# Accelerated Underwriting in Life Insurance

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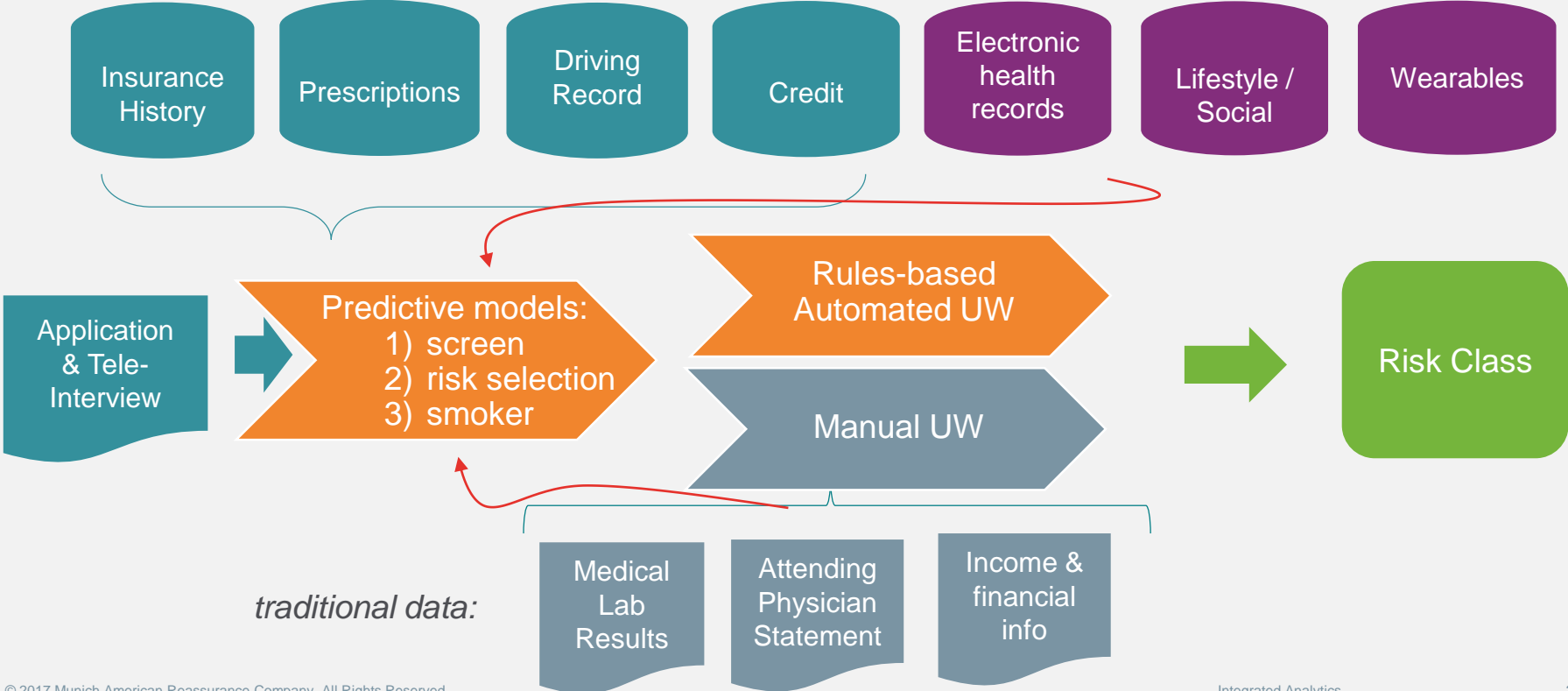
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Integrated Analytics

Munich RE

# Agenda

- Underwriting process

- Alternative data-based mortality scores

- Rx mortality scores

- Health records: APS, EHR

- Wearables

- Marketing and lifestyle data

- Smoker predictor case study

# New tools need to integrate into the underwriting process



*Available risk assessment tools / data:*

Insurance History | Prescriptions | Driving Record | Credit | Electronic health records | Lifestyle / Social | Wearables

