Insurance and Actuarial
Advisory Services

Helping a Company Achieve Its Commercial Lines Underwriting Goals: A Focus on Implementation

22 March 2011

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Introduction

► Implementation can be the most challenging phase of a predictive modeling project.

► Unanticipated issues can arise late in the process that have the potential to derail the entire project.

► By preparing for these issues, a modeling team can achieve its company's or a client's requirements.

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Overview

1. ## Implementation planning

   ► Company-specific strategic considerations

   ► Designation of a steering committee

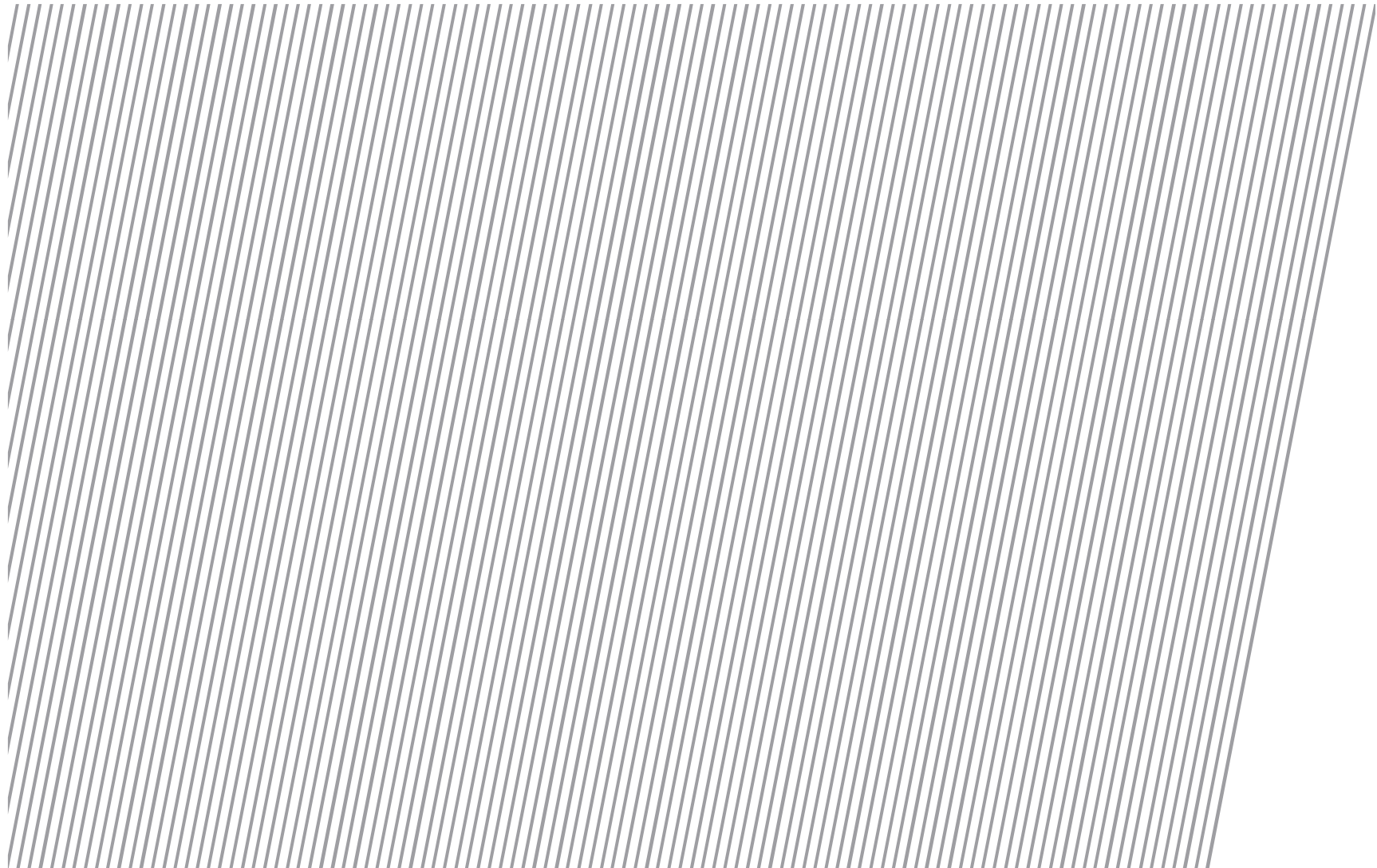   ► Awareness of market conditions

   ► Deployment data options

2. ## Model deployment and monitoring

   ► Analysis of impact on book of business

   ► Establishment of rule set

   ► Development of management reports

   ► Review and recalibration of model

   ► Leverage model intellectual capital

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Implementation planning

Implementation strategy for commercial lines predictive models

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Company-specific strategic considerations

► Company-specific factors often become primary strategic drivers late in the process

- ► Corporate objectives
  - ► Stock vs. mutual
  - ► Growth vs. profitability
- ► Distribution and account constraints
  - ► Control and flexibility of agent relationships
  - ► Emphasis of accounts over coverages
- ► Schedule rating limitations
  - ► Degree of flexibility of use of credits and debits
  - ► Possibility of other approaches (tiering, underwriting, etc.)
- ► Intellectual capital protection
- ► Centralized vs. decentralized

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Designation of a steering committee

Obtaining commitments from a cross-functional steering committee preempts issues during deployment.

