

2018 Predictive Analytics Symposium

Session 04: M/S - The Evolution of Predictive Models in Life Insurance Underwriting

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The Evolution of Predictive Models in Life Insurance Underwriting

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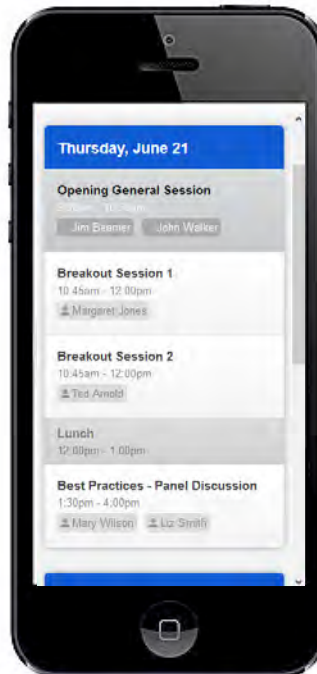


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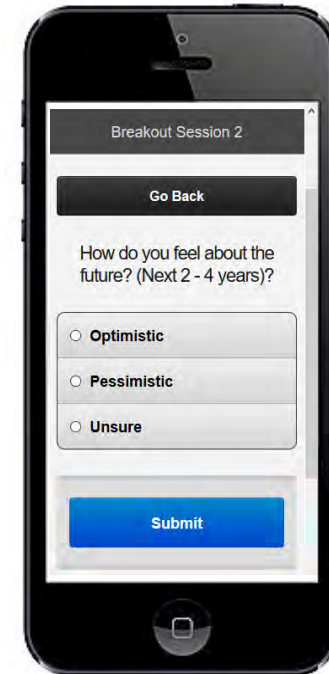
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Step 3: Respond to Polls when they appear