Application & Tele-Interview

Predictive models:
1) screen
2) risk selection
3) smoker

Rules-based Automated UW

Manual UW

Risk Class

*traditional data:*

Medical Lab Results | Attending Physician Statement | Income & financial info

# Opportunities and risks of accelerated underwriting

## Risks

### Opportunities

**Better customer experience**
- Less intrusive – no fluid testing
- Less hassle – no test scheduling
- Faster

**Better producer experience**
- Less administration
- Faster

**Insurer benefits**
- Redesigned apps and reflexive questions – better risk assessment
- Higher sales, cross-sells
- Lower underwriting costs
- Access to new/underinsured markets

**Higher loss costs**
- Elimination of data may result in less accurate risk assessment
- Elimination of fluids may miss some health conditions
- Misrepresentation / anti-selection

# Alternative data-based mortality scores

*Our methodology:*

## Classical A/E analysis

- credible deaths in general population datasets
- limited credibility in insurer-specific datasets; however there is still enough consistency across carriers

## Statistical analysis using predictive models

- maximizes the insight gained from retrospective studies, even with limited claim incidence
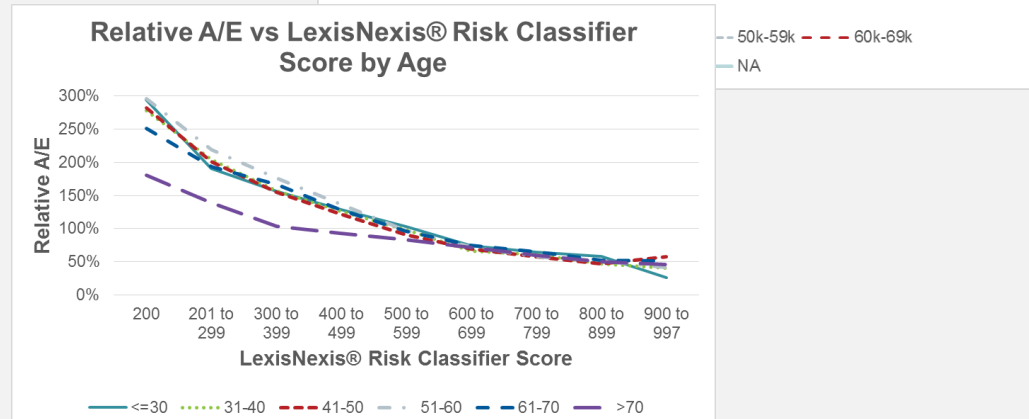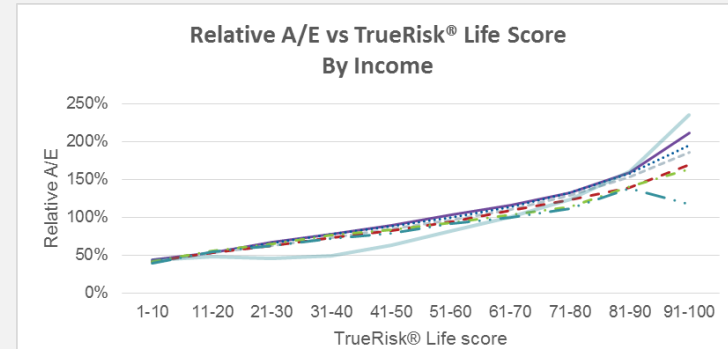- isolates the effect of the scores and places confidence bands around relative mortality estimates

