



S8-Predictive Analytics

Darryl Wagner, FSA, MAAA
Principal, Deloitte Consulting

Waves of Reforms...Oceans of Opportunities

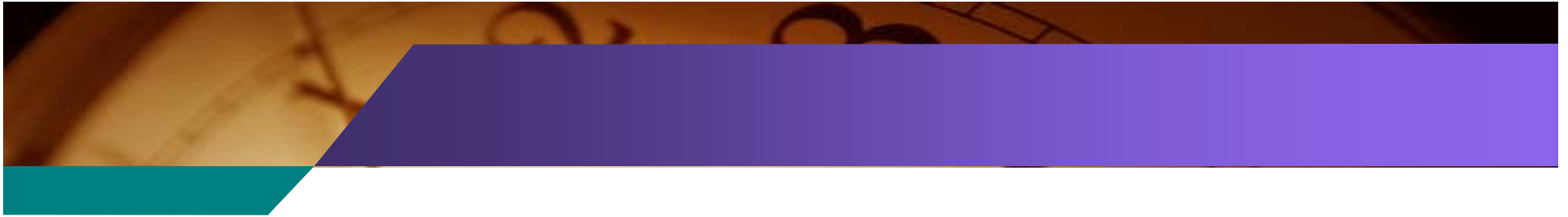
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Agenda

- Introduction and Background
- Predictive Analytics and Insurance
- Examples of Predictive Analytics Applications
- Making Predictive Analytics a Reality



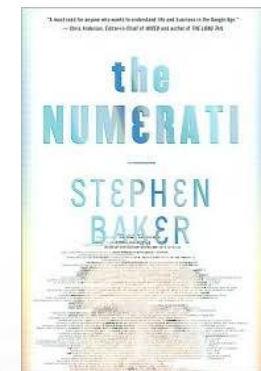
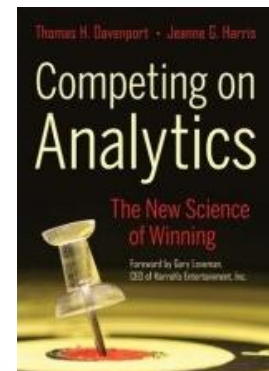
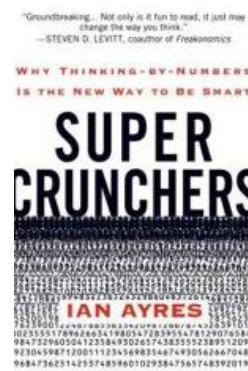
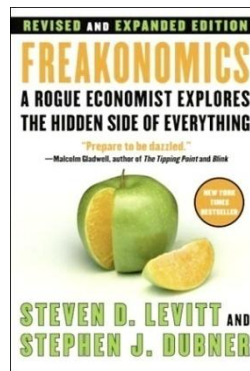
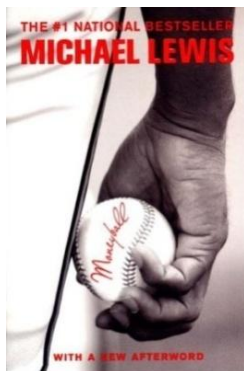
Introduction and Background



Why Predictive Analytics?

“Organizations of all kinds are eagerly seeking new ways to leverage the large and ever-growing stores of high-quality data now available. Businesses and disciplines that rely heavily on data analytics include marketing, health care, finance and resources management. But industries of nearly every type are coming to appreciate the central role played by data analytics in effective decision-making at the highest organizational levels.”¹

Recent Business Publications



“Data , data, everywhere – A special report on managing information,” February 27th, 2010



“Inside Deloitte's Life-Insurance Assessment Technology,” November 19, 2010



“Insurers Test Data Profiles to Identify Risky Clients,” November 19th, 2010



Report on Insurance, "Driving Operational Excellence in Claims Management," February 21, 2011

Data has long been realized to provide value. Predictive Analytics allows a company to harness this value to make more informed decisions

¹ Northwestern University's Master of Science in Predictive Analytics, <http://www.predictive-analytics.northwestern.edu/>

Why Predictive Analytics?

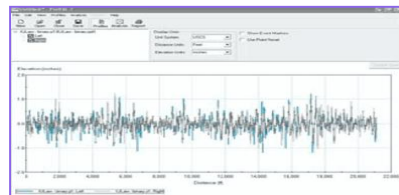
Predictive Analytics involves the use of modern data mining, pattern matching, data visualization and modeling tools to produce analyses and algorithms that help businesses make better decisions. With this foresight, analytics can help determine which events may have the most impact on Genworth.

Predictive Analytics has come into its own, both because of the findings of cognitive science and behavioral economics, and also because of a recent and rapid proliferation of huge databases, cheap computing power, and advances in data acquisition, aggregation, visualization, applied statistics and machine learning techniques. Notable factors include the following:



The Data Deluge

We now gather, store and transmit unimaginable quantities of data each day. The problem, as anyone facing an inbox full of email well knows, is that evaluating and responding to more information requires that scarcest of resources – time and attention. Analytics is increasingly regarded as a necessity to **focus decision-makers' attention on the meaningful insights hidden in the depths of oceans of data.**



Algorithms and Software

Increasingly powerful tools and methods for analyzing data and **providing better insights** are being discovered and promulgated at an unprecedented rate.



Increased Awareness

Farsighted leaders in a variety of domains are increasingly aware of **the competitive and operational advantages that analytics can bring.**

Many insurers may be missing the opportunity to enhance profits and drive value through Predictive Analytics, and those who explore these capabilities could gain a competitive advantage

Beyond Insurance...

Business applications for predictive analytics cut across a broad spectrum of industries.



- Banks have used credit scores (FICO) to segment creditworthy from non-creditworthy borrowers... the process of offering/pricing **loans** was transformed
- Progressive insurance pioneered the application of credit scores to **pricing auto insurance**



- Capital One runs 1000s of **marketing experiments** per year, testing the effectiveness of different combinations of interest rates, marketing channel, and incentives



- Predictive models are used to predict the **price of different wine vintages** based on variables about the growing season
- Decision tree models are used to help **ER** doctors better triage patients complaining of chest pain



- Harrah's **casinos** predicts the walk-away “pain point” for each player to strategically deploy “luck ambassadors” bearing gift certificates for dinner and drinks



- Health plans are using lifestyle data and behavioral modeling to identify those members who are most **willing to change**