► Underwriting

  ► To identify discontinuities with current rating structure

► Information technology

  ► To advise on system integration options and potential issues

► Marketing

  ► To anticipate agent/producer responses and communicate changes to the field

► Executive management

  ► To provide strategic input, allocate resources and prioritize project

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Awareness of market conditions

Market conditions can be as important as internal factors in the successful deployment of predictive models.

► Examples of this include the following:

   ► Hard market conditions may obviate the need to offer discounts to attractive accounts.

   ► Soft market conditions may limit ability to achieve increases in less attractive accounts (leading to loss of business).

   ► Changes in regulation can impact the ability to use a model or specific variables (e.g., credit).

   ► Legislation can shift the landscape, making historical experience an inaccurate indicator (e.g., tort reform).

   ► New competitors that are pricing aggressively may limit the value of pursuing new business.

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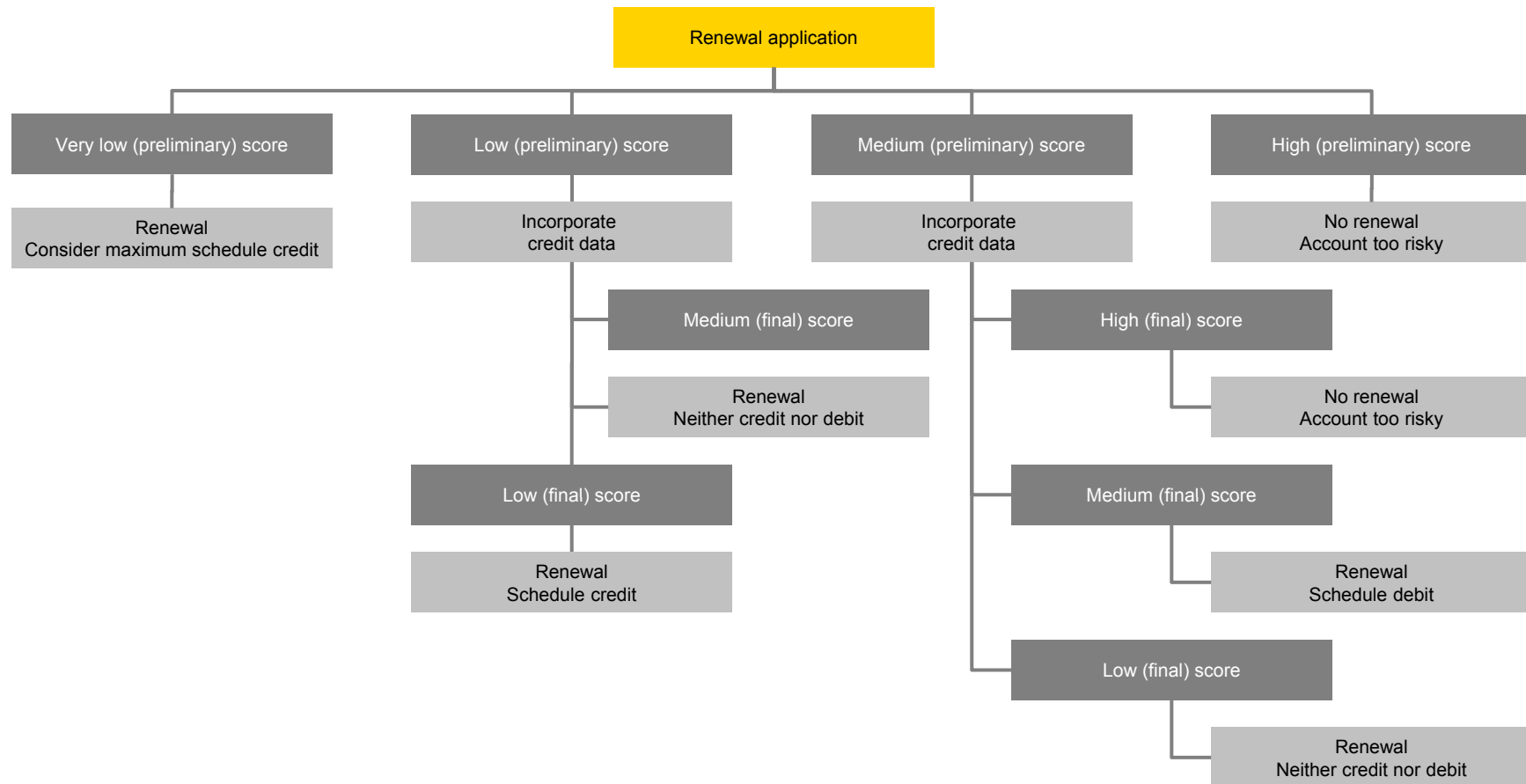*Quality In Everything We Do*

Deployment data options

Data may drive the implementation of a model from several perspectives such as cost, predictors and timing.