# Alternative data-based mortality scores
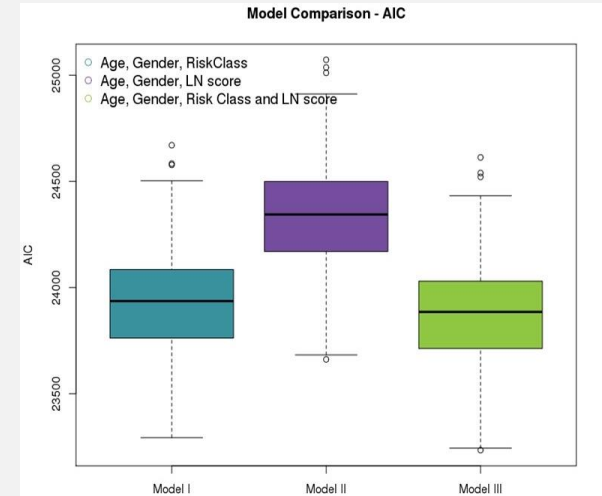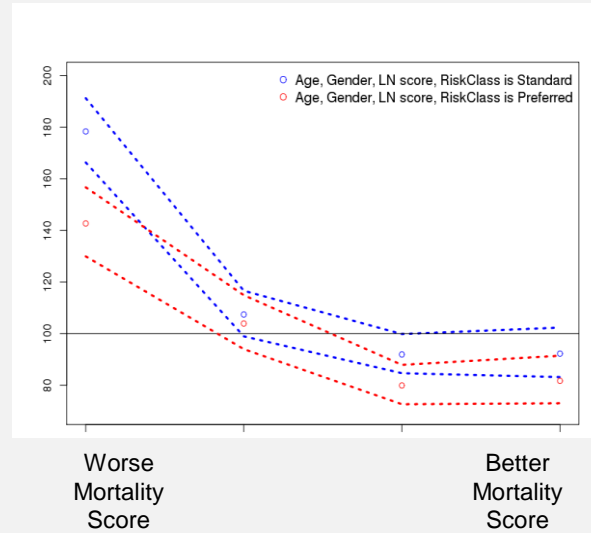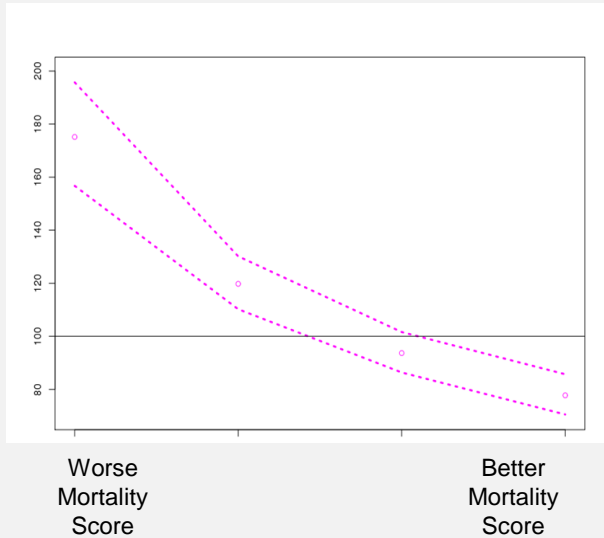
Our analysis suggests the scores:
- Are a new non-medical based dimension of mortality risk
- Are not intended to mimic the same UW risk class assigned using traditional medical underwriting
- Can improve the fit of mortality predictions on top of health-based underwriting criteria
- Provide mortality segmentation even within similar levels of affluence

Common applications include:
- Set threshold for eligibility into AUW program
- Set threshold for cases that are Declined
- Set threshold for Preferred criteria
- Risk class shifting



Relative A/E vs TrueRisk® Life Score By Income



Relative A/E vs LexisNexis® Risk Classifier Score by Age

# Alternative data-based mortality scores

Worse Mortality Score — Better Mortality Score

Worse Mortality Score — Better Mortality Score

- Age, Gender, LN score, RiskClass is Standard
- Age, Gender, LN score, RiskClass is Preferred