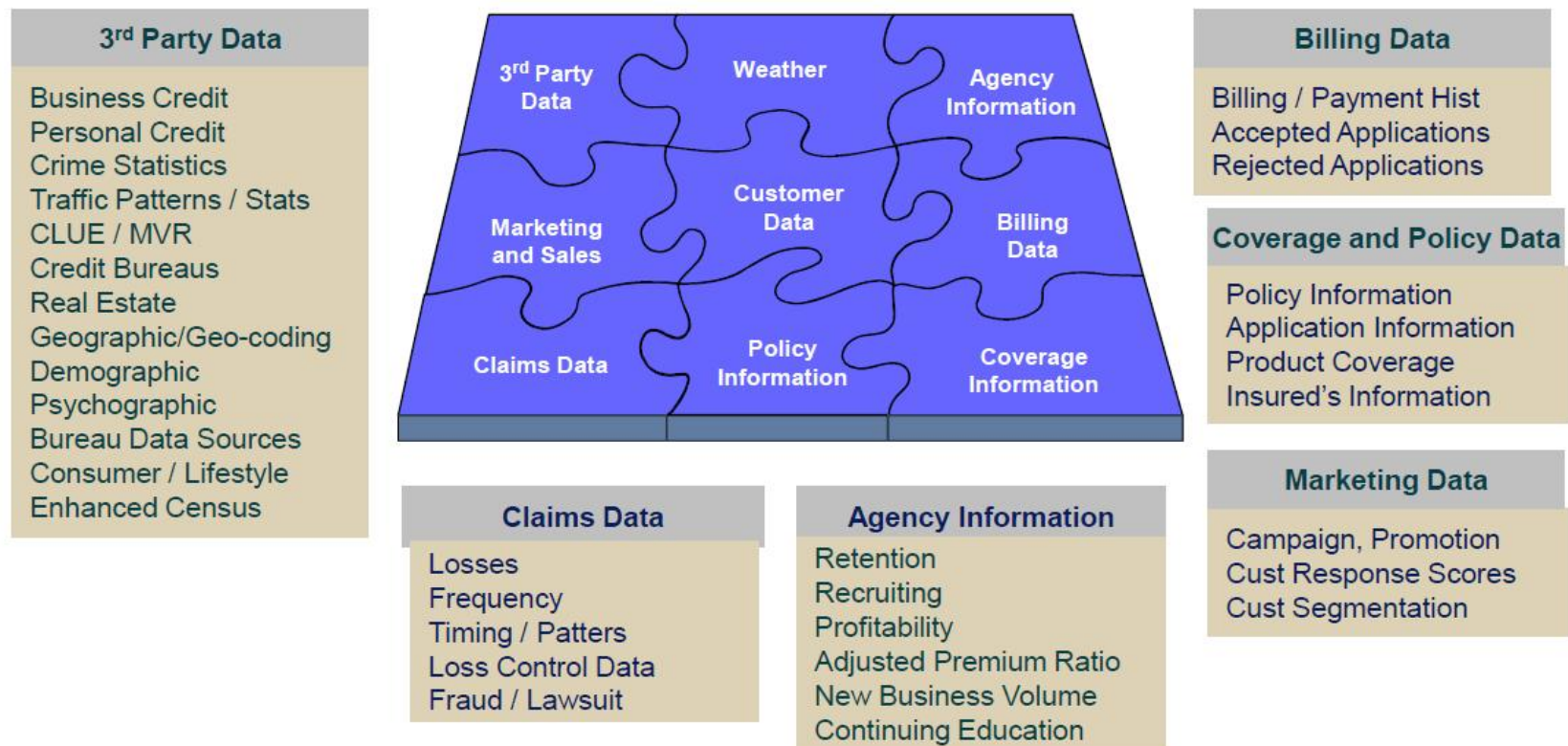


Predictive Analytics and Insurance



Insurance is founded on data

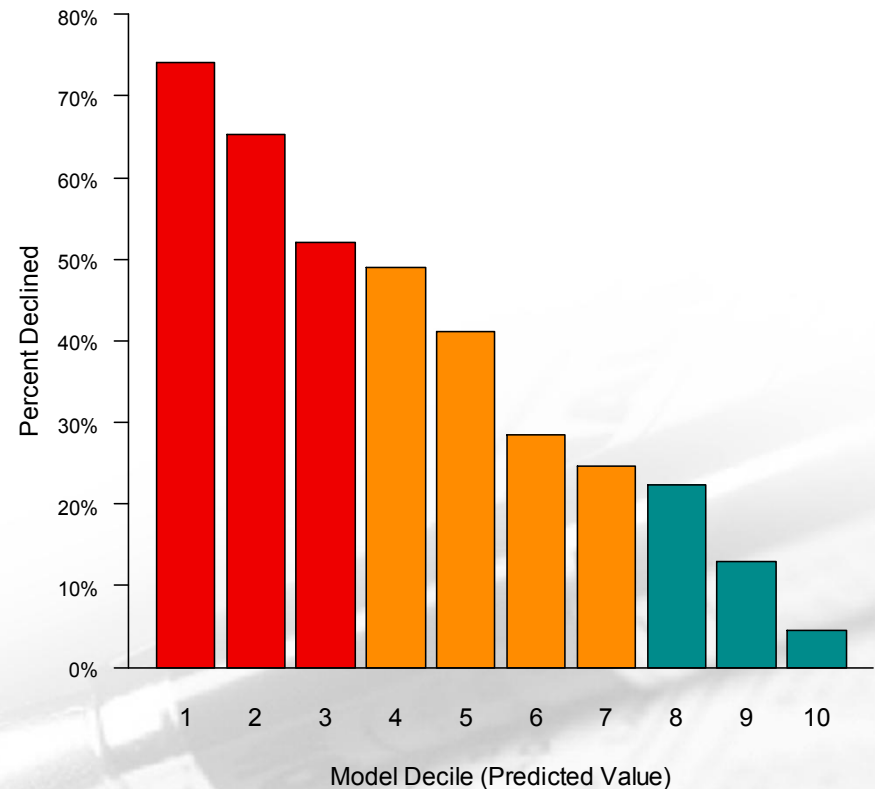
- Insurance industry contains large amount of data and is ideal for data mining and predictive modeling applications.
- Information age provides a wealth of external/3rd party data sources.



The Strategic Use of Predictive Analytics in Insurance

- Like baseball, insurance is a numbers game.
 - Both fields are awash in data and a lot of money is at stake!
- As with baseball, so in insurance: All of this data – until fairly recently – has not been used in **strategic** ways.
- Life insurance example: Models can be built to assign probabilities of (e.g.) being declined or (e.g.) being assigned to the best underwriting class based on readily available data.

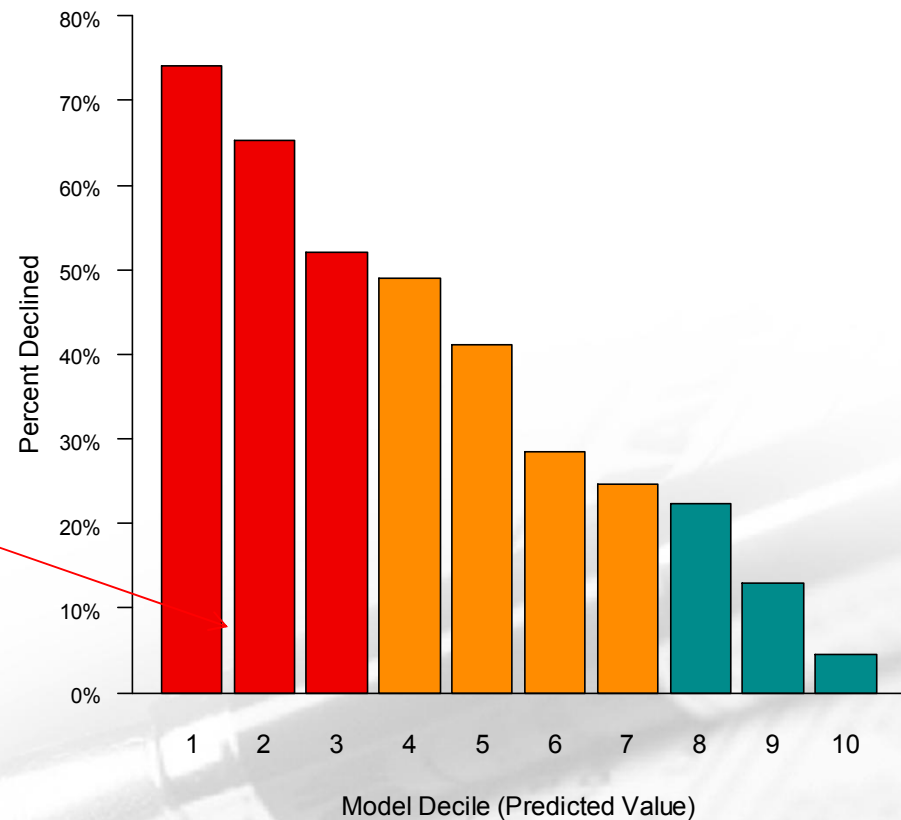
Underwriting Model Lift Curve (Hypothetical)



The Strategic Use of Predictive Analytics in Insurance

- Strategic application: data-driven underwriting
- Models estimate the probabilities that a risk will fall into the best / worst underwriting classes.
- In this hypothetical example
 - **Worst 10%** of risks have a >70% decline rate

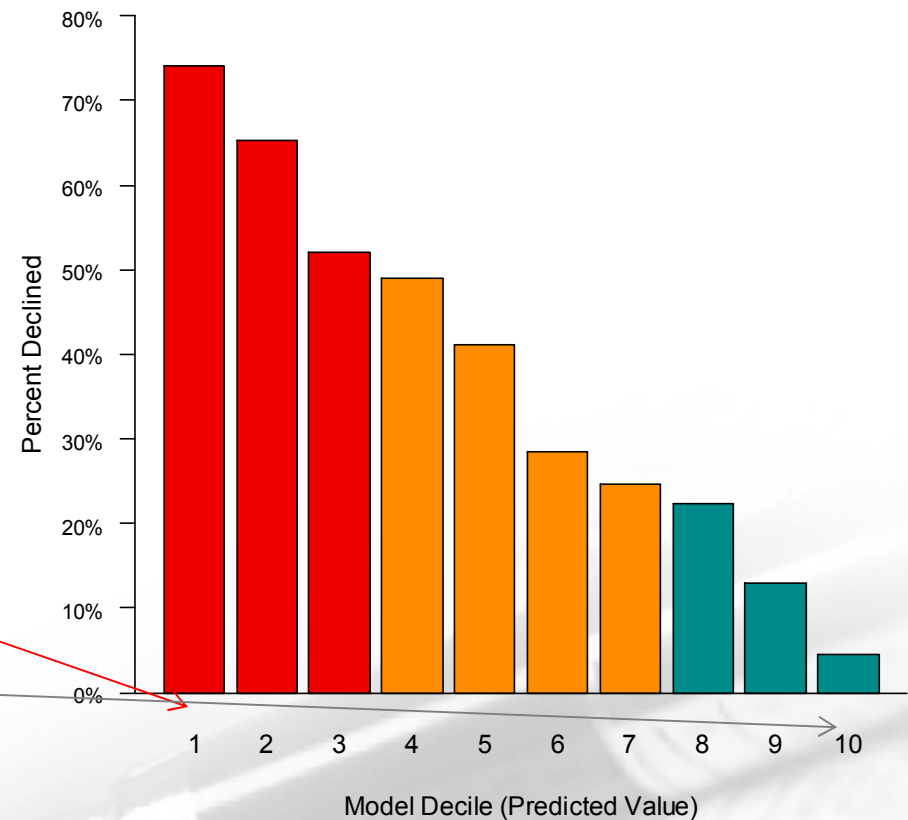
Underwriting Model Lift Curve (Hypothetical)



