



The Future of Predictive Modeling – As Viewed from the P&C Marketplace

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The History of P&C Predictive Modeling

Progressive Insurance

- 1980's – Progressive began experimenting with alternative underwriting variables
- 1991 – Progressive became the first company to use credit scores
- 1996 – Credit scores implemented in all states
- 2002 – Progressive uses over 200 data elements in its scoring process
- 2004 – Progressive pilots a GPS car based system to record driving data points
- Today – Progressive now uses thousands of data elements in its scoring process

Progressive's Growth

Financial Results	2005	1996	1991	1986
Net Premiums (billions)	\$14.0	\$3.4	\$1.3	\$1.2
Loss Ratio	68.1%	70.2%	65.7%	68.1%
Net Income (millions)	\$1,394.0	\$313.7	\$47.1	\$89.8

- Net Premiums Compounded Annual Growth
 - Pre-Modeling: 8%
 - Post-Modeling: 18%
- Net Income Compounded Annual Growth
 - Pre-Modeling: 12%
 - Post-Modeling: 27%

What Progressive Credits Its Success To

- Externally – Company of Firsts
 - First to use credit scores “to develop more accurate policy premiums”
 - First to offer 24/7 customer service
 - First to launch a website
 - First to offer comparison rates
 - First to sell online in real time
- Internally
 - Competitive advantage lies in their ability to better assess risk – Predictive Modeling
 - Reduction in high risk
 - Increase in the best risks through marketing, sales, and retention efforts

P&C Modeling Today

- Predictive Modeling is Table Stakes
- Used in:
 - New business
 - Renewals
 - Marketing and sales
 - Underwriting, pricing, reserving, managing and fraud
 - Commercial & personal
 - Biz liabilities, E&O, D&O, auto, home, workers comp, med malpractice, etc.
- Data Variables
 - Moved from solely credit score to 1,000s of variables
 - Looking at the present, the historical, and the changes over time
 - Internal elements
 - External elements
 - D&B, credit reporters, marketing datasets, government filings, legal proceedings, etc.
 - ***Majority of current models' predictive value is coming from external data elements***

Modeling Move Towards Healthcare

- Workers Compensation
 - Medical component is now >50% of costs
 - Non-medical components >50% of predictive power
 - Boss's rating greater predictor than diagnosis (medical grouper)
 - D&B information
 - Individual lifestyle, financial, and household data
- Disability
- Life (mortality)
- Medical

Predictive Modeling

Predictive Modeling applies mathematical and statistical techniques to predict the future profitability of a book of business at a policy level basis.

Predictive Modeling

Sample Lift Curve

An Objective Approach to Analyze Risk

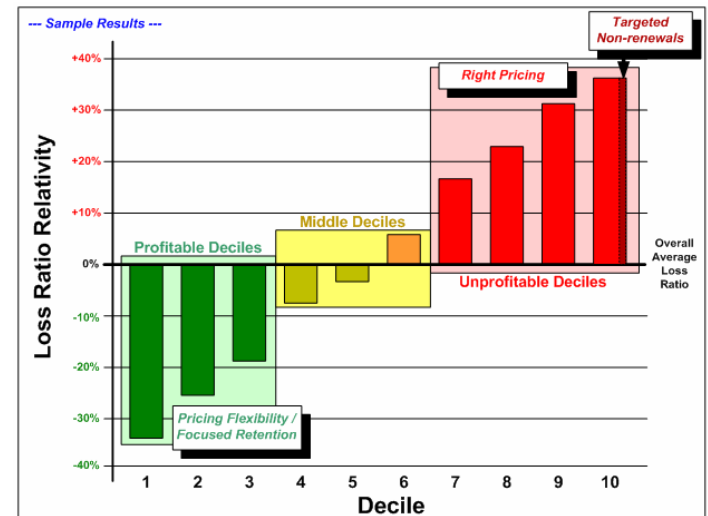
- Limits subjective reasoning from the underwriting process
- Leverages internal and external data to predict individual risk profitability at the policy level
- Utilizes historical data to develop the model and enhance predictive power

A Tool to Allow Increased Efficiency

- Can allow for increased amount of “low touch” policies/claims
- Provides objective guidance for more efficient and consistent pricing
- Improves underwriting workflow allocation efficiency for appropriate assignment of resources