► Examples of this include:

  ► Data elements may be prohibitively expensive to purchase for all accounts.

  ► Information known for existing policyholders and used in renewal scoring may not be available for new business.

► The following slide presents a possible rule set for determining which data sources should be included.

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Deployment rule set design: external data management

Renewal application

| Very low (preliminary) score | Low (preliminary) score | Medium (preliminary) score | High (preliminary) score |

Very low (preliminary) score
- Renewal
  Consider maximum schedule credit

Low (preliminary) score
- Incorporate credit data
  - Medium (final) score
    - Renewal
      Neither credit nor debit
  - Low (final) score
    - Renewal
      Schedule credit

Medium (preliminary) score
- Incorporate credit data
  - High (final) score
    - No renewal
      Account too risky
  - Medium (final) score
    - Renewal
      Schedule debit
  - Low (final) score
    - Renewal
      Neither credit nor debit

High (preliminary) score
- No renewal
  Account too risky
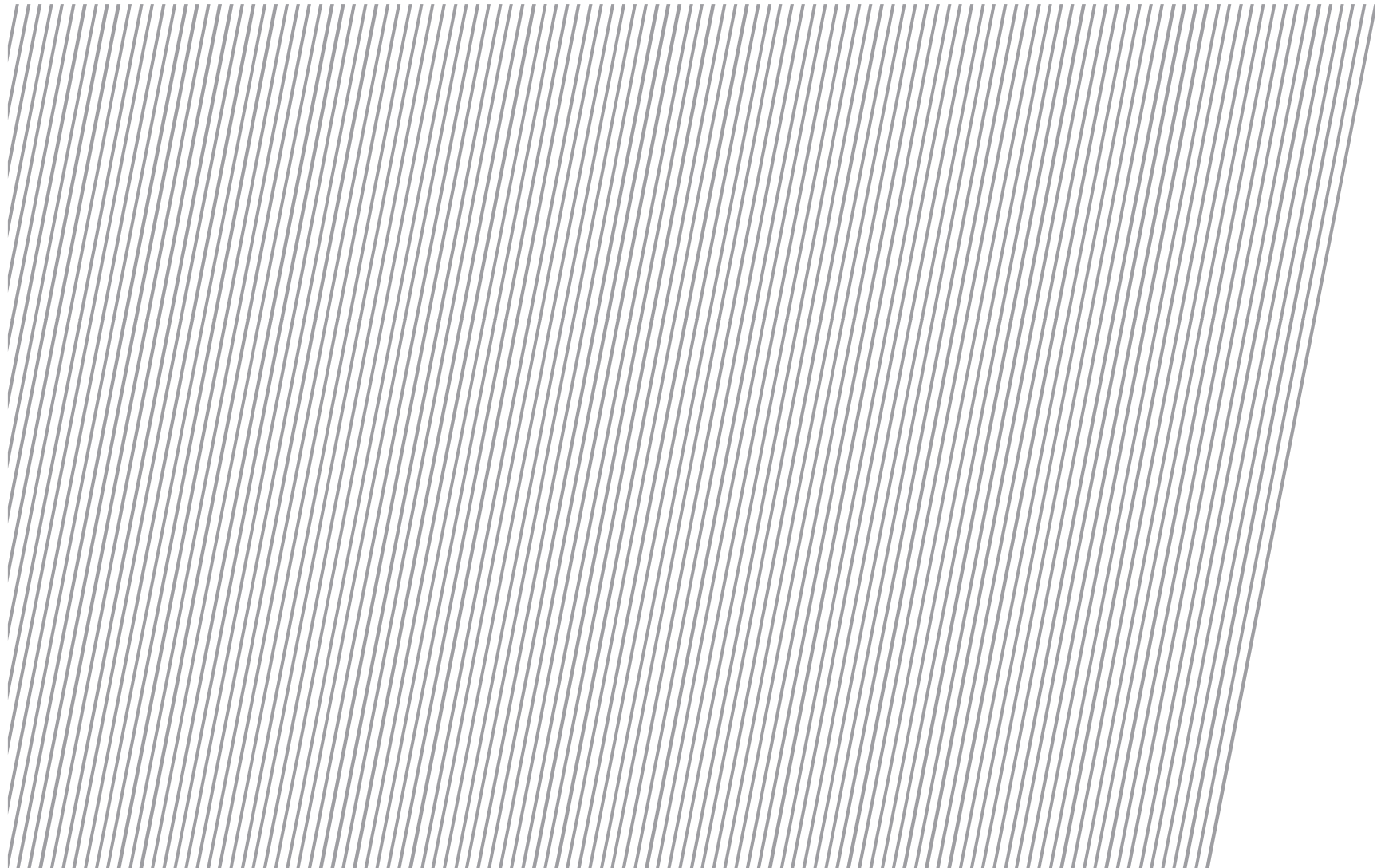
▶ External data costs can be limited by considering relevant predictor variables after the preliminary assessment of an account.