The Strategic Use of Predictive Analytics in Insurance

- Strategic application: data-driven underwriting
- Models estimate the probabilities that a risk will fall into the best / worst underwriting classes.
- In this hypothetical example
 - **Worst 10%** of risks have a >70% decline rate
 - **Best 10%** of risks have <5% decline rate

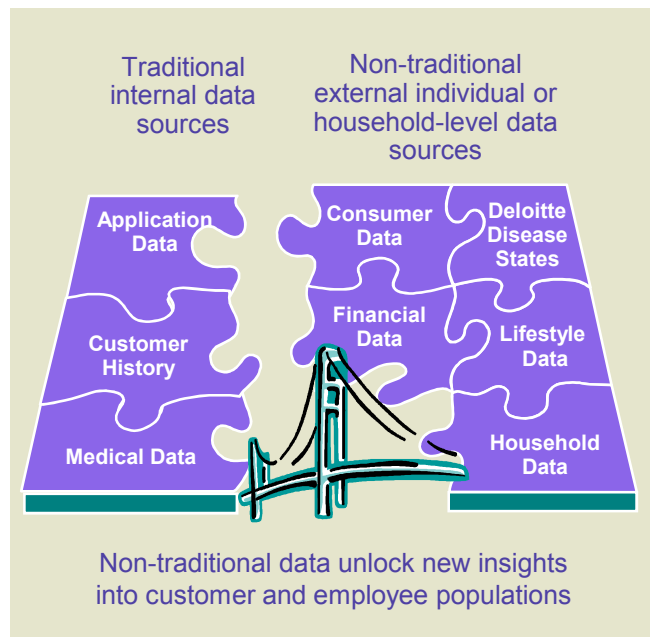
Underwriting Model Lift Curve (Hypothetical)



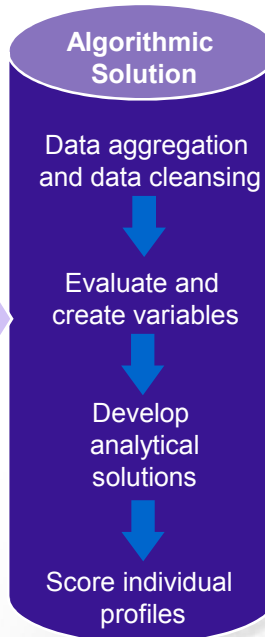
Conceptual Overview and Potential Business Value

“Predictive analytics – or the process of using a variety of statistical techniques from modeling, data mining, and game theory to analyze current and historical facts to make predictions, as well as assess risks and opportunities, about future events. Predictive analytics are now being used in a wide variety of fields such as healthcare, pharmaceuticals, financial services, insurance, and telecommunications.”¹

Innovative Data Sources



Segmentation



Business Value

Agent Recruitment & Retention

- Analytic rigor applied to subjective process
- Rules based candidate prioritization
- Expanded, diversified recruiting pool

Marketing Campaigns (Target Marketing, Lead Generation)

- Segmentation beyond traditional “likely to buy”

Application Triage

- Eliminate time-consuming and physically invasive tests for certain applicants
- Streamline application review process
- Improve ease of doing business

In-force Management (Customer Retention, Cross-Sell and Up-Sell Programs)

- Identify compounding components of at risk-customers
- Develop, deploy data driven intervention strategies
- Improved mortality by focusing retention efforts on best risks

Claims Management

- Streamlined claims adjudication / fraud detection process
- Understand exposure and identify improvement opportunities

Member Lifetime Value

- Deeper understanding of the lifetime value of customers
- Develop an aggregate present value of future profits for all customers across all product lines

¹ University of California, Predictive Analytics Center of Excellence, http://ucsdnews.ucsd.edu/pressreleases/sdsc_announces_center_of_excellence_for_predictive_analytics/

Overview of Business Applications Across Insurance Policy Lifecycle

Predictive Analytics Enabled applications span the entire insurance policy lifecycle.

Simplified Insurance Lifecycle



Agent Recruitment / Retention

- Improve efficiency of Agent recruiting
- Improve effectiveness of Agent retention

Target Market / Lead Generation / Cross-Sell / Up-Sell

- New - Likely to Qualify
- Potentially much better segmentation

Application Triage

- Risk segmentation
- Streamline app review process
- Speed to issue for healthiest lives

In-Force Management

- Health risk evaluation
- Efficient use of resources / budge
- Better understand where pro active programs effective

Claims Management

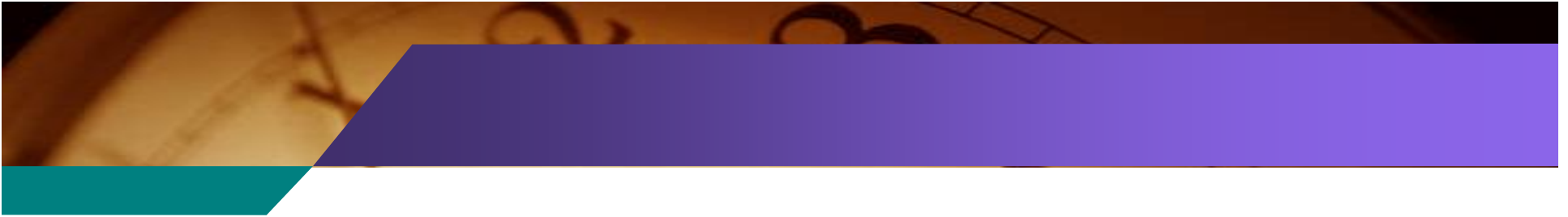
- Improve exposure analysis
- Fraud detection tool and expedited adjudication

Possible Data for Life Insurance Algorithms

An insurance-based Algorithmic Solution approach starts with all of the traditional data that can be captured within the first 48 hours. This information can then generally be supplemented¹ with a variety of external datasets. This approach can assist in segmenting those who may otherwise appear indistinguishable from one another.

Data category	Traditional Underwriting	New Business Application Triage	Target Marketing / Cross-Selling Applications
Application			
▪ Basic demographics	•	•	•
▪ Medical history	•	•	
▪ Family history	•	•	
Paramedical examination			
▪ Fluids	•		
▪ Height/weight	•		
Other medical/interview			
▪ Telephone interview	•		
▪ APS/medical records	•		
▪ Treadmill Test	•		
▪ EKG	•		
▪ MIB (Medical Information Board data)	•	•	
▪ Rx (prescription data)	•	•	
Driving record (MVR)			
▪ Traffic conviction history	•	•	
▪ Auto accident history	•	•	
Existing policy data		•	?
3rd party data		•	•

1 – Timing depends on MVR delivery (slower in some states) and arrangements with third-party data providers



Examples of Predictive Analytics Applications



Algorithmic Solutions – Broader Business Applications

Agent Recruitment and Retention

An additional high-value area where Predictive Analytics might provide competitive advantage is in the area of recruiting and retaining and agents.

