Deloitte.

Tools for Performance Metrics and Business Intelligence

Mo Masud

Lisa Wester

October 12, 2007

CASUALTY ACTUARIAL SOCIETY
CAS
1914 ®

Agenda

Rationalizing Performance Metrics and Business Intelligence

Measuring Model Impact through Business Intelligence

Business Intelligence and Reporting In Action

Steps to Realize Business Intelligence Opportunities

Key Discussion Themes

Going Beyond Model Development to Gain a Competitive Edge

Predictive Modeling is a Continuous Process

Aligning Strategy with Predictive Modeling Results to Maximize Benefits

The Role of IT and Decision Support Systems in Predictive Modeling

Designing New Ways to Measure Strategic Choices in a Predictive Modeling Enabled World

Practical Ways to Measure Predictive Modeling Impact

Steps to Get Started

Rationalizing Performance Metrics and BI

The Time is Now for Going Beyond Just Model Development

Looking into the future

Analytics is allowing organizations to stay ahead of the competition and ahead of the market

The predictive modeling story resonates well with all parties – consistent, objective, reduced expense, accurate

Analytics is becoming a core competency and organizational strategy – competing on analytics

Data driven

- Ability to store, process and distribute information faster than competitors will differentiate organizations and give them a competitive advantage

- Data quality and data governance is a top IT priority

- Developing fluid business strategies based on predictive modeling results will set part the market leaders

Rationalizing Performance Metrics and BI

Attributes of companies that are analytically-oriented

One or more senior execs who are strongly advocating analytics and fact-based decision making

Widespread use of descriptive statistics, predictive modeling and complex optimization techniques

Substantial use of analytics across multiple business functions and processes

Movement toward an enterprise-level approach to managing analytical tools, data, and organizational skills and capabilities
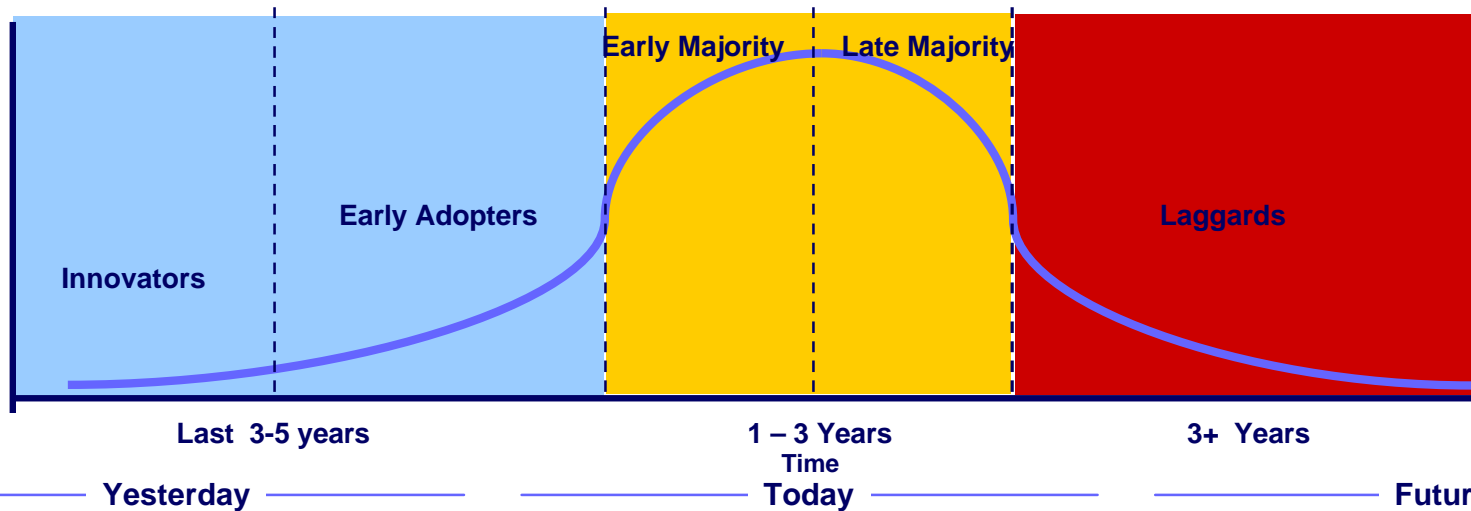
Stages of analytic competition

1. Facing major barriers (organizational, technical)

2. Analytic progress is made only locally, and not spread to other parts of the company

3. Value and promised realized, but unsuccessful implementation of analytic strategies

4. Vision has been realized, but enterprise-wide adoption has not been undertaken

5. Analytic competition has been built into company strategy

Source: *Competing on Analytics, Thomas H. Davenport, Don Cohen, and Al Jacobson*

Rationalizing Performance Metrics and BI

Predictive Modeling in the Property & Casualty Insurance Industry is a Now a Core Business Strategy

Chart regions: Innovators / Early Adopters (Last 3-5 years) — Early Majority / Late Majority (1 – 3 Years, Time) — Laggards (3+ Years)

Yesterday	Today	Future
Several Carriers have already implemented Predictive Modeling for commercial business	**Several carriers that have already developed modeling capabilities are rapidly advancing their capabilities**	**Companies must go beyond just model development**
– Primarily targeted at non-renewals and right pricing – Customized models – Large financial benefits	– Broader adoption in the industry – Numerous production systems – Expansion into account models – Broader business applications – Tighter linkage to business rules – New players are entering the space	– Standard practice in leading companies – Will be seamlessly integrated with business rules to drive results – Early adopters will have leveraged capability to gain market share – Extension to non-standard lines and more creative applications – Generic LOB tools will emerge – Integration of models across functions (Claim, U/W, Marketing) – **Ability to process results faster than competitors will distinguish market leaders**

6

Rationalizing Performance Metrics and BI

Several companies that have implemented Predictive Models are raving about the impact that it has had on their business.

