



Verisk  
Insurance Solutions

# Integrating Telematics Into Rating Plans

CAS Ratemaking and Product Management Seminar  
March 12th, 2013

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# Project Greenlight



Image Credit: Shutterstock® / Oleg Liubimtsev

# Mission Impossible?

$$\begin{array}{l}
 \text{"Break Even"} \\
 \text{L/R Improvement} \\
 \text{on UBI Book}
 \end{array}
 = \frac{\begin{array}{c} \text{Expenses Created by UBI} \\ d + 12 \times T \times w \end{array}}{\begin{array}{c} N \times T \times T \\ \text{UBI Premium Base} \end{array}}$$

T = useful life (years)  
N = device rotations / yr.

d = device cost (% of P)  
w = monthly service (% of P)

# There's Some There Here

Date	2013 /01 /28
Time (UTC)	07:05:45.65

Latitude	
Longitude	

Speed (MPH)	44 ↑ / 41 ↓
Driver Side Seatbelt	Engaged

Perform. (RPM)	2250 ↑ / 2100 ↓
Engine Temp (°F)	221 °

Trip Mileage	21.115
Trip Time	00:32:29.08

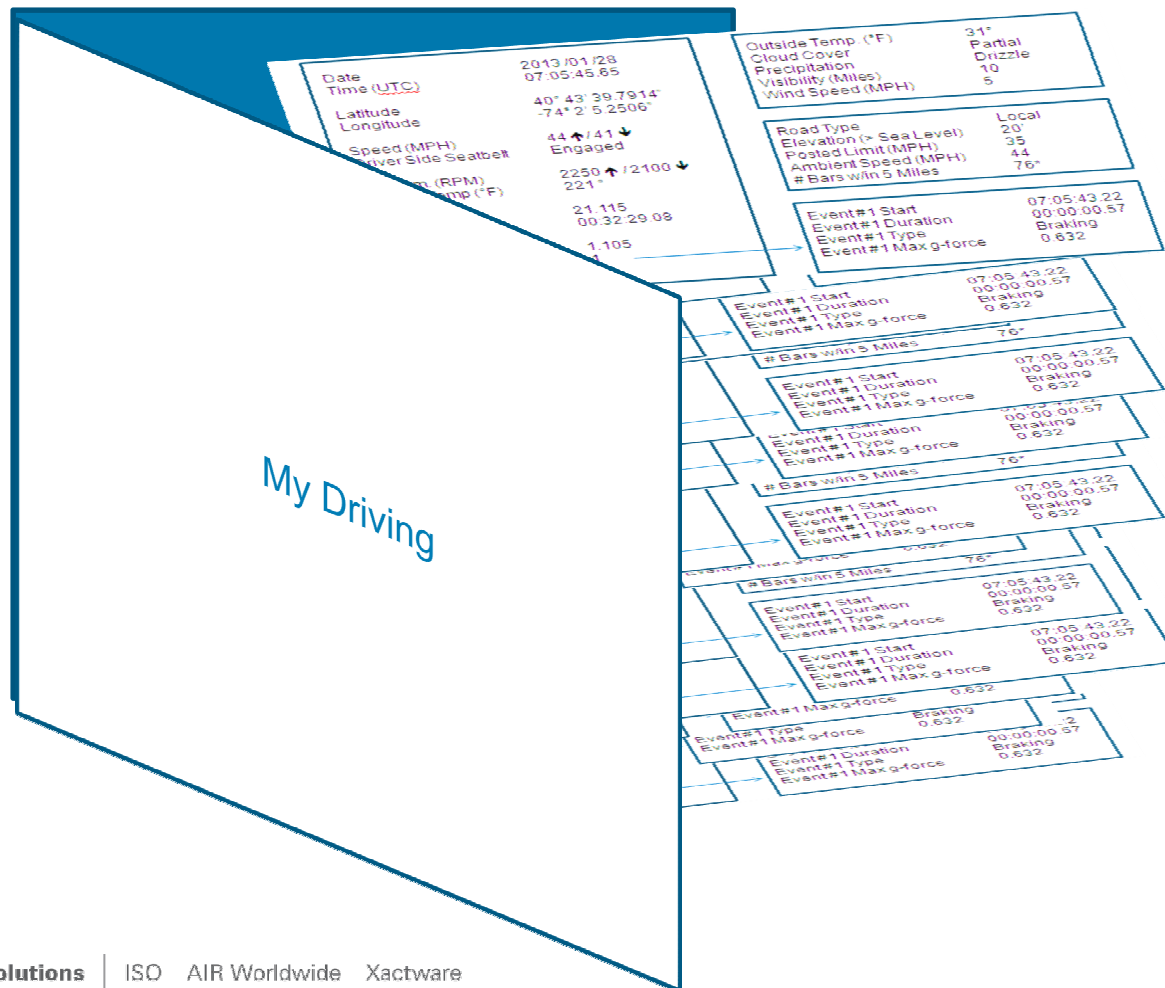
Trip Fuel (Gallons)	1.105
Accel. Events	1

