American Academy of Actuaries

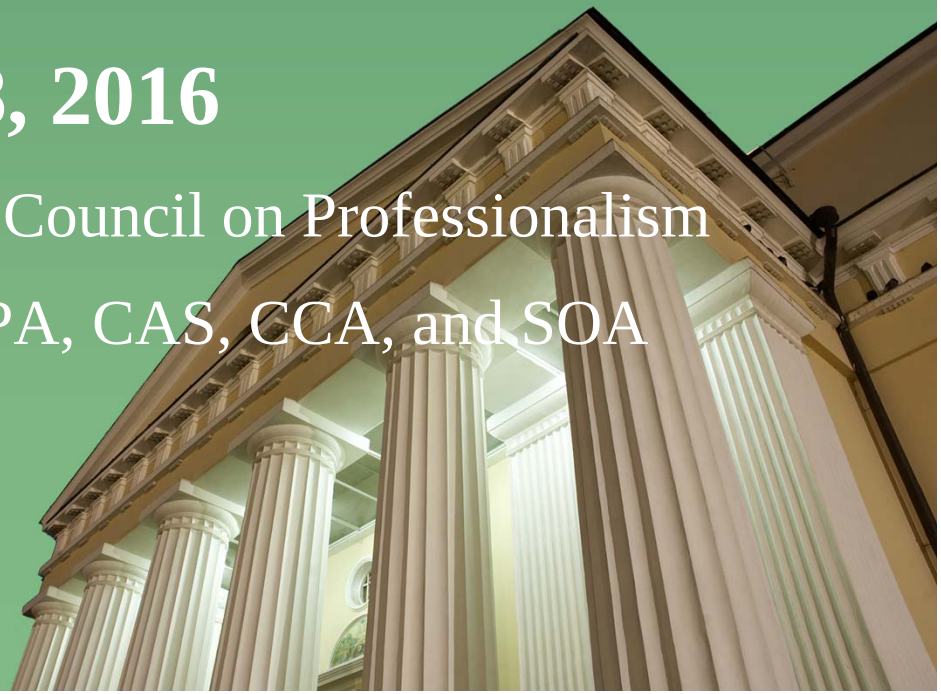
*Objective. Independent. Effective.*™

# Big Data and Actuarial Professionalism

**June 28, 2016**

Sponsored by the Academy's Council on Professionalism

and co-sponsored by ACOPA, CAS, CCA, and SOA



# Presenters

- **Bob Beuerlein**, MAAA, FSA, FCA, CERA
  Academy President-Elect
- **Ross Winkelman**, MAAA, FSA
  Member, Actuarial Standards Board
- **Jim MacGinnitie**, MAAA, FCAS, FSA
  Academy Senior Casualty Fellow
- **Moderator: Paul Kollmer-Dorsey**
  Academy General Counsel and Director of Professionalism





# Disclaimer

**Please note:** The presenters' statements and opinions are their own and do not necessarily represent the official statements or opinions of any boards or committees of the American Academy of Actuaries, or any other actuarial organization, nor do they express the opinions of their employers.





# The Big Picture





# What is Big Data?

- No widely accepted definition
- 5 Vs:
  - Variety
  - Value
  - Veracity
  - Volume
  - Velocity
- Predictive Analytics
- Computational Algorithms
- Data Handling





# Role of the Actuary

- Multidisciplinary Team
- Statistician, Computer Expert, Actuary
- Subject Matter Expert
- Hypothesis Generator
- Turn Big Data into Smart Data

# State of Big Data – Property/Casualty

- Used by 50% of companies
  - Primarily for pricing, underwriting, and risk selection
- Handles interdependence with greater sophistication
- Reduces antiselection

# Examples – Property/Casualty

- Pricing, especially personal lines
- Underwriting
- Claims management
- Quoting
- Fraud detention/prevention
- Premium audit
- Agent selection/retention

# State of Big Data – Health

- Traditional Sources – Claims and Eligibility
- "Big Data"
  - Electronic Medical Records
    - Lab results
    - Medications
    - Other clinical detail
  - Consumer data
    - Purchasing history
    - Lifestyle (TV, diet, activity, etc.)