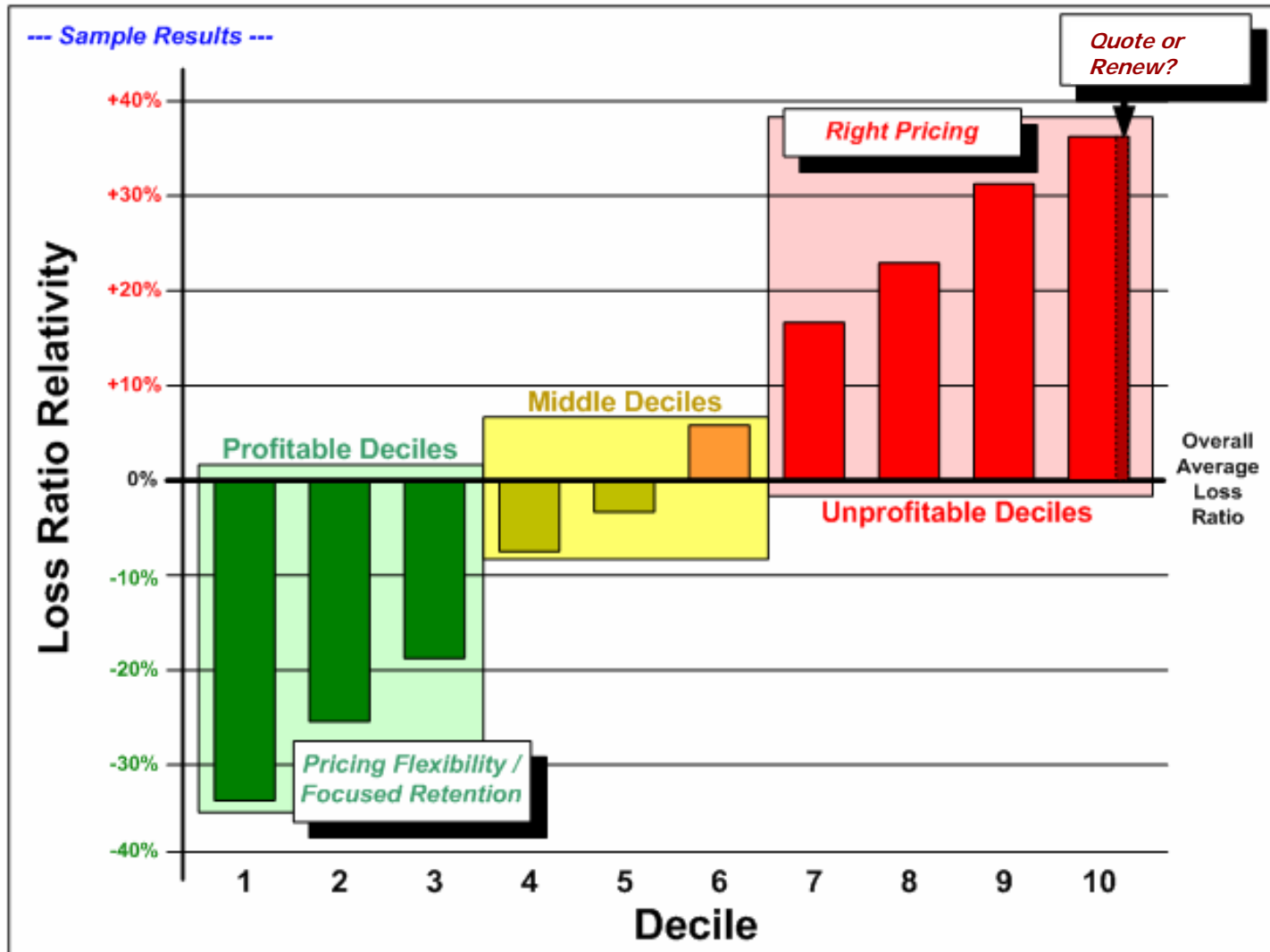
A Means to an End

- The predictive model itself delivers the relative profitability indication for each policy
- The business value to be obtained from the predictive model comes from careful implementation of model results into underwriting process, pricing, and systems



The model supports key business decisions and yields increased profitability and growth.

Predictive Modeling Overview – What can You Do with the Models?

