
CL-3: Commercial Applications of Predictive Analytics

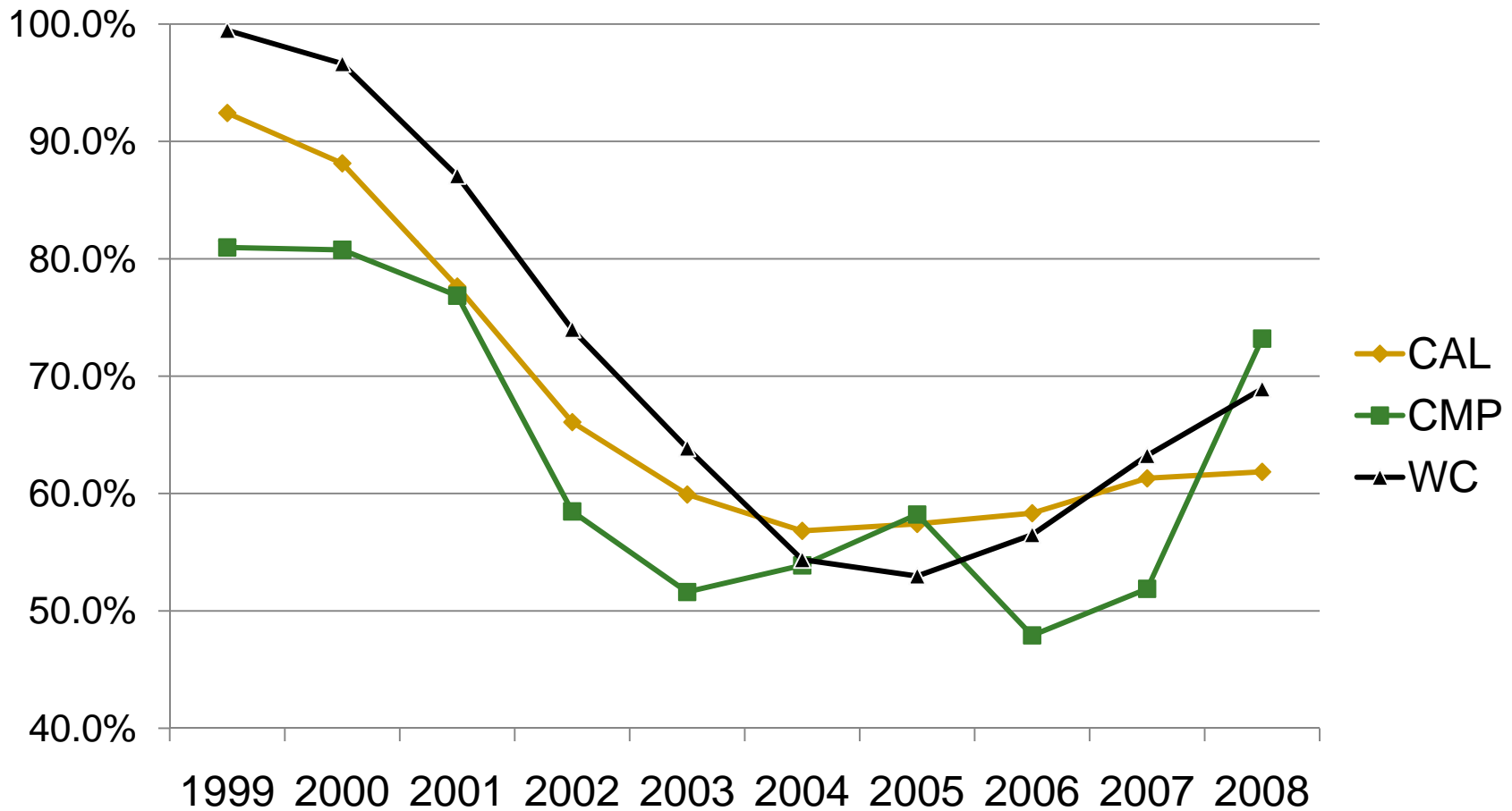
Robert J. Walling III, FCAS, MAAA
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Chicago, IL

Discussion Outline

- Market Status
- Data Sources
- Implementation
 - Rating Plans
 - Underwriting Scores
 - Other
- Follow Through

Market Status

Net Ultimate Loss & DCC Ratios



Current Main Street Market Shares

Rank	Insurance Group	DWP \$(000)	Market	
			Share	Cumulative
1	Liberty Mutual Insurance Companies	8,821,030	7.8%	7.8%
2	Travelers Insurance Companies	8,111,954	7.2%	15.0%
3	American International Group Inc	8,022,228	7.1%	22.1%
4	Zurich Financial Services NA Group	5,811,128	5.1%	27.2%
5	Hartford Insurance Group	5,336,891	4.7%	31.9%
6	Nationwide Group	3,051,929	2.7%	34.6%
7	Chubb Group of Insurance Companies	2,772,976	2.5%	37.1%
8	CNA Insurance Companies	2,705,088	2.4%	39.5%
9	State Farm Group	2,483,052	2.2%	41.6%
10	State Compensation Insurance Fund of CA	2,387,692	2.1%	43.8%
11	W. R. Berkley Group	2,265,200	2.0%	45.8%
12	ACE INA Group	2,118,827	1.9%	47.6%
13	Farmers Insurance Group	1,907,668	1.7%	49.3%
14	Progressive Insurance Group	1,882,116	1.7%	51.0%
15	Auto-Owners Insurance Group	1,728,019	1.5%	52.5%
16	Cincinnati Insurance Companies	1,725,706	1.5%	54.0%
17	QBE Americas Group	1,684,836	1.5%	55.5%
18	Old Republic General Insurance Group	1,452,696	1.3%	56.8%
19	Allianz of America	1,310,682	1.2%	58.0%
20	Safeco Insurance Companies	1,287,336	1.1%	59.1%

CL Predictive Analytics – Here to Stay

- Five Leading BOP Insurers Using Predictive Modeling 2000-2006:
 - Beat Industry Loss Ratio by 3.5 – 6.6 Points
 - Outperformed Industry 5 of 7 years, Up to 15 Points
 - All Grew Faster Than Industry
 - One Group by 5% per year!
- Superior Growth ***and*** Operating Results
- Sustained Competitive Advantage
- Cream Skimming, Adverse Selection

