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# REVIEWING PREDICTIVE MODELS: A UNIQUE PERSPECTIVE

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**MERLINOS** actuaries  
consultants

Ratemaking and Product Management  
Seminar & Workshops  
March 27–29, 2017



# WHY ARE WE HERE TODAY?

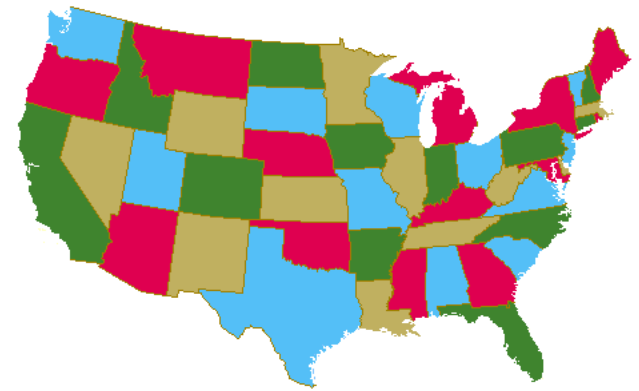
- Merlinos Perspective
- General Regulatory Concerns
- Regulatory Challenges
- Recommendations and Future Developments

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# OUR PERSPECTIVE

- Merlinos & Associates has been engaged by many jurisdictions over the years to provide actuarial review of rate filings.
- Over the last 25 years, we have reviewed thousands of rate filings, including over 100 filings with PA.
- We work with the smallest and largest States, and those with and without actuaries.



# MERLINOS – OUR PERSPECTIVE

Half of my work is for regulators,  
half for industry...



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# REGULATORS OVERALL CONCERNS

## Rating Statutes Require:

- Rates Not Inadequate
- Rates Not Excessive
- Rates Not Unfairly Discriminatory



# REGULATORS OVERALL CONCERNS

## Reasonability of Variables Used



- Clear relationship to loss potential.
- 4<sup>th</sup> moment of distribution of humidity in a ZIP code?

## Fairness and Ethical Concerns



- Number of insured's relatives in 20 mile radius with felony convictions?
- Percentage of single mother households in a ZIP code?

# REGULATORS OVERALL CONCERNS

## Transparency of Rating Process

- Q** ■ Can I re-create someone's rate from a manual if I need to respond to a complaint?
- *Are there scoring components that aren't visible in the manual, or can't be recreated based on some clear criteria.*

- Q** ■ Can insureds naturally relate and identify themselves in a certain class?
- *Consistent concern with extremely granular geographic rating.*
  - *Also concern with more esoteric variables.*

# REGULATORS OVERALL CONCERNS

## Applicability of Model to “my” State

- **Small states** are concerned countrywide models potentially are *unfavorable* to their consumers:
  
- **Large states** are concerned countrywide models potentially are *unfavorable* to their consumers:

# REGULATORS OVERALL CONCERNS

## Dislocations and Potentially Unfair Discrimination

- **Predictive Model implementations often lead to large changes for some policyholders.**
- **Renewal Capping routines complicate future reviews and delay price signaling within the market.**
- **Gaps between models and proposals are drawing more skepticism as Price Optimization discussion grows.**

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# OLD REGULATORY FRAMEWORK

Data  
+ Models  
+ Results  

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= Effective  
Oversight

- Data = Trust but Verify
- Models = Review of Calculations
- Results = Reasonability Tests

# NEW REGULATORY FRAMEWORK

$$\begin{aligned} & \text{Data} \\ & + \text{Models} \\ & + \text{Results} \\ \hline & = \text{????????} \end{aligned}$$

- **Data** = How can we trust and verify new data sources?
- **Models** = How do we review complex models?
- **Results** = What if the results are not intuitive or understandable?

# WHY IS A NEW PARADIGM SHIFT DIFFICULT?

- Sophisticated modeling calls for **skills** that humans naturally lack.
- Sophisticated modeling requires **knowledge** that is often not in our educational backgrounds.
- Modeling is often **interdisciplinary**.
- The modeling field is constantly **changing**, bringing in concepts from math, statistics, natural and behavioral sciences, and computer science.





