

# Promotion Targeting

*In this case study, we describe how predictive modeling was used to manage many aspects of product promotion campaigns, including targeting, budgeting, and discount properties. It helped our client to implement a completely new business model.*

## Business Problem

Client communications is an important aspect of every business. Many companies, including most retailers, interact with their consumers directly, collect information about their preferences, and benefit from these insights by reaching out to individual customers and personalizing the customer experience. Many other companies, including product manufacturers, have a limited ability to interact with consumers and therefore lack insight into the behavior of individual customers. This creates an opportunity to connect manufacturers, retailers, and consumers in a network in which both retailers and manufacturers can freely interact with customers to improve customer loyalty and enhance profits.

Grid Dynamics was engaged by a marketing agency that implemented this business model. The agency partnered with a number of retail supermarket chains to gain access to their in-store and digital channels, receive anonymized customer data and transactions, and send advertisements and promotions directly to customers through these channels. On the other side, they offered marketing services to manufacturers of consumer packaged goods. A manufacturer could order a product

promotion campaign from the agency, whereupon the agency used its comprehensive customer database to find the best recipients of promotions and then deliver promotions to the customers using the channels of their retail partners.

Despite this efficient business model, the agency lacked efficient operations. Promotion campaign management at a large scale, across multiple retail chains and manufacturers, requires advanced customer intelligence capabilities in order to select the right customers, pick the best time for communication, dynamically optimize budgets, and make many other decisions. The agency relied on manual processes to make these decisions, using Excel templates and rough historical statistics, which often led to suboptimal and approximate results. AI could add great value by automating many of these processes and making mathematically precise decisions in real time.

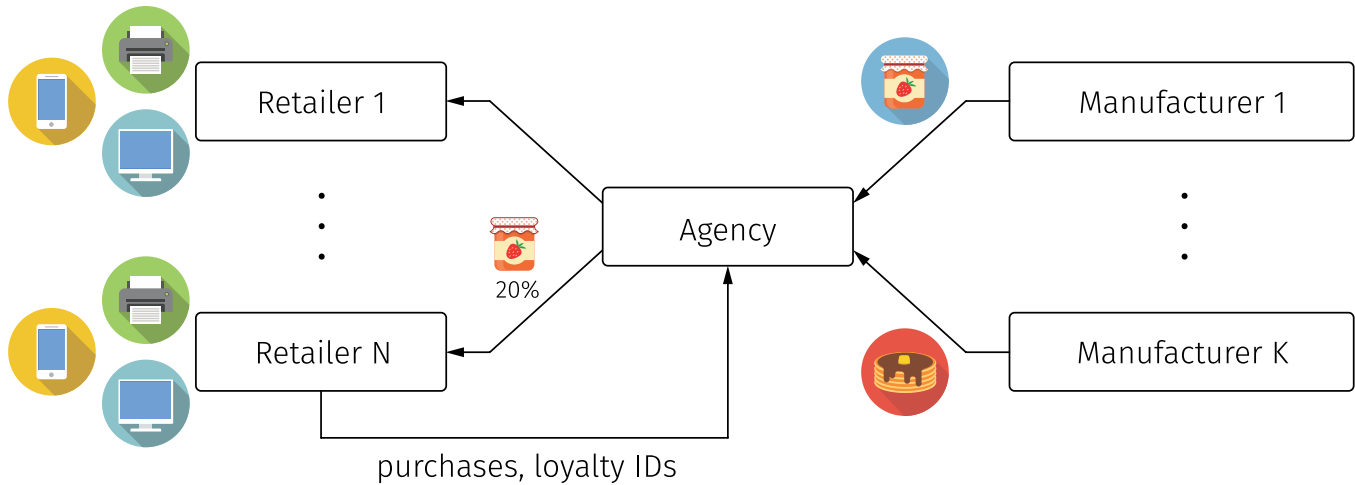
The goal was established to create a fully automated service for manufacturers that would allow them to configure, optimize, and execute promotion campaigns. This service had to use a wide range of predictive and economic modeling methods to choose the best marketing strategies for manufacturers and optimize all aspects of campaign execution.