"**85% of our new products are automated with predictive modeling**, which enhances underwriting consistency and makes it easy for our commercial agents to do business with Safeco"

"Fully launched Customized Pricing, our predictive pricing model that automatically provides the most appropriate price for a new small business submission"

"**Achieved overall written premium growth of 4%.**"

AIG's Mr. Purdy who describes predictive modeling as "evolutionary" said, "I expect that **every insurer will be using** WC data they collect to do **predictive modeling at least by 2010**."

"Modeling is now moving to a higher level of sophistication"

"Commercial lines NPW grew 3% for Q2, driven by $83M in **new commercial business, up 13%** compared to Q2 2006."

"The dramatic improvement is a **direct result of** our multidisciplinary WC improvement strategy and **predictive modeling**"

"Because our comprehensive **use of predictive modeling is now analyzing 80% of our commercial lines business**, both new and renewal accounts, we are able to better match price to risk. As result we feel we can continue to improve our profit margin […]"

"As Maryland continued to experience an increasingly soft market, **we retained 86% of expiring premium**"

"Predictive modeling / automated underwriting were implemented to enhance service delivery."

"The **quality of our property, WC, auto, and specialty mix is continuing to improve** as we use predictive models"

"**Agents are giving us preferred shelf space** vs. weaker competitors"

"**Increased ease of use** through faster decisions, streamlined processing, and expanded account rounding"

"**Reduced system quote to issue time** through dynamic questions, improved agent interface, and automated UW."

Rationalizing Performance Metrics and BI

But if everyone in the industry is doing it, how can companies differentiate themselves

The answer may lie at looking at leading-edge companies in other industries

Banking - With SPSS, HSBC Bank USA effectively mines an ever-growing file of customer data, creating predictive models to uncover cross-selling and "roll over" sales opportunities. Focusing on the best prospects for each product helps maximize sales and minimize marketing costs, and SPSS' ease of use helps researchers deliver intelligence faster to decision makers.

Retail - Using the Wal-Mart Model, Paul Westerman points out Wal-Mart's use of store and product traits to guide replenishment. Simplified, 'beach' products are assigned to 'beach' stores. But how many snorkels should go to a particular store? Paul advises that "a data warehouse can provide a good estimate based on another, similar product that has the same distribution."

Market basket analysis reveals these complementary products. Combined with demographic data, you understand the market forces at work (e.g., a correlation with young affluent families) and send masks and flippers to stores in neighborhoods with swimming pools, too.

Through careful planning, your past and future converge to tackle today's problems.

Healthcare - The new way is predictive modeling, and it is being implemented at health plans left and right.

"The goal of a clinical strategy is to find the right intervention for the right person at the right time," says Carol McCall, vice president of Humana's Center for Health Metrics, "and ultimately, you want to be able to understand enough about people to be able to literally custom-tailor the exact intervention so that you can meet them in a way that they will be the most receptive to it." McCall is a fellow of the Society of Actuaries and a member of the Academy of Actuaries.

Rationalizing Performance Metrics and BI

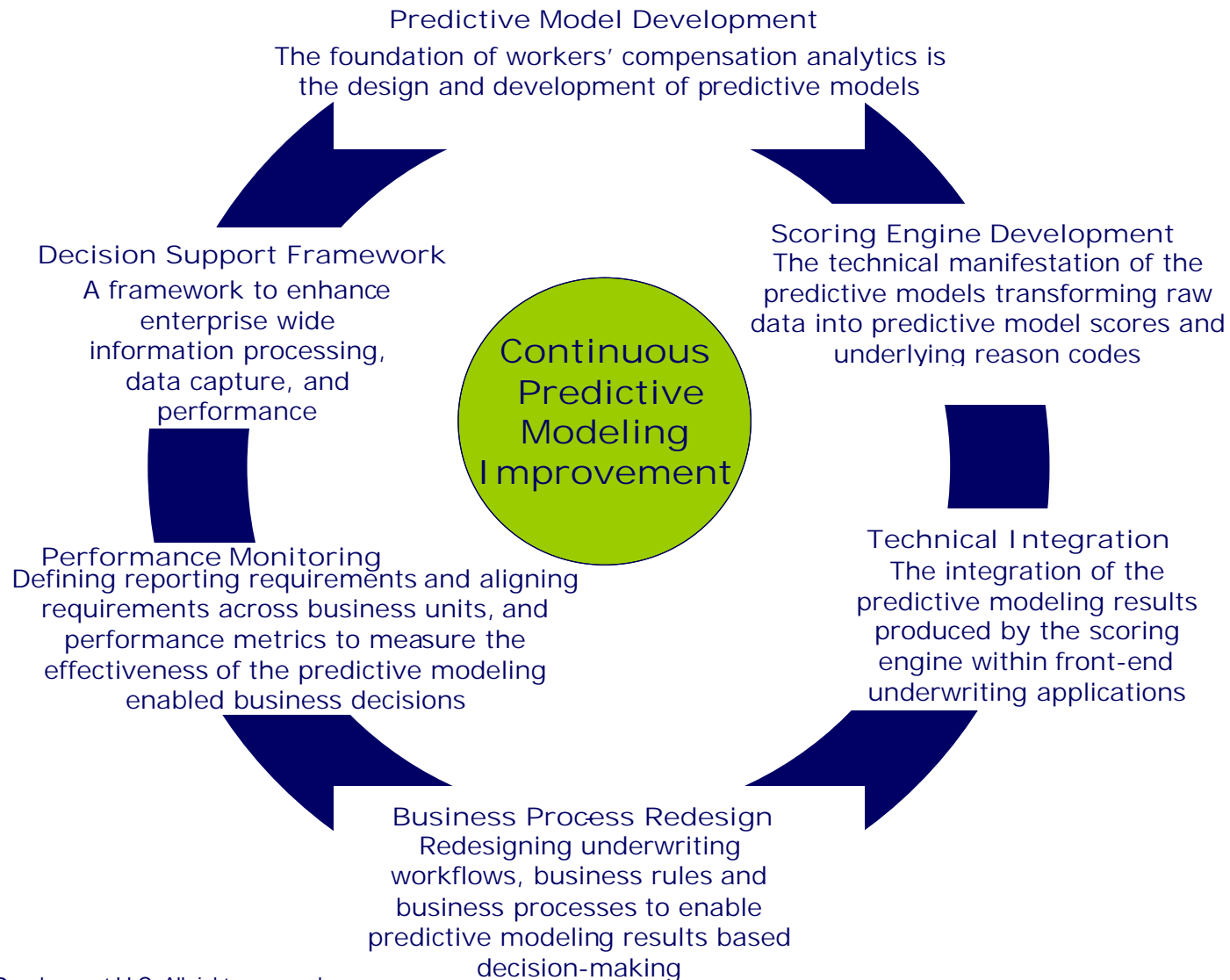**Enhanced Decision Support Capabilities Gives Organizations a Competitive Edge**