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Model deployment and monitoring

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Analysis of impact
on book of business

► Once the model is developed, the likely impact should be evaluated before actual deployment.

► "Batch scoring" of the entire renewal book allows for this review (see next slide).

► This review should consider several points of view:

  ► Likely shift in book due to scores for certain customer segments

  ► Any impact to "favored" producers or policyholder groups that should be avoided

  ► Revenue impact of model on renewal book (may aim for positive revenue impact or revenue neutrality)

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Batch scoring of renewal book to assess impact

► Batch scoring of entire renewal book allows for an analysis of the expected impact.

► The following slide shows a summary of the results by decile for the full population:

Risk Identifiers		Risk Factors (Predictors)								OSHA Violations Prior 5 Years	Business Score Percentile	Average Months Open	Model Output	
ID	Year	Payroll	Class Group	Experience Mod	State Group	Claims Free	Change in Unemployment Rate	Percent Bachelors	DUIs per Capita				Score	Decile
3471888	2003	64,064	7	-0.1470	Midwest	No	0.2188	0.1242	0.0036	No	100	125	27	3
3471888	2003	57,218	15	-0.1470	Midwest	No	0.2188	0.1242	0.0036	No	100	125	87	9
3471888	2003	28,311	12	-0.1470	Midwest	No	0.2188	0.1242	0.0036	No	100	125	22	2
3471888	2003	39,251	14	-0.1470	Midwest	No	0.2188	0.1242	0.0036	No	100	125	40	7
3471888	2003	28,381	2	-0.1470	Midwest	No	0.2188	0.1242	0.0036	No	100	125	65	8
3471888	2004	59,136	7	0.2600	Midwest	No	0.1795	0.1242	0.0033	No	96	151	94	10
3471888	2004	68,711	15	0.2600	Midwest	No	0.1795	0.1242	0.0033	No	96	151	57	6
3471888	2004	28,117	12	0.2600	Midwest	No	0.1795	0.1242	0.0033	No	96	151	19	2
3471888	2004	47,159	14	0.2600	Midwest	No	0.1795	0.1242	0.0033	No	96	151	5	1
3471888	2004	16,758	2	0.2600	Midwest	No	0.1795	0.1242	0.0033	No	96	151	41	3
4893008	1997	15,600	10	0.0860	Southern	No Data	0.0590	0.1274	0.0100	No	75	104	50	5
4893008	1997	12,750	10	0.0000	Southern	No Data	0.0590	0.1274	0.0100	No	75	104	100	10
4893008	1998	16,989	10	0.1460	Southern	No Data	0.0417	0.1274	0.0074	No	75	104	56	6
4893008	1999	12,750	10	-0.0545	Southern	Yes	-0.2000	0.1274	0.0071	No	97	104	52	5
4893008	1999	17,316	10	0.1490	Southern	Yes	-0.2000	0.1274	0.0071	No	97	104	92	9
4893008	2000	17,316	10	-0.2580	Southern	Yes	0.0000	0.1274	0.0070	No	94	104	45	4
4893008	2001	12,750	10	-0.1900	Southern	Yes	0.5000	0.1274	0.0068	No	98	104	9	1
4893008	2004	12,750	10	0.0000	Southern	No Data	0.0698	0.3270	0.0065	No	98	229	73	8

Scoring summary

► Scoring summary shows statistics by decile (excerpt below).

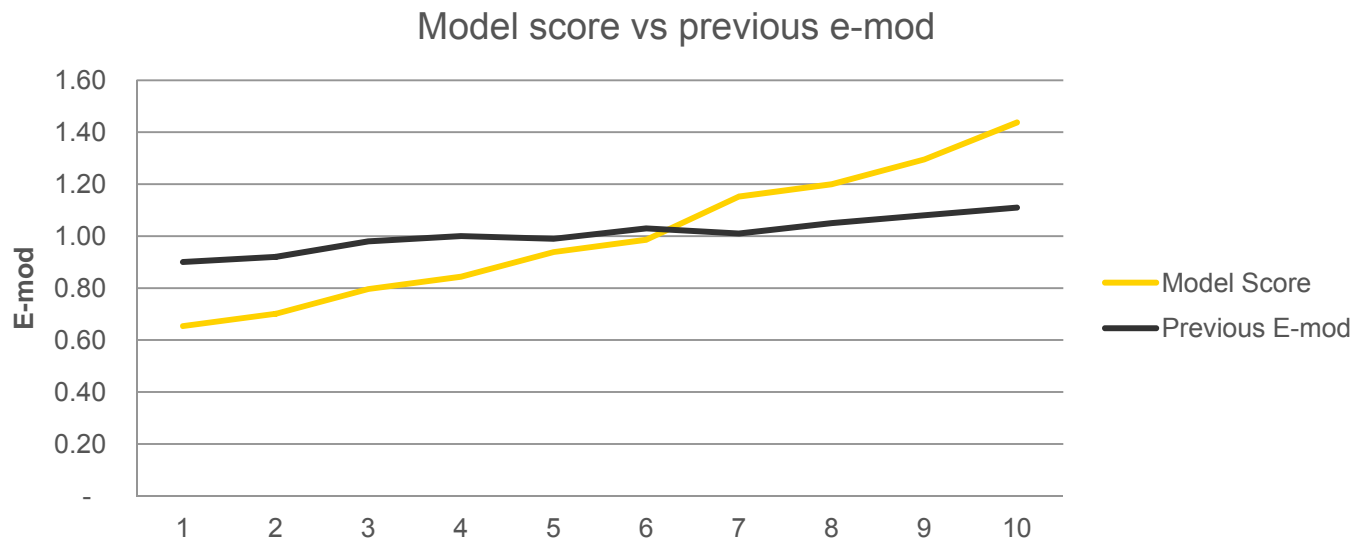| Decile	Policyholder count	Average score	Average e-mod	Average payroll	Most prevalent class
1	2,000	34	0.90	15,000	Drivers
2	2,000	36	0.92	17,000	Drivers
3	2,000	41	0.98	20,000	Construction
4	2,000	44	1.00	25,000	Construction
5	2,000	49	0.99	26,000	Office Workers
6	2,000	51	1.03	24,000	Office Workers
7	2,000	60	1.01	26,000	Construction
8	2,000	62	1.05	27,000	Electricians
9	2,000	67	1.08	32,000	Electricians
10	2,000	75	1.11	31,000	Electricians
Overall	20,000	52	1.00	24,300	Construction