## Analysis: Environment

The environment included three major economic agents: retailers, manufacturers, and the agency itself (see Figure 3).

Retailers were the owners of the customer bases and the marketing channels, which included in-store printers of personalized coupons, e-commerce websites, and mobile applications. Each of these channels could be used to send promotions directly to customers. Some of these promotions were simply advertising messages, but most of them were dollar-off or buy-one-get-one coupons that could be redeemed at checkout, either at the point of sale (POS) or through digital channels.

**Figure 3.** Promotion exchange environment.



The agency integrated with the retailers in a way that allowed it to receive purchase transactions from all channels in real time. The transaction data included individual line items and loyalty card numbers (when the loyalty card was swiped), which enabled the recording of purchase histories for all known customers. Meanwhile, the agency could send personalized promotions to retail channels in real time.

Finally, manufacturers were the main clients of the agency. They did not have access to customer data or retail channels, but they could use services offered by the agency to communicate with customers.

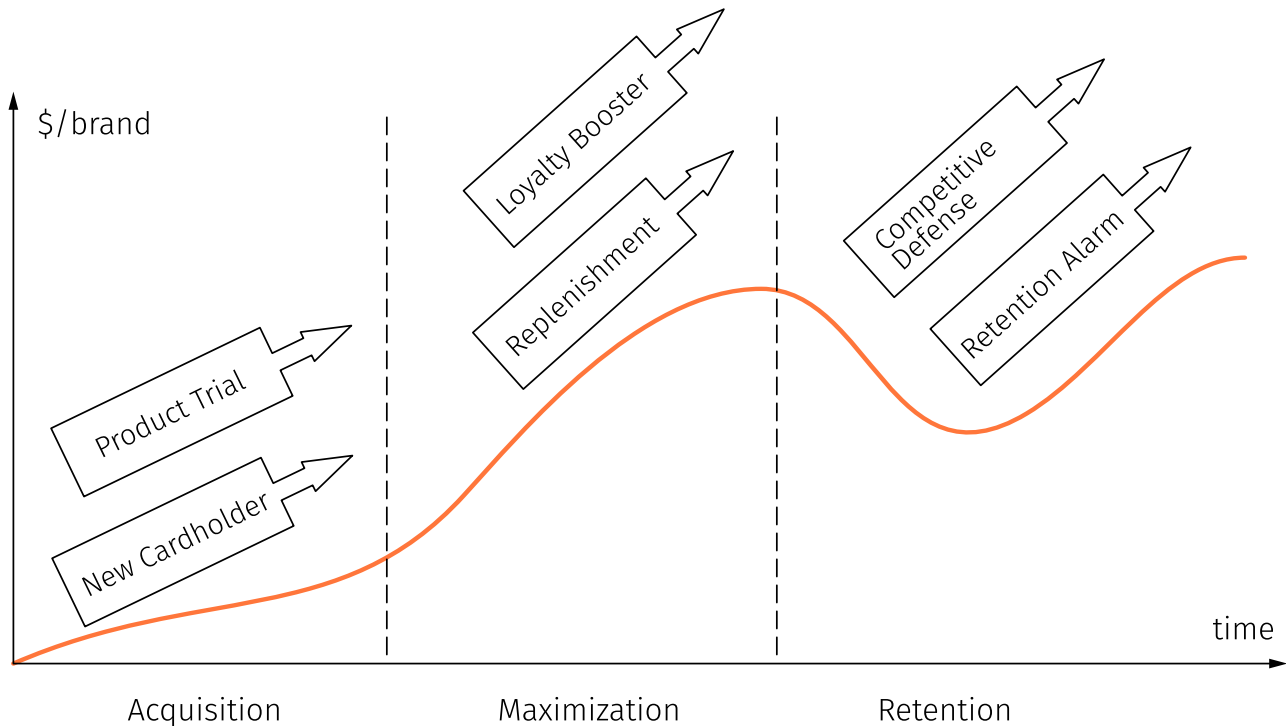
### Analysis: Objectives

Each economic agent in the above environment had its own goals and considerations. Most campaigns were sponsored by manufacturers, meaning they covered promotion costs and the cost of agency services in pursuit of the following:

- Increasing market share by attracting more customers.
- Trading margins for volume by providing discounts and special offers.