Outside Temp. (°F)	31°
Cloud Cover	Partial
Precipitation	Drizzle
Visibility (Miles)	10
Wind Speed (MPH)	5

Road Type	Local
Elevation (> Sea Level)	20'
Posted Limit (MPH)	35
Ambient Speed (MPH)	44
# Bars w/in 5 Miles	76*

Event #1 Start	07:05:43.22
Event #1 Duration	00:00:00.57
Event #1 Type	Braking
Event #1 Max g-force	0.632

# Drill Down or Aggregate Up



# Data Considerations

- Granularity
- Credibility
- Homogeneity
- Salability
- Analytics
- Alternatives

# Integration Options

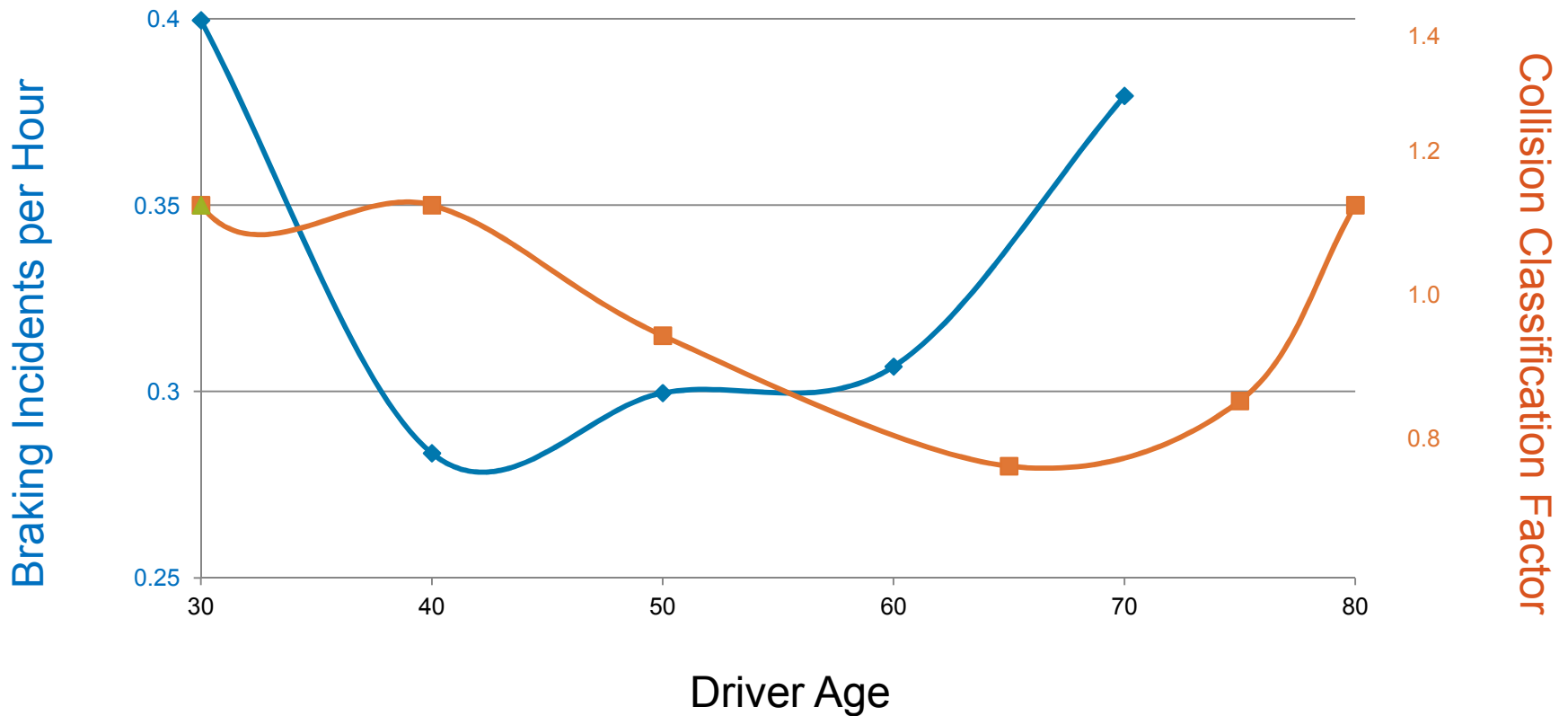
- Authenticate
- Substitute
- Refine
- Enhance
- Accelerate
- Overhaul