- The strongest statistical models will not offer clients any benefits to their bottom line unless it is seamlessly integrated within their technical and business infrastructure

- In conjunction with a integrated predictive modeling solution, clients must realign their business strategy to capitalize on their predictive modeling solution

- Operating in a predictive modeling enabled organization is a new way of doing business and requires new performance metrics to measure the success of the predictive modeling investment

- Realizing predictive modeling benefits is a continuous process that is evolving to meet the demands of the external market

- Business intelligence tools are the means to continuously monitor and measure the impact of predictive modeling enabled strategies

Deloitte.

Measuring Model Impact through Business Intelligence

Measuring Model Impact through Business Intelligence

Achieving Continuous Predictive Modeling Improvement

Predictive Model Development
The foundation of workers' compensation analytics is the design and development of predictive models

Decision Support Framework
A framework to enhance enterprise wide information processing, data capture, and performance

Scoring Engine Development
The technical manifestation of the predictive models transforming raw data into predictive model scores and underlying reason codes

Continuous Predictive Modeling Improvement

Performance Monitoring
Defining reporting requirements and aligning requirements across business units, and performance metrics to measure the effectiveness of the predictive modeling enabled business decisions

Technical Integration
The integration of the predictive modeling results produced by the scoring engine within front-end underwriting applications

Business Process Redesign
Redesigning underwriting workflows, business rules and business processes to enable predictive modeling results based decision-making

Measuring Model Impact through Business Intelligence

Aligning strategy with predictive modeling results is the first step to maximize benefits

Predictive Modeling Enabling Business Strategies for Success

Underwriting Excellence

- Improve pricing precision
- Increase objectivity throughout the underwriting process
- Enhance risk selection and risk avoidance capabilities
- Improve pricing competitiveness in profitable segments
- Improve underwriter negotiation capabilities

Marketing and Retention

- Target the right risks for non-renewals
- Improve retention of profitable risks
- Increase cross-sell opportunities
- Identify geographic and product expansion opportunities
- Enhance recruiting of profitable producers

Operational Efficiency

- Reduce transaction costs
- Straight through processing of select risk segments
- Improve ease of doing business with agents
- Improve claims management activities
- Improve customer service at all levels

Enhanced Decision Making

- Increase fraud detection capabilities
- Improve monitoring of underwriting performance
- Enhance ability to react to market forces sooner
- Increase information processing capabilities and data governance

Develop · Analyze · Select · Deploy

Operations · Marketing · Underwriting · IT
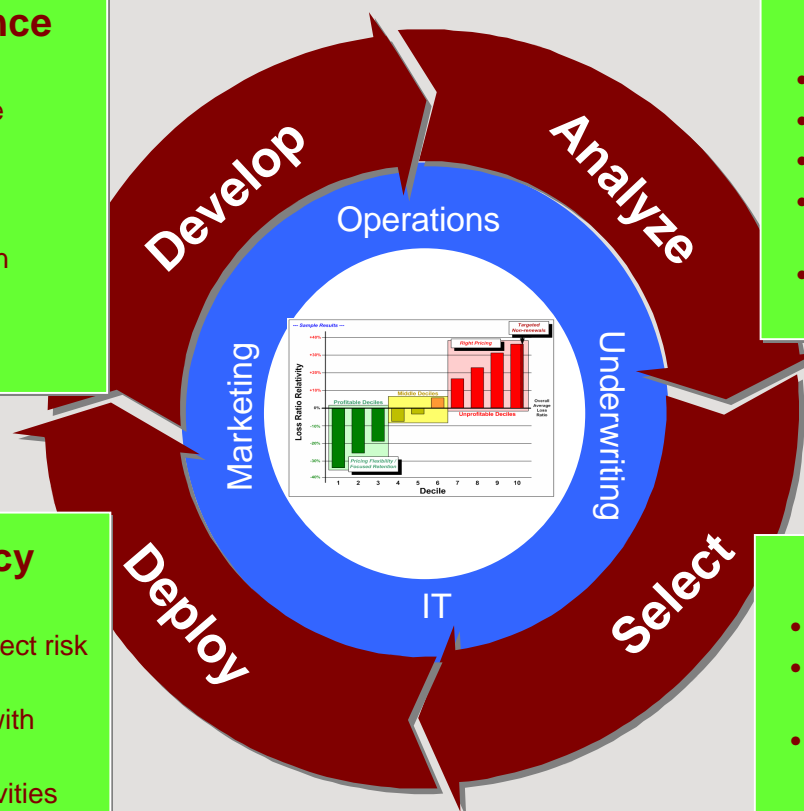
Measuring Model Impact through Business Intelligence