# WHY IS A NEW PARADIGM SHIFT DIFFICULT?



- Modeling process naturally lacks transparency.
- Lots of problematic language and acronym problems.
- The job of regulators has not changed, but challenges have grown.

# WHAT ARE THESE CHALLENGES?

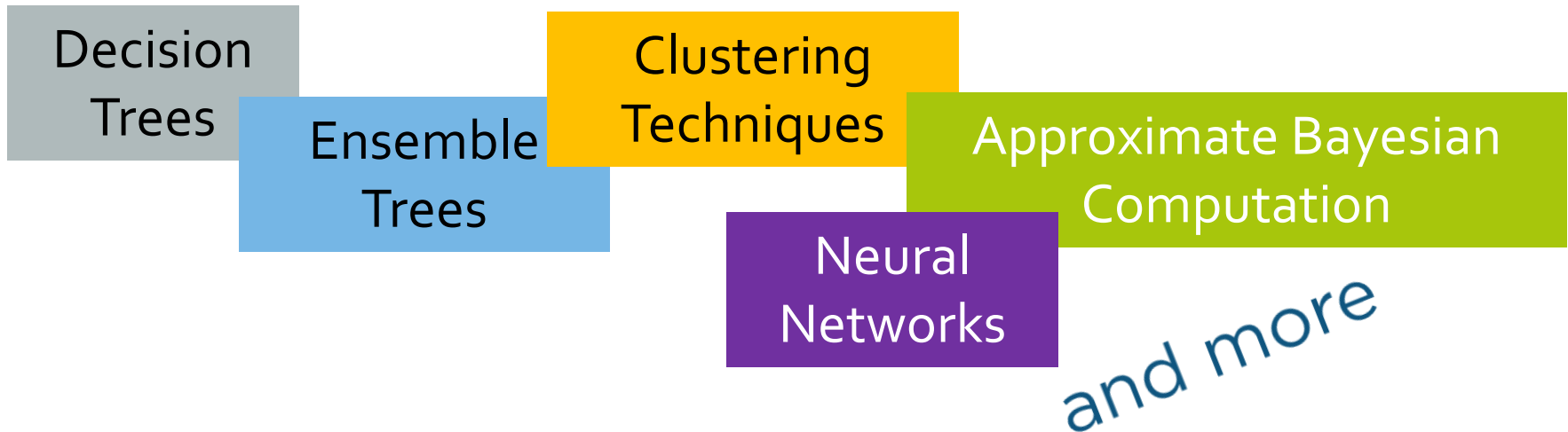
**Number of Filings  
Containing Models!**

**Lines of Business  
Expansion**



# WHAT ARE THESE CHALLENGES?

- Predictive modeling is a growing discipline that spans industries...therefore it is constantly changing.
- GLMs are common in insurance, but other techniques are beginning to be adopted...



*Continued developments in the realm of machine learning will surely be adopted into the insurance arena in the near future.*

# WHAT ARE THESE CHALLENGES?

## Understanding and Reviewing Third Party Data

- IN-HOUSE
- OUTSOURCE



**Budgets and Staffing Levels  
Largely Haven't Changed!**

With all of these developments and complex statistical routines...

**Q** ■ ■ How can the regulator keep up and make sure these types of analyses are reviewed and used properly?

**A** ■ ■ **Fortunately...**  
■ Focus on Broad Controls  
■ Framework of modeling process can lessen need to verify every calculation