Image Credit: Shutterstock® / Oleg Liubimtsev

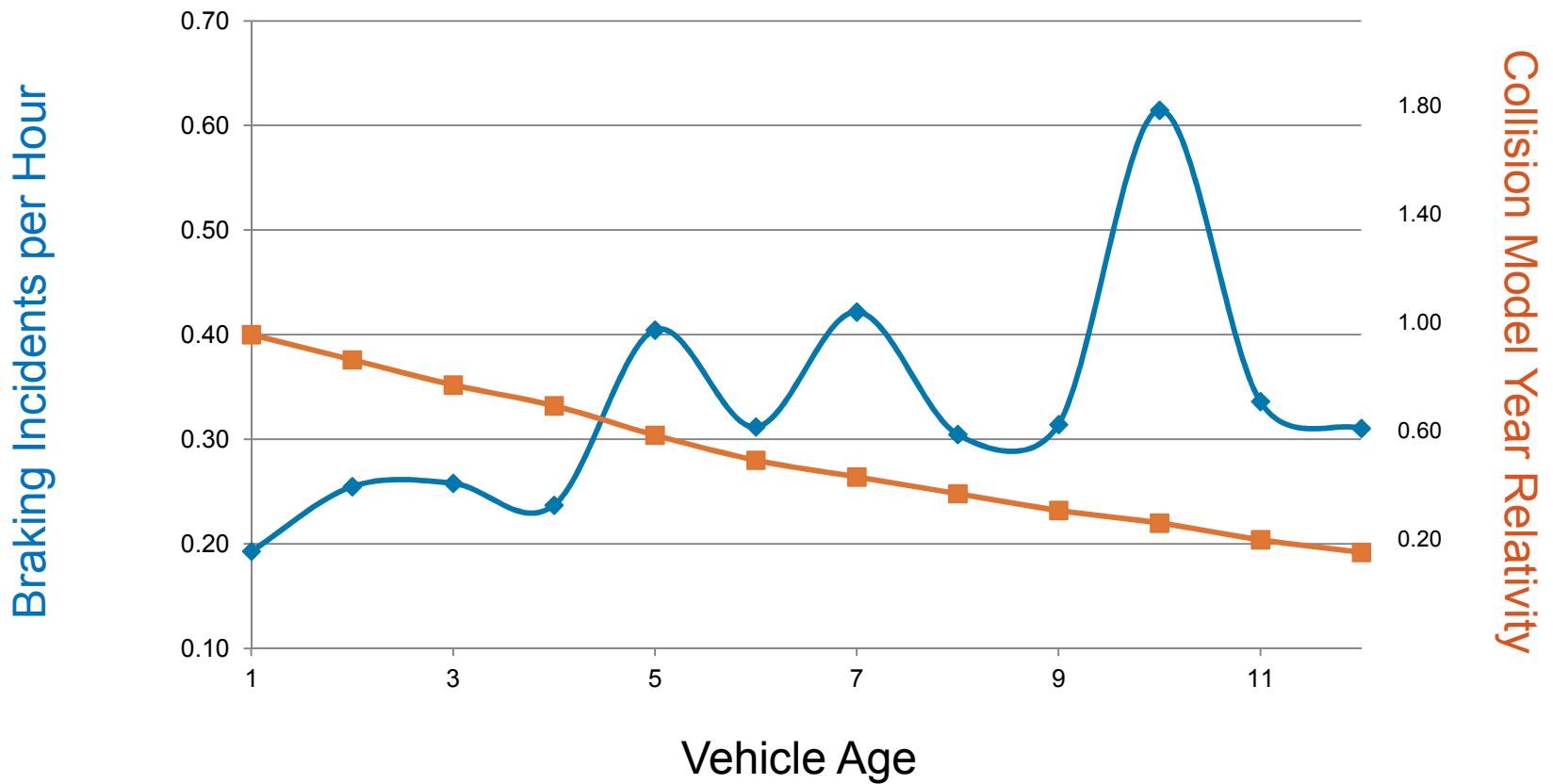