POS printer for personalized full-color coupons.

**Figure 4.** Promotion targeting objectives.

- Building brand loyalty by providing offers and communicating with customers.

Retailers also benefited from promotion campaigns sponsored by manufacturers, because promotions drive more traffic to stores, increase overall sales volume, and improve customer loyalty to retailers. Finally, the agency was paid based on the sales uplift delivered by the campaign as compared to a control group of customers excluded from targeting.

Our first step was to identify the set of business objectives that could be used by marketers to orient the AI system, pointing it in the right direction. Since promotion campaigns typically aim to improve the relationship between the brand and consumers, the set of objectives was defined based on the consumer lifecycle (see Figure 4):

- *Acquisition.* Marketers often want to acquire customers for new or existing products, and the system has to provide the ability to optimize promotions for this purpose.

- *Maximization.* Once a consumer starts to interact with the brand, the goal is to straighten the relationship and build loyalty. This can be achieved by running campaigns that stimulate more frequent purchases and the purchase of larger quantities per order.
- *Retention.* Finally, marketers can focus on customers who are at risk of switching to competitors, with the goal of winning them back using retention campaigns.

### Analysis: Controls

The agency could control many aspects of promotion campaigns to deliver very focused messages to the right customers:

- *Targeting (who).* The ability to send personalized messages allows marketers to exploit variability in tastes, price sensitivity, and propensity to buy.
- *Outreach/budgeting (how many).* The ability to

control the number of messages is important in balancing campaign costs and profits.

- *Timing (when)*. Message timing can be optimized to reach out to customers at the end of individual purchasing cycles.
- *Coupon properties (what)*. Promotion properties such as discount value are among the major factors that influence campaign efficiency.

This number of controllable parameters is difficult to optimize without a software system that uses predictive analytics for personalization and forecasting.

**Solution: Vision**

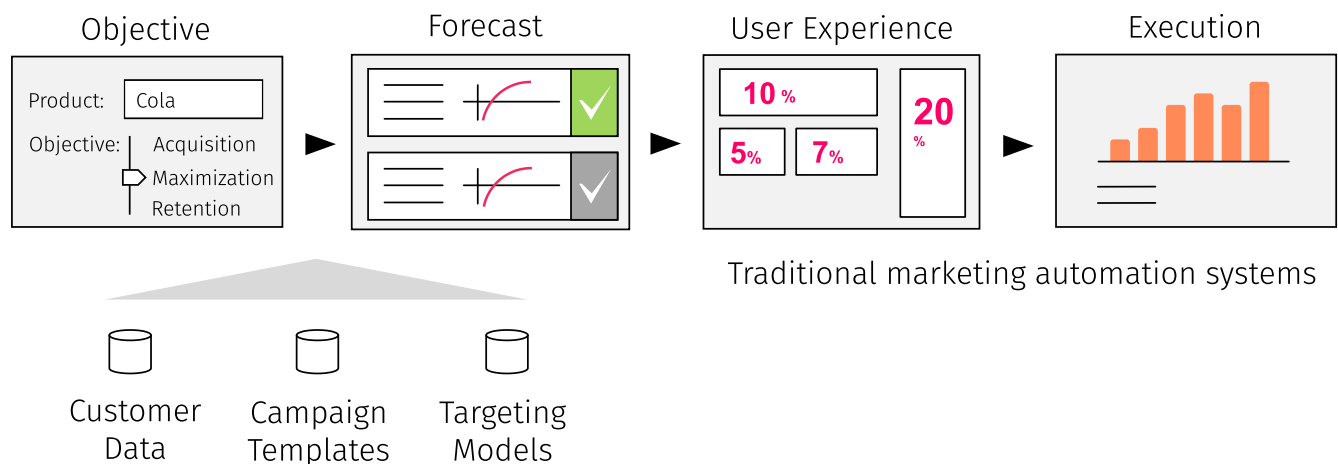
Once the objective and controls were identified, the next step was to define user workflow and create a high-level blueprint of a system.

