ISO Risk Analyzer®

Personal Auto

Environmental Module

Location Component of Loss Costs

- ## Territories should be *big*
  - Have a sufficient volume of business to make credible estimates of the losses.

- ## Territories should be *small*
  - Driving conditions vary within territory.

Some Environmental Features Related to Auto Accidents

- **Proximity to Business Districts**
  - Workplaces
    - Busy at beginning and end of work day.
  - Shopping Centers
    - Always busy (especially on weekends).
    - Better traffic lights & turn lanes.

Some Environmental Features Related to Auto Accidents

- Weather
  - In combination with terrain.
  - Variability as well as typical conditions.

- Traffic Density
  - Less traffic sharing the same space decreases odds of collision.

Combining Environmental Variables

- Individually, the variables have predictable - but small - effect.

- Variables could have positive and negative effects.

- ISO built a model to calculate the combined effect of all variables.

  - _

Data Sources

- ## ISO Data & Analytics
  - Statistical Data & Ratemaking Analyses
  - Weather Data (AIR)

- ## Additional Insurer Data – Development Partners

- ## Third-Party Data

Data Sources - Examples

■ **Comprised of over 1000 indicators**

- **Weather and Terrain**

- **Traffic Density and Driving Patterns**

- **Traffic Composition**

- **Traffic Generators**

- **Experience and trend**

Modeling Techniques Employed

- Sampling – Stratification, Train / Validation / Test (TVT) partition.

- Exploratory Data Analysis (EDA) – univariate analysis, transformations, known relationship to loss.

- Sub models / data reduction – neural nets, splines, principal component analysis, k-means clustering.

- Spatial Smoothing – parameters related to auto loss patterns.

- Variable Selection – Stepwise, cross-validation and bootstrap techniques.

Weather Component
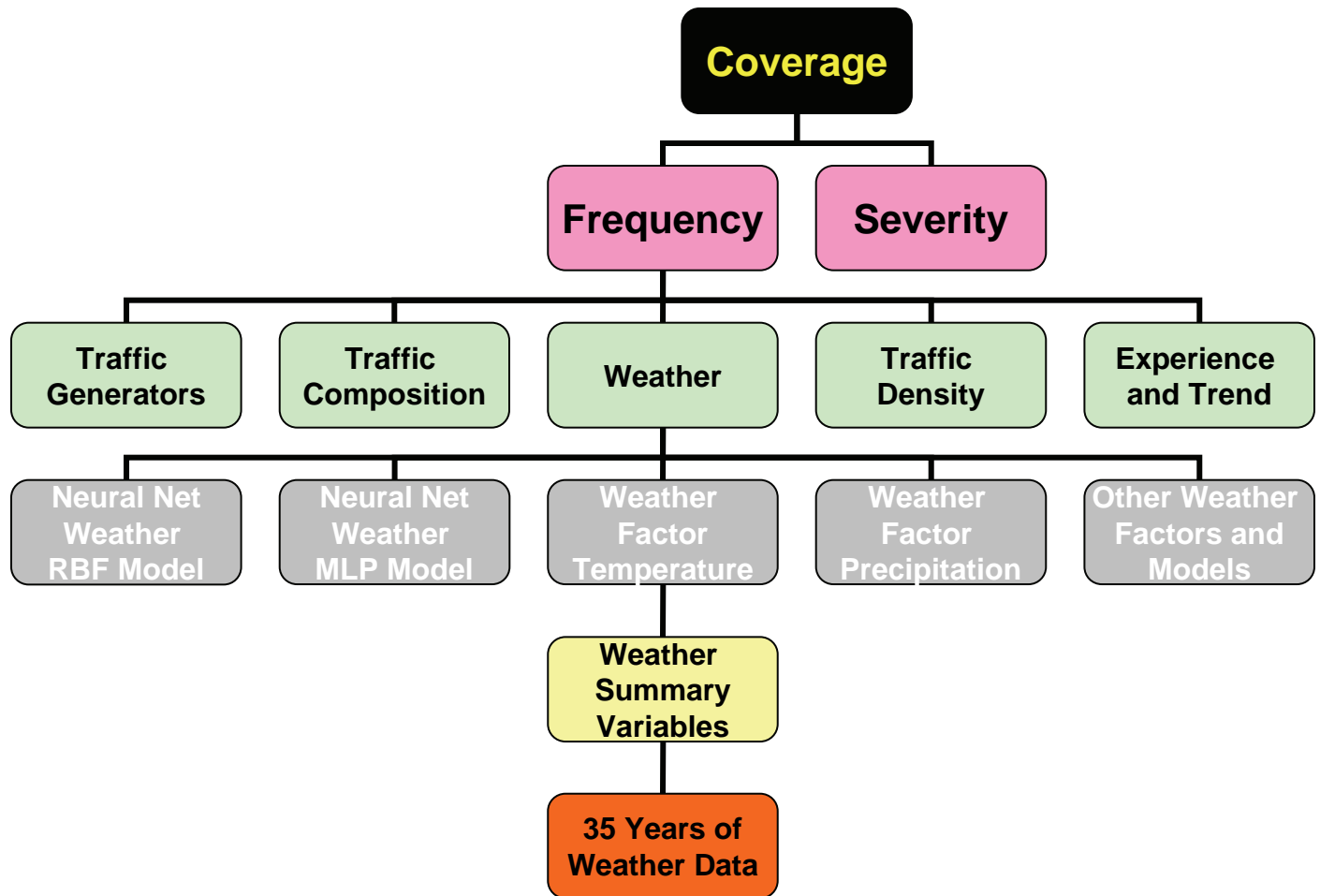
Model Output

- Separate Models by Coverage
  - e.g. Bodily Injury Liability, Comprehensive

- ISO Risk Analyzer output is:
  - **Predicted Loss Cost**
  - **Relativity – Normed to ISO territory**
  - **Components**
  - **Reason Codes**
  - **Scores**

Model Testing and Review

- ISO conducted extensive testing in order to confirm predictive ability in total and by component.