# Some Overlap



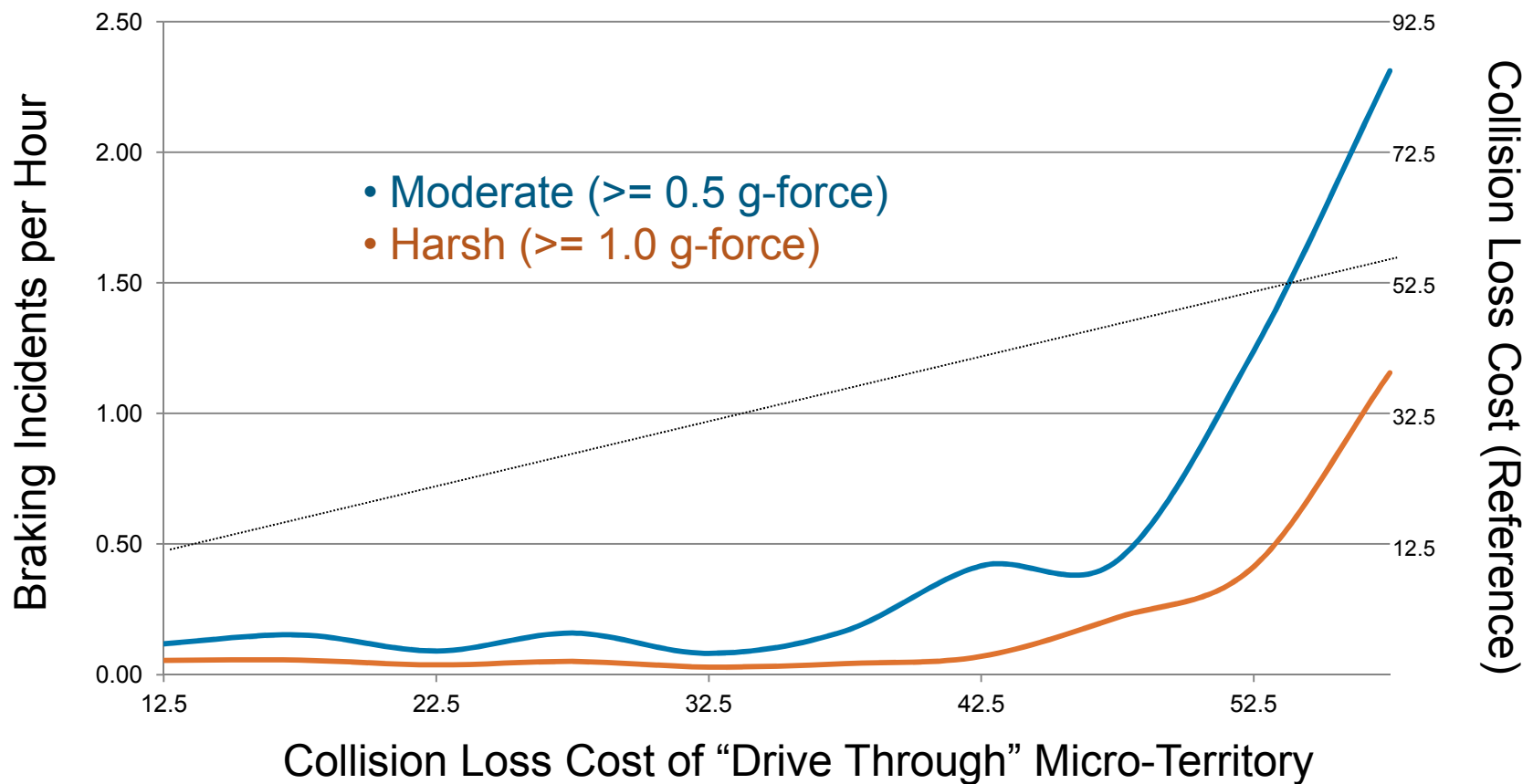
Source: ISO Fleet Data  
Q/E September 30, 2012