We envisioned a fully automated system that would allow a marketer to focus on business goals and user experience, with advanced data analysis and optimizations done by AI components in the

background. The workflow starts with selecting a product to be promoted and setting business objectives that need to be achieved, as shown in Figure 5. The system then evaluates various marketing strategies using statistical models and data, predicts potential outcomes for each strategy (such as the expected number of distributed promotions, response rate, and return on investment [ROI]), and presents the recommended options to the marketer. The marketer reviews these options and then configures elements that require human involvement, such as the graphical design of promotions.

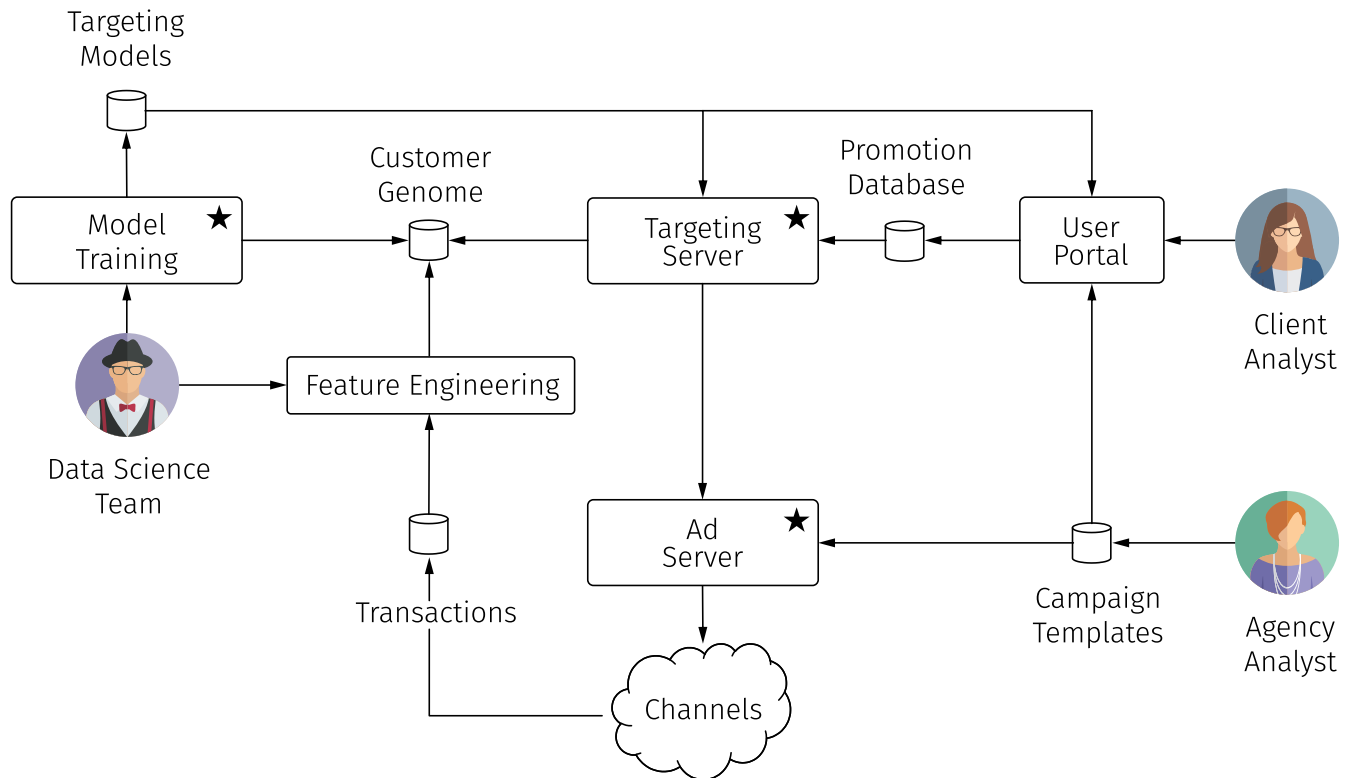
The fully configured campaign is submitted for execution. The system receives a request from channels each time a customer makes a purchase or visits a website, and the system then chooses the optimal offering in real time based on a customer profile and other signals. The marketer can monitor this process using a dashboard that collects data from all channels and presents campaign KPIs in real time.

