Estimating the Value of Insurance

Business Processes

Overview

CSAA Insurance Group, a AAA insurer, offers automobile, homeowners, and other personal lines of insurance to AAA members through AAA clubs. Founded in 1914, it is one of the top personal lines and property casualty insurance groups in the United States. The company, with 3,500 employees, serves 3.1 million customers

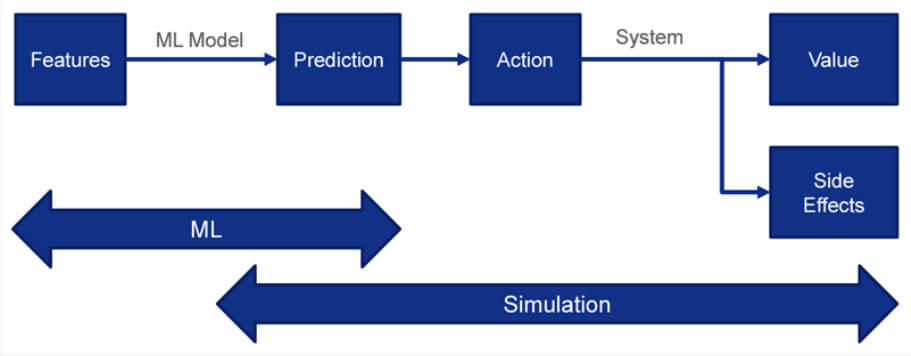
The V2C was peace of mind because uncertainties were transferred to the insurer and, in case of loss (e.g., from fire, flood, car crash, etc.), the payout from the insurance company. Value of the insurance was realized if the customer purchased or renewed the policy.

As for estimating customer lifetime value, V2I could be calculated as the amount of premium excluding loss, expenses, and capital costs over a lifetime. The insurer was interested in returning the investments.

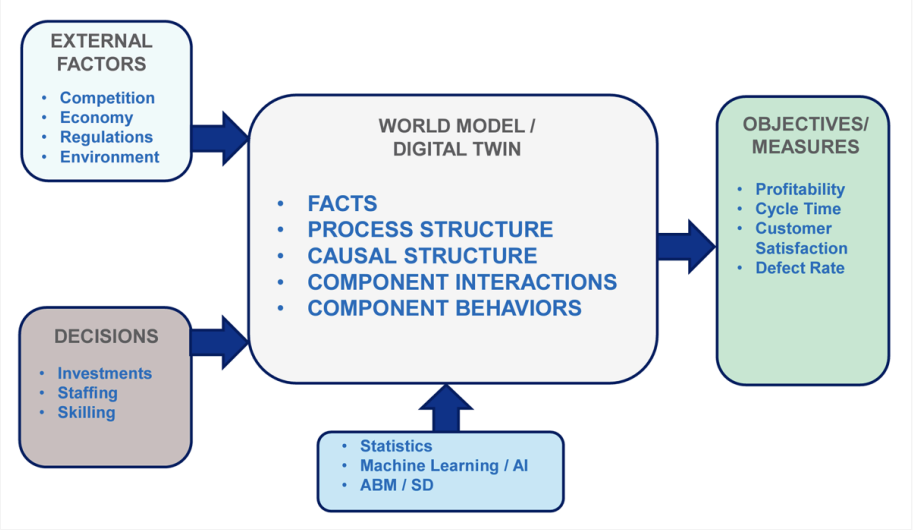
Previously, to estimate V2C, CSAA specialists used samples from theoretical distributions for auto insurance loss, home insurance loss, cash availability, and household income. These distributions were made by hand to quantify uncertainty.

Solution

CSAA engineers built a simulation model to make the right decisions based on data and to understand consequences before taking real actions. Simulation enabled them not only to predict some situations but also to see created value and the side effects of actions that may be negative.



multimethod modeling.

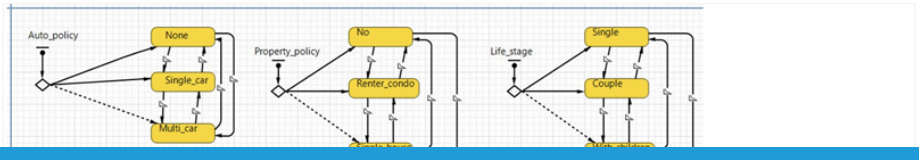


Structure of the decision model

With AnyLogic as insurance modeling software, they represented 5,000 households in the model. For each household, there were cash availability, income, and laws that were generated by the distributions defined earlier.

Engineers adopted a couple of assumptions to estimate values. Peace of mind was 10% of annual household income. When the loss was bigger than the household cash, the adverse effect of the cash shortage increased by 1.2 times the shortage amount.

The picture below shows the agent-based approach in the AnyLogic model. In particular, the implementation of the household agent logic, which includes five statecharts to capture changes over time.



enlarge)

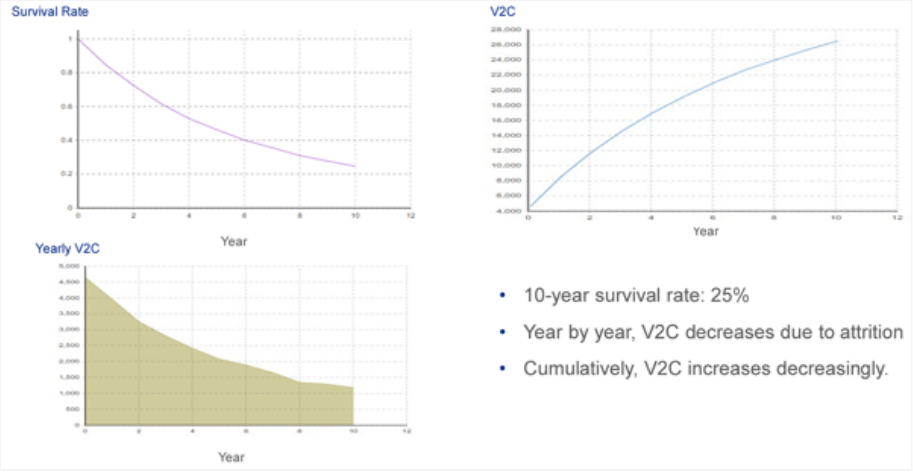
The first two statecharts are related to insurance policies. The third is the customer's life stage. At the bottom of the picture are two statecharts: customer segments and retention status, which is the outcome variable.