# Mixed Signals



Source: ISO Fleet Data  
Q/E September 30, 2012

# Tempered Effect



Source: ISO Fleet Data  
Q/E September 30, 2012

# Exploratory Data Analysis

- Basic Reasonability
- Extreme Outliers
- Gaps
- Duplication
- Relational Edits
- Correlations

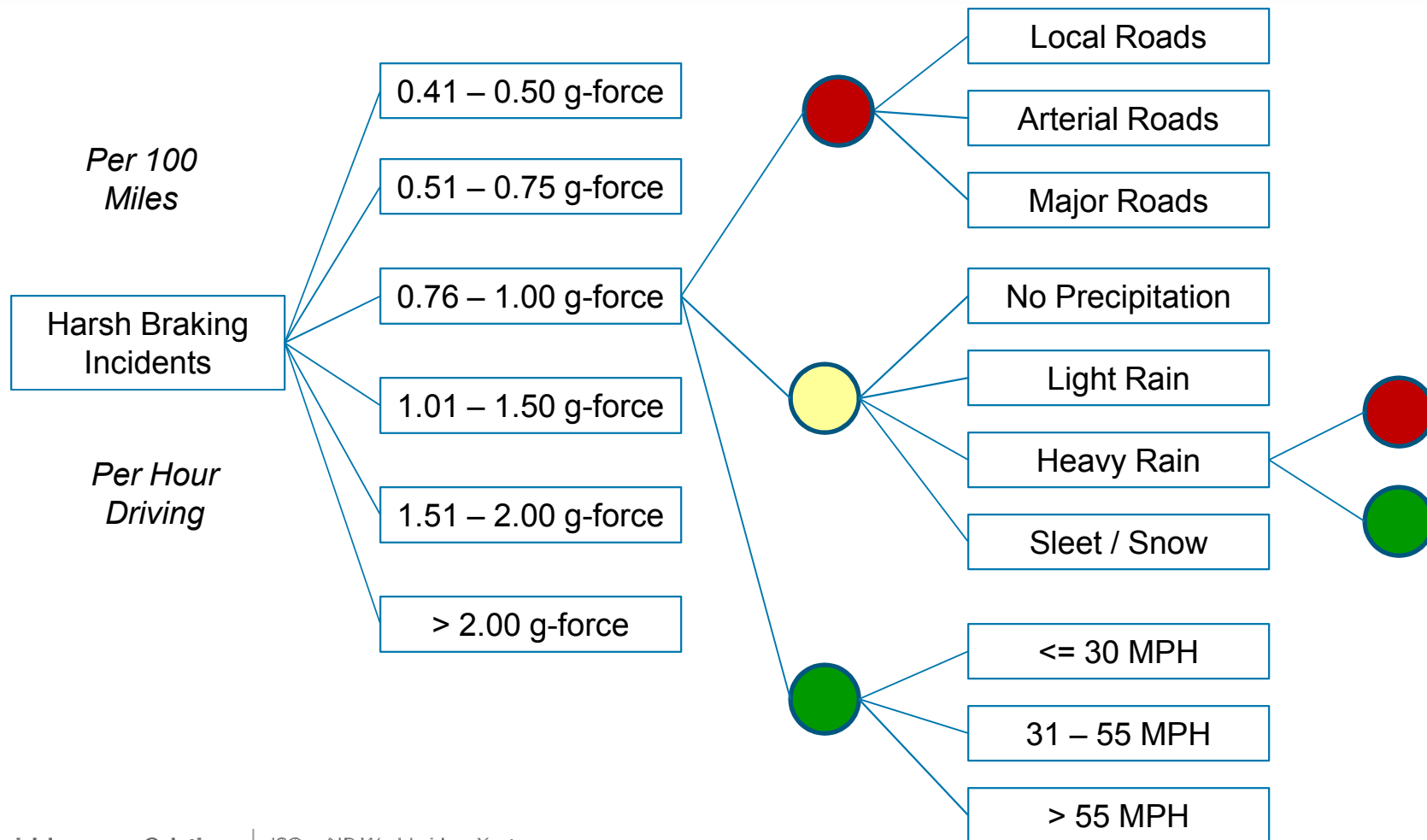
# Correlations

Example Correlation Matrix

	<u>Variable</u>	1				
1	Mileage	1.0	2			
2	Average Speed	0.3	1.0	3		
3	Moderate Braking	-0.2	-0.3	1.0	4	
4	Severe Braking	0.0	-0.1	0.5	1.0	5
5	Vehicle Age	0.3	0.2	-0.1	-0.1	1.0

