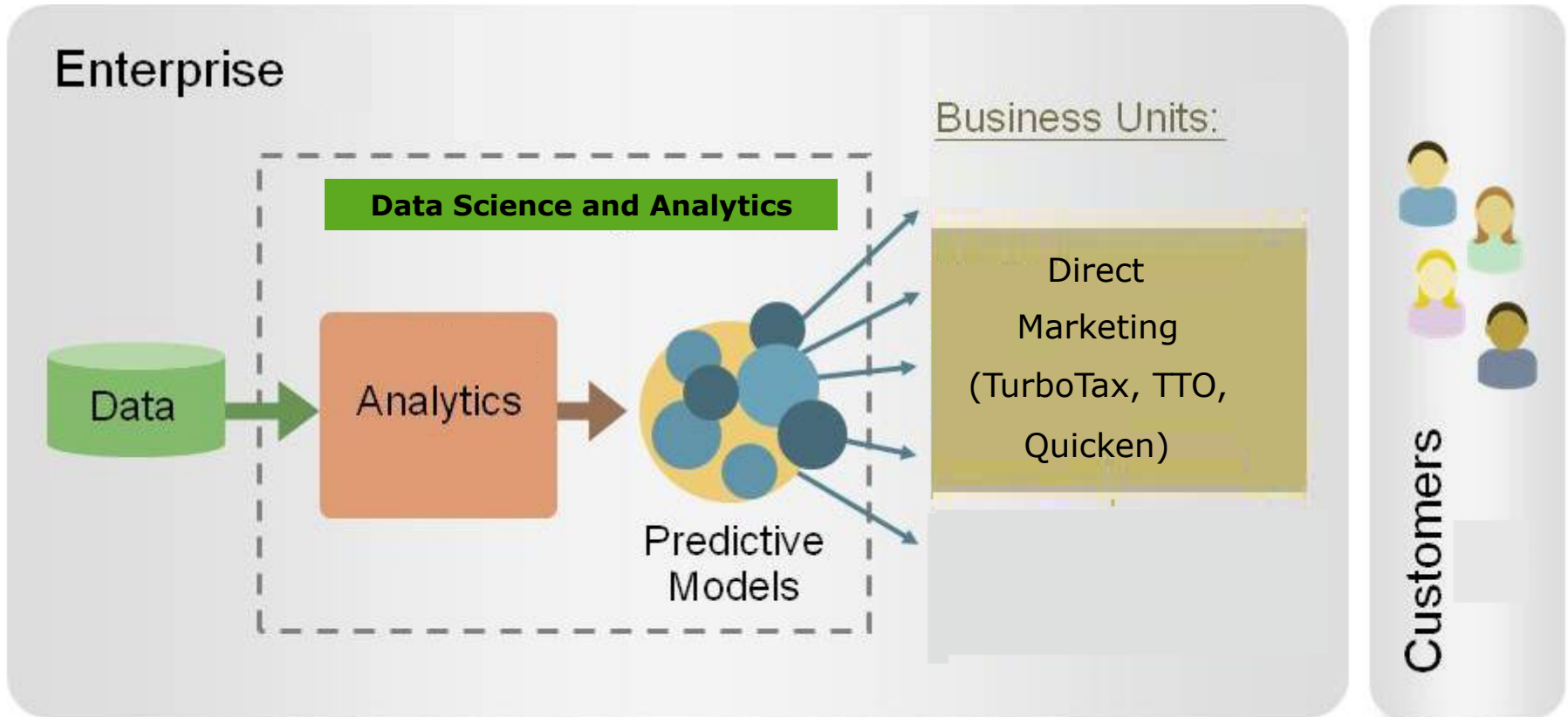
Predictive Analytics World

April 15, 2013

Madhu Iyer

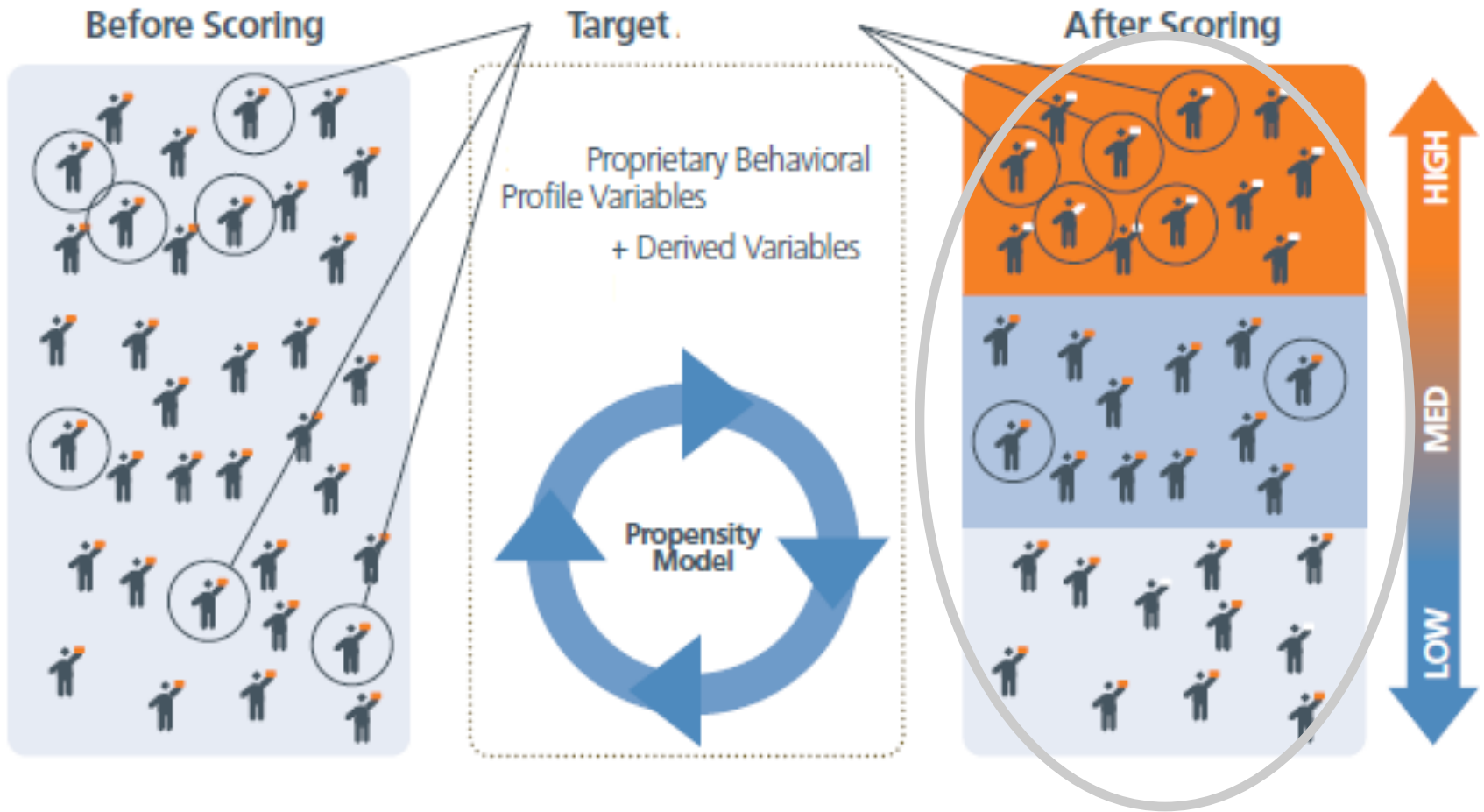
Inna Shapotina

# Introduction



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

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Buy if <b>do</b> receive an offer	No	Do-Not-Disturbs	Lost Causes
	Yes	Sure Things	Persuadables
		Yes	No