A practical approach to align business strategy with predictive modeling results

Segmentation of policies along the lift curve by decile and by decile groupings (green, yellow, red), can be used to develop strategies and tactics for pricing and business rules that address different parts of the lift curve. The use of deciles to affect underwriting results and meet operational goals (e.g., increasing straight-through processing) is termed "decile management". There are 5 impact categories where deciles drive rules.
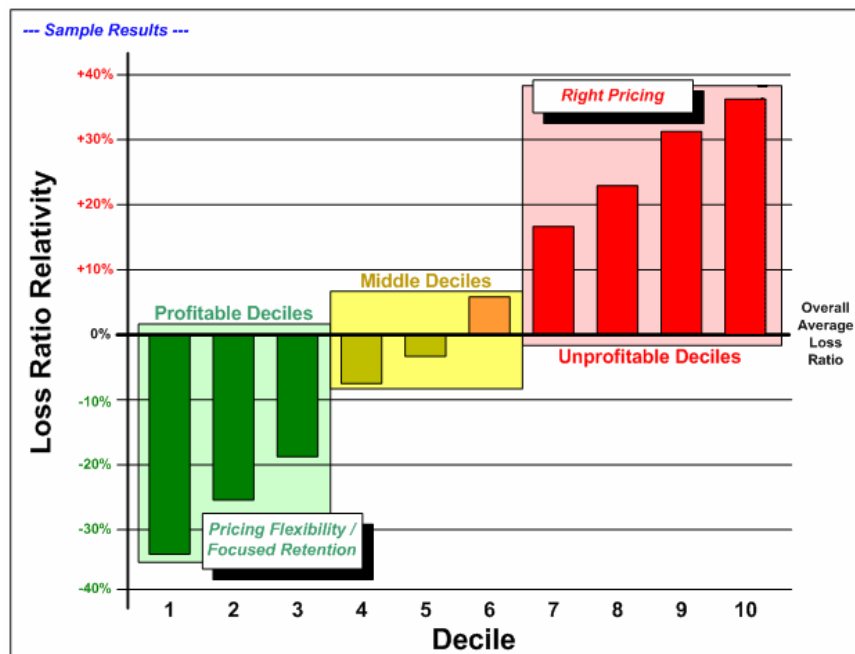
Decile Management Impact Categories	Hypothetical Business Rules
Pricing	For deciles 1-3 initial pricing will be at a 20% discount of manual price
Underwriter Referral Rules	All risks in deciles 7 – 10 are automatically referred for underwriter review
Underwriter Pricing Flexibility	Only a 10% pricing range will be provided for deciles 4-6
Override Approvals	Management approval is required for all override transactions on deciles >7
Underwriting Exposure Rules	Ask underwriting rule group #3 only for risks in decile 8 or greater

Measuring Model Impact through Business Intelligence

Turning insight into action – rules based decision making

Sample Underwriting Business Rules

Overview:
The predictive model, through the pricing matrix, will provide a suggested 'right-price' for specific risks. There are many important implementation decisions that will drive how this price recommendation is utilized.

Sample Business Rule:

- Low scoring policies can be placed in any rating tier. No referral necessary if price is less than expiring and quoted at within 10% above matrix recommendation.

- Moderate scoring policies can be placed in all but the most competitive tier. No referral necessary if price is more than 10% off expiring but not greater than 20%.

Green
- Since these risks are profitable and desirable, your goal is to write and retain as many as possible.
- These risks give you the greatest flexibility in achieving competitive market pricing; you should only give enough pricing credit to write/retain the account.
- Market conditions in relation to model recommended pricing should be monitored to avoid policy attrition of most desired accounts.

Yellow
- The use of subjective credits and company placement options should be limited on these risks as they are already generally priced adequately. Minor adjustments may be necessary but primarily, these risks can be automatically processed subject to underwriting satisfaction.

Red
- In order to achieve profitability in this zone, the recommended price may be be beyond what the market can bear or outside filed pricing deviations. In these cases, the pricing correction may take place over several years, due to filing limitations.

Measuring Model Impact through Business Intelligence

Examples of new performance metrics to make sure your strategies are working

New Business Underwriting	- Recommended Total Premium - Deviation from Recommended vs. Premium Written - Distribution of Recommended Scheduled Modifications - List of most frequent positive contributing reason messages - Comparison of premium year over year
Renewal Underwriting	- Recommended Total Premium - Deviation from Recommended vs. Premium Written - Distribution of Recommended Scheduled Modifications - Distribution of recommended Non-Renewals - Deviation from Recommended vs. Applied Non-Renewals - List of most frequent positive contributing reason messages - Comparison on schedule modification from prior year
Marketing and Distribution	- Agent Distribution by Decile - Individual agent book distribution across deciles - Hit ratio of leads generated by model
Claims	Deviation between predicted and actual claim frequency/ severity

Measuring Model Impact through Business Intelligence

IT and Decision Support Systems are key components that enable ongoing measurement