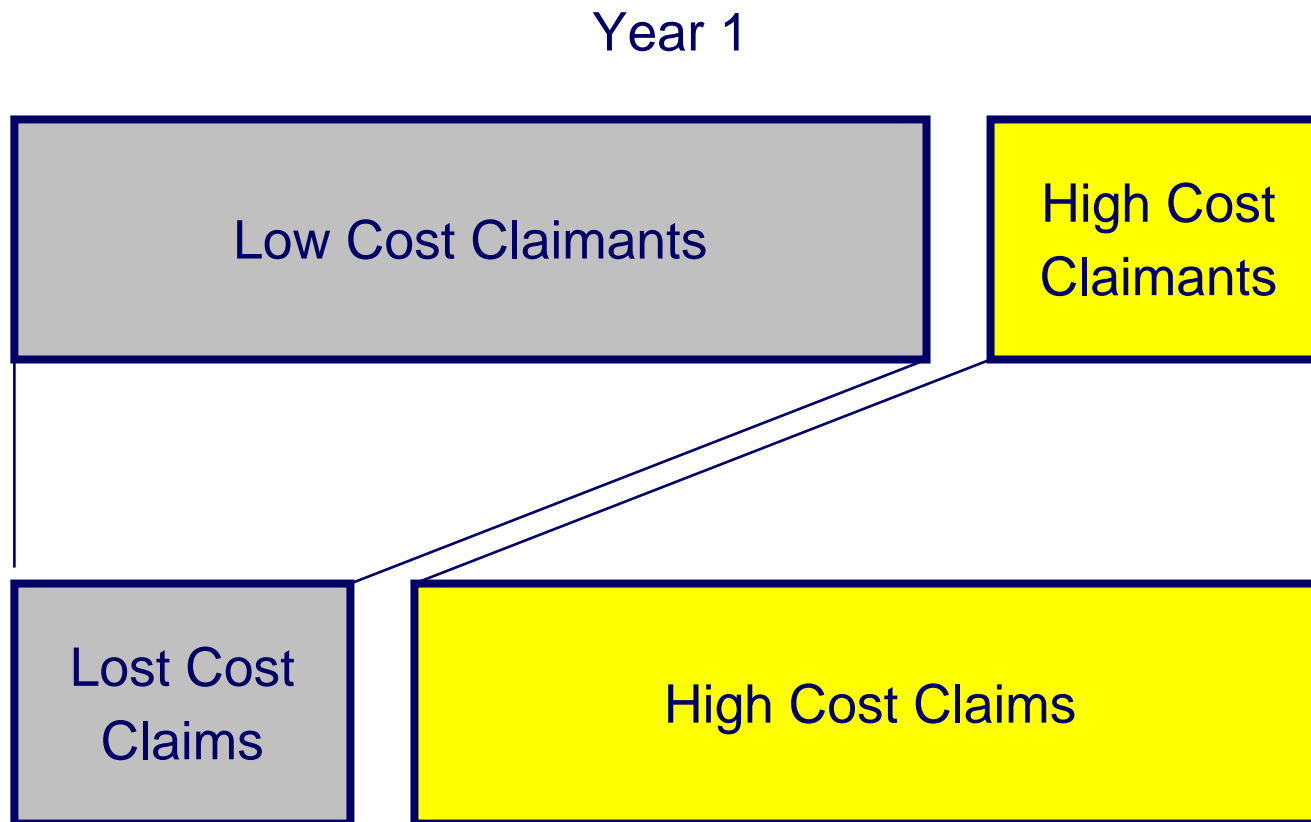


Predictive Modeling in Healthcare

- Internal Data – Medically-Based
 - Traditional claims data
 - ICD-9
 - CPT4
 - Episode groupers, etc.
 - Newer claims categories
 - Pharmacy data
 - MIB
 - Lab data
 - Only about 25% of the population has enough medical data to make a significant impact on a predictive model
 - ***Considering retention issues, lack of historical data, and poor data matching techniques, the average health plan has significant predictive medical data on only about 12% to 15% of its population***
- Other Internal Data
 - Application data
 - HRAs

Examining the 80/20 Rule

- 20% of the people account for 80% of the claims



Examining the 80/20 Rule

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- In year two, 75% of high cost claimants move to low cost claimants