Data Sources

Un(der)-Explored Data Sources

- Internal Data
- Credit-based Tools
- Other External Data Sources

Internal Data

- Rating
- Underwriting
 - Cancellation
 - Reinstatement
 - Endorsements
- Agency
- Marketing
- Multiline information (auto, WC, umbrella, broadening endorsements, etc.)
- Affiliations/Associations
- Claims
- Application Information
- Billing Plan
- Payment history

Internal Data – ACORD BOP Application

- Percent Occupied
- Years in Business
- Age of Building
- Alarms
- Computer Back Ups
- Building Height
- Swimming Pools
- Safety Program
- Elevators
- Years of Same Mgt.
- Updated Systems
- Sole Occupancy
- Hours of Operation
- Deliveries?
- Franchise?
- # of Employees/Leasing

Credit Information

■ Information Available

- ❑ Credit scores (Personal & Commercial)
- ❑ Payment history
- ❑ Balance information
- ❑ Public records

■ Sources

- ❑ Equifax
- ❑ Experian
- ❑ TransUnion
- ❑ ChoicePoint/LexisNexis
- ❑ Third party vendors



Credit Scores Include Demographics Such As...

- Years in Business
- Standard Industrial Classification codes
- Business Size
 - Revenues
 - Capital
 - Net Worth
 - Number of Employees
- History
- Reputation
- Background of Principals
- Structure of the business

Credit Data Example

Public Filings

The following data includes both open and closed filings found in D&B's database on this company.

Record Type	Number of Records	Most Recent Filing Date
Bankruptcies	0	-
Judgments	0	-
Liens	0	-
Suits	0	-
UCC's	1	01/27/03

The public record items contained herein may have been paid, terminated, vacated or released prior to today's date.

Financial Stress Score Class

Financial Stress Score Class: 1

(Lowest Risk:1; Highest Risk:5)

Demographics Example

D&B Company Overview

This is a headquarters location

Branch(es) or Division(s) exist Y

Chief Executive	JOSEPH HERBERS, PRES
Year Started	2003
Employees	45 (35 Here)
Financing	SECURED
SIC	8999
Line of business	Services
NAICS	541612
History Status	CLEAR

A Hierarchical Approach to No-Hits

- Use a Commercial Score First
 - High hit rate for large, more established businesses
 - Not great on small, new businesses
- New, Small Businesses often have simple ownership structure
- Use Personal Credit Information on Principal Owner
 - Close proxy to financial resolve of a small business
 - Some programs focusing exclusively on small business skip commercial score

Other External Data Options

- Zip Code-based Demographics
- Property Characteristics (MSB, First American)
- Motor Vehicle Records
- Vehicle/Driver Characteristics (SAFER, Central Analysis Bureau, RL Polk, DriveCam, Green Road)
- Loss Prevention Survey Scores
- Prior Claims

SAFER (Part 1)

Entity Type:

Carrier

Out of Service
(Interstate Only):

No

Out of Service
Date:

None

Legal Name:

KA BULK TRANSPORT LLC

DBA Name:

KLEMM TANK LINES

Physical Address:

2204 PAMPERIN RD
GREEN BAY, WI 54313-8931

Phone:

(920) 434-6343

Mailing Address:

P O BOX 11708
GREEN BAY, WI 54307-1798

USDOT Number:

171830

State Carrier ID
Number:

MC or MX Number:

MC-147216

DUNS Number:

02-320-3300

Power Units:

547

Drivers:

636

MCS-150 Form
Date:

10/14/2009

MCS-150 Mileage
(Year):

49,073,288 (2008)

SAFER (Part 2)

Inspection results for 24 months prior to: [02/22/2010](#)

Total inspections: 1105

Note: Total inspections may be less than the sum of vehicle, driver, and hazmat inspections. Go to [Inspections Help for further information.](#)

Inspections:

	Inspection Type	Vehicle	Driver	Hazmat
Inspections		859	1095	919
Out of Service		77	3	13
Out of Service %		9%	0.3%	1.4%
Nat'l Average % (2007- 2008)		22.27%	6.60%	5.02%

Crashes reported to FMCSA by states for 24 months prior to: [02/22/2010](#)

	<u>Crashes:</u>				
	Type	Fatal	Injury	Tow	Total
Crashes		1	20	28	49

Loss Control Survey as Scorecard Input

Core Section	Questions	Points	# of N/A
1. Frequency and Severity Trends	3	10	0
2. Loss Prevention Direction	13	41	1
3. Substance Abuse	1	4	
4. Accident Investigation	2	6	0
5. Claims Management	3	12	0
6. Emergency Response	5	11	1
7. Regulatory Compliance	14	21	6
8. Liability	4	7	2
9. Motor Vehicle	4	14	0
10. Ergonomics	4	2	2
TOTALS	53	128	12

Supplemental Section	Applicable Sections	Questions	Points	# of N/A
A. Construction	<input checked="" type="checkbox"/>	20	50	5
B. Distribution	<input type="checkbox"/>	6		
C. Health Care	<input type="checkbox"/>	6		
D. Quarries	<input type="checkbox"/>	12		
E. Service Companies	<input type="checkbox"/>	4		
F. Transportation	<input type="checkbox"/>	7		
TOTALS		20	50	5

$$\left(\frac{73}{\text{Total Questions (Core \& Supplemental)}} - \frac{17}{\text{\# of N/A}} \right) \times 4 = \frac{224}{\text{Maximum Points}}$$

$$\frac{178}{\text{Total Points (Core \& Supplemental)}} \div \frac{224}{\text{Maximum Points}} = \frac{79}{\text{Final Score}} \%$$

Implementation – Class Plan

WC Class Analysis

NCCI Class Code	Class Description	Revised Company Exposure (\$00)	2004 NCCI Loss Cost	Proposed Loss Cost	Change from Current
7228	Trucking: Local Hauling Only	66,891	9.81	6.68	-32%
7380	Commercial Drivers	95,217	5.48	7.39	35%
7382	Bus Company	12,658	5.41	6.04	12%
8006	Gasoline Station	52,068	3.78	5.39	42%
8385	Bus Company	10,496	3.47	4.32	25%
8387	Service Stations	32,628	3.20	1.83	-43%
8391	Automobile Body Repair Shop	118,611	4.01	2.64	-34%
8393	Automobile Body Repair	33,165	2.99	0.98	-67%
8748	Automobile Salespersons	96,971	1.75	2.36	35%
42	Landscape Gardening & Drivers	70,943	8.45	4.46	-47%
5190	Electrical Wiring - Within Buildings	206,541	3.60	2.51	-30%
5437	Carpentry - Interior	111,300	6.87	4.83	-30%
5474	Painting Or Paperhanging	113,721	6.65	4.36	-34%
5606	Contractor - Executive Supervisor	113,489	2.09	14.49	593%
9052	Hotel: All Other Employees	863,123	3.22	2.53	-21%
9058	Hotel: Restaurant Employees	167,039	2.15	2.34	9%
9082	Restaurant NOC	709,574	2.61	1.83	-30%
9083	Restaurant: Fast Food	139,396	2.45	3.36	37%
8017	Store: Retail NOC	280,356	2.40	2.74	14%
8033	Store: Meat, Grocery & Provision Stores	458,603	2.85	2.14	-25%
8601	Architect Or Engineer - Consulting	135,932	0.99	1.25	26%
8742	Salespersons, Collectors or Messengers	672,184	0.95	1.20	26%
8810	Clerical Office Employees NOC	2,628,543	0.55	0.74	34%
8820	Attorney - All Employees & Clerical	148,121	0.44	1.48	237%
8832	Physician & Clerical	342,051	0.63	0.39	-38%