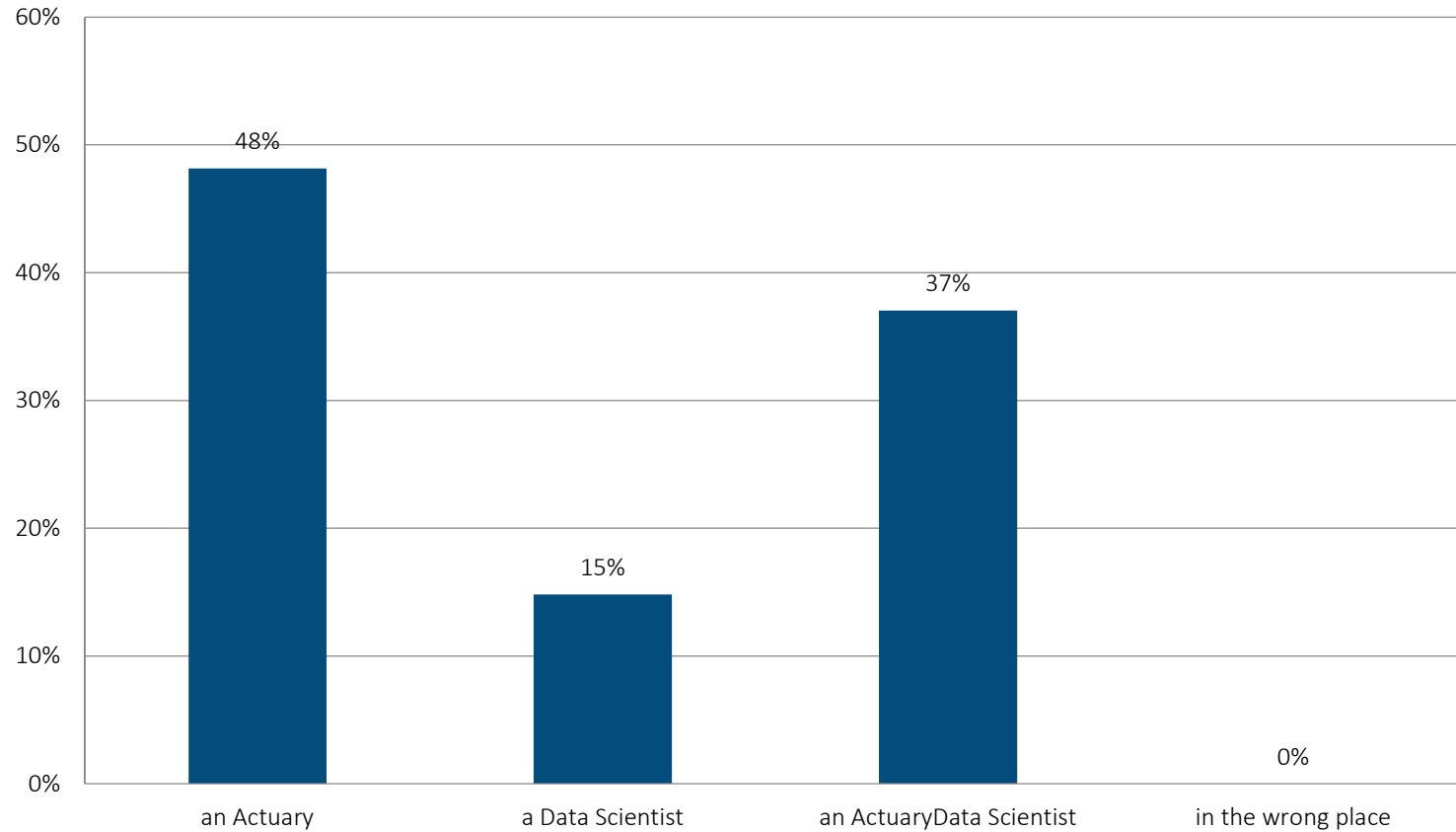


Welcome

Are you:

- a) an Actuary?
- b) a Data Scientist?
- c) an Actuary/Data Scientist?
- d) in the wrong place?

Are you:

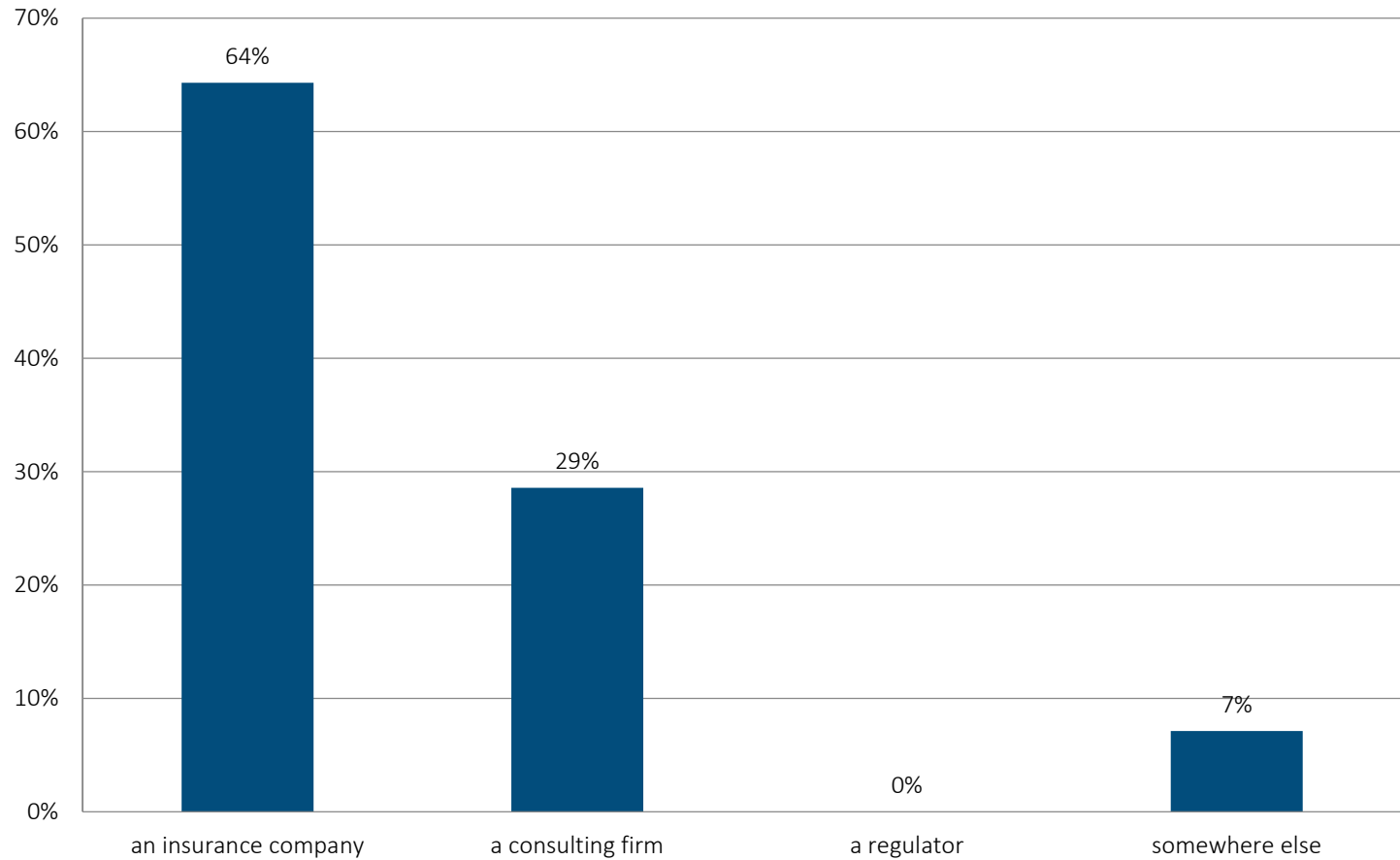


Welcome

Do you work at:

- a) an insurance company?
- b) a consulting firm?
- c) a regulator?
- d) somewhere else?

Do you work at:



Live Content Slide

When playing as a slideshow, this slide will display live content

Poll: Do you work at:

A very brief history of actuarial predictive models

- In 1774, Richard Price ran the first experience study for the ‘Society for Equitable Assurances on Lives and Survivorship’



A very brief history of actuarial predictive models

- 1990's – P&C insurers adopt credit score in pricing personal lines
- 2000's – P&C models incorporate additional data sources to segment risks in personal and commercial lines

A very brief history of actuarial predictive models

- Recent Milestones
 - CAS – Predictive Modeling Seminar (2006)
 - First life underwriting predictive model pilots (2008)
 - WSJ article (Mar 12, 2011)
 - o “Would You Buy Life Insurance from a Machine?”
 - SOA – Advanced Business Analytics seminar (2013)
 - LIMRA – Big Data Conference (2014)
 - SOA
 - o Predictive Analytics Symposium (2017)
 - o Exam PA (2018)
 - AAA
 - o “Big Data and the Role of the Actuary” (2018)
 - o Data Science & Analytics Cmte (2019)
 - NY DFS Insurance Circular Letter (2019)