Year 1

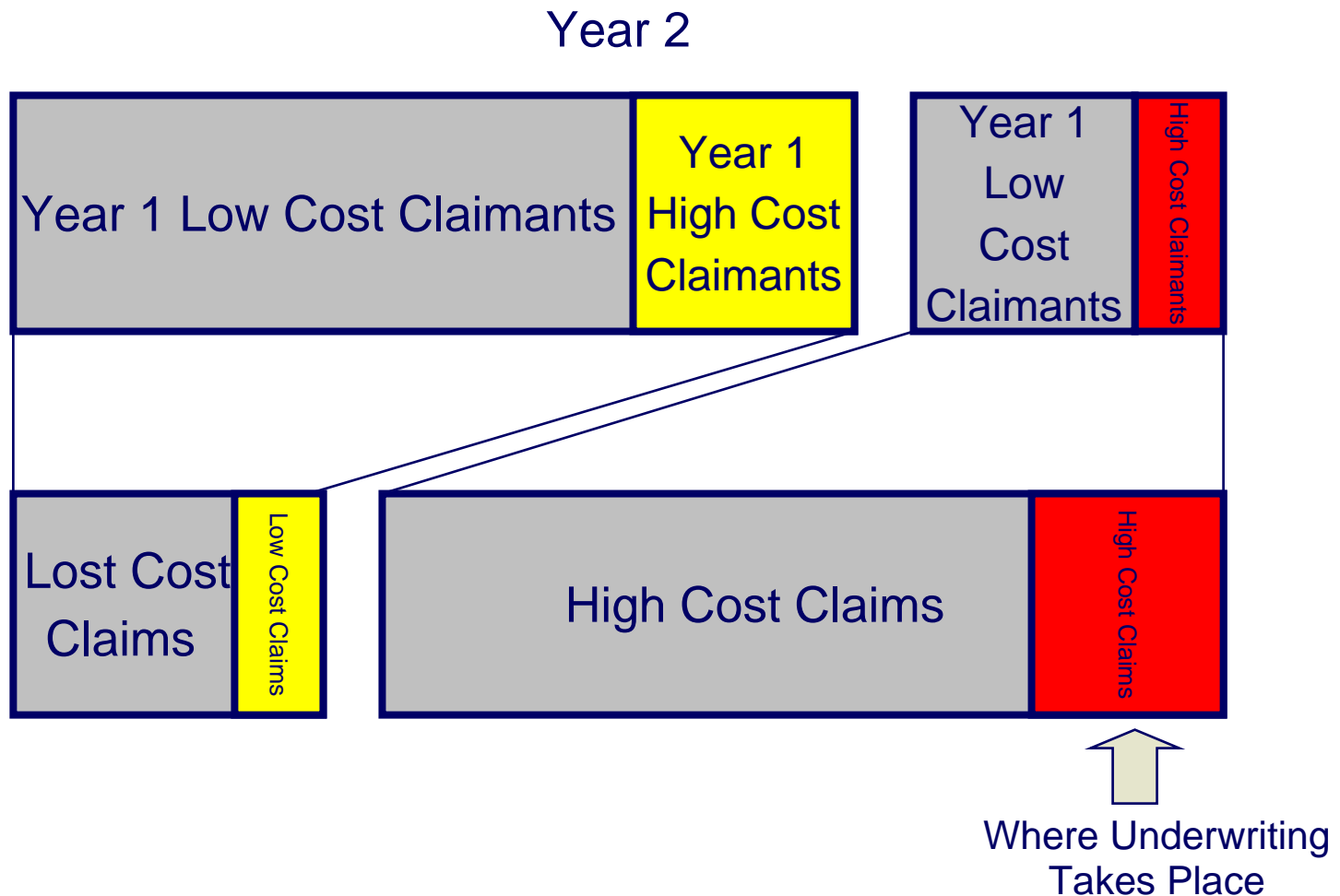


Year 2



Examining the 80/20 Rule

- 20% of the people account for 80% of the claims
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A Move Towards Alternative Datasets

- Applications and enrollment forms
 - Family information
 - Age, sex and age differences in family members
 - Employment
 - Job description
 - Height / weight
 - Commute time
 - Geography
- Health Risk Assessments (HRAs)
 - Excellent Source for Lifestyle-Based Data
 - Medical & lifestyle information
 - Behavioral characteristics
 - HRA Problems to Overcome
 - Expensive to administer
 - Poor participation rates
 - Timing issues for new business/members