**Model Comparison - AIC**

- Age, Gender, RiskClass
- Age, Gender, LN score
- Age, Gender, Risk Class and LN score
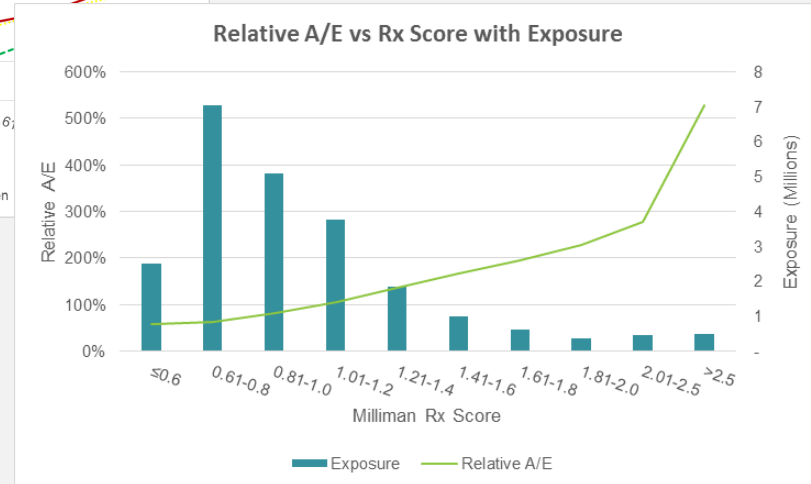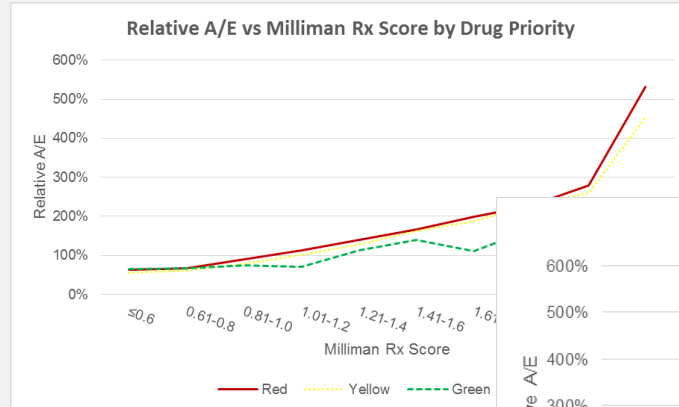
Model I    Model II    Model III

*Statistical techniques isolate the impact of the scores and provides confidence bands around estimates*

# Rx (prescription drug)-based mortality score

- Milliman is one of the major providers
- Effectively stratifies mortality risk across attributes
- Particularly effective to identify high mortality risk when little other medical data is available
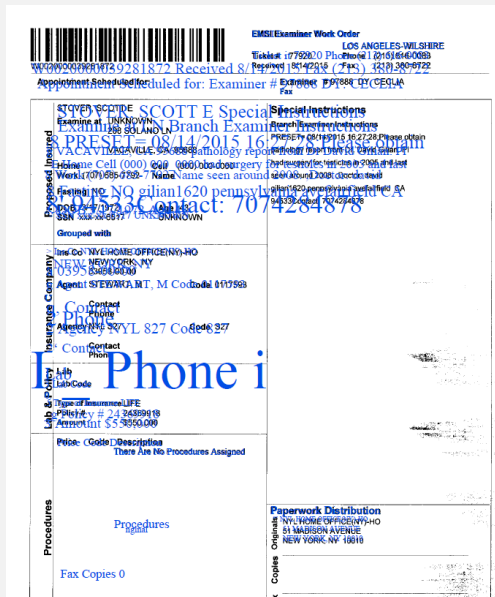
Common applications include:
- Set threshold for eligibility into AUW program
- Set threshold for cases that are Declined
- Set threshold for Preferred criteria
- Risk class shifting
- Combine with other mortality scores/UW criteria