Class Refinement

Eligible Occupancies	Classification Factors			Class Code
	Building Lessors	Building Occupants	Business Personal Property	
The following are the eligible classes of business. No other types of business may be insured under this program. See also the Ineligibility List in the main section of this manual.				
Air Conditioning Equipment Dealers	1.314	1.150	0.806	00072
Alterations – Clothing	1.278	1.333	1.512	71961
Animal Cemetery	NA	0.526	0.619	00056
Animal Cemetery – Lessors Risk	0.604	NA	0.619	00056
Animal Hospital	NA	0.526	0.619	00057

ICC Weight Classes

Truck Class Definitions



Commercial Light Duty Trucks - Examples: Minivan, Utility Van, Multi-Purpose, Pickup, Mini-Bus, Step Van.

Where the Gross Vehicle Weight is:

Class 1 (Gvw 0 - 6000)

Class 2 (Gvw 6001 - 10000)

Class 3 (Gvw 10001 - 14000)



Medium Duty Trucks - Examples: City Delivery, Large Walk-in, Bucket, Landscaping.

Where the Gross Vehicle Weight is:

Class 4 (Gvw 14001 - 16000)

Class 5 (Gvw 16001 - 19500)

Class 6 (Gvw 19501 - 26000)



Heavy Duty Trucks - Examples: Refuse, Tow, City Bus, Furniture, Conventional, COE, Fuel, Fire Engine, Refrigerated, Dump, Cement.

Where the Gross Vehicle Weight is:

Class 7 (Gvw 26001 - 33001)

Class 8 (Gvw 33001 - 150000)

Cargo/Trailer Combinations

■ Flatbed

- ❑ Steel
- ❑ Pipe
- ❑ Building Materials
- ❑ Other

■ Dry Van

- ❑ Carpet/Garment
- ❑ Food
- ❑ Alcohol/Tobacco
- ❑ Moving & Storage
- ❑ Less Than Trailer Load (LTL)
- ❑ Other

■ Tanker

- ❑ Food Grade
- ❑ Petroleum Products
- ❑ Chemical
- ❑ Haz Mat

■ Refrigerated Box

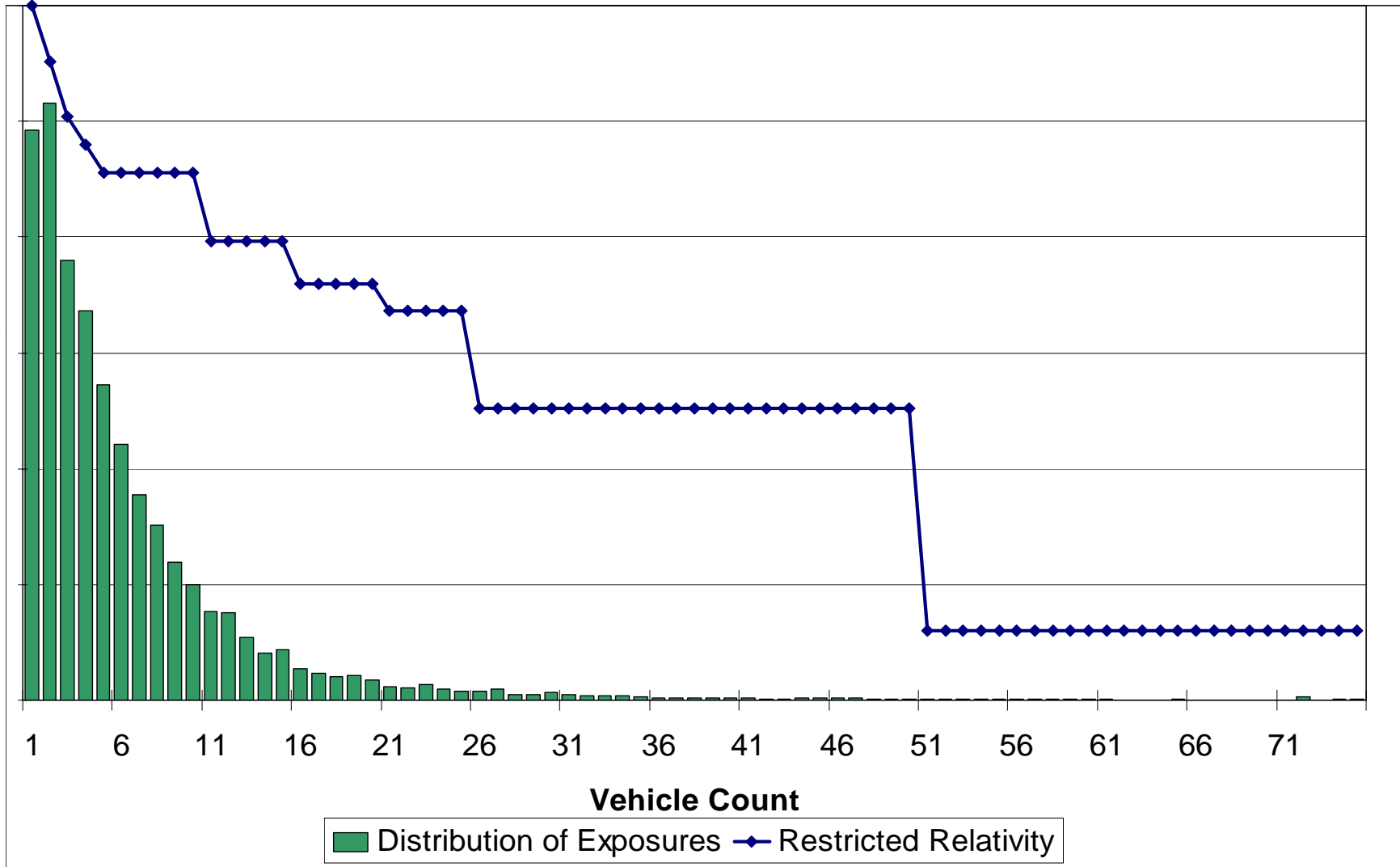
- ❑ Produce
- ❑ Seafood
- ❑ Alcohol/Tobacco
- ❑ Other