► Reason code distribution shows impact of each predictor variable.

Predictor	Positive reason codes			Negative reason codes		
	First	Second	Third	Third	Second	First
Class	20%	15%	10%	10%	15%	20%
State	5%	15%	30%	25%	15%	10%
Credit	5%	5%	25%	40%	20%	5%
Loss free	10%	25%	10%	0%	0%	0%
Prior claims	0%	0%	0%	5%	5%	30%

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Comparison to prior rating

▶ Comparison of model indications to prior e-mod by decile illustrates the impact of the model.

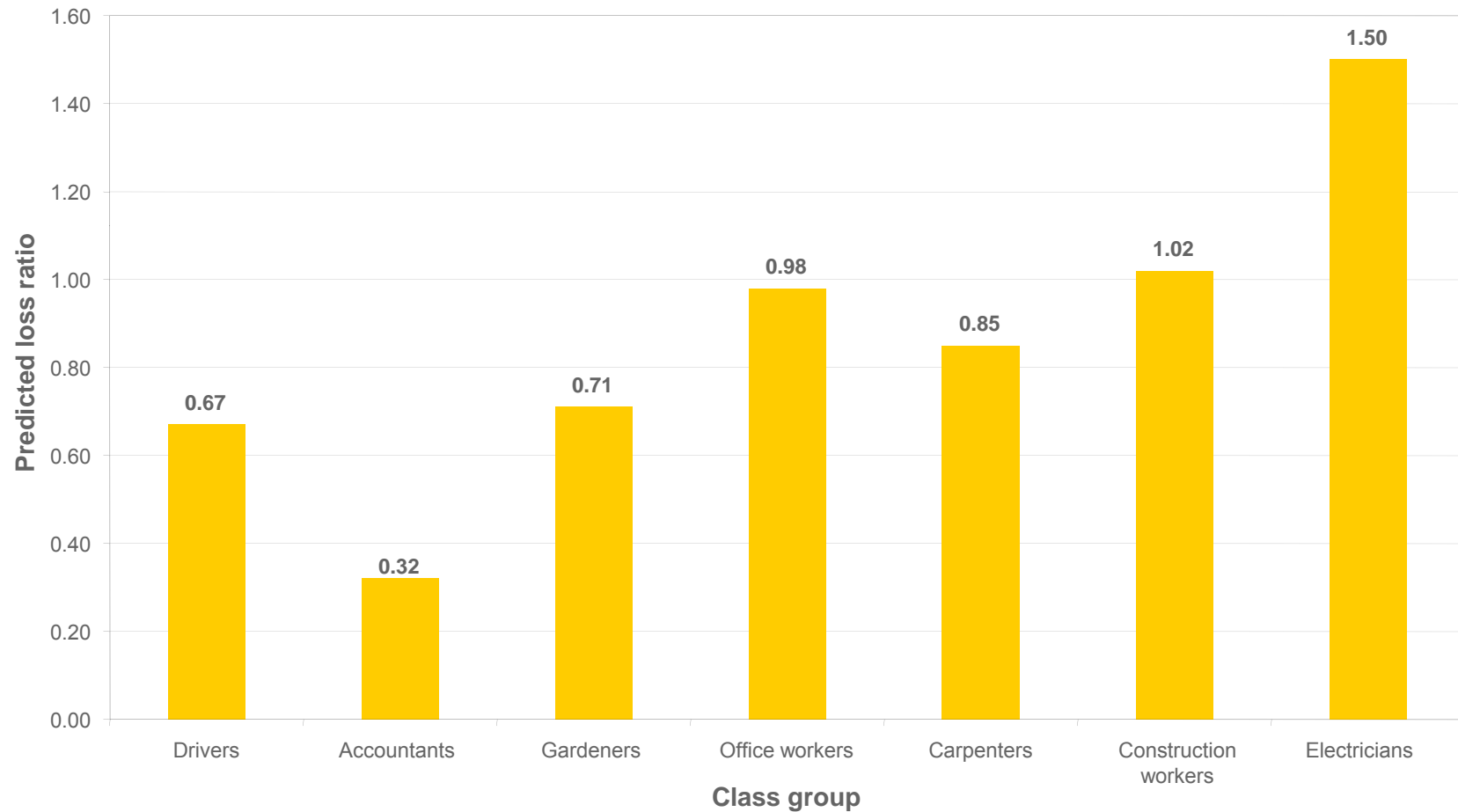▶ As shown in the example below, model may indicate larger credits or debits in the extreme deciles.