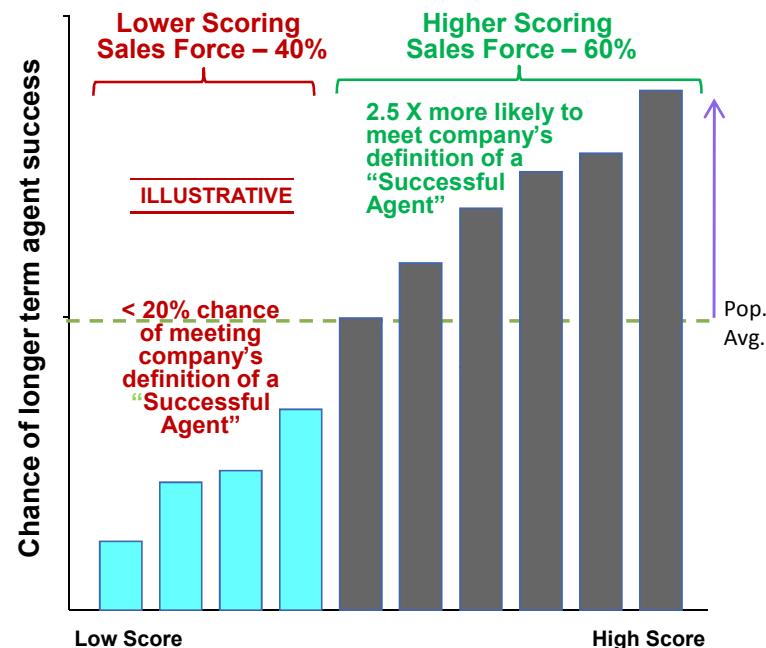
Simplified Insurance Lifecycle



Agent Analysis

- The analysis can be based upon internally available information:
 - Not-in-Good-Order
 - Field Underwriting
 - Business Quality
 - Requirements Turnaround
 - Call Center Questions / Calls
 - Cycle Times
 - Sales Patterns
- Algorithms score weighted factors and can provide on-going monitoring for at-risk producers and enable more targeted coaching / assistance
- Ironically, the most common obstacle is the failure to methodically capture key data

Illustrative Results



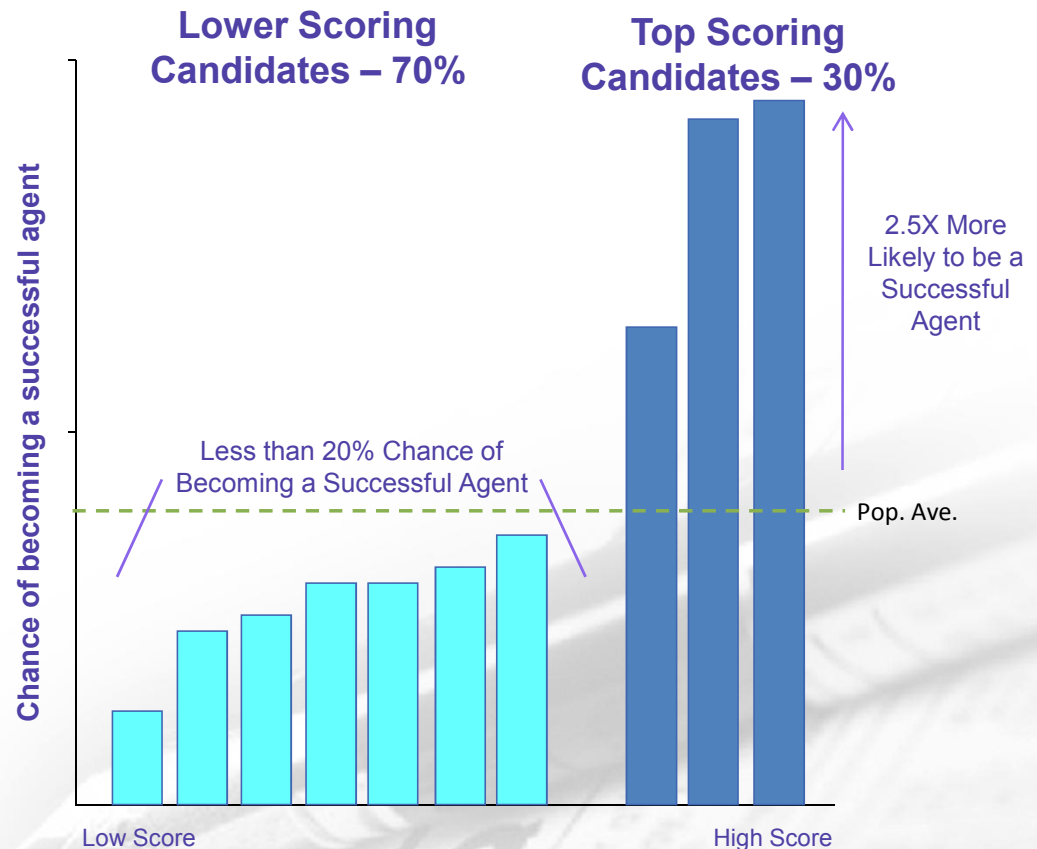
Benefits

- Rules based candidate prioritization
- Expand and diversify recruiting pool
- Retention indicators

Broaden Your Exposure - Agent Success Segmentation

There have been several types of models that approximate agent success. Career focused models have been developed models that look at a prospects propensity to become a successful agent, whereas independent channels models have identified those independent agents who are most likely to generate product specific revenue streams.

- The model scores individuals from 1 to 10 with 1 being the least likely to resemble a successful agent and 10 being the most likely.
- The model is then tested on a validation set of data and the results are presented in a lift curve as shown below.
- Candidates in the first couple of deciles have less than a 20% chance of becoming successful agents
- Candidates in the best deciles have almost a 60% chance of being successful.

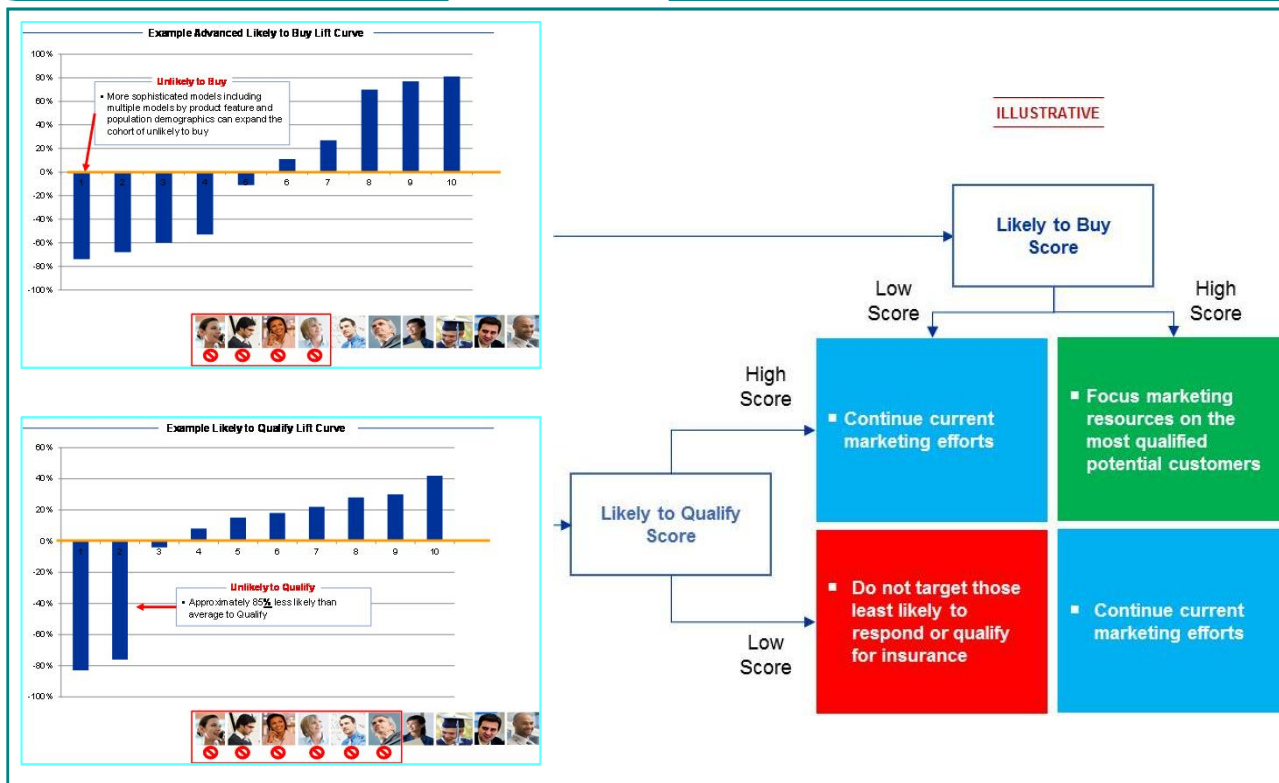
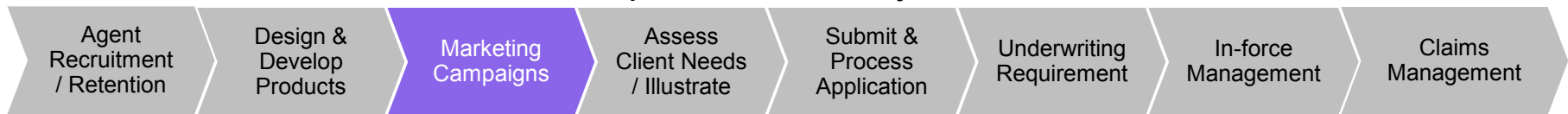


Algorithmic Solutions – Broader Business Applications

Marketing Campaigns – Target Marketing, Lead Generation, Cross-Sell, Up-Sell

Predictive Analytics can also provide opportunities to more efficiently and effectively target solutions to consumers and customers. Using Likely to Buy in tandem with Likely to Qualify (new to the market) not only helps you segment those who are likely to buy a policy, but are also likely to qualify for that policy.