Current State Decision Support Systems	Enhanced Decision Support Framework
• IT resource intensive monthly production reports • Reporting needs are localized at the business unit or functional level • Limited corporate wide initiative towards data quality and data governance • Based on traditional underwriting and actuarial metrics • Limited flexibility for sensitivity analysis and simulation of impact of business action • Not designed to measure business process improvements and customer satisfaction • Information processing and decision support capabilities are not at the end user or business unit level	• Dynamic reports will drill down capabilities in a "real time" information processing environment • Reporting needs are aligned with enterprise wide strategy • Top down approach to data quality and data governance with support from senior executives • Analysis conducted on new performance metrics designed to maximize predictive modeling ROI • Flexibility at the end-user level to customize reports and develop scenarios and perform "what-if" analysis • An decision support framework designed to enhance information processing and analysis capabilities across multiple business units

Measuring Model Impact through Business Intelligence

Predictive Modeling changes the way companies do business…

Ongoing measurement allows them to make sure their new strategies are working

Performance Metrics and Monitoring	• Develop performance metrics to measure model performance in a predictive model enabled business environment • Implement reporting tools to measure the impact of predictive modeling on key performance metrics • Re-adjust business strategy and operations based on business intelligence derived from performance metrics *Contributing to ongoing measurement of predictive modeling impact*
Improved Distribution Channel Management	• Examine marketing model results and identify geographic territories for possible market expansion and profitable growth opportunities • Identify profitable agents based on modeling results and target for relationship management • Identify profitable territories for new agency appointments *Contributing to a improved customer service and marketing activities*
Ease of Doing Business	• Identify non-predictive application data currently being captured by Utica Mutual in an effort to streamline and reduce unnecessary information currently being captured during the underwriting process • Develop initial business rules to leverage model results during the underwriting process *Contributing to agency focused operations and reduced expenses*

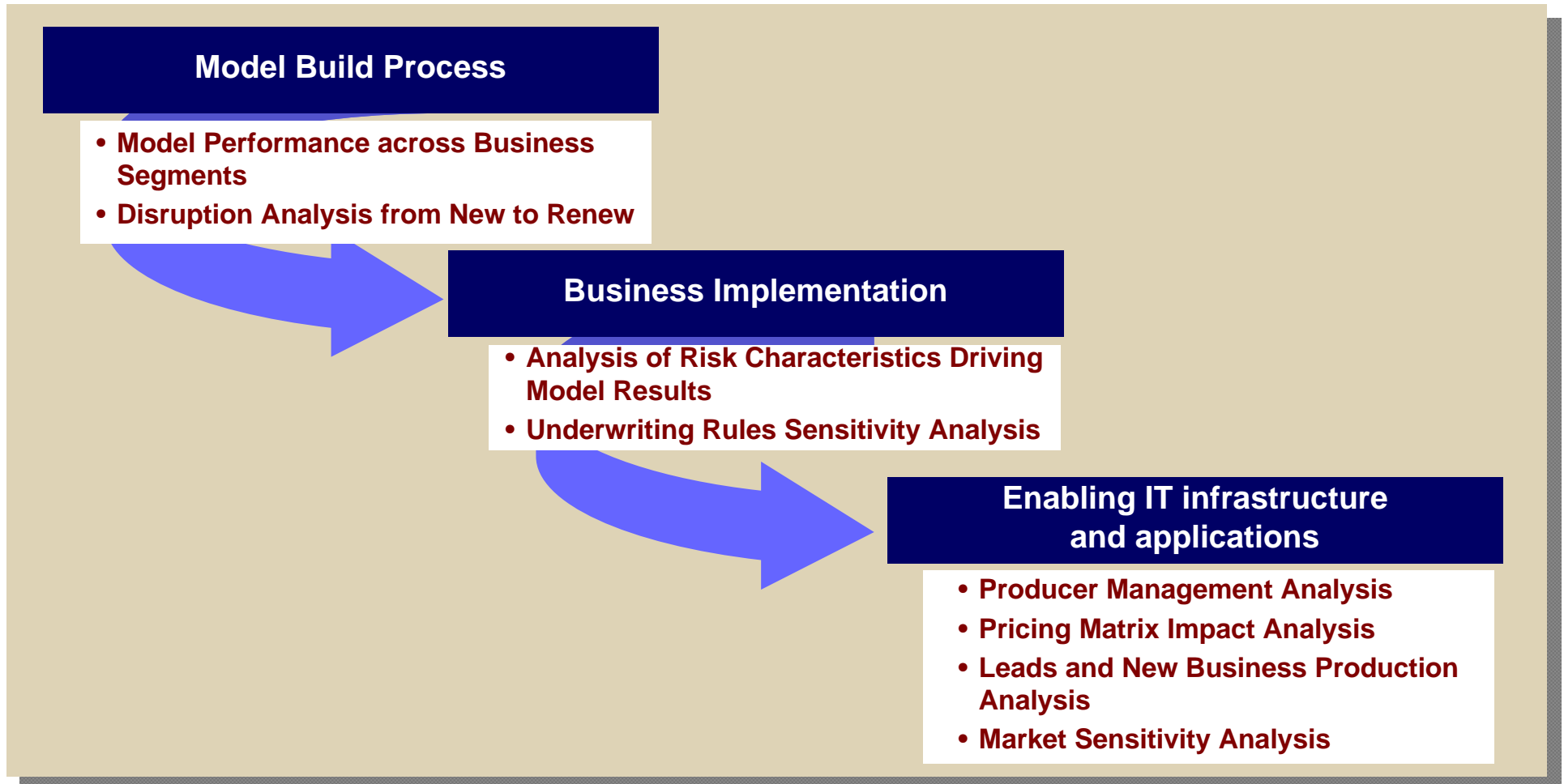# Business Intelligence and Reporting in Action