Model score vs previous e-mod

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Impact assessment:
Loss ratio by class group

Predicted loss ratio by class group

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Establishment of rule set

► Model output is translated into business actions through the definition and use of a rule set.

► The rule set may involve the following:

- ► Schedule rating credit/debit: adjustment for a decile/score
- ► Schedule rating bands: any limitations on this flexibility
- ► Accept/reject criteria: threshold for rejecting risks (if any)
- ► Tiering: potential to utilize multiple companies/papers
- ► Dividend plans: another possible way to differentiate

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Development of management reports

Several reports should be developed and tracked to monitor performance and use of the model.

► Override performance reports

   ► Track accounts where model indication is not followed.

   ► Compare performance of accounts with and without overrides.

► Model performance reports

   ► Track changes in loss ratio for new, renewal and overall business.

► Population drift reports

   ► Track changes in the distribution of policyholders over time.

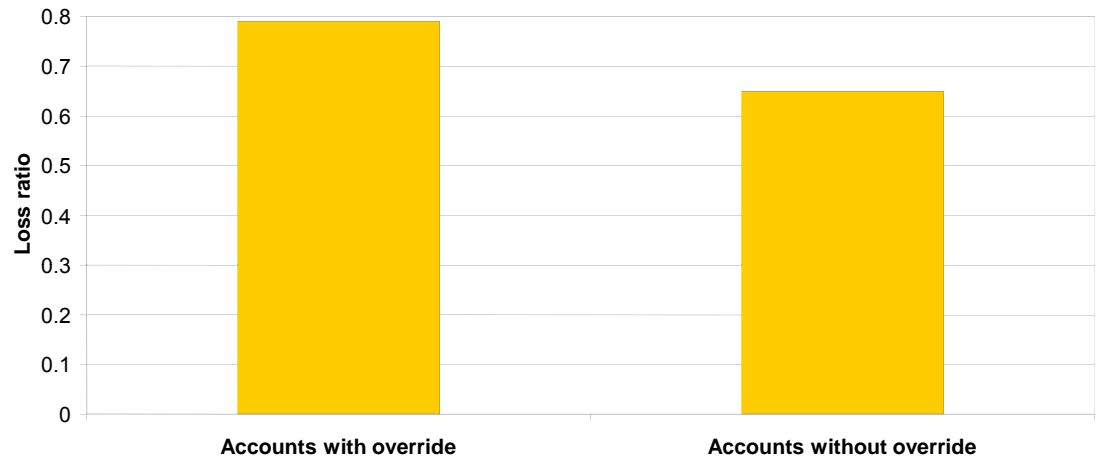   ► This may be achieved through use of similarity modeling.

Examples of each report are shown on following slides.

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Override performance report

Override performance

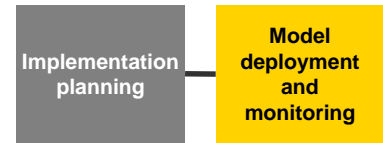| Policy	Predictive model score	Decile	Override	Type of override	Override reason	Resulting loss ratio
100101	0.35	4	Y	Override Tier Recommendation - Increasing Tier	Competitive Considerations	0.42
100105	0.62	6	Y	Override Tier Recommendation - Decreasing Tier	Policyholder Accommodation	0.55
100108	0.45	4	Y	Override of Schedule Mod - Increasing Mod	Conflicting Score Reason Codes	0.00
100111	0.09	1	Y	Override of Schedule Mod - Increasing Mod	Conflicting Score Reason Codes	0.15
100115	0.98	10	Y	Override of Accept/Reject Recommendation	New Policyholder Management Team	1.51
100235	0.54	5	Y	Override of Schedule Mod - Decreasing Mod	New Policyholder Management Team	0.46
100257	0.22	2	Y	Override Tier Recommendation - Increasing Tier	Competitive Considerations	0.00
100568	0.13	1	Y	Override Tier Recommendation - Increasing Tier	Underwriter Discretion	0.00
100789	0.78	9	Y	Override Tier Recommendation - Decreasing Tier	Policyholder Accommodation	0.72