Simplified Insurance Lifecycle

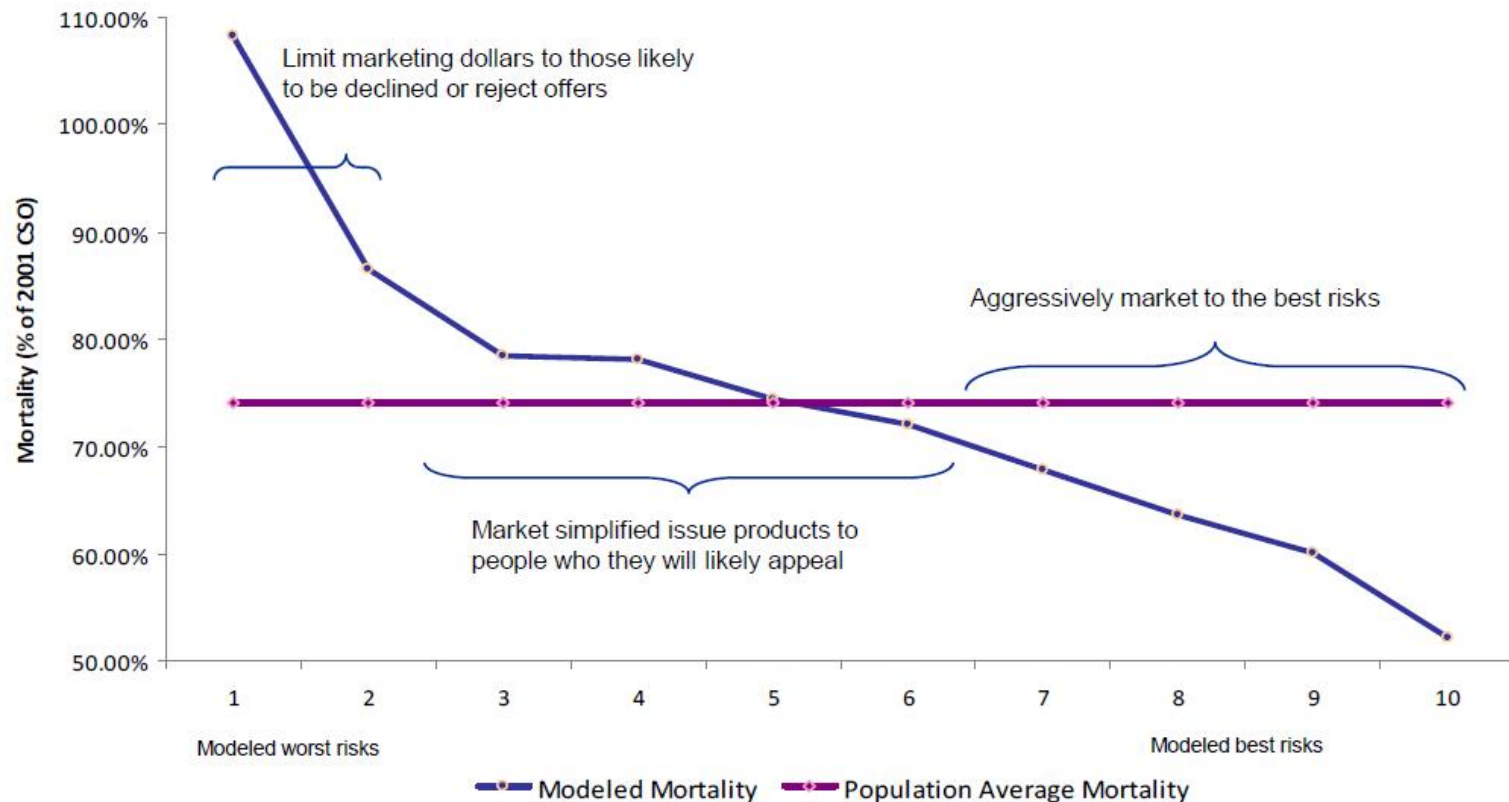


Benefits

- Deeper segmentation of consumers and customers
- More cost effective and productive marketing campaigns
- Better agent and customer experience

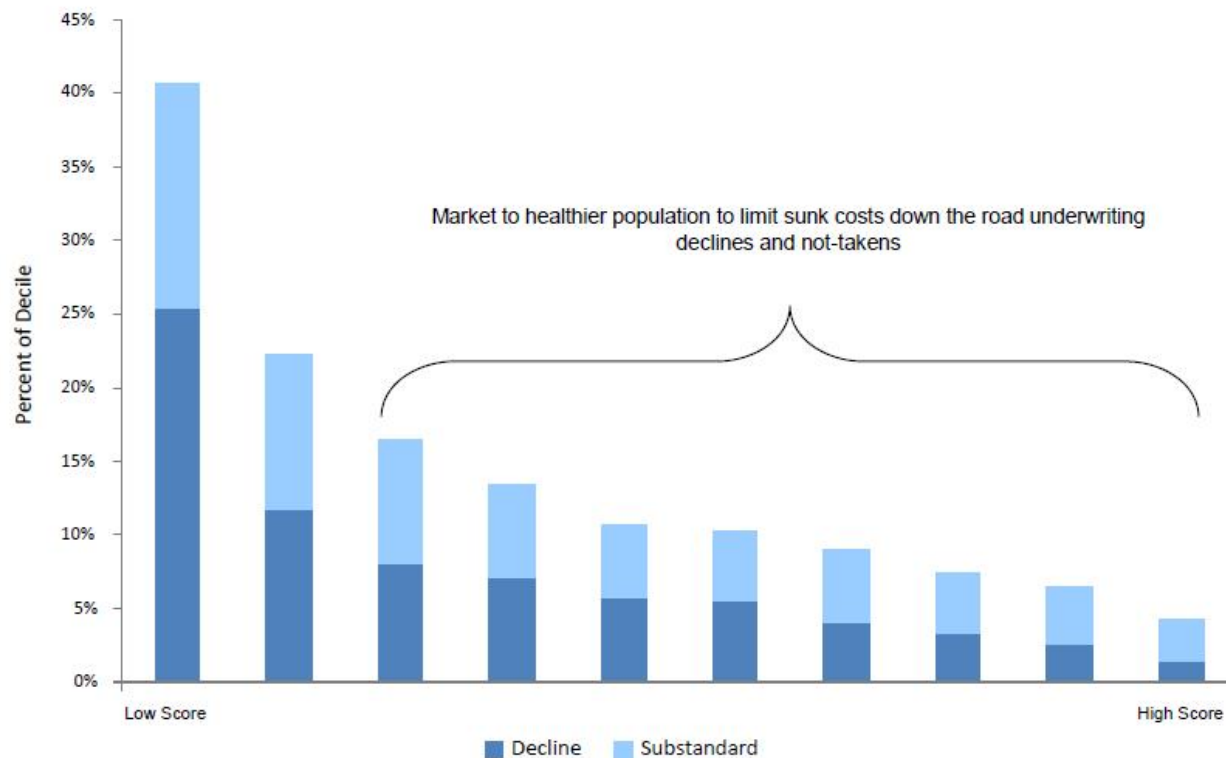
Predictive model helps to focus marketing effort

If there is no application data or signature authority to obtain MIB or MVR, a health risk based model using only marketing data can be constructed to identify individuals who would likely be declined through traditional underwriting, to identify the best mortality risks, and to identify segments of the population well suited to a particular product or type of underwriting.



Cross marketing models help to estimate the likelihood of application acceptance

Typically, nothing is known about health status before an applicant applies and is underwritten. However, a marketing model can provide an advanced look to help allocate marketing resources. As the graph shows, declined and rated cases are much more likely to score poorly in the model. Results shown are for a client who is building this into their cross marketing to sell life insurance products to annuity customers.