# Examples – Health

- **Clinical interventions** – How to identify lifestyle issues affecting service utilization
- **Target marketing** – In ACA, risk adjustment changes profitability view
- **Risk score coding** – Find people who have conditions, but who haven't received services for that condition

# State of Big Data – Life/Annuity

- Big Data
  - Not a new topic
  - Direct Marketing – 1980s
  - Analysis of data
- Predictive Analytics
  - Recent Developments
  - Predict Behavior

# Examples – Life/Annuity

- Direct Marketing – Measure and predict "lift" in response rates
- Variable Annuities – Policyholder Behavior
- Life Insurance
  - Underwriting
  - Retention
  - Agency Selection
  - In Force Management
  - Fraud Detection

# Future Developments

- Telematics
- Internet of things
- Machine learning/Cognitive computing/Artificial intelligence

# Identifying Professionalism Challenges and Resources in Connection with the Use of Big Data

# The Code of Professional Conduct

**"With great power comes great responsibility" – Spider Man, 2002, Uncle Ben to Peter Parker**

**Professional Integrity** PRECEPT 1. An Actuary shall act honestly, with integrity and competence, and in a manner to fulfill the profession's responsibility to the public and to uphold the reputation of the actuarial profession.

- **Annotation 1-2.** An Actuary shall not provide Actuarial Services for any Principal if the Actuary has reason to believe that such services may be used to violate or evade the Law or in a manner that would be detrimental to the reputation of the actuarial profession.

- **Annotation 1-4.** An Actuary shall not engage in any professional conduct involving dishonesty, fraud, deceit, or misrepresentation or commit any act that reflects adversely on the actuarial profession.

# Some Legal Reference Points

- Applicable law includes, but not limited to:
  - State insurance laws and regulations
  - The Unfair Claims Practices Act and Unfair Trade Practices Act
  - The Fair Credit Reporting Act
  - Gramm-Leach-Bliley privacy laws





# Understanding Some Ethical Guidelines

- Questions to consider
  1) Does your approach comply with applicable law – both letter of the law and in spirit?
  2) Are certain permissions needed?
  3) Are you comfortable describing what you are doing to stakeholders (consumers, insurance companies, providers, DOI, auditors, etc.)?

# The ASOPs and Big Data

Examples of ASOPs that might apply to Big Data follow. This list of ASOPs is not exhaustive. Ultimately, it is the actuary's responsibility to identify the standard(s) that apply to each assignment.





# The ASOPs and Big Data

- ASOP No. 23: Data Quality
  - Section 4.1.g: Disclose "(1) the existence of results that are highly uncertain or have a potentially material bias of which the actuary is aware due to the quality of the data; and (2) the nature and potential magnitude of such uncertainty or bias, if they can be reasonably determined;"

# The ASOPs and Big Data

- ASOP No. 12: Risk Classification
  - Section 3.2.1: "The actuary should select risk characteristics that are related to expected outcomes."
  - Section 3.3.3: "When establishing risk classes, the actuary should (a) comply with applicable law; (b) consider industry practices for that type of financial or personal security system as known to the actuary; and (c) consider limitations created by business practices of the financial or personal security system as known to the actuary."
- Risk Classification Monograph
  http://dev.actuary.org/files/publications/RCWG_RiskMonograph_Nov2011.pdf

# The ASOPs and Big Data

- ASOP No. 38: Using Models Outside the Actuary's Area of Expertise (P&C)
  - Section 3.3.1: The actuary should be reasonably familiar with the basic components of the model and have a basic understanding of how such components interrelate within the model. In addition, the actuary should identify which fields of expertise were used in developing or updating the model and should make a reasonable effort to determine if the model is based on generally accepted practices within the applicable fields of expertise. The actuary should also be reasonably familiar with how the model was tested or validated and the level of independent expert review and testing.