SIC Relativities

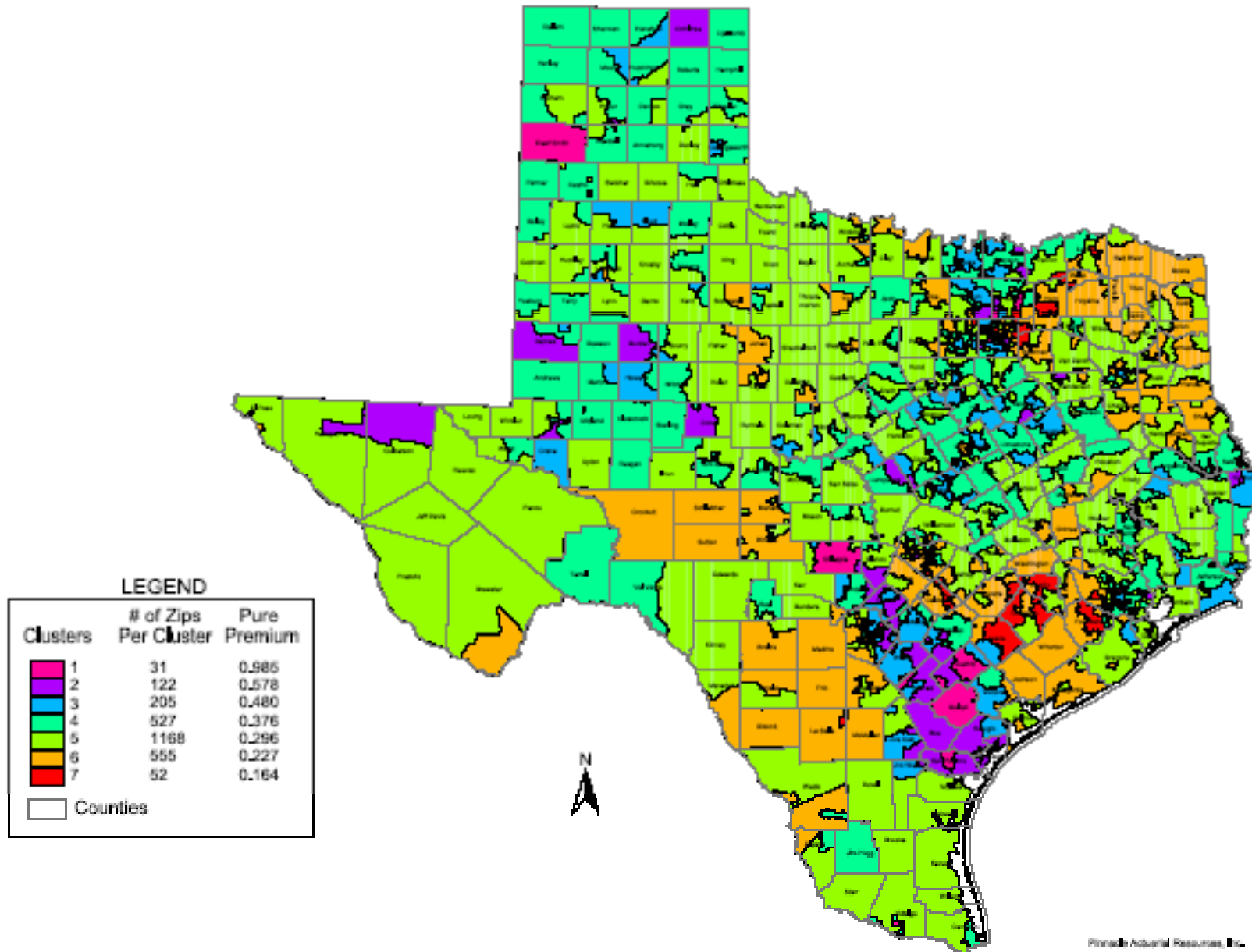
SIC Rating Factors

SIC	Factors	Descriptions
0742	0.85	Veterinary Services
0782	1.10	Lawn and Garden
1711	1.05	Plumbing, Heating, Air Conditioning
1731	0.95	Electrical Work
1742	0.85	Plastering, Drywall and Installation
1743	1.10	Terrazzo, Tile, Marble, Mosaic Work
1761	0.85	Roofing, Siding and Sheet Metal
2759	0.90	Commercial Printing
5261	0.85	Retail Nurseries and Garden Stores
5531	0.85	Auto and Home Supply Stores
5712	1.10	Furniture Stores
6512	0.90	Non Residential Building Operators
6512A	0.90	Real Estate: Offices
6512B	0.90	Real Estate: Retail Centers
6512C	0.90	Real Estate: Industrial Parks
6512D	0.90	Real Estate: Warehouse

Impact of Number of Vehicles



Territory Clustering



Multi-Policy Discounts

CATEGORIES

DISCOUNT applied to the Businessowners Policy

Commercial Automobile Policies	7%
Commercial Automobile Policies (excluding Garage Liability and Dealers Blanket).	
Commercial Umbrella Policies	4%
Commercial, Econ-O-Pak and Habitational Umbrella policies.	

Life, Health or Annuity Policies 2%

- The following policies written on an owner, partner or corporate officer of the business:
 - Life policy (nongroup) with a face amount of \$100,000 or more or Simplified Issue Life policy with a face value of \$50,000 or more; or
 - Annuity policy with a combined cash value exceeding \$10,000 or more, or
 - Disability Income policy with a monthly benefit of \$1,000 or more; or
 - Long Term Care Policy.

Package Discounts

★G. PACKAGE DISCOUNTS

The following discounts apply to Commercial Auto premium when written in conjunction with the following Businessowners products.