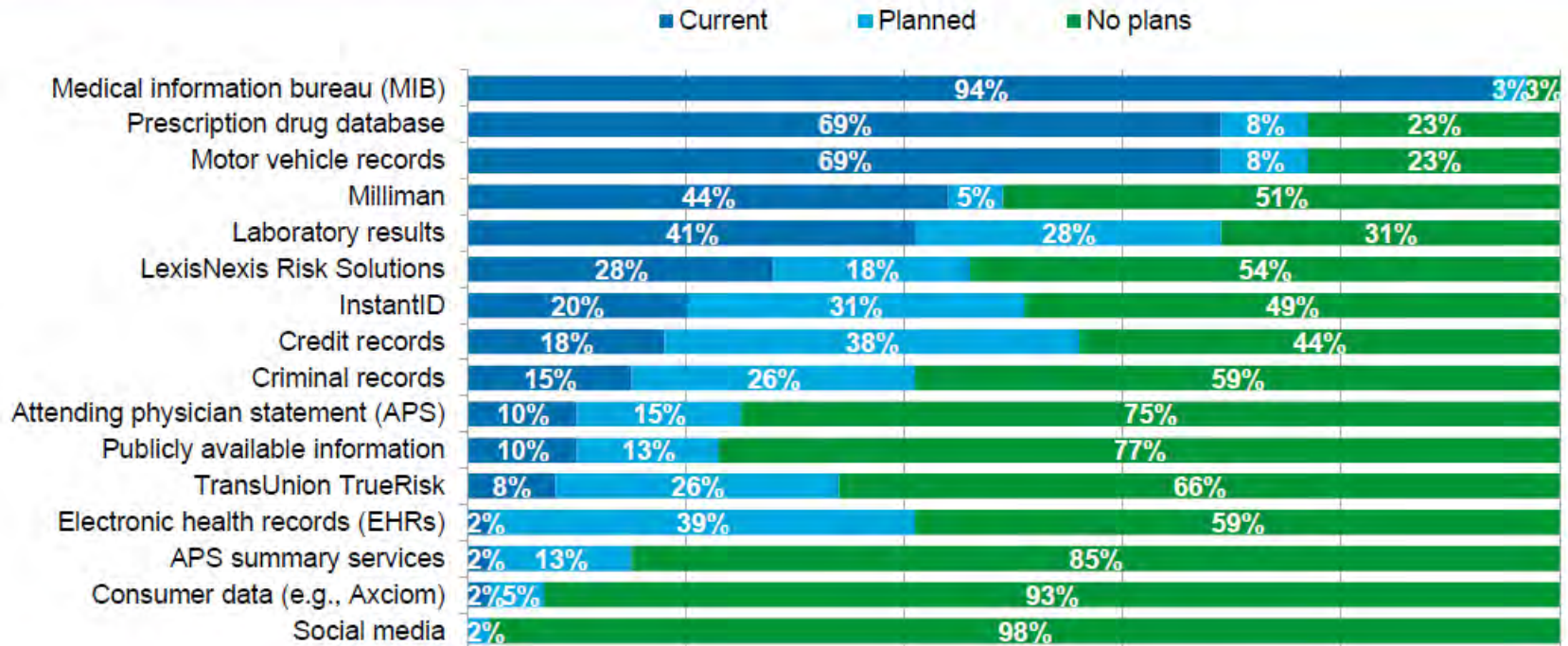


Data for Underwriting Models

- Early iterations of underwriting models: Consumer marketing data
- Later underwriting models: Application data (using the right process to obtain accurate data)
 - Digital data for current UW requirements available at the time of application
- Current State: Application + Third Party data and models to provide additional mortality segmentation
 - Breakthrough #1 – Credit based models (i.e. LexisNexis Risk Classifier or TransUnion TrueRisk Life)
 - Breakthrough #2 – Medical data (DHD, EHR, Rx....etc.)

Number and Type of Data Sources used has expanded significantly

Figure 14 — Electronic Databases and Information Sources Used and Planned



N=39 companies

LIMRA: Transforming Underwriting, Automated Underwriting Company Practices for Life Insurance in 2017

Introduction of 3rd Party Models

- Lab Scoring
- Rx Scoring
- Credit Scoring
- Health data Scoring
- Public Information Scoring
- Smoking Propensity
- Avocation Propensity
- Misrepresentation Scoring



Model Techniques

- Initially: GLM models
 - ✓ Following from the use of models in P&C
 - ✓ Explainable & easy to use
- Now: Machine Learning techniques are common
 - ✓ Random forests, gradient boosted models, some neural nets, SVM, ensembles
 - ✓ More comfort, better software, and improved model performance

Regulation

- Initially, no reaction from regulators
 - Assumption was some P&C related regulations around the use of credit score applied
 - Life Insurance application questions are subject to review
- NY DFS letter
 - Use of external consumer data and information sources in underwriting for life insurance
- Impact to PBR assumptions
 - Some states are requiring additional mortality and higher reserves for accelerated business
- NAIC P&C Cmte: “Best Practices for Regulatory Review of Predictive Analytics”
 - Open for comment; outlines practices for P&C filings

Regulators are interested in learning from the industry.

Regulatory Perspective

In your opinion, what is the best way to regulate life insurance predictive models used for underwriting?

- a) ASOPs define appropriate behavior
- b) Ensure PBR requires appropriate disclosures
- c) Market conduct exams
- d) File algorithms like P&C

Regulatory Perspective

What has your company done to help regulators understand the use of predictive models in underwriting?

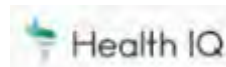
- a) Proactive engagement covering entire program?
- b) Proactive engagement focused on a specific data element or model?
- c) Reactive to specific inquiries
- d) Worked w/ a reinsurer or vendor to engage regulators
- e) Nothing

Staffing

- Finding staff for data science projects
 - Initially hard to find staff to work on projects
 - Limited actuaries with relevant experience (P&C)
 - Some companies had existing functions with data scientists, usually marketing or P&C, with talent to draw from
- Training for existing staff
 - Industry conferences (like this one)
 - SOA (Predictive Analytics Certificate Program)
 - Master's programs
 - 3rd party training

Competition

- Initially – competition from other insurance companies was the primary focus
- Then came insure tech!



Success and Failures

- Case study on building and implementing a Predictive model for underwriting
 - What went well?
 - What did not go so well?