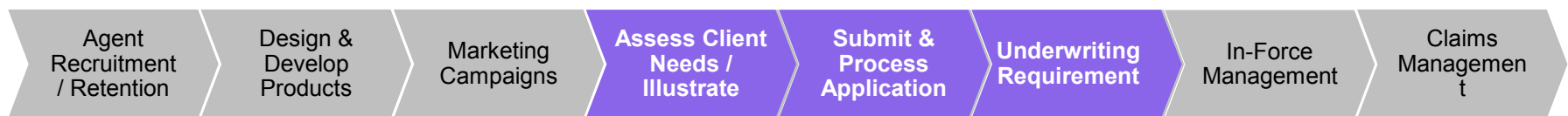


Algorithmic Solutions – Broader Business Applications

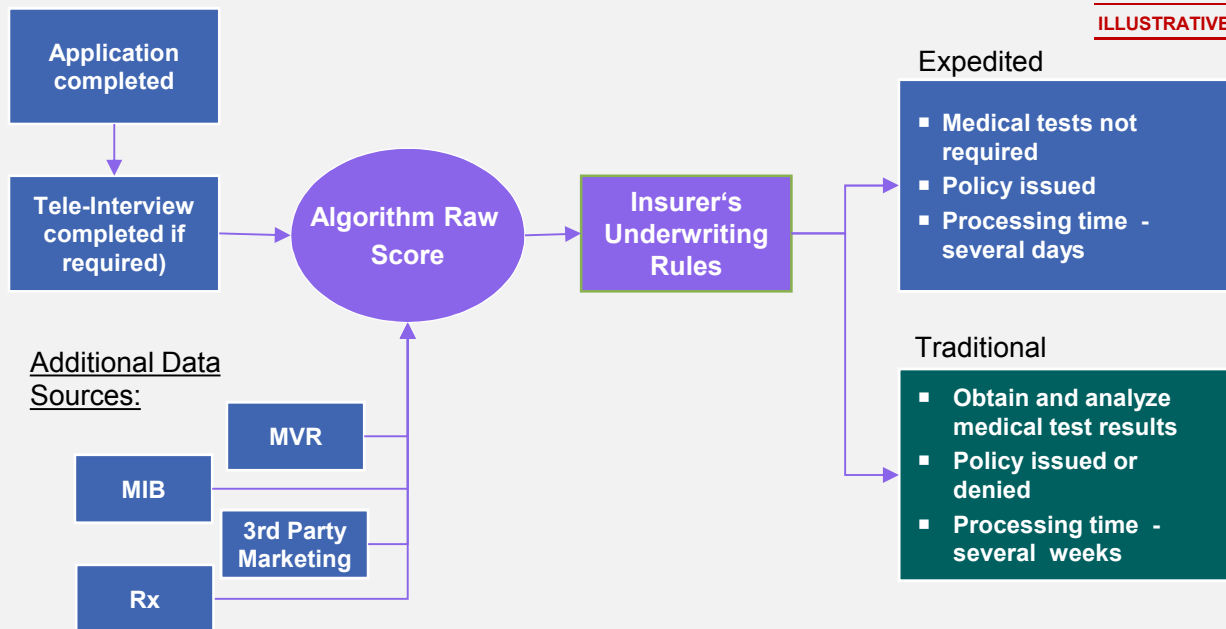
Why Consider Application Triage?

Today's discussion will focus primarily on benefits of Predictive Analytics enabled Application Triage, as well as requirements to leverage Predictive Analytics for process improvement.

Simplified Insurance Lifecycle



Predictive Analytics Enabled Application Triage Process

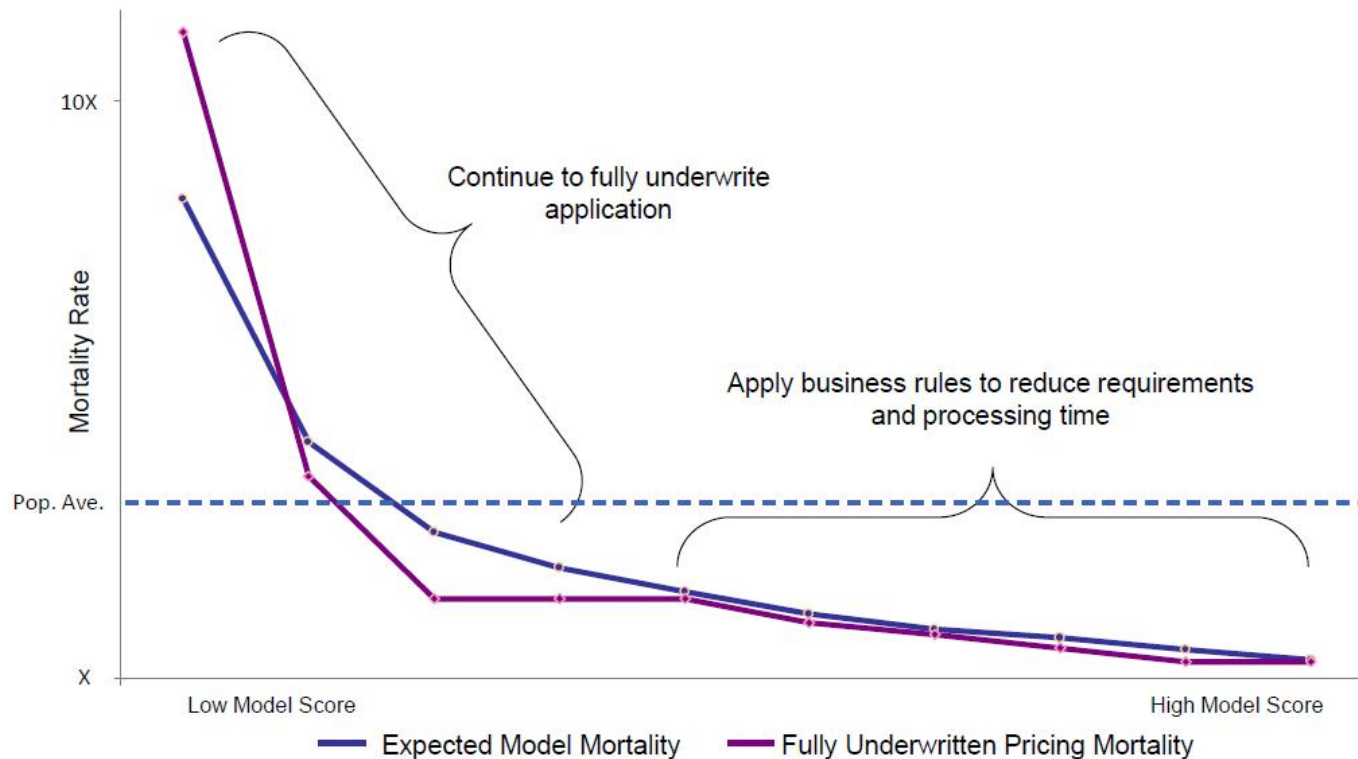


Benefits

- Eliminate time-consuming, expensive and physically invasive tests for certain applicants
- Streamline application review process
- Improve ease of doing business

An underwriting model can reasonably replicate results

An underwriting model using application data, MIB data, motor vehicle and third party data can reasonably match fully underwritten pricing mortality assumptions for a significant portion of the business - including the preferred class. The graph shows actual results for a recent engagement. When business rules are added, results are often improved.



Algorithmic Solutions – Broader Business Applications In-Force Management

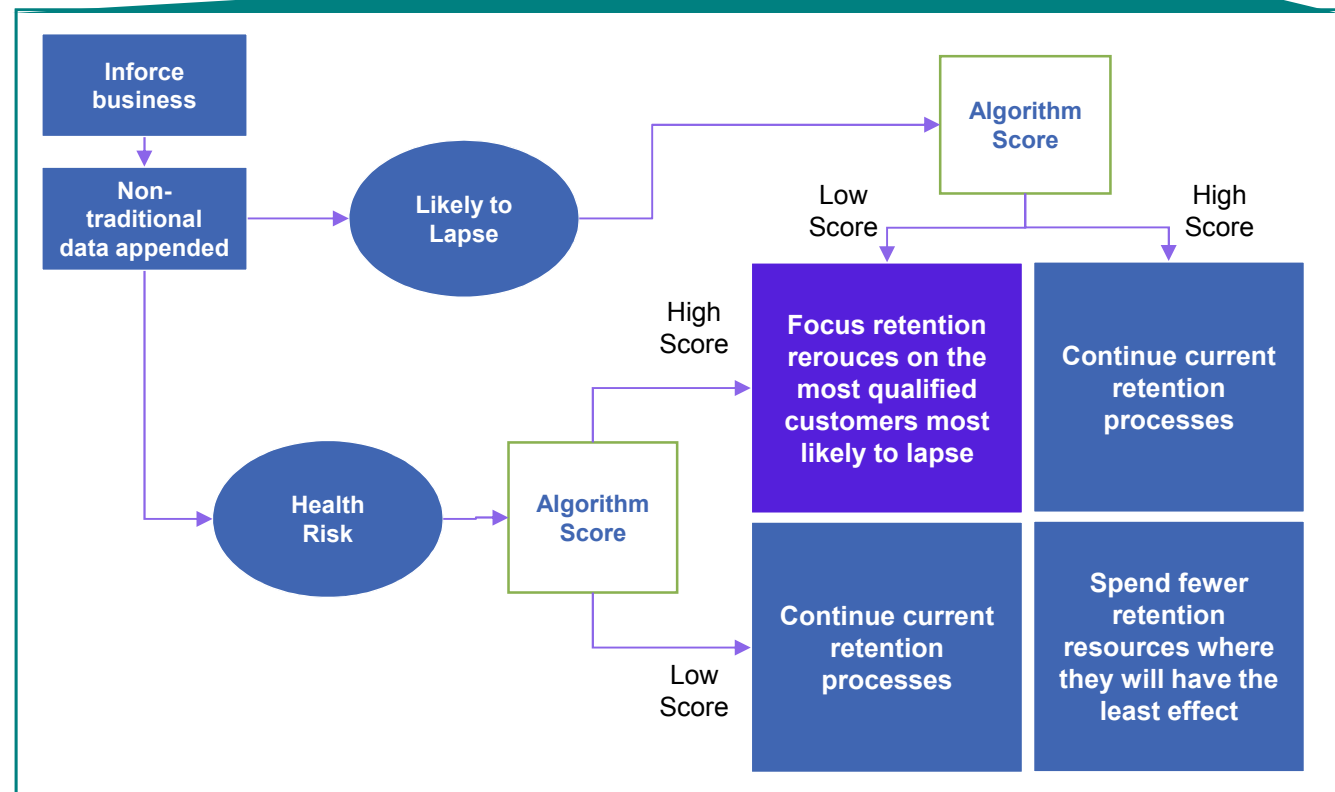
Some companies could enhance the management of their substantial in-force block, where Predictive Analytics are typically focused on business losses and lapses rather than actually improving the business.