Source: ISO Fleet Data  
Q/E September 30, 2012

# Give Me A Brake



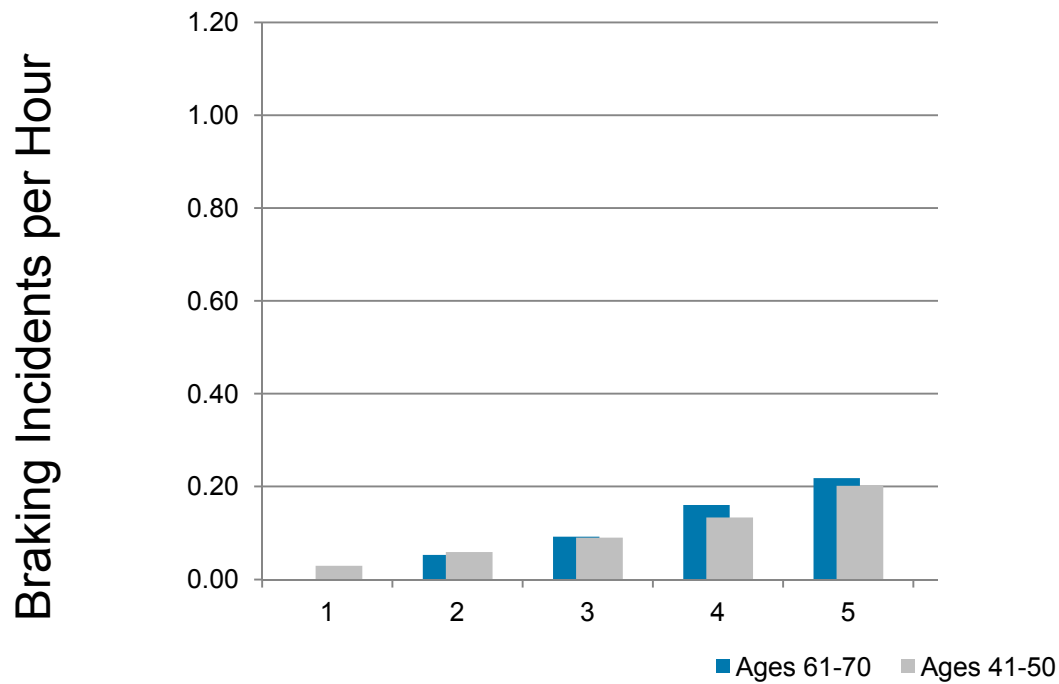
# Dimension Reduction

Principal Component	Eigenvalue	Proportion
Braking1	14.4672	49.47%
Braking2	7.1031	24.29%
Braking3	3.2054	10.96%
Braking4	1.4161	4.84%

Variable	Braking1	Braking2	Braking3	Braking4
Brake_05h_rLocal	0.061	0.003	0.371	-0.081
Brake_10h_wRain	0.072	-0.027	0.014	0.256
Brake_20h_sHiSpd	0.231	0.083	-0.052	0.043
Brake_08h_sLoSpd	-0.187	0.145	0.008	-0.025
Brake_15h_sAvg	-0.035	0.025	0.021	0.038

**Note:** Results displayed are hypothetical.

# Variable Interactions



Source: ISO Fleet Data  
Q/E September 30, 2012