Wholesale Distribution Industry	15.0%
Artisan Contractor Industry	5.0
Restaurants	5.0
Retail and Service Industry	5.0
Habitational	5.0
Commercial Real Estate	5.0
Manufacturing Industry Businessowners Policy	5.0
Auto Service and Repair	5.0

The following discounts apply to Commercial Auto Premium when written in conjunction with the following Sentinel Program:

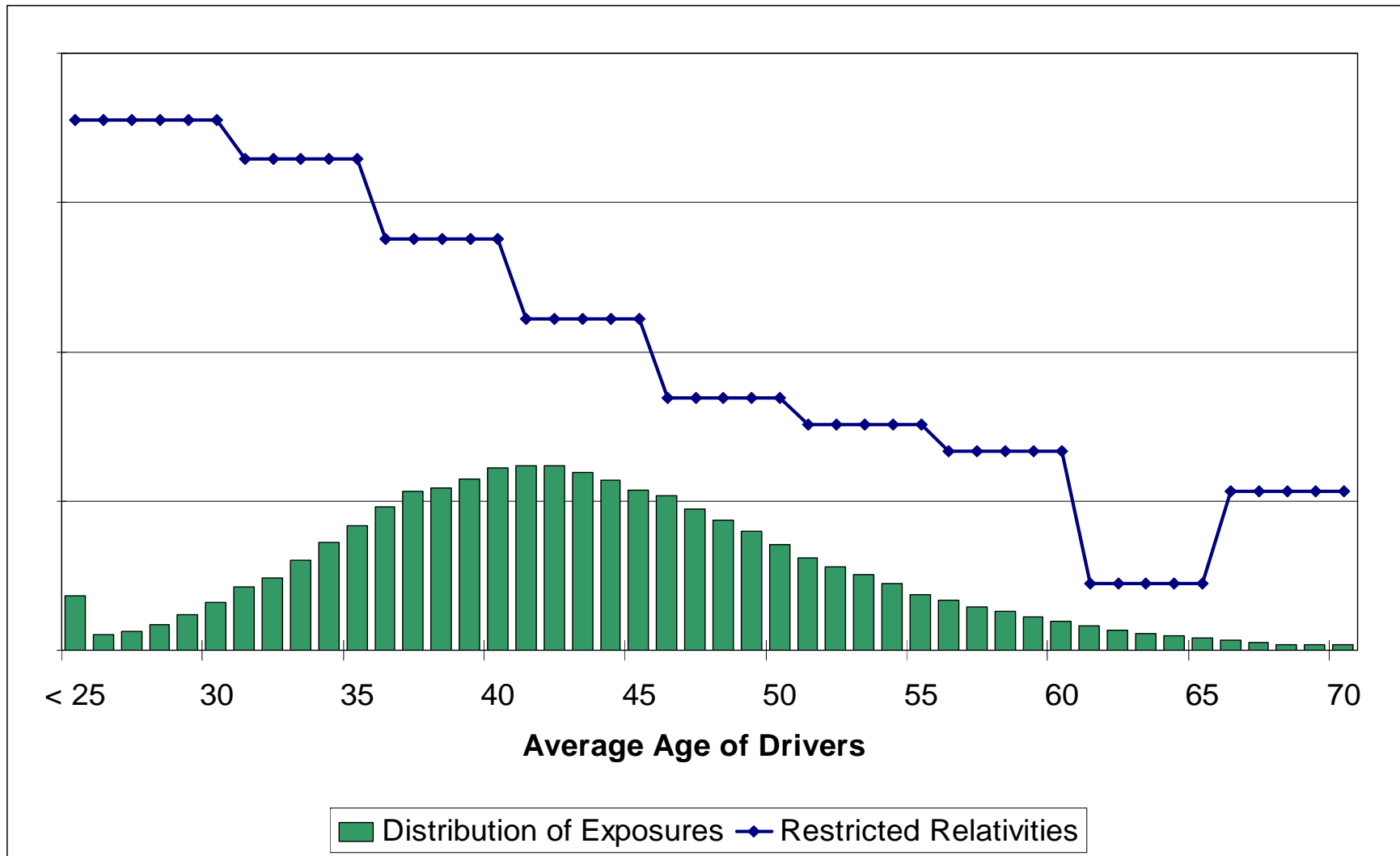
Wholesale Distribution Industry	15.0%
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Implementation – Underwriting Score

Underwriting Score

- Definition – A scaling of multiple predictive model factors into a single metric resulting in a single premium modification and/or an eligibility threshold.

Impact of Average Driver Age



CA Scorecard Example

Accidents per Driver

Accidents/ Driver	Score Points
0%	40
Up to 20%	25
21-40%	15
40-80%	10
More than 80%	0

Moving Violations per Drive

Moving Violations/ Driver	Score Points
Up to 20%	75
21-40%	50
41-60%	25
More than 60%	0

Credit Score

Credit Score	Score Points
A	75
M	20
NS	40
S	125
U	0

Average Driver Age

Average Driver Age	Score Points
25 & Under	50
26-30	35
31-35	20
36-40	40
41-45	60
46-50	75
51-55	85
56-60	90
61-65	95
66-70	100
70 & over	0