Simplified Insurance Lifecycle



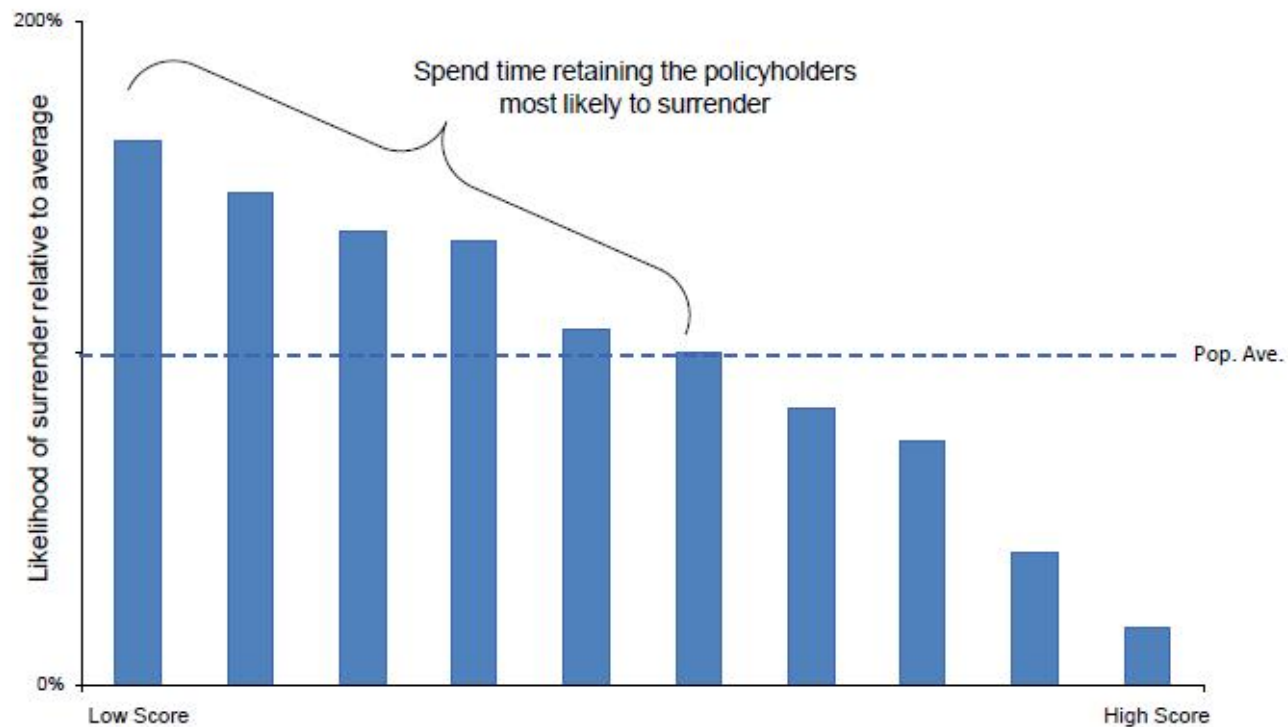
Benefits

- Identify compounding components of at risk-customers
- Develop, deploy data driven pro-active intervention strategies
- Improved mortality by focusing retention efforts on best risks



Targeting retention effort help to reduce lapse rates

Our modeling efforts have proven quite successful in predicting likelihood of surrender/lapse. The 10% of the population with the lowest model scores are nine times more likely to surrender than the 10% who score the highest. Customer retention efforts should focus on retaining customers who are most likely to lapse.



Algorithmic Solutions – Broader Business Applications

Claims Management

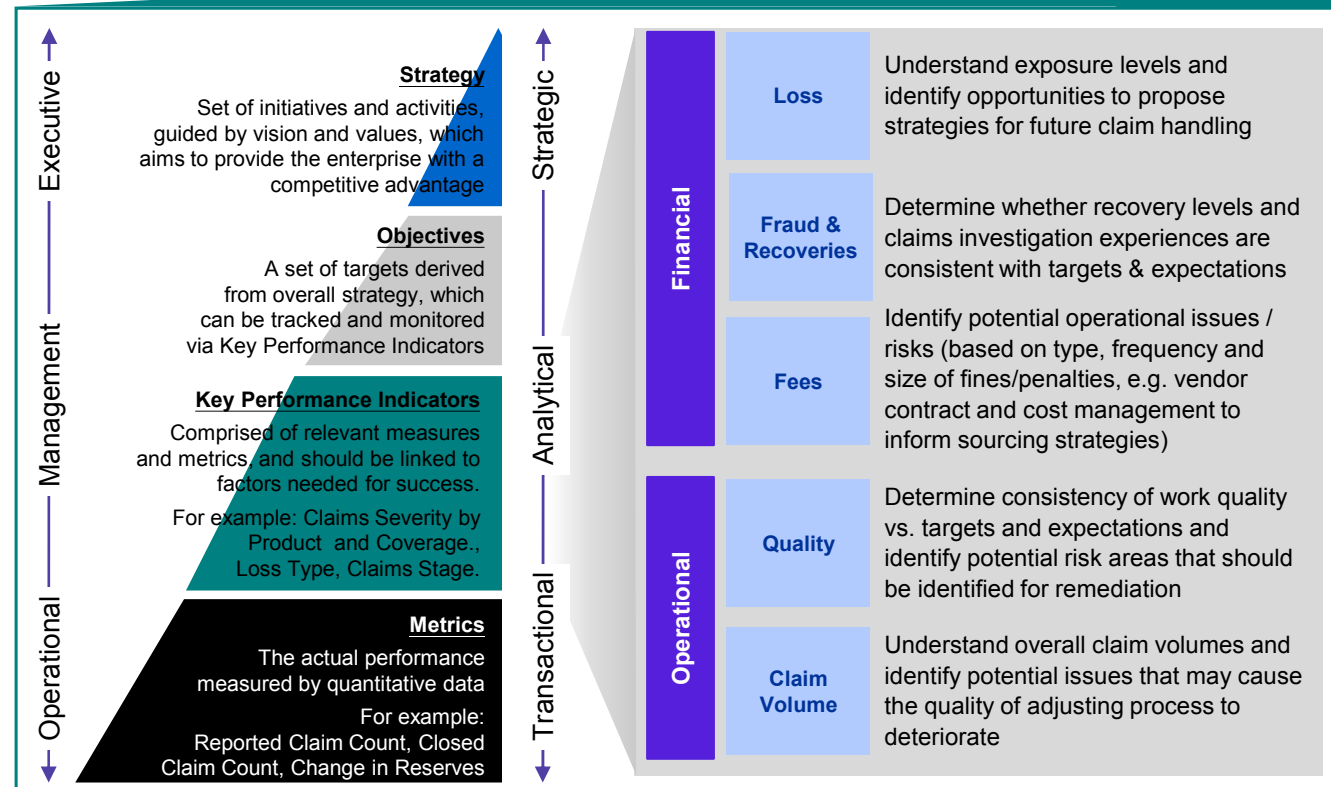
- Predictive Analytics will provide granular insight into key performance indicators for the Claims business enabling management to more efficiently meet the business's strategic objectives..