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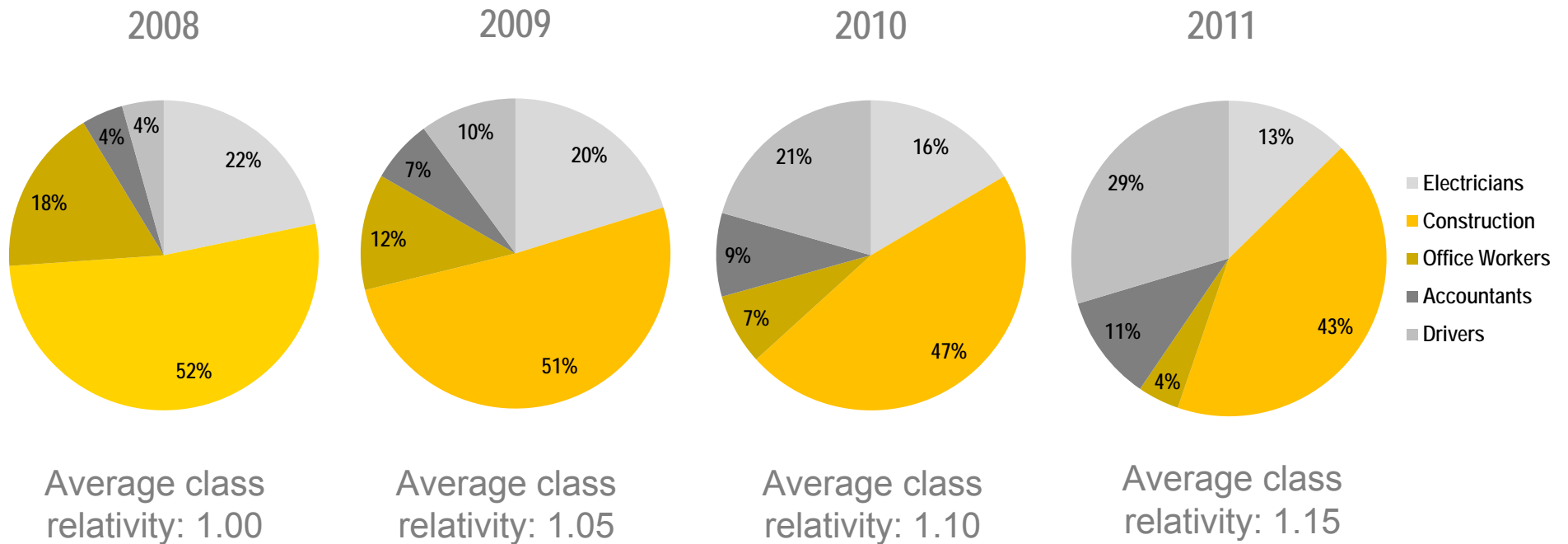*Quality In Everything We Do*

Model performance reports

► High-level summary below shows policyholder count and loss ratio over time by decile.

► Expectation is that volume in higher deciles should decline and overall loss ratio should decrease.

Decile	Policyholder count				Loss ratio			
	2008	2009	2010	2011	2008	2009	2010	2011
1	2,000	2,160	2,333	2,519	68%	67%	68%	69%
2	2,000	2,060	2,122	2,185	70%	71%	71%	71%
3	2,000	2,030	2,060	2,091	74%	75%	74%	74%
4	2,000	1,980	1,960	1,941	76%	76%	77%	76%
5	2,000	2,020	2,040	2,061	80%	82%	81%	81%
6	2,000	1,960	1,921	1,882	82%	80%	79%	80%
7	2,000	1,940	1,882	1,825	89%	85%	83%	84%
8	2,000	1,920	1,843	1,769	91%	89%	88%	86%
9	2,000	1,880	1,767	1,661	95%	90%	88%	87%
10	2,000	1,800	1,620	1,458	101%	92%	90%	88%
Overall	20,000	19,750	19,548	19,394	83%	80%	79%	79%

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Population drift reports

▶ Review of distribution of key variables by year will reveal any shifts in policyholder population.

▶ Average relativity by year provides further insight into impact of shift.

2008

Average class relativity: 1.00

2009

Average class relativity: 1.05

2010

Average class relativity: 1.10

2011

Average class relativity: 1.15

Legend:
- Electricians
- Construction
- Office Workers
- Accountants
- Drivers

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Review and recalibration of model

► Model should be reviewed periodically in order to make adjustments in model algorithm, use, or rule set.

► Reasons that recalibration may be necessary:

  ► Drift to different distribution of policyholders

  ► External changes to environment

  ► Changes to class plan or rating plan

► Additional data that becomes available is a consideration.

  ► Particularly for predictors that were initially borderline

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Leverage model intellectual capital

There is often potential to leverage the intellectual capital that is developed for other purposes.

► Several examples of this include the following:

▶ Underwriting models may be extended to applications in a marketing context where there are opportunities for growth.

▶ Going one step further, an underwriting model could also be used to evaluate the potential of a company's agencies.

▶ Models originally designed for underwriting purposes could also be broadened to provide pricing indications.

The following slides go further into detail on marketing applications.