Relative A/E vs Milliman Rx Score by Drug Priority



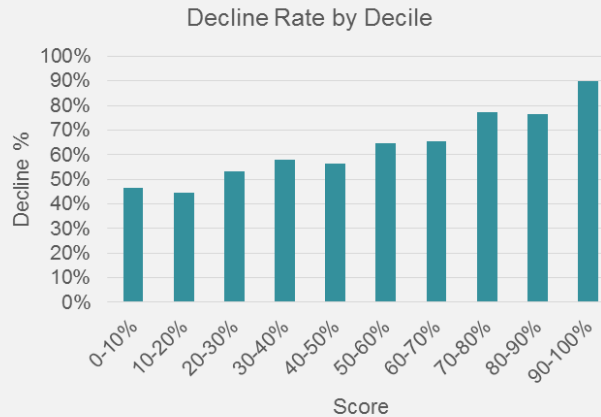Relative A/E vs Rx Score with Exposure

# Health records

1) The APS provided the most useful information for modeling.
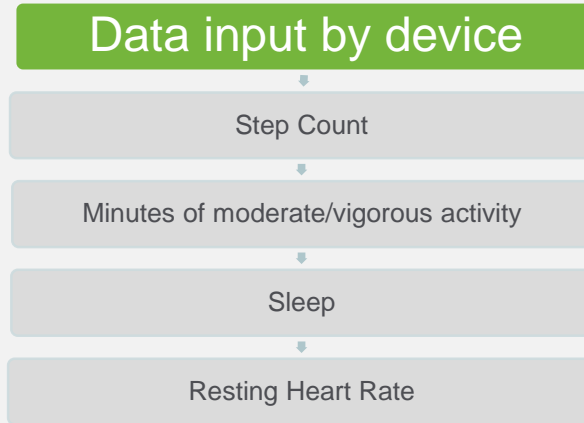


2) Various regression and machine learning techniques including random forest, gradient boosting and support vector machines applied to predict probability of decline.



Decline Rate by Decile

3) Besides probability, model provides keywords driving prediction along with page where found in text.

- axillary: 12, 28, 30
- prostate: 12, 56, 57
- svc: 33
- ancillary: 39, 40, 41, 43, 44
- prostatic: 57, 61
- influenza: 62, 63, 66
- jaundice: 59
- excised: 59, 61, 62
- jaundiced: 68

# Wearables

## Info input by user

- Age
- Height
- Weight
- Waist Circumference
- Blood Pressure
- Family History
- Behavior (stress, happiness, smoking, alcohol)

## Data input by device

- Step Count
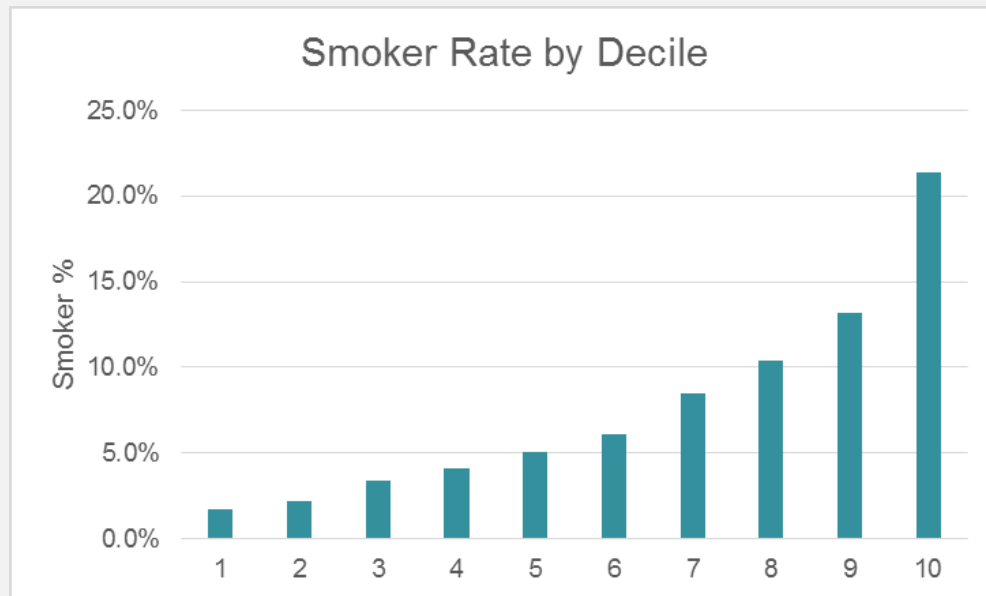- Minutes of moderate/vigorous activity
- Sleep
- Resting Heart Rate
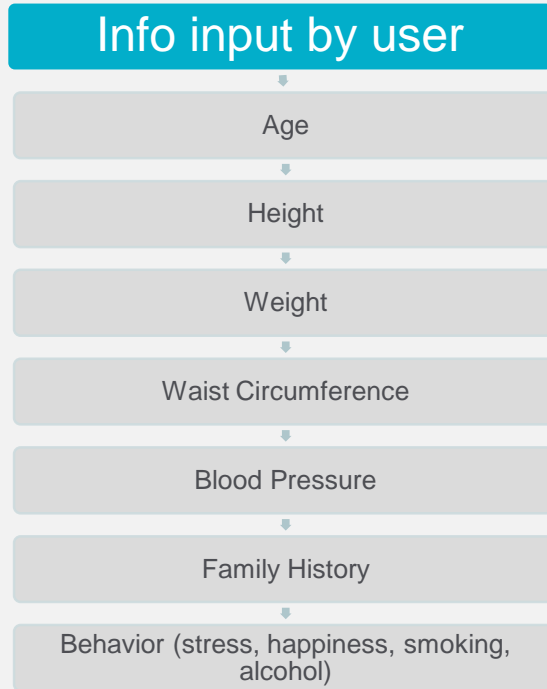
Incorporate with application, UW data, new risk assessment tools for:
- Screening
- Risk class assignment
- Mortality model