Consumer Datasets

- The plethora of consumer data has dramatically changed our way of interacting with consumers
- Consumer data measured in Disk Storage per Person (DSPA)
 - 1985 – 0.02 Mbytes/yr
 - 1995 – 26 Mbytes/yr
 - 2005 – 3,500 Mbytes/yr
- 95% of U.S. Households
 - Historically: household-based
 - Newest trend: individual-based
 - Observed
 - Implied
- Price tag is under \$0.15 per name
- Not covered under HIPAA and FCRA

Consumer Data

- Why?
 - Primarily used for marketing, customer service and fraud purposes
 - Graham-Leach-Bliley Act of 1999
 - Requires opt-out
 - “Permitted by law”
 - Joint marketing agreements
- Where?
 - Government – Public Records
 - Census
 - Financial Services
 - Surveys
 - Warranties
 - Loyalty Programs
 - Internet Purchases
 - Subscriptions

Consumer Data – What?

- Traditional Demographics
 - Age, sex, race, etc.
- Financial
 - Homeowner, credit score, mortgage/auto/credit card balances, etc.
- Household
 - Marriage status, number and ages of children, etc.



Consumer Data – What?

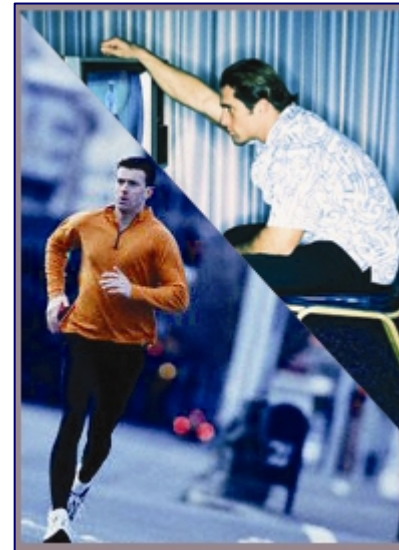
- Lifestyle-Based Elements

- Physical activeness

- Running, walking, cycling, aerobics, golf, tennis, etc.

- Physical inactiveness

- Television time, computer time, board games, stamp and coin collecting, etc.



Consumer Data – What?

- Lifestyle-Based Elements
 - Food purchases
 - Fast food, diet food, gourmet, vegetarian, etc.
 - Wine and other alcohol
 - Self improvement
 - Health/fitness, dieting/weight loss, etc.
 - Mental wellness, personal improvement, etc.



Consumer Data – What?

- Lifestyle-Based Elements
 - Tobacco
 - Occupation
 - Travel
 - Motor vehicle type
 - Recreational vehicles
 - Other



Lifestyle-Based Analytics (LBA)

- Roots are in predictive modeling
- Maps lifestyle behaviors to health risks
- Focuses on strong correlations that exist between lifestyles and many disease states
 - Diabetes
 - Hypertension
 - Cardiovascular
 - Stroke
 - COPD/Respiratory
 - Back Pain
 - Maternity
 - Most cancers
 - Some mental health: Depression, Alzheimer's, etc.
 - Others: Osteoporosis, Arthritis, etc.

LBA Example

Diabetes Profiling Example			
Data Element	Employee A	Employee B	Diabetes Ratio A to B
Age	40	40	1 to 1
Vehicle Type	MiniVan	MiniVan	1 to 1
# of Children	3	0	1 to 10
Outdoor Rec	4 plus	No	1 to 25
Fast Food	Rarely	Frequent	1 to 40
Lifestyle Ind	M17	RE3	1 to 60
Hobbies	Active Outdoor	Reading	1 to 80
....
....
Online Purchasing	Sporting Goods	Clothes	1 to 110

Maternity Example

Traditional maternity factors are based on age/sex/geographic/family enrollment

- A simple Empirical model using number and ages of children can increase accuracy by over two-fold
- Additional lifestyle elements can dramatically improve accuracy by including financial indicators, household living parameters, square footage of house, number of bedrooms, type and size of vehicle, etc.