Number of Vehicles

# of Vehicles	Score Points
0-4	0
5-10	25
11-15	30
16-20	40
21-25	45
26-50	80
Over 50	125

MVR No-Hits per Driver

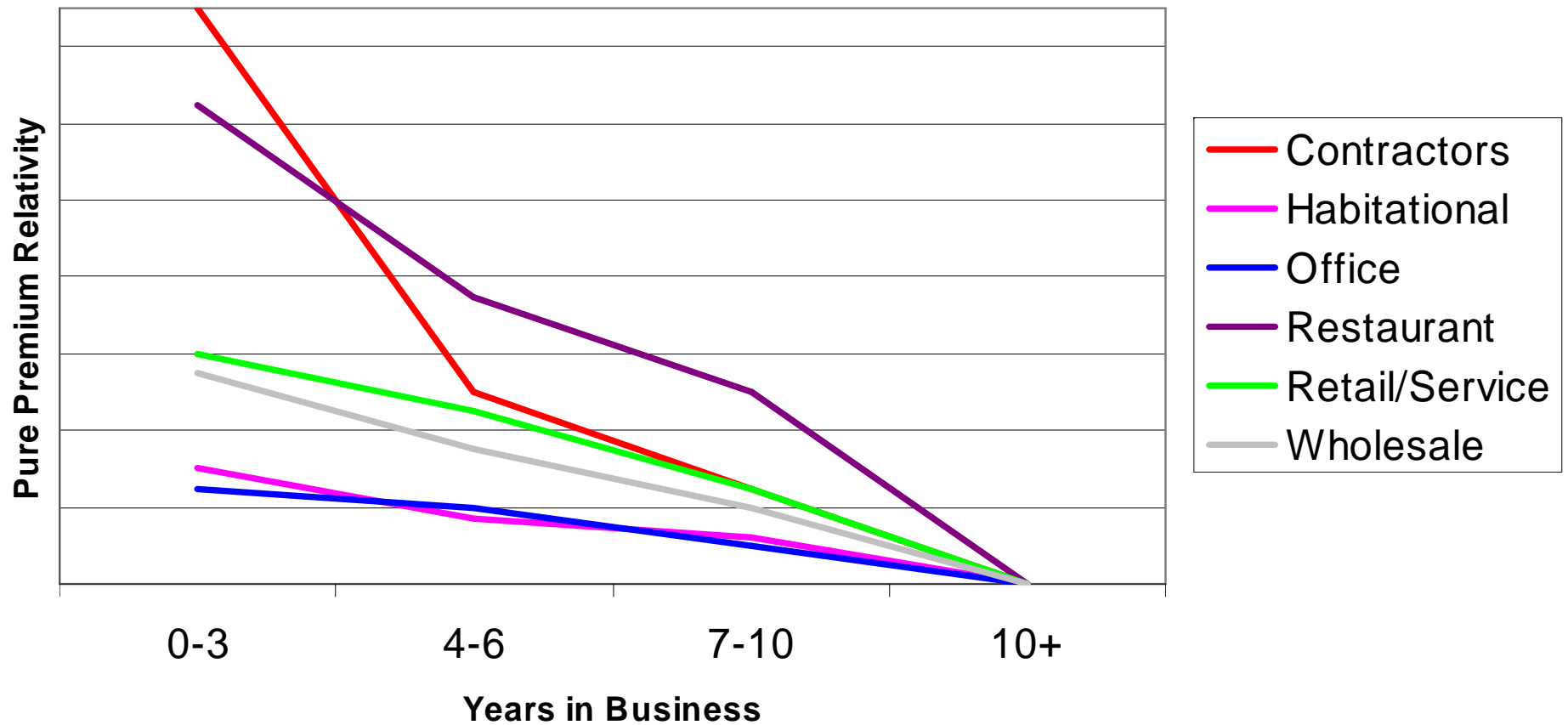
MVRs w/ "No Hit"/ Total Drivers	Score Points
0%	35
Up to 10%	15
More than 10%	0

CA Scorecard Example

Total Points	Relativity
751-800	0.50
700-750	0.60
651-700	0.75
600-650	0.84
551-600	0.92
500-550	1.00
451-500	1.20
400-550	1.35
351-400	1.50
300-350	1.70
251-300	2.00
200-250	2.25

Interactions Matter

Pure Premium Relativities by Program and Years in Business



Underwriting Scorecards with Interactions

Multivariate analysis allows the modeling of interactions and facilitates incorporation into scorecards

Years of Current Control	Score Points					
	Contr.	Habit.	Off.	Rest.	Ret./Serv.	Wholes.
0-3	60	115	120	70	95	100
4-6	100	130	125	85	100	110
7-10	120	135	135	100	120	125
10+	150	150	150	150	150	150

Scorecard Advantages

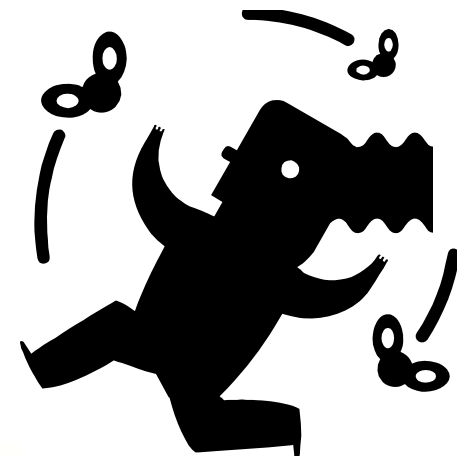
- Regulatory
 - Underwriting Guidelines
- Preserve Competitive Advantage
 - To File or Not to File?
- Small & Class Specific Factors
- Response to Counter-Intuitive Results
Similarity to Credit Scoring (Intuitive)
- **Ability for Underwriter/Agent Feedback**

Lots of Small Factors

Criteria and Point Allocation

For ALL Natures of Business, the following apply:

- Percent Building Occupied
95-100% = 4 pts; 90-65% = 2 pts; all else = 0 pts.
- Years in Business
Over 10 = 16 pts; 5 to 10 = 8 pts; all else = 0 pts.
- Age of Building
Less than 10 = 16 pts; 10 to 25 = 10 pts; 26-50 = 2 pts; over 50 = 0 pts.
- Alarms
Local = 4 pts; Central Station (U.L. Appd) = 16 pts;
Central Station (Other) = 8 pts; None = 0 pts.
- Building Appraisal Received - owner occ. only
Yes = 4 pts; No = 0 pts.
- EDP: Off-Site Backup
Yes = 2 pts; No = 0 pts.
- Building Height (# stories) - owner occ. only
Less than 3 = 8 pts; 3 to 6 = 4 pts; all else = 0 pts.
- Parking Lot or Garage at premises - owner occ. only
Yes = 0 pts; No = 4 pts.



Class-Specific Scoring

In addition to the above, the following objective criteria are used, depending on the nature of business of the occupancy.

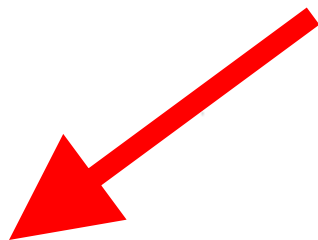
- **Habitational**
- Owner/Manager on Premises
- Athletic Courts
- Clubhouse
- Exercise Room
- Playground
- Pool with Diving Board
- Woodstove
- Fireplace
- Restaurant on Premises

- **Office-All Other, Office-Medical**
- Sole Occupancy
- Restaurant on Premises

- **Funeral Home**
- Sole Occupancy

- **Retail/Service/Wholesale**
- Sole Occupancy
- Closing Time Before 9pm
- Chain or Franchise
- Theft Monitoring Devices
- Restaurant on Premises
- Off-Premises Repair/Installation < 10%
- Delivery Operations
- Inventory Skidded

- **Restaurant**
- Sole Occupancy
- Closing Time Before 9pm
- Chain or Franchise
- Delivery Operations
- Inventory Skidded