*Factors listed here are illustrative, not exhaustive, and vary by device; provided by Vivametrica*

# Marketing and lifestyle data

| Area | Predictor | Direction |
|------|-----------|-----------|
| Affluence | Face amount | ▼ |
| | Home value | ▼ |
| | Client issue age - older | ▼ |
| | Education | ▼ |
| | Investment assets | ▼ |
| Lifestyle | Catalog stationery buyer | ▼ |
| | Healthy behavior change index | ▼ |
| | Survey *xxxxx* music | ▲ |
| | Survey *xxxxx* vacations | ▲ |
| | Survey lotteries or sweepstakes | ▲ |
| | Survey *xxxxx* diet | ▼ |
| | *xxxxx* pet ownership | ▲ |
| Location | Counties, grouped | ▼ |

## Smoker Rate by Decile

# Smoker predictor case study

Cumulative extra mortality cost

- Model SA
- Model SL

100% non-disclosure

50% non-disclosure

Current non-disclosure

I, II, III, IV

Extra Mortality Cost, %

# of accepted stright-through deciles

| | Fluid Test | Non-disclosure | Extra Mortality* |
|---|---|---|---|
| I | All | 25% | 0% |
| II | None | 25% | 12% |
| III | None | 50% | 21% |
| IV | None | 100% | 40% |

- Currently all applicants are sent for fluid tests; extra mortality is 0%
- When fluids are eliminated without routing likely smokers for tests, mortality will increase
- At current self-disclosure, Model SL minimizes extra mortality cost (slightly)
- As non-disclosure increases, Model SA minimizes extra mortality cost

*Calculated as smoker liar rate * 200% (mortality multiplier for smokers)*

- Milliman Rx Risk Score Validation White Paper:

  - https://www.munichre.com/site/marclife-mobile/get/documents_E937882213/marclife/assset.marclife/Documents/Publications/Milliman-Rx-Risk-Score-WP_FINAL_8.31.17.pdf

- TrueRisk® Life Score Validation White Paper:

  - https://www.munichre.com/site/marclife-mobile/get/documents_E-921937629/marclife/assset.marclife/Documents/Publications/Transunion_TrueRisk_IA_Final_6.15.17.pdf

# Accelerated Underwriting in Life Insurance

Thank you!

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