Maternity Model

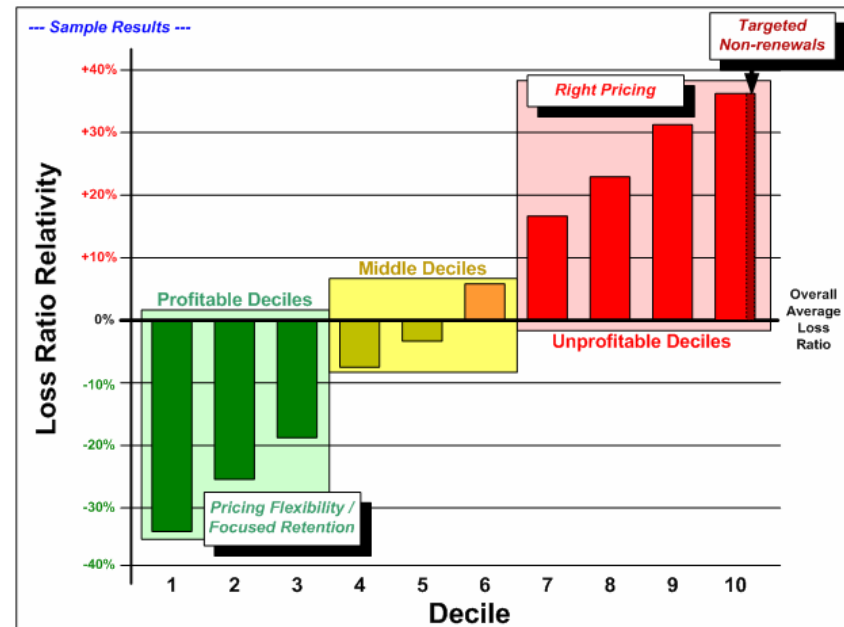
Sample Birth Rates

35 yr female – 6.9%

- With 0 Children – 6.0%
- With 1 Child – 9.1%
 - With a newborn – 4.3%
 - With a 2 yr old – 15.4%
- With 2 Children – 6.5%
 - Ages 10 & 8 – 2.8%
 - Ages 4 & 2 – 9.1%
 - Boy & girl – 5.8%
 - Two girls – 12.5%
- Range considering age & sex of children and spouse is from 1% to 29%

Underwriting Applications

- Individual & Small Group Health Underwriting
 - Augment current techniques
- Medium Group Health Underwriting
 - Absence of medical data
- Preferred Underwriting
 - Predictor of the healthy (preferred)
- Tele-Underwriting
 - Criteria for identification
- Fraud Detection



Marketing/Sales Applications

- Consumer marketing evolution
 - Most likely to purchase
 - Market to individuals with the high propensity to purchase your product
 - Timing of offers
 - Most likely to retain
 - Market to those most likely to buy and keep your product
 - Retention programs for those like to leave
 - Most likely to remain healthy
 - Market to the healthiest individuals who are most likely to buy and keep your product
 - Few or no regulations regarding marketing, sales and retention efforts