Learnings



- Changing the process will change your data
- The underwriting risk class is a biased target
- You can find unexpected value in your data
- Change management will be one of your biggest challenges
- Model monitoring and controls are essential

Learnings



- Target mortality impact
- Resetting data
- Model miss vs. misrepresentation
- Creative blending of human + automated
- Distribution positioning

Predictive Models - Looking ahead

- Significant progress has been made over the past 10 years, but where do we think the Life Insurance Industry is headed?
- David
 - Use of Digital Health Data
 - Automated customer experience with Human intervention (underwriter or agent) needed only for complex products
- Jason
 - DI (moving from Life to another product)
 - Digital Interaction models with clients

Digital Health Data: Healthcare Terminology, Codification, Standardization

The **Unified Medical Language System (UMLS)** integrates and distributes key terminology, classification and coding standards, and associated resources to promote creation of more effective and interoperable biomedical information systems and services, including electronic health records.

The Unified Medical Language System (UMLS)

1. SNOMED CT – Systemized Nomenclature Of MEDicine, Clinical Terms
2. ICD – International Classification of Diseases
3. RxNorm

You can use the UMLS to:

- Link terms and codes between doctor, pharmacy, and insurance company records
- Process texts to extract concepts, relationships, or knowledge
- Facilitate mapping between terminologies

Disability Income Underwriting



LIFE INSURANCE LEVERS

- Ratings
- Flat extras

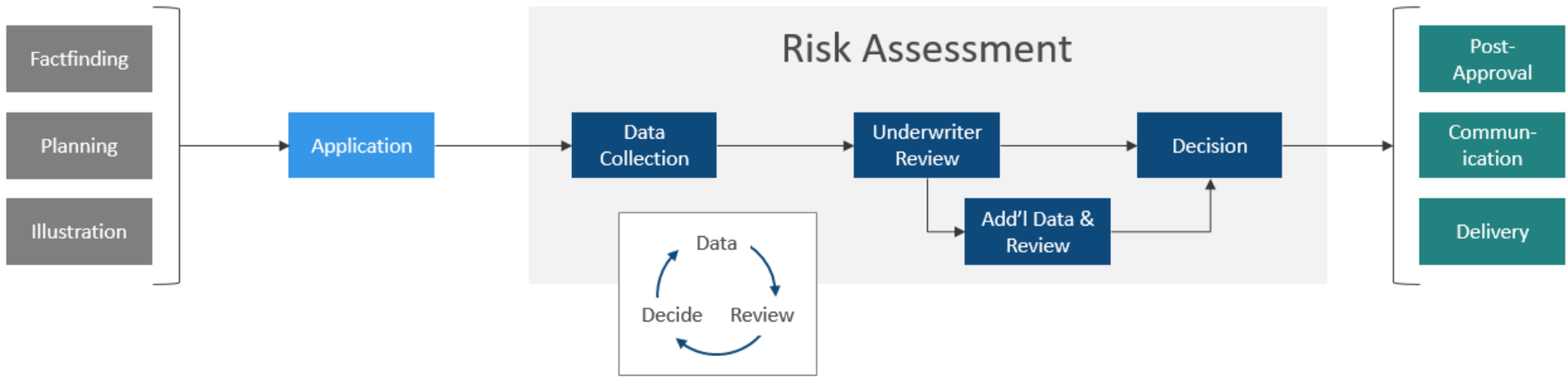
Mixes more
ART with
SCIENCE



DISABILITY INSURANCE LEVERS

- Rating
- Rider
- Occupation class
- Benefit period
- Elimination period
- Definition of disability







Digital Interactions & Risk Assessment



Interactive Client Data allows for continued improvement...

- A/B testing
- Behavioral economics
- Misrepresentation analysis
- “Creepy” vs. “cool”

Figure 3. Top data sources life insurers use now and plan to use in two years to improve customer centricity

	Now	Two years
 Internal customer data	55%	82%
 Customer interactions/surveys	55%	73%
 Clickstream data	18%	45%
 Social media	13%	35%
 Web scraping	11%	29%
	Now	Five years
 Wearables	6%	38%

Predictive analytics speeds innovation for life insurers, Life Predictive Analytics Survey Report
Willis Towers Watson 2019

Are real-time fully underwritten decisions an achievable goal?

- a) Yes
- b) No

Thank You!