Improving Customer Retention and Profitability for a Regional Provider of Wireless Services

By applying advanced techniques for modeling and visualizing customer records, Elder Research, Inc. created a combined data mining and text mining solution for increasing market efficiency and reducing churn. The model improved targeted messages that resulted in higher profitability for nTelos, a regional mobile phone carrier.

Industry
» Telecommunications

Business Issue
» Reduce the rate of customer churn at nTelos.

Solution
» Utilize both quantitative and qualitative text information to identify possible churners.

Benefit
» Better targeted messages and customer interventions to improve profitability.

The Client
nTelos Wireless is a leading provider of wireless communications services to consumers and businesses in seven mid-Atlantic states. Based in Virginia, the company has approximately 400,000 subscribers and annual revenues in excess of $400 million.

The Challenge
Competition in the wireless telecommunications industry is intense. To maintain profitability, wireless carriers must control churn, or loss of subscribers to other carriers.

In 2010, churn caused nTelos’s market share and profitability to decline dramatically. In an effort to reverse the trend, management had acquired a sophisticated analytical software package and supporting consulting services from a leading technology firm. However, after many months, the results had been unsatisfactory.

In January 2011, nTelos hired Elder Research, Inc. (ERI) to help identify the causes of its high churn and implement actions to reduce it.

The Approach
Analyzing wireless carrier churn is a complex analytical challenge. Many variables are involved, some of which are difficult to measure accurately as the percentages of change are small. A broad spectrum of analytical techniques must be expertly applied to ensure accurate data and prescribe effective corrective actions.

Because of the complexity of the assignment, ERI implemented a seven-step solution approach:

Step 1: Correct analytical software deficiencies.
Shortly after beginning, ERI addressed installation issues with the analytical software purchase, so that it performed satisfactorily.

Step 2: Understand the problem and the data.
ERI worked with subject-matter experts from nTelos to understand the business benefit of potential outcomes, the costs of different types of errors in classification, the sources of data available, and the actions possible given predictions. Inside each data source of value, careful attention was paid to the type and meaning and valid ranges, etc. of each factor. (Astonishingly, the previous consultants had been reported as saying, “We don’t need to know about your business, just give us the data.”)
Step 3: Improve accuracy of input data.
The data audit by ERI revealed serious flaws in the input data, such as discrepancies in customer account information, which made it unsuitable for analytic purposes as is. ERI created and employed custom data-verification software to ensure that the data met the accuracy standards required by predictive models.

Step 4: Employ predictive modeling to reduce churn.
ERI built and implemented analytical models connecting churn to key variables such as the nature of the customer’s contract, the length of time remaining on the contract, the customer’s credit score, the type of plan, the number of roaming minutes used, and the region of the country.

These analyses enabled ERI to assign “most-likely-to-leave” scores to nTelos’s customers and predict 90 days in advance which ones would churn. The client’s marketing team and call center could then target high-risk customers with appropriate incentives to make a positive intervention.

Head-to-head, ERI’s new predictive model proved to be 2.5 times more effective than the client’s previous methods at identifying customers who were likely to churn. Further, the ERI models prioritized likely churners so that intervention was twice as successful as before.

“Elder Research brought the expertise we lacked to solve our problem. Once they got a handle on our processes, they were able to look at some of the data differently, in ways that we had never considered. They gave us insight as to why certain populations leave us. This let us run more focused marketing campaigns with better results. In effect, they showed us a smaller pond with more fish in it.”

Frank Fenneran
Senior Research Analyst

Step 5: Use text mining to incorporate call center knowledge into predictive models.
Realizing that the comments from customers recorded by the company’s call center could provide useful predictive data, ERI began mining this text information for predictive probabilities and also depicting it visually in tag clouds, which are graphic images that correlate key words used by the client’s customers with their ultimate actions. In a tag cloud, words that are used more frequently appear in larger type, and words with stronger correlations appear as dark red.

The illustration above shows a tag cloud for phone customers who churned voluntarily (i.e., they made their own decision to terminate their services and were not forced to do so for non-payment or other reasons). The word blackberry, for example, appears in large green type, which indicates that it is frequently mentioned by customers in this category, but that it is not strongly correlated with churn. On the other hand, the word iphone, which appears in the center bottom left of the tag cloud, is in smaller, red type, which indicates that it is infrequently used but strongly correlated with this category of churn. (At the time, nTelos did not offer the iPhone.)
The “likelihood to churn” models were then enhanced by adding a new source of information: call center conversations. Mining this text enriched the features available to the models and enabled ERI to increase the targeting effectiveness by a further 3.1%.

**Step 6: Track predictive model results with a “test-and-learn” strategy.**

Once the predictive models were developed and deployed, ERI implemented a test-and-learn strategy using control groups to evaluate marketing strategies and monitor predictive model performance.

This strategy unexpectedly revealed that customers who were due for contract renewal were more likely to churn if they received voicemail messages from call center operators. Upon inquiry, it was discovered that operators were essentially reminding customers that their contract was about to expire! Management changed the call center script so that new savings opportunities were instead mentioned, and churn decreased substantially.

**Step 7: Conduct “survival analysis” to identify trends.**

*Survival analysis* looks beyond individual customers to identify larger-scale trends. Using this technology (borrowed from its extensive development in the medical domain) ERI was able to show nTelos, for example, that customers who prepaid for their services by automatic debit arrangement were less likely to churn than customers who prepaid by credit card, and far less likely to churn than customers who paid with cash (as shown in the Survival Analysis chart to the left). Based on this information, management modified its prepayment plans to encourage auto-debits, and churn decreased for this category of customer.

The Results

Measurements conducted using statistically significant control groups for multiple categories of customers showed that ERI’s services in the areas of software development, data refinement, analytical measurement, and problem solving decreased nTelos’s churn from 3.5% in 2011 to 2.9%, in 2012 - the lowest level in years.

Based on data derived from the control group methodology used in the test-and-learn strategy, it is estimated that the implementation of ERI’s predictive model booster the year’s profits for nTelos by more than $1 million.

**About Elder Research, Inc.**

Elder Research Inc. (ERI) - the nation’s leading consulting company in data mining, predictive analytics, and text mining - helps government agencies and Fortune Global 500® companies solve real-world problems by amplifying the productivity of their analysts. Drawing from experience in multiple industries, ERI brings cutting-edge technology into front-line practice to achieve a high return on investment for its clients.

Located in Charlottesville, VA; Washington, DC; and Baltimore, MD, ERI was founded in 1995 by Dr. John Elder, who has co-authored 3 books (2 of which won national awards) on practical data mining, ensemble modeling, and text mining. To learn more about Elder Research and its services, visit www.datamininglab.com or call (434) 973-7673.