# Model the Effects

*/\* hypothetical SAS to implement telematics-sourced rating variables on top of existing rating plan \*/*

```
Proc GenMod Data=MyLib.UbiBook;
class avspd_range;
p=1.8;
y=_resp_; a=_mean_; variance var=a**p;
deviance d= ... ; /* <- insert messy formulate here */
model pure_prem = braking1 braking2 braking3 /* from PCA */
      avspd_range * pct_gtlim left_05h pct_peak pct_early
      / link=log scale=d offset=ln_presPrem type3;
output out=MyLib.UbiBook_scored pred=ubi_prem;
Run;
```

# Big Data Notwithstanding

- External Data and/or Model
- Alternate Dependent Variables
- Heuristic Approach
- Reduced Scope

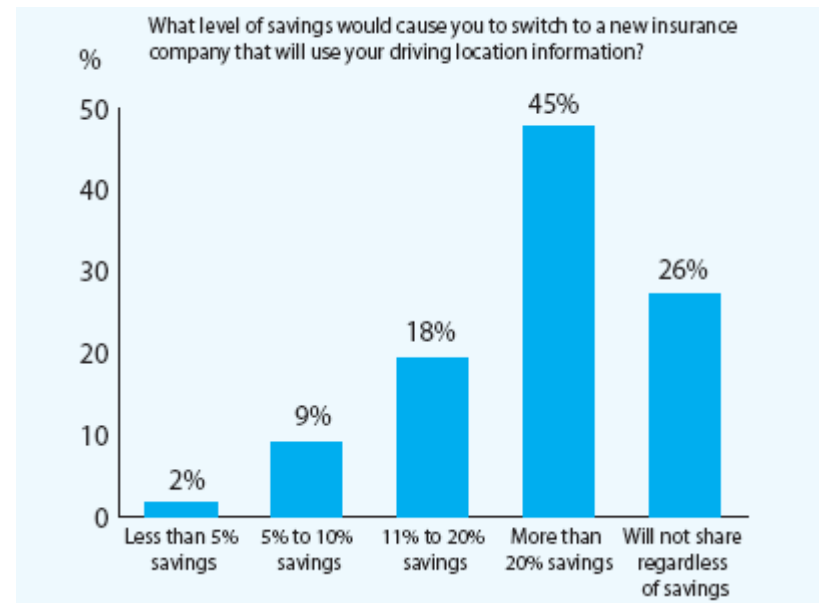
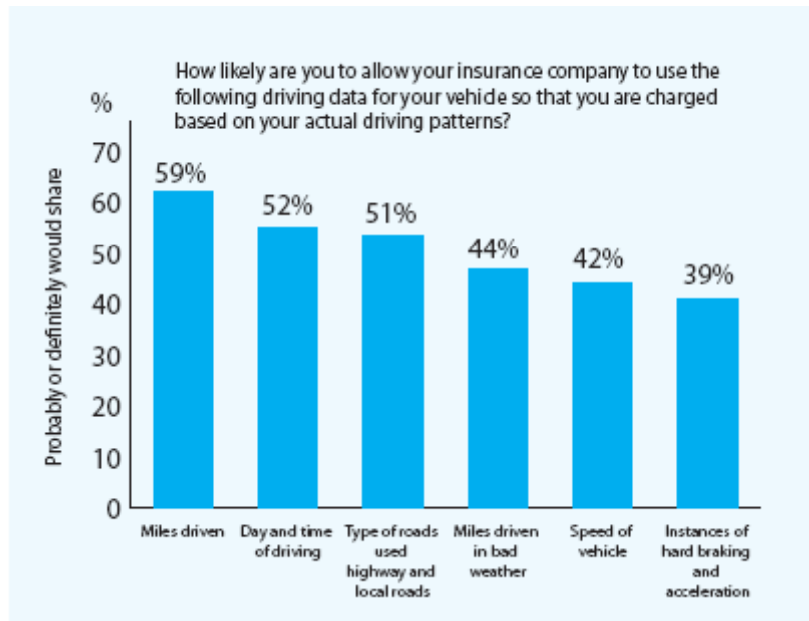