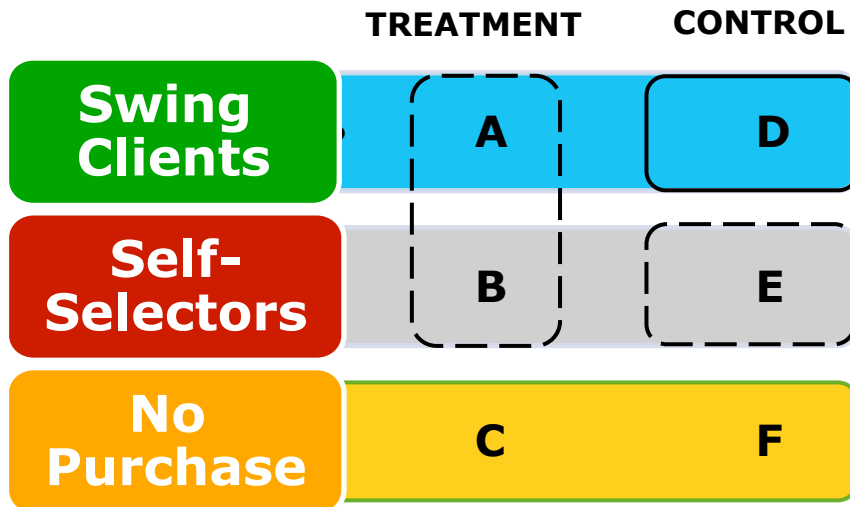
Buy if **don't**  
receive an offer



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

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 =

$$\begin{aligned}
 & P(A|A \cup B \cup C) = \\
 & = \frac{P(A \cup B | A \cup B \cup C)}{P(\text{PURCHASE} | \text{TREATMENT})} \times \frac{(2-1/P(A \cup B | A \cup B \cup E))}{P(\text{TREATMET} | \text{PURCHASE})}
 \end{aligned}$$

**Uplift is the Difference Between Purchase  
 Probability With and Without Treatment**

# The Product: Quick Books Desktop

QuickBooks > Compare QuickBooks Products

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Whether you're just starting out or your business is growing, there's a QuickBooks that fits your needs. Learn how different versions compare with this easy-to-use QuickBooks comparison chart.



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Plus	Mac	Pro	Premier	Enterprise Solutions
\$39.95/month	\$249.95	From \$249.95	From \$399.95	From \$600/user
<a href="#">Try It Free</a>	<a href="#">Buy Now</a>	<a href="#">Buy Now</a>	<a href="#">Buy Now</a>	<a href="#">Try It Free</a>
<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>

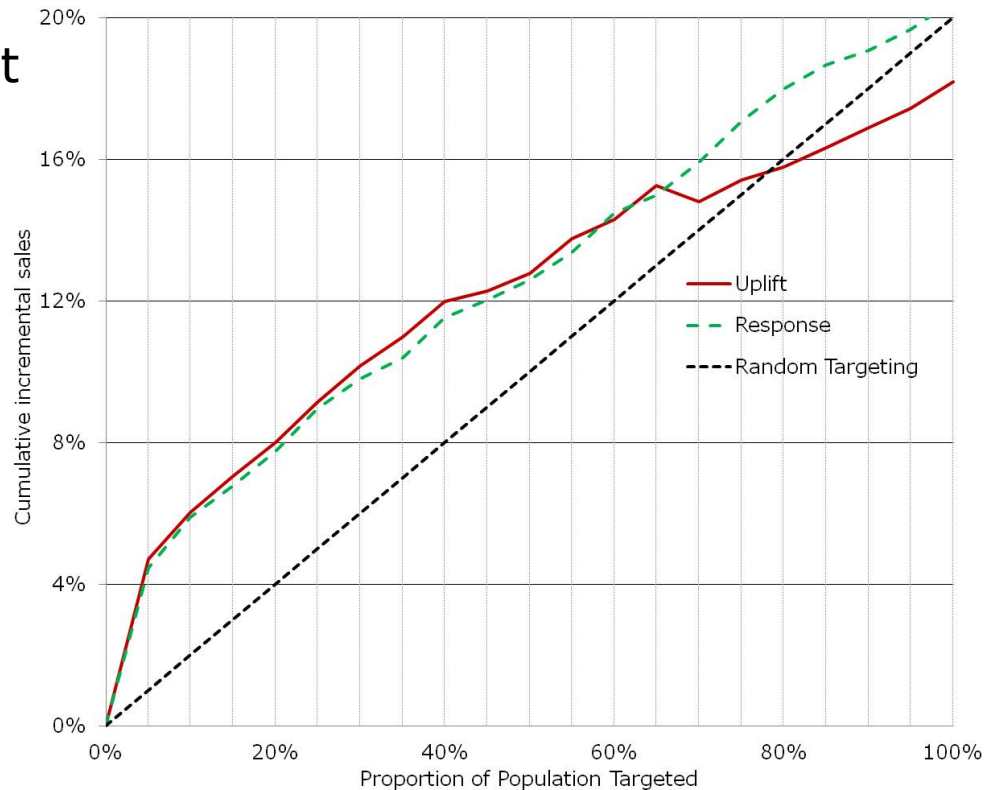
# Application: QBDT Upgrades - Direct Marketing Campaign

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- 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

- 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...



- 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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