# The ASOPs and Big Data

- Third Exposure Draft on Modeling
  - Target release later this summer
  - Applies to all practice areas

# The ASOPs and Big Data

- ASOP No. 25: Credibility Procedures
  - Section 3.5: "In carrying out credibility procedures, the actuary should consider the homogeneity of both the subject experience and the relevant experience. Within each set of experience, there may be segments that are not representative of the experience set as a whole. The predictive value can sometimes be enhanced by separate treatment of these segments. The actuary should also consider the balance between the homogeneity of the data and the size of the data set."

# The ASOPs and Big Data

- ASOP No. 41: Actuarial Communications
  - Section 3.2: In the actuarial report, the actuary should state the actuarial findings, and identify the methods, procedures, assumptions, and data used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary's work as presented in the actuarial report.
  - Section 3.4.4: An actuarial communication should identify the party responsible for each material assumption and method. Where the communication is silent about such responsibility, the actuary who issued the communication will be assumed to have taken responsibility for that assumption or method. The actuary's obligation when identifying the other party who selected the assumption or method depends upon how the assumption or method was selected.

# The ASOPs and Big Data

- Also consider applicable ASOPs relating to:
  - Assumption Selection
  - Modeling
  - Pricing / Ratemaking
  - Risk Evaluation

# Qualifications and Beyond

- Annotation 2-2 of the *Code of Professional Conduct*
  - "The absence of applicable qualification standards for a particular type of assignment…does not relieve the Actuary of the responsibility to perform Actuarial Services only when qualified to do so…"

# Qualifications and Beyond

- Precept 2 of the *Code of Professional Conduct* states:

  "An Actuary shall perform Actuarial Services only when the Actuary is qualified to do so on the basis of basic and continuing education and experience, and only when the Actuary satisfies applicable **qualification standards**." (emphasis added)

- The USQS applies to members of all five U.S.-based actuarial organizations (Academy, ASPPA/ACOPA, CAS, CCA, and SOA).

- The USQS sets forth qualification requirements for actuaries practicing in the U.S.

# Qualifications and Beyond

- Qualification requires:
  - A minimum level of technical skill.
  - Practical real-world experience.
  - Familiarity with all the laws, regulations, and standards of practice that apply.
  - Keeping up with new techniques, rules, and market developments.

# Qualifications and Beyond

- USQS Section 4.3: Emerging or Non-Traditional Areas of Actuarial Practice
- "An actuary practicing in an emerging or non-traditional practice area can satisfy the continuing education requirements by maintaining knowledge of applicable standards of practice, actuarial concepts, and techniques relevant to the topic of the Statement of Actuarial Opinion."

# Qualifications and Beyond

- Look in the Mirror test
  - Requires you to objectively examine your professional qualifications (basic and continuing education and experience) and make a reasoned judgment about whether you can fulfill your obligations under the Code to:
    - Act honestly, with integrity and competence; perform actuarial services with skill and care (Precept 1)
    - Perform actuarial services only when qualified to do so (Precept 2)

# Support from the ABCD

- Role of the:

  **A**ctuarial

  **B**oard for **C**ounseling and **D**iscipline

# Role of Professional Judgment

- Questions to consider
  1) How representative is your data set?
  2) Does your model account for biases?
  3) How accurate are your predictions based on big data?
  4) Does your reliance on big data raise fairness or ethical concerns?

Source: Big Data: A Tool for Inclusion or Exclusion, FTC, January 2016

# Qualifications and Beyond

- The Role of Professional Judgment
  - Correlation is not Causality
  - Big Data can be misleading
    - Context
    - Overreliance
    - Cherry-picking
  - Value of being able to connect the dots

# Questions?

Thank you.

# REGISTER NOW

Extra-early registration ends on June 30

## 2016 ANNUAL MEETING AND PUBLIC POLICY FORUM

NOVEMBER 3-4, 2016 ★ CAPITAL HILTON WASHINGTON, D.C.

www.actuary.org/2016annualmeeting

American Academy of Actuaries
*Objective. Independent. Effective.™*