Image Credit: Shutterstock® / Oleg Liubimtsev

# Practical Considerations

- Roll-Out
- Observation
- Privacy and Data Handling
- Intellectual Property
- Insurance Regulation

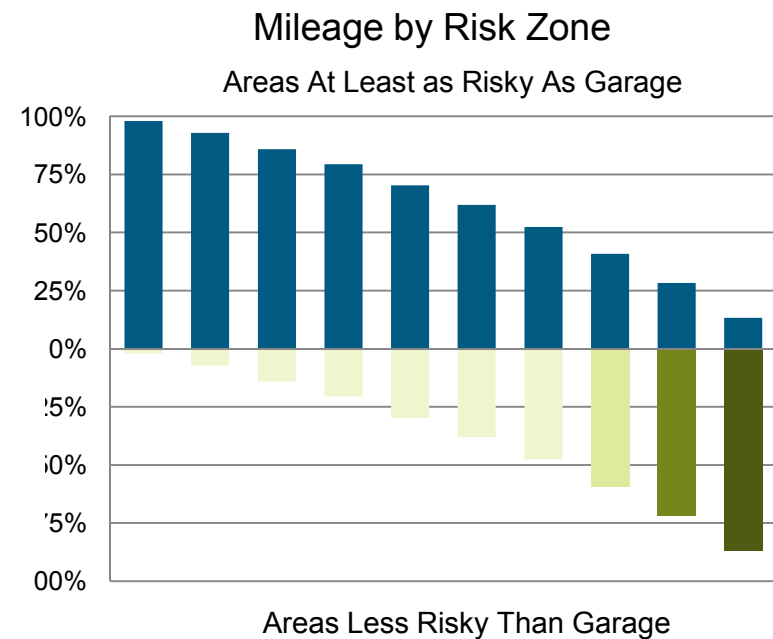
# Survey Says



Source: Insurance Services Office, *Will Consumers Agree to Install Telematics Devices in Their Cars?* (2010)  
<http://www.iso.com/images/stories/documents/downloads/applied-informatix/verisk-telematics.pdf>

# Case in Point

- Territorial Refinement
- Discount-Only
- Non-Contiguous Bands
- 90+ Day Observation
- Filed in 25+ States in 2013



Source: ISO Fleet Data  
Q/E September 30, 2012

# Post-Implementation

## Metrics

- Loss Ratio
- Retention
- Behavioral Improvement
- Growth Rate

## Challenges

- Lack of Data
- Long Term Return Period
- Volatility
- Hawthorne Effect



Image Credit: Shutterstock® / Oleg Liubimtsev

# Questions and Remarks



Image Credit: Shutterstock® / Oleg Liubimtsev

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