The model developers used predictive features as inputs to predict outcome variables at each point in time.

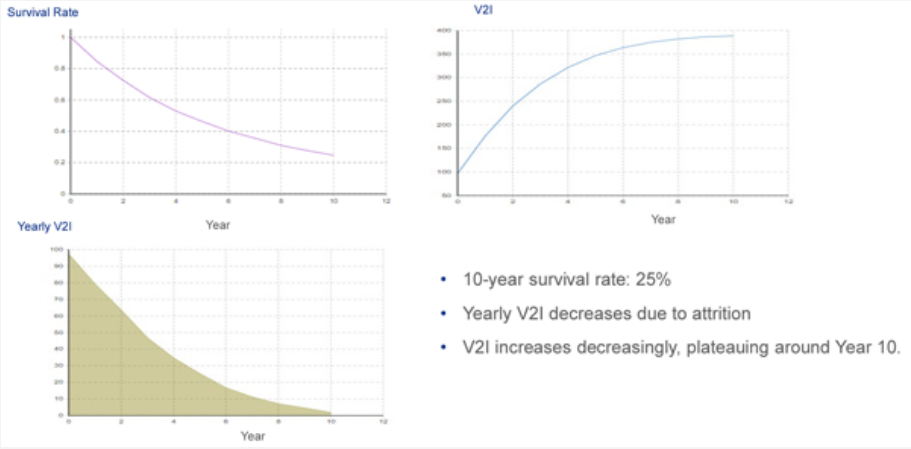
Results

The results of the demo model that are shown in the following graphs are not based on real data and are only used for illustration purposes.

In the picture below, there are the results for V2C. The upper left graph shows a 10-year survival rate of 25%. The lower graph illustrates that yearly V2C decreased due to attrition. After a customer canceled the policy, the value became zero. The upper right graph shows cumulative V2C that increased more and more due to attrition.



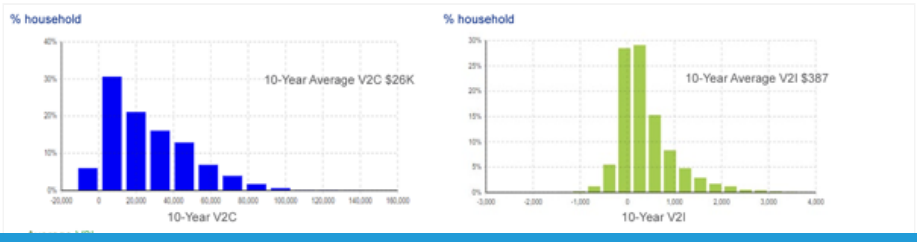
The graph on the right shows that V2I dropped much faster than V2C. The cumulative curve plateaued around year 10, which was much sooner than for V2C. This means that the value to the insurer will be lower for the next few years.



Simulation modeling of customer lifetime value (click to enlarge)

In the graphs below, the blue bar chart at the top of the picture illustrates the distribution for value of insurance (V2C), which averages $26,000 over 10 years.

The green bar chart demonstrates the distribution for V2I, which averages $387 over 10 years. Retention was a driving force for both V2I and V2C, and they were positively correlated. This enabled specialists to conclude that this business benefits both the customer and the insurer.

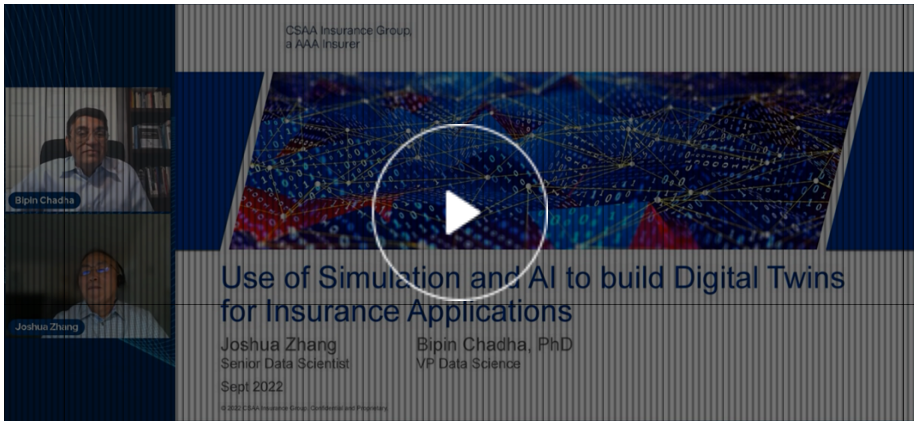


CSAA engineers visualized the results on the AnyLogic GIS map with 5000 households to represent positive, zero, and negative values.

In the future, managers can also investigate how price changes affect V2I and V2C, what happens if expense ratios go up and down, who the target customer segments are, and how to better match risk to price using simulation modeling. CSAA plans to drive all kinds of decisions in the business with the help of AnyLogic as insurance modeling software.

The case study was presented by Joshua Zhang and Bipin Chadha, of CSAA Insurance Group, at the AnyLogic Conference 2022.

The slides are available as a PDF.



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