Simplified Insurance Lifecycle



Benefits

- Streamline claims adjudication / fraud detection process
- Expose and identify improvement opportunities

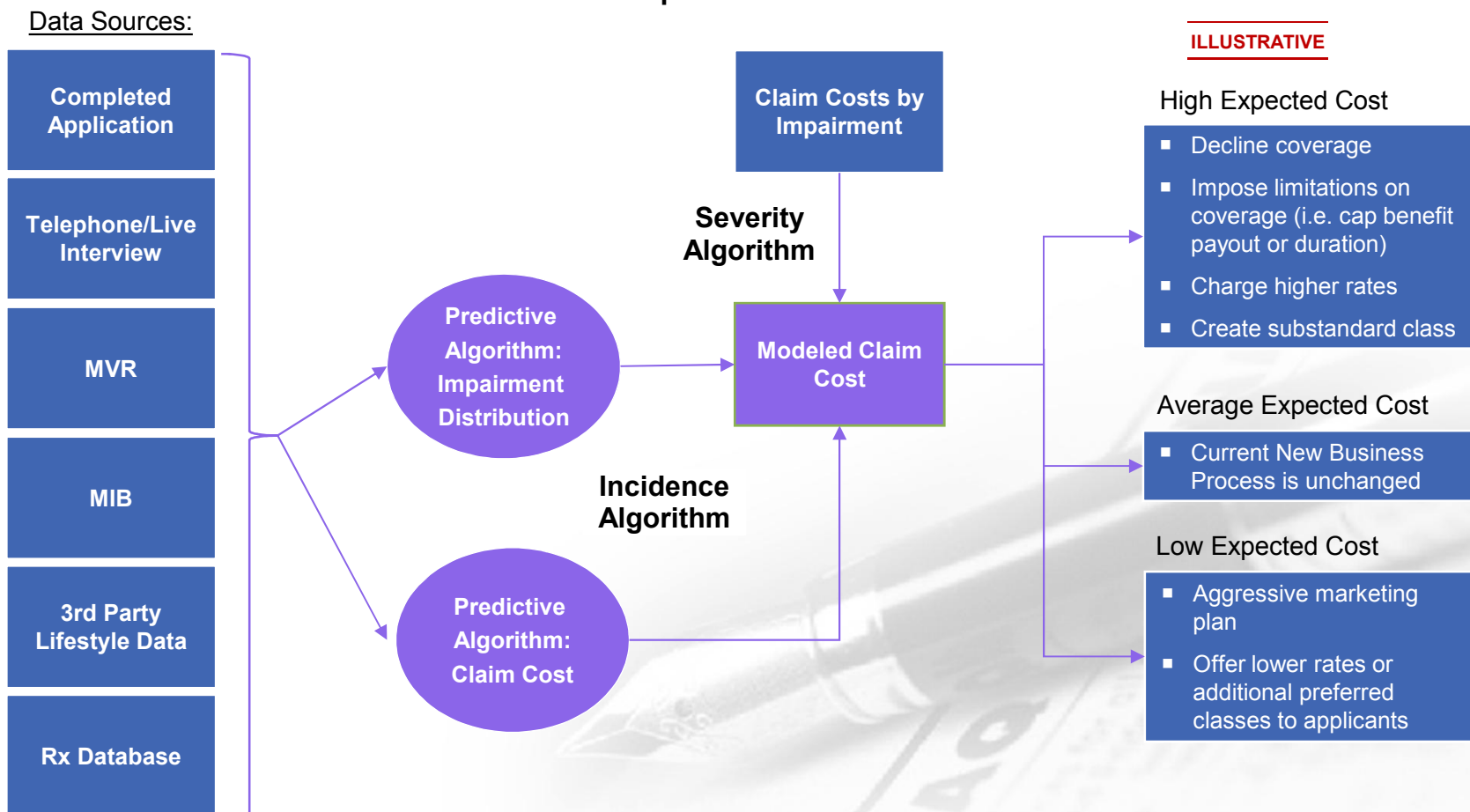


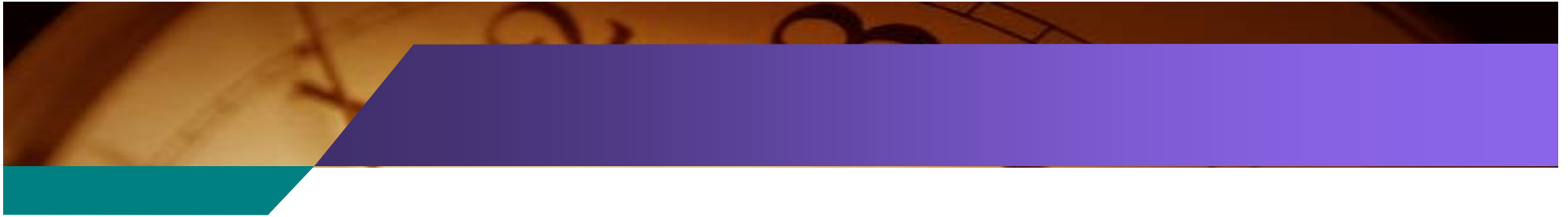
Algorithmic Solutions – Broader Business Applications

Potential LTC Application

- For LTC insurance, we envision that Predictive Analytics will be used to better understand both the likelihood of developing certain cognitive or physical impairments that would incur LTC claims, as well as to model whether a policy holder is likely to have higher or lower than average claims costs in the event they do experience a claim. Based on these advance analytics the insurer can determine courses of action for different groups of applicants.

Example of Process





———— Making Predictive Analytics a Reality ————





What capabilities are required in order to deliver these analytic-driven improvements?

Data and technology	<ul style="list-style-type: none">• Provide the ability to pull and integrate data from multiple, disparate systems.• Never assume that data is correct. Ensure that all data sets have the integrity and quality required before running analysis.• Design adequate databases/data cubes to improve the outcomes/ findings of the analysis.
Analytics and process	<ul style="list-style-type: none">• Provide the ability to analyze and integrate external data, both qualitative as well as quantitative.• Apply multiple analytic tools on the same issue in order to triangulate in on the real issue.• Never talk or analyze in averages — real benefits can only be realized by dealing at the most granular level. Aggregate measures hide variance.• Prioritize the implementation of improvement opportunities by value — the realization of tangible benefits early on is the most effective way to obtain buy in.
People and organization	<ul style="list-style-type: none">• Strong executive sponsors that can drive cooperation and build consensus across stakeholders groups with conflicting interest (e.g. finance and sales).• Involve resources who are experienced not only in the analytic techniques, but also in the business.• Recognize that your results will often be counter-intuitive to your audience, and that you will be fundamentally challenging years of accumulated conventional wisdom.

The success of an predictive analytics initiative will depend on your ability to anticipate and manage the typical challenges at every stage of the process

Building infrastructure

- Do not accept data at face value. Explore what is supposed to be in the data field versus what is actually in the data field.
- Avoid multiple versions of the truth — one source of data is critical
- When buying analytic capacity, double or triple your expected capacity and speed requirements.
- Do not implement improvement opportunities without base-lining current performance.

Conducting analysis

- Do not rely on analytic insight only — business insight is required.
- Expect technical challenges — databases crash, people make mistakes. Plan for them.
- Do not take outliers at face value — they are often anomalies or mistakes.

Driving adoption

- Test your results against the most conservative scenarios.
- Do not present analyses to executives that have not been validated with the owners.
- Be absolutely certain of the analysis. One small error anywhere calls into question the whole initiative.
- Your results will be challenged — be prepared to respond.



Implementing predictive analytics is not a big bang. Develop capabilities over time and customize them to your needs

Philosophy	Rationale
Adopt a crawl, walk, run approach	Achieving analytics excellence requires focusing on each major process separately. Addressing the entire process will delay results and could lead to poor implementation decisions.
Value first — Technology second	Relentlessly focusing on margin improvements prevents the program from being a only technology driven. Value is delivered through operational and decision-making improvements — not a new platform.
Transfer knowledge and capabilities	Maximizing the value of you advanced analytics investments requires adequate knowledge transfer to build strong in-house capabilities to use analytics in a repeatable and sustainable way.
Allow for adjustments to plan and resourcing with minor disruption	Program needs to be flexible to meet unexpected changes in the business and priorities.
Enable executive go/no-go decision points	Investments are made based on prior success. Limits downside of the business case. Executive interactions are more frequent and ensures a focus on value.

Skill set needed for an predictive analytics project

Skill Set	
Statistical	Expert level, beyond college/actuarial exams
Actuarial and insurance	Subject matter expertise in the industry
Programming	Need scalable software, computing environment
IT system administration	Data extraction, data load, model implementation
Project management	Critical due to scope and multi-disciplinary nature of the project

Data analytics is a natural extension of traditional actuarial capability, but more than traditional actuarial capability



Summary: Extracting profit from data

The use of predictive analytics has become a powerful tool to drive decision making and increase value across sectors and industries.

Implementing predictive analytics is not a big bang. Develop capabilities over time and customize them to your needs.

- Link objectives with clear business drivers
- Know your data
- Start Simple
- Leverage existing insights
- Make it actionable and measurable
- Test and learn