Underwriting Scorecard - Farmers

Risk Characteristic Pricing Element	Response	Point Value
Years in Business at this Location	New in Business	5
	Less than 1 Year	4
	1-2 Years	3
	2-3 Years	1
	3-4 Years	0
	4-5 Years	-1
	5-6 Years	-2
	6 Years or More	-3
Responsible for Parking Lot	Yes	2
	No	0
Wiring Year	25 Years or More	4
	20-24 Years	0
	11-19 Years	-2
	10 Years or Less	-4

Underwriting Scorecard - Farmers

Location of Business	Attached to Habitational Structure	10
	Stand-alone Building	3
	Strip Shopping Center	0
	Enclosed Mall	-3
Hours of Operation Open to Public	21-24 Hours	10
	16-20 Hours	5
	12-15 Hours	0
	Less than 12 Hours	-5
Percentage of Sales from Catering Services	Over 10%	10
	1-10%	5
	None	0
Total Percent of Sales from Liquor Sales	More than 20%	5
	1-20%	2
	None	0
Drive Thru	Yes	0
	No	0
Credit Score	All Responses	0

Underwriting Scorecard - Farmers

Debit or Credit Factors

Point Values				Debit or Credit Factors
Over	70	points		1.15
66	to	70	points	1.14
61	to	65	points	1.13
56	to	60	points	1.12
51	to	55	points	1.11
46	to	50	points	1.10
41	to	45	points	1.09
36	to	40	points	1.08
31	to	35	points	1.07

Travelers BOP Scorecard

Master Pac Tier Rating Factors

Pricing Track	Pricing Factor	Pricing Track	Pricing Factor
1	.52	21	1.14
2	.55	22	1.16
3	.58	23	1.20
4	.61	24	1.25
5	.64	25	1.30
6	.67	26	1.35
7	.70	27	1.40
8	.73	28	1.45
9	.76	29	1.50
10	.79	30	1.60
11	.82	31	1.70
12	.85	32	1.80
13	.88	33	1.90
14	.91	34	2.00
15	.94	35	2.10
16	.97	36	2.25
17	1.00	37	2.40
18	1.03	38	2.55
19	1.06	39	2.70
20	1.10	40	2.85

**NOTICE
THE
LIFT!**

CA Scorecard Example - Hartford

Company Rates applicable to Sentinel Insurance Company, LTD only: ✓

Based on the following risk characteristics:

1. MVR Information
2. Average Driver Age
3. Youthful Composition
4. Length of Credit History
5. Total Number of Trades
6. Percentage of Balance Overdue of All Trades
7. Total Balance of Regular Trades
8. Number of Public Records / Collections
9. Amount of Judgment
10. Average Number of Days Balance Overdue in the Past 3 Months
11. Number of Inquiries in the Past 9 Months
12. Years in Business (when financial information is not available)
13. Industry Classification
14. Percentage of TTT Power Units
15. Prior 3-Year Loss Frequency by Size of Risks
16. Other risk-specific characteristics that are not contemplated above

use the applicable tier factor as a final step prior to rounding to determine the final rates.

CA Scorecard Example - Hartford

Tier	Factor	Tier	Factor	Tier	Factor
1	0.40	18	0.81	35	1.66
2	0.42	19	0.85	36	1.73
3	0.43	20	0.89	37	1.81
4	0.45	21	0.92	38	1.88
5	0.47	22	0.96	39	1.96
6	0.49	23	1.00	40	2.05
7	0.51	24	1.05	41	2.13
8	0.54	25	1.09	42	2.23
9	0.56	26	1.14	43	2.32
10	0.58	27	1.19	44	2.42
11	0.61	28	1.24	45	2.52
12	0.63	29	1.29	46	2.63
13	0.66	30	1.35	47	2.74
14	0.69	31	1.40	48	2.86
15	0.72	32	1.46	49	2.98
16	0.75	33	1.53	50	3.11
17	0.78	34	1.59		

NOTICE THE LIFT!

UNINSURED/UNDERINSURED MOTORISTS Factor is 1.00.

Implementation - Other

Other Applications of Analytics

- Agency Management
- Eligibility Guidelines
- Rules Engines
 - Credit Updates
 - Exposure Audit
 - MVR Ordering
- Targeted Marketing

Targeted Marketing Example

- Your Company has a BOP Scorecard

- Customer Response Data Shows..

- Exceptional Hit Ratio
 - Superior Loss Ratio
 - Convenience Stores with
 - Hours of Operation \leq 16 Hours
 - In Business \geq 3 Years
 - Liquor Sales $<$ 25% of Total Revenues
 - Six or fewer Gas Pumps



- What happens if I buy a marketing list of all convenience stores that meet these criteria that are within 10 miles of one of my preferred agents?