Business Intelligence and Reporting in Action

A framework for P&C companies to stay ahead of the competition in today's predictive modeling enabled business environment

- The ability to measure, monitor and analyze the performance of your predictive modeling initiative and related business decisions will allow carriers to distinguish themselves from competitors in today's competitive market

- New metrics and monitoring tools are required to measure the effectiveness of your predictive modeling initiative and how the market is reacting to your business strategy

- New metrics and monitoring tools are critical in measuring the impact of your business decisions and to help determine if your business process is aligned with your predictive modeling initiative

- An enterprise wide data collection and management strategy will maximize the long term performance of your predictive modeling initiative and improve your reporting and information processing capabilities

- Choosing a reporting model that meets your short-term and long-term objectives will ensure that key metrics and information is available at all levels of your organization
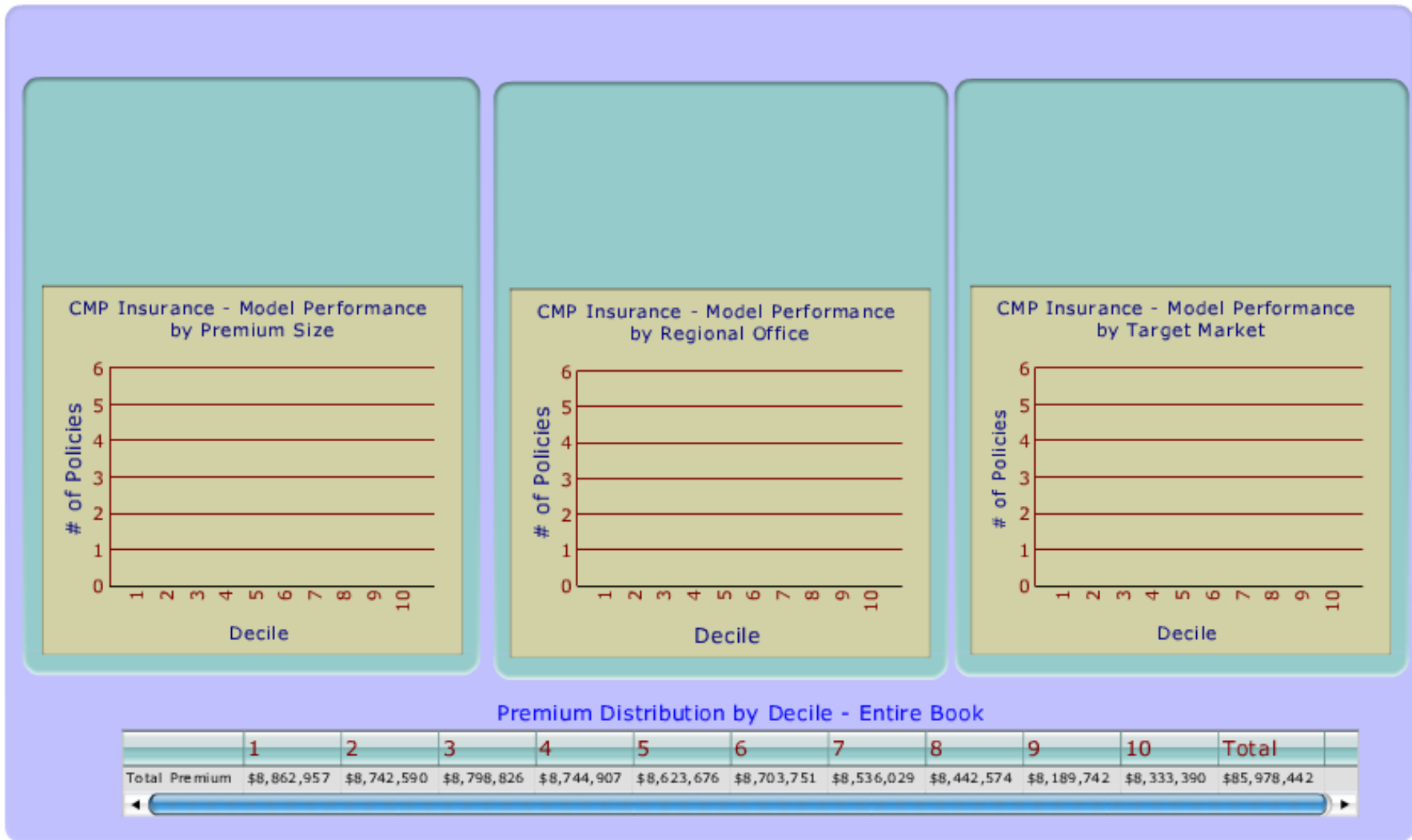
Business Intelligence and Reporting in Action