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Application of underwriting model for marketing use

When deploying underwriting models, consideration should be given to simultaneous application in marketing.

► The following aspects will need to be addressed:

   ► Competitive position: assessment of how much business the company stands to win or lose in a market given competitive position

   ► Distribution channel strengths/weaknesses: identification of channels or agencies that may be compatible with marketing initiatives

Application of underwriting model for marketing use

► Current policyholder base: possibility of leveraging current policyholders to gain new business through targeted referrals

► Line of business/account focus: recognition of company/client philosophy in each line (priority line vs. loss leader)

► Potential policyholders can be pre-scored and sorted using marketing models

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Group	Group Score	Score	License Number	Nearest Agent	Name	Specialty	Address	City	Zip	Phone
	0.178	0.178	13172	AGENT 6	Physician 1	Pediatrics	Address 1	MILTON	xxxxx-1567	555-243-6361
A	0.238	0.210	71531	AGENT 1	Physician 2	Family Practice	Address 2	PHILADELPHIA	xxxxx-3670	555-981-1041
B	0.564	0.236	57666	AGENT 2	Physician 3	Family Practice	Address 3	PHOENIXVILLE	xxxxx-1521	555-648-5466
	0.245	0.245	30108	AGENT 1	Physician 4	Ophthalmology	Address 4	PITTSBURGH	xxxxx-2718	555-707-0341
	0.247	0.247	22882	AGENT 9	Physician 5	Psychiatry	Address	FT WASHINGTON	xxxxx-2248	555-456-8668
A	0.238	0.251	13348	AGENT 3	Physician 6	Family Practice	Address 2	PHILADELPHIA	xxxxx-3670	555-981-1041
	0.255	0.255	68656	AGENT 1	Physician 7	Family Practice	Address	PHILADELPHIA	xxxxx-1204	555-391-1722
	0.255	0.255	10370	AGENT 10	Physician	Anesthesiology	Address 7	MECHANICSBURG	xxxxx-0016	555-493-6654
⋮										
⋮										
	0.568	0.568	45519	AGENT 1	Physician 9	Pediatrics	Address 8	FOUNTAIN HILL	xxxxx-3634	555-456-3638
	0.582	0.582	47197	AGENT 7	Physician 10	Internal Medicine	Address 9	HERSHEY	xxxxx-3010	555-590-3142
	0.587	0.587	42407	AGENT 2	Physician 11	Family Practice	Address 10	PHILADELPHIA	xxxxx-1462	555-662-6250
	0.592	0.592	23000	AGENT 8	Physician 12	Family Practice	Address 11	PITTSBURGH	xxxxx-7671	555-853-5733
	0.593	0.593	28414	AGENT 10	Physician 13	Neurology	Address 12	PHILADELPHIA	xxxxx-2737	555-272-2460
	0.596	0.596	14443	AGENT 4	Physician 14	General Surgery	Address 13	PITTSBURGH	xxxxx-8438	555-453-1614
	0.597	0.597	5643	AGENT 6	Physician 15	Thoracic Surgery	Address 14	LEBANON	xxxxx-6901	555-757-3765
C	0.841	0.599	29733	AGENT 8	Physician 16	Child Psychiatry	Address 15	GLENSHAW	xxxxx-4310	555-843-9501
⋮										
⋮										
	0.899	0.899	14819	AGENT 7	Physician 17	Family Practice	Address 16	HAVERFORD	xxxxx-5736	555-763-1233
	0.899	0.899	15128	AGENT 7	Physician 18	Family Practice	Address 17	PHILADELPHIA	xxxxx-4006	555-456-2062
	0.904	0.904	16357	AGENT 7	Physician 19	Family Practice	Address 18	PITTSBURGH	xxxxx-5338	555-648-1575
C	0.841	0.906	10124	AGENT 1	Physician 20	Child Psychiatry	Address 15	GLENSHAW	xxxxx-4310	555-843-9501
B	0.564	0.906	15287	AGENT 1	Physician 21	Family Practice	Address 3	PHOENIXVILLE	xxxxx-1521	555-648-5466
	0.917	0.917	80790	AGENT 8	Physician 22	Internal Medicine	Address 19	NORTHUMBERLND	xxxxx-0850	555-649-3683
	0.918	0.918	27390	AGENT 7	Physician 23	Urological Surgery	Address 20	BRYN MAWR	xxxxx-5136	555-946-4257
	0.922	0.922	23454	AGENT 8	Physician 24	Family Practice	Address 21	WILKES BARRE	xxxxx-1212	555-635-6543

ATTRACT

MIDDLE

AVOID

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Heat map for use in target marketing

► Determine the best geographic areas to focus marketing efforts.

► Provide intelligence to agencies regarding information that can help evaluate potential customers.

► Align distribution channels with strengths in the book of business.

Book of Business in Illinois

◆ - Agent location

Risk Score ▇ 0.0 – 0.2 ▇ 0.2 – 0.4 ▇ 0.4 – 0.6 ▇ 0.6 – 0.8 ▇ 0.8 – 1.0

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