- ISO had the model peer reviewed by Professor Abba Krieger, Chair of the Statistics Department at University of Pennsylvania's Wharton School:
  - "Created with diligence that one rarely sees in industry."
  - "All of the coefficients were significant ---"
  - "The coefficients made sense and the results were reproducible.
 - "It is clear that these models perform well."
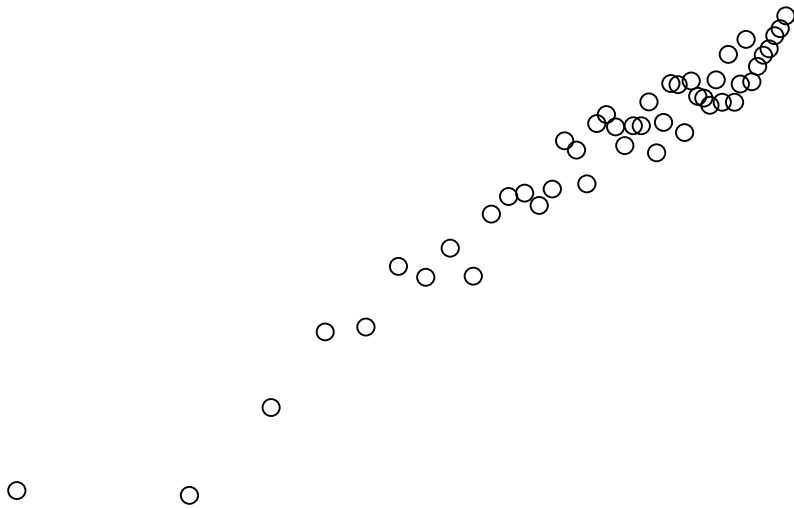
Reason Codes

Predicted Loss Costs will be accompanied by up to 5 *Reason Codes*

➢ *Reason Codes* are distinct for each coverage

➢ *Reason Codes explain the departure from territory rating*

- Ranked from greatest to least impact on rating
- Identifying the effect in terms of eight dimensions:
  likelihood or severity of loss (2) by (4) components
- Each reason code also indicates the relative magnitude and direction associated with the reason

Reason Codes

Distribution of Component Reasons
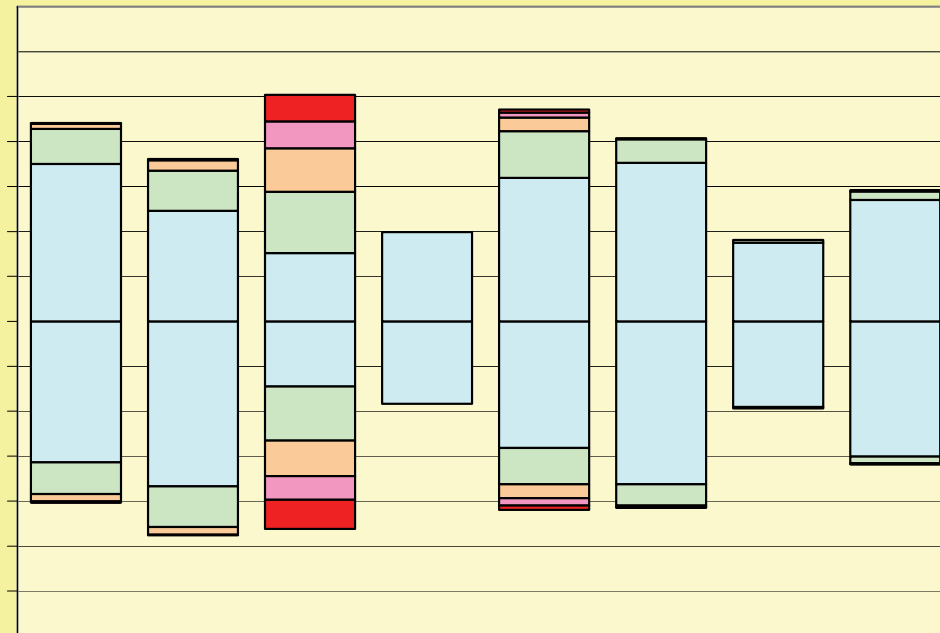
ISO's Filing Plans

- ISO will be filing a rating rule based on Environmental module of Risk Analyzer Model

- Filing an optional rating plan

- Rating Rule "sits on top of" the existing ISO rating plan

- Rating rule with a multiplicative factor corresponding to a scoring range

Structure of
ISO Rating Rule

Score	Multiplier
744 – 800	0.75
712 – 743	0.80
- - - - -	
- - - - -	
464 – 537	1.00
- - - - -	
- - - - -	
258 – 289	1.20
200 – 257	1.25