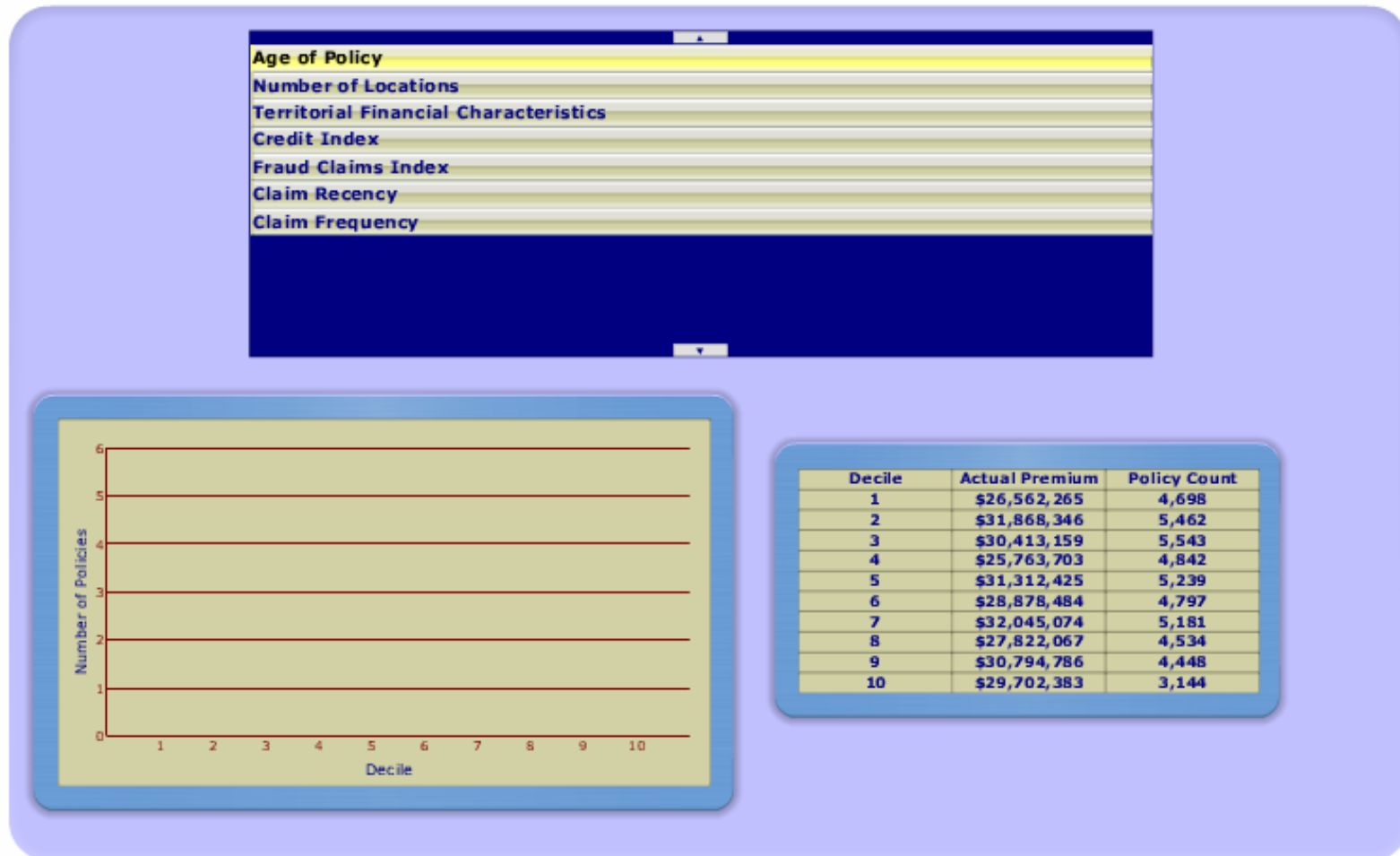**Applying Performance Metrics at critical steps in the predictive modeling process**

Model Build Process

- **Model Performance across Business Segments**
- **Disruption Analysis from New to Renew**

Business Implementation

- **Analysis of Risk Characteristics Driving Model Results**
- **Underwriting Rules Sensitivity Analysis**

Enabling IT infrastructure and applications

- **Producer Management Analysis**
- **Pricing Matrix Impact Analysis**
- **Leads and New Business Production Analysis**
- **Market Sensitivity Analysis**

Business Intelligence and Reporting in Action

Pre- Final Model Development – Measuring robustness of the predictive model

CMP Insurance - Model Performance by Premium Size

CMP Insurance - Model Performance by Regional Office

CMP Insurance - Model Performance by Target Market

Premium Distribution by Decile - Entire Book

	1	2	3	4	5	6	7	8	9	10	Total
Total Premium	$8,862,957	$8,742,590	$8,798,826	$8,744,907	$8,623,676	$8,703,751	$8,536,029	$8,442,574	$8,189,742	$8,333,390	$85,978,442

Business Intelligence and Reporting in Action

Pre-Business Rules Development – Measuring underlying risk characteristics driving model results

Age of Policy
Number of Locations
Territorial Financial Characteristics
Credit Index
Fraud Claims Index
Claim Recency
Claim Frequency

Decile	Actual Premium	Policy Count
1	$26,562,265	4,698
2	$31,868,346	5,462
3	$30,413,159	5,543
4	$25,763,703	4,842
5	$31,312,425	5,239
6	$28,878,484	4,797
7	$32,045,074	5,181
8	$27,822,067	4,534
9	$30,794,786	4,448
10	$29,702,383	3,144