**Figure 5.** Solution vision.



Traditional marketing automation systems

**Figure 6.** Technical solution. Components that use AI capabilities are marked with a star.



## Solution: AI Usage

The main challenge of this project was determining how to automate a large number of decisions that are typically made by a marketing analyst based on numerous factors including brand, type of promoted products, campaign objectives, best practices, and marketer experience. We divided these various decisions into several categories and developed optimization algorithms for each category.

The first category of decisions is related to promotion targeting, that is, matching customers and promotions. This problem can be solved efficiently using predictive analytics. First, each of the defined business objectives can be converted into a probability estimation task. For example, a retention campaign should target customers with the highest probability of switching to a different brand. Next,

the system analyzes the historical data and finds the distinctive purchasing patterns that often precede a switch. These patterns can be used to estimate the risk for any given customer and thus determine the best audience for a retention campaign. The same methods can be applied to acquisition and maximization campaigns.

The second category of decisions is budgeting decisions. It includes optimization of outreach (the number of promotions), discount rates, and other parameters that influence the campaign's ROI. These tasks can typically be reduced to demand forecasting and response rate forecasting, so predictive analytics helps to solve these problems efficiently.

Some targeting and budgeting decisions are done up front, before a campaign starts, but others are done in real time. For example, the system can be very selective of customers at the beginning of a

campaign, targeting only high-risk customers, but can later decrease the risk threshold depending on the observed budget burndown rate.

## Solution: Architecture

The technical solution we developed is illustrated in Figure 6. It includes three distinct subsystems:

- *Modeling subsystem.* Events and purchase transactions received from all channels were used to train and evaluate predictive models. Data transformation rules and models were initially designed by the data science team and then deployed in an automated process that continuously prepared data and retrained models for diverse combinations of product categories and business objectives. This achieved a high level of automation, so that the involvement of the data science team was not required for setting up individual campaigns.
- *Administration subsystems.* Agency and manufacturer marketers could use a web portal to create and execute promotion campaigns. The portal provided functionality for campaign forecasting and optimization, interactive tools for promotion design, and KPI monitoring dashboards.
- *Transactional subsystem.* Requests from the channels were served in real time by transactional applications. A unique combination of promotions was selected for each request by a targeting server that used predictive models to score and rank promotions based on the purchasing behavior of the customer. A database of various statistical metrics about customer behavior (the so-called Customer Genome), which was updated in real time by the modeling subsystem, was also used by the transactional systems to calculate personalized scores for promotions.

## Results

- The key result of this engagement was a fully automated service for the agency's clients.

It dramatically improved client experience, reduced campaign setup time from a few weeks to a few days or even hours, and reduced labor costs on the agency side.

- The solution provided manufacturers with more than 15 campaign strategies that covered all of the top-level business objectives (acquisition, maximization, and retention). Strategy templates were developed by agency analysts, and then the parameters of these templates were tailored by AI in runtime for individual campaigns.
- The absolute majority of campaign management decisions, including targeting and budgeting, were automated using machine learning.
- Core services were implemented in a channel-agnostic way, and new marketing channels could be added easily. Marketing campaigns could deliver a seamless omni-channel experience.

## Related Business Cases

Although this solution was built as an exchange that connects multiple retailers and manufacturers, individual retailers can use a similar design to manage promotions internally.

The methods and components used in this solution are applicable to a wide range of marketing communication use cases. The propensity scores produced by the targeting algorithms can be used to personalize diverse aspects of the customer experience, including emails, website content, and online search results. Budget optimization algorithms can be used to optimize email and direct mail campaigns.