Follow Through

From Project to Process to Culture



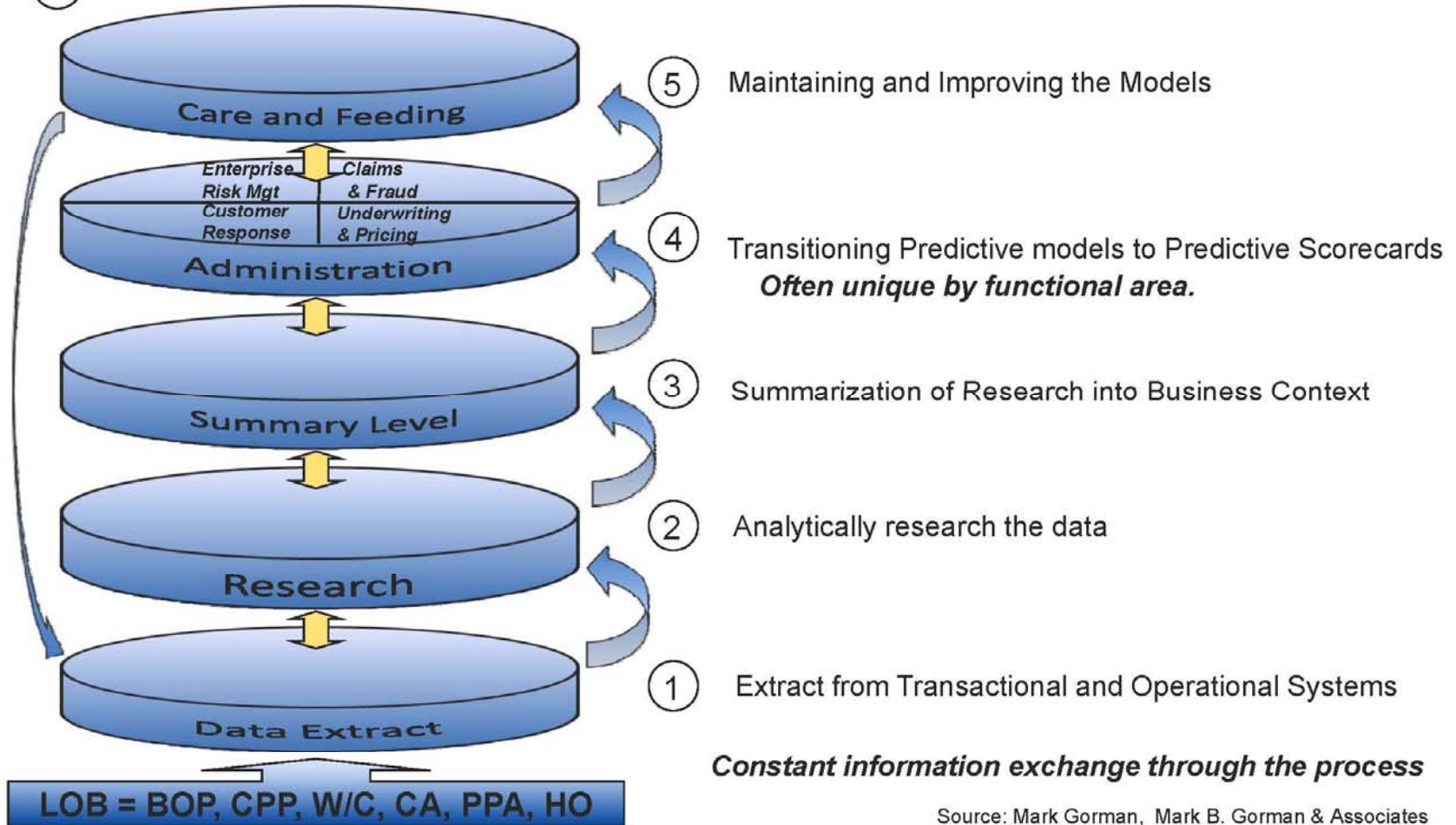
“Data Driven”

“Data Siloed”

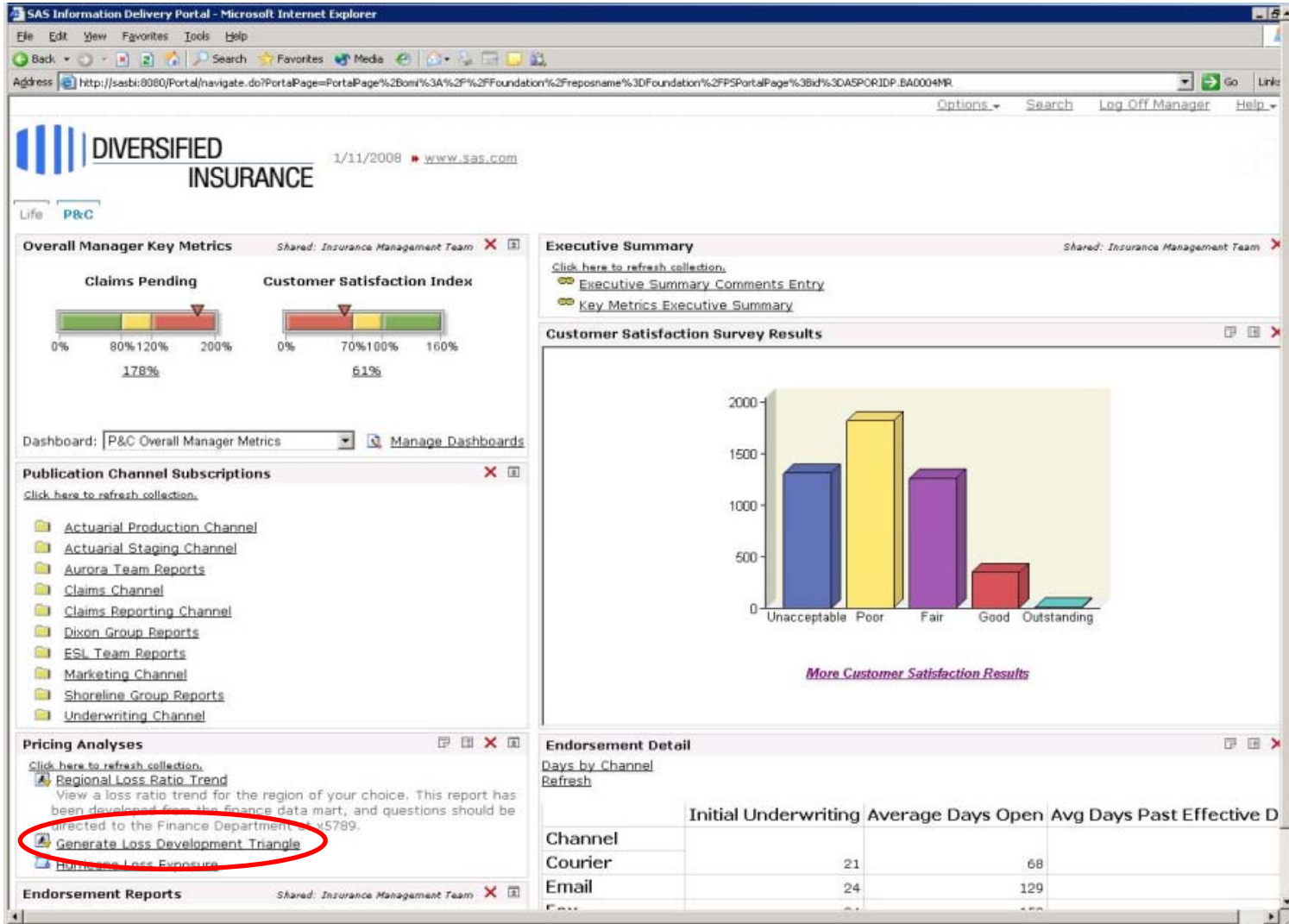
“Data
Aware”

Solution Overview

⑥ Leverage new findings to provide feedback to the requirements of data extraction for improved models.



Analytics Dashboards



Conclusion

- “The goal is to transform **data** into information, and information into insight”
 - Carly Fiorina, President –HP

- “Don't be buffaloed by experts and elites. Experts often possess more **data** than judgment. Elites can become so inbred that they produce haemophiliacs who bleed to death as soon as they are nicked by the real world.”
 - Colin Powell