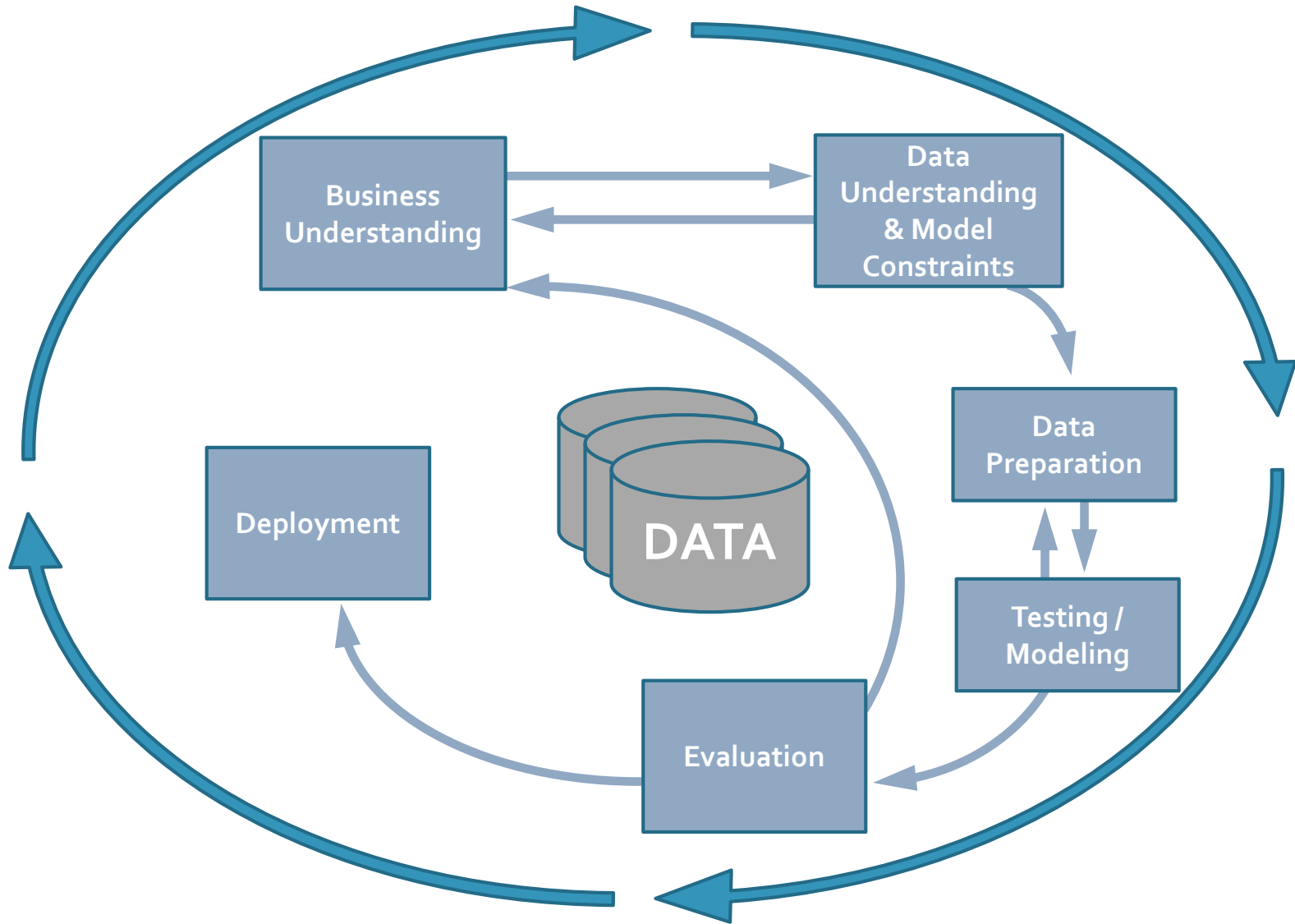
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# Where Do We Go From Here

- Cost and efficiency of executing regulatory oversight are increasing.
- Actions at the NAIC Level/CASTF.
  - GLM Regulatory Survey
  - Discuss Information Sharing
  - Potential for NAIC Level Reviews?
  - Continued Education for NAIC staff on all these issues
- Movements in Market Conduct Arena.
- Potential Focus on modeling framework/risk focus style.

# GENERAL MODELING FRAMEWORK





# SUMMARY

- Regulators have to review lots of models...**Be helpful!**
- Many filings focus on statistical detail only...don't neglect to **tell the story** of the modeling process.
- Demonstrating a well thought out and controlled modeling process can be **more important** than a hard statistic
- Step back from numbers, and **ask**:
  - ✓ *Do the variables make sense?*
  - ✓ *How is management using/adjusting my model? Is that appropriate? Do they understand potential model risk?*
  - ✓ *If I was a regulator, might I have a concern with this?*

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*Thank you!*

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