Disease Management/Wellness Applications

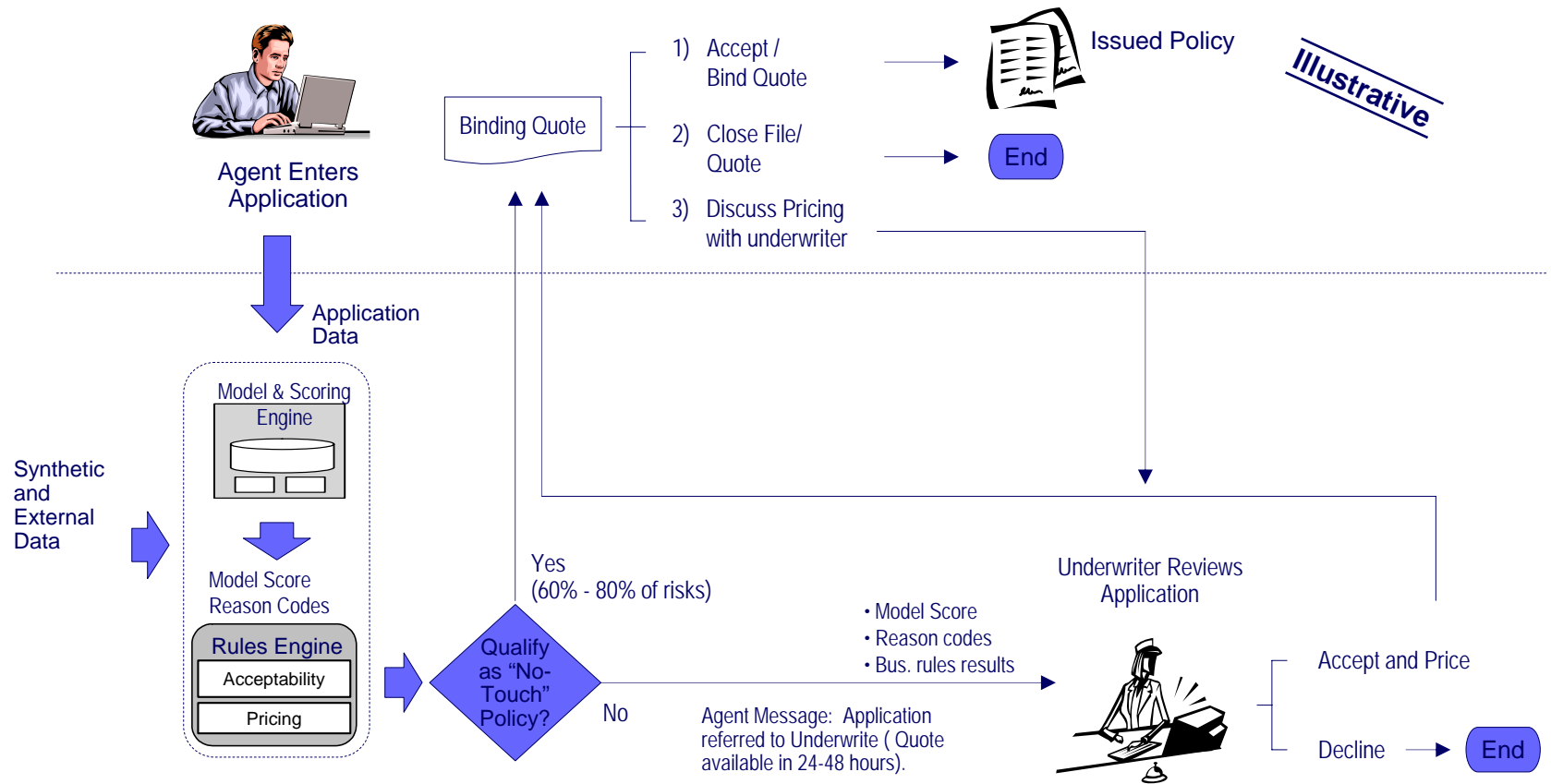
- Identification of the "at-risk" population
 - Allows you to rank order the other 80% of the population
 - Models can be built around disease state or condition
- Behavioral modeling
 - Willingness to participate
 - Identification of a person's propensity to be engaged
 - Looks at individuals current behaviors
 - Program success modeling
 - Modeled based on past outcome measures
 - Tailored to the specific program

Disease Management/Wellness Applications

- Timing
 - The stage in a person's life has a great deal to do with successful outcomes
 - Life changing events
 - New job
 - Relocation
 - Purchase of new home
 - Birth of a child
 - Maternity
 - Children leaving home
- Marketing communications
 - Studying lifestyle patterns gives us a clue to how to address the issue
 - 40 year-old male
 - 2 hour daily commute
 - 3 small children
 - Extensive travel
 - Diet food purchaser
 - 20lbs overweight

Illustrative New Business Process

Predictive Modeling will help transform underwriting capabilities, enabling sustained profitable growth, increased ease of doing business for agents, and process efficiencies.



Improvements Over Current State:

- Streamlined data requirements
- Score calculated and quote returned to agent within minutes of app. entry
- Broader range of risks quoted

- 60-80% of risk are not touched by UW; underwriter workload reduced
- Agent receives bindable quote for a majority of issues (price will not change at policy issuance)
- Agent can bind quote and send policy to issue in minutes

- Due to reduced UW referral volume, UW's provide faster turnaround time for referred files
- Score and rule reason codes guide underwriter risk and pricing decisions consistently across organization

What is the Future?

- Expect to see non-traditional data sources become important elements in the next wave of predictive models
- Watch as earlier adopters in the underwriting world gain significant competitive advantages by picking off the best risks, eliminating the worst risks, or even both
- Traditional disease management models will begin to include behavioral characteristics to identify those who are more likely to succeed and to identify the best choice of care management given several options
- As managed care continues to move towards managed health, predictive models will be needed to assess those who are next at risk, not just those who are currently diagnosed

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