Business Intelligence and Reporting in Action

Tying it all together – Pricing Impact Dashboard
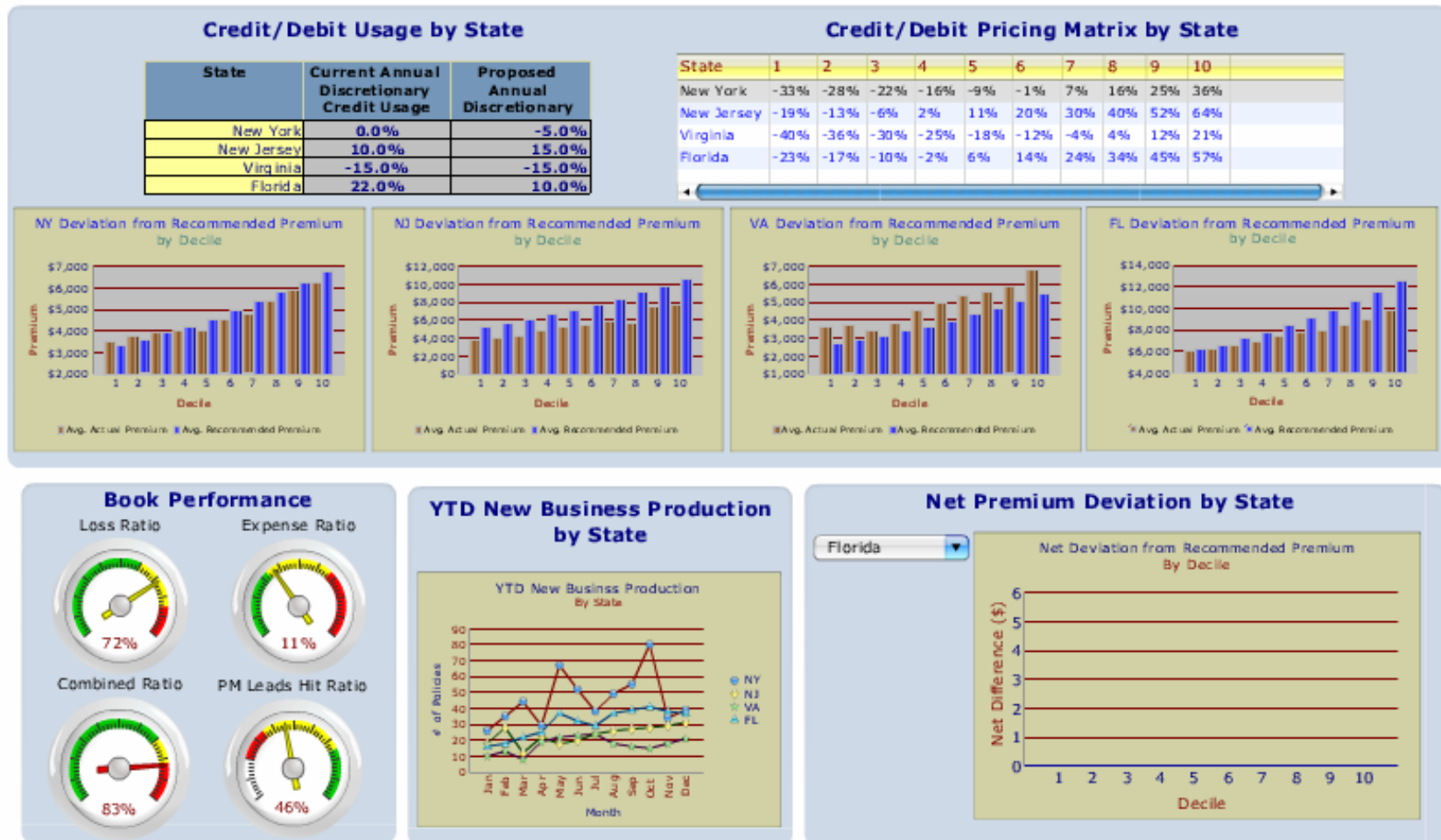
Steps to Realize Business Intelligence Opportunities

Steps to Realize BI Opportunities

Benefits
- A framework that aligns technology, analytical and business services to maximize return on your predictive modeling initiative
- Designed to achieve seamless integration across technology platforms, business applications and functional business units
- Increases an organization's access to timely information and dissipates information across all levels of an organization
- Improves data quality and data collection efforts to further enhance future predictive modeling recalibration efforts
- Provides a mechanism to communicate results to key internal and external stakeholders.

Primary Activities
- Design reporting and data warehousing framework
- Develop performance metrics
- Implement reporting framework
- Analyze results
- Realign strategy and metrics based on performance metric results

Tools and Methodologies
- Data warehousing and ETL tools
- Business Objects, Crystal Reports, Cognos among others
- Java, .Net or other application development tools

Steps to Realize BI Opportunities

Lessons learned through the model build and conceptualization work should be considered as P&C companies develop their implementation plans.

	Model Value Capture Lessons	P&C Company Implications
Understand the Predictive Power	– Companies often focus on the individual variables rather than the aggregate power – Relationship between variables drives the major components of value creation	– Ready the organization to rigorously apply, rather than deconstruct, the model – Importance of communication and education on the usage of the model output should not be understated
Pursuit of "Great" Models Often Obstructs Immediate Value Capture	– The model's lift often exceeds the company's capacity for rating action based on filed rating plans – Companies often waste months looking to "fine tune" current variables and uncover new variables	– Validate and implement the current model as soon as possible to enable value capture – Prepare/research new variables for future model updates - Data Quality and Governance – Modeling additional market segments will drive significant value
It's All About Implementation	– Modeling sometimes remains an actuarial exercise, rather than an enterprise implementation priority – Companies fail to recognize the sweeping nature of the changes required to realize full benefits and that predictive modeling is a continuous process	– Prepare the organization for the next stage of the underwriting journey where models will be used as the central risk selection and underwriting tool – Develop performance metrics and framework to continuously monitor the impact of the predictive modeling initiative
Avoid the "Interim Trap"	– Companies often fail to move beyond the interim workarounds that apply to the best or worst scoring policies, rather than addressing the book holistically – Short term "quick fix" changes can encumber rather than empower underwriters – which can serve to obstruct buy-in	– Don't let immediate value capture obstruct the full implementation – To achieve full growth and efficiency gains full implementation is required

Speaker Contact Information

Mo Masud, Senior Manager
Deloitte Consulting LLP
momasud@deloitte.com
860-725-3341

Lisa Wester, Manager
Deloitte Consulting LLP
lwester@deloitte.com
312-486-1994

Deloitte.