



Session 3

Big Data Applications: For pricing and beyond

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SOA Predictive Analytics Seminar

8, Sept. 2017



Predictive Analytics: Applications in pricing and beyond

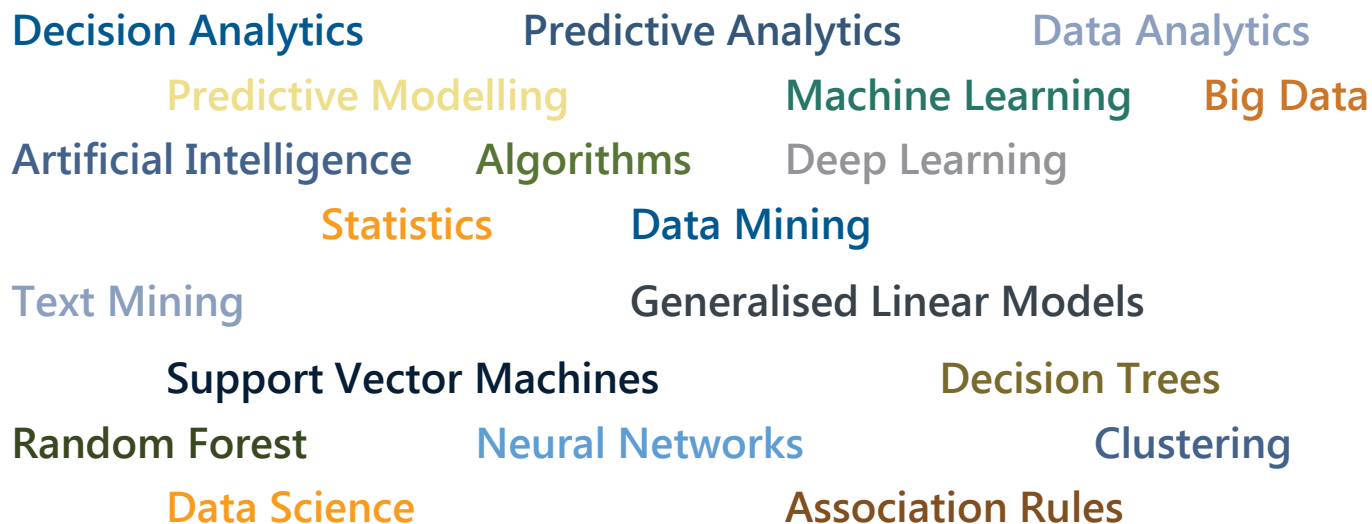
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8 September, 2017



Numbers people are better with numbers than words....



Step outside of insurance (for just a minute, don't worry)

- Walmart, Amazon, Expedia – product recommendations
- Airlines – price discrimination
- fivethirtyeight.com – good with both numbers and words (though not perfect)
- Data can improve lives
 - Exposing disparities (socioeconomic differences, pay gaps)
 - Health reform in US
- So, is big data dirty business?
 - doesn't have to be (% consumers open to data sharing)
- But, rather than start with a slick solution, start with a business problem.
What decisions are being made without data?

AGENDA

01 Growing data in insurance

02 Main uses of predictive analytics today

03 Mini case studies involving actuaries

04 Will we lose our jobs?

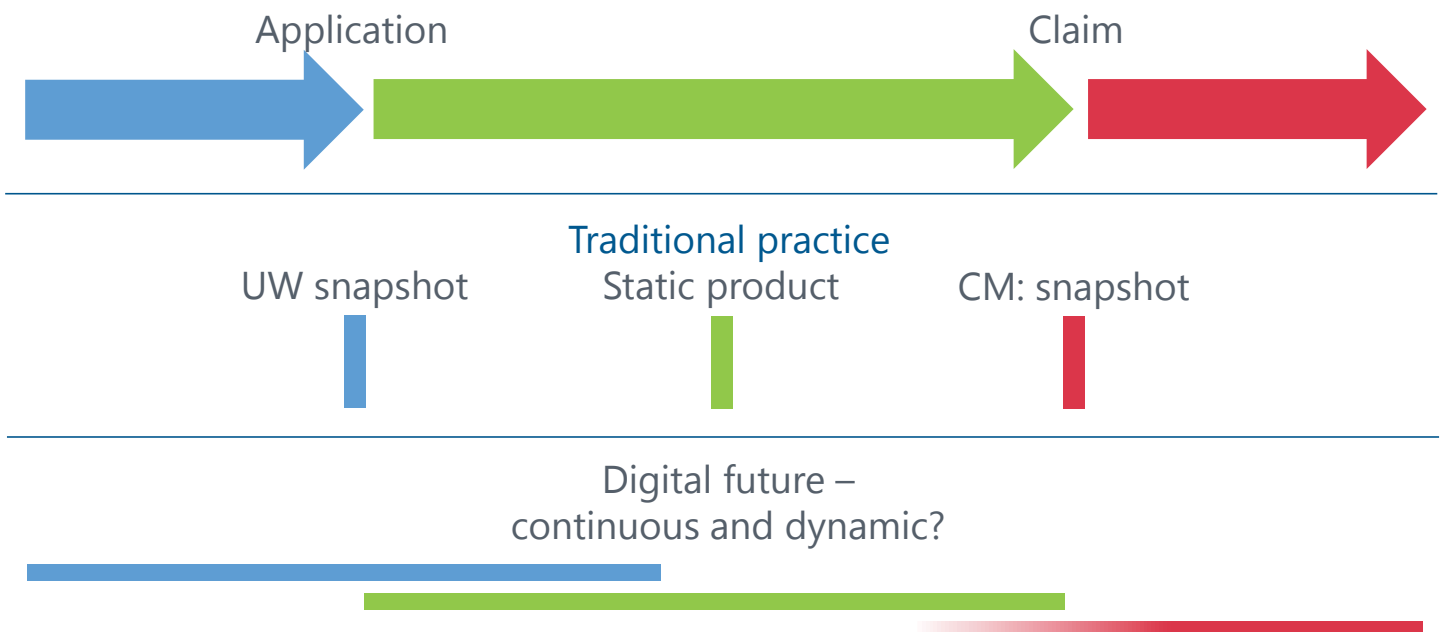
Beginnings of predictive modelling in insurance

- Motor insurance – underwriting and ratemaking
- Risk scores in health – software vendors

Pay as you live

- Telematics & usage-based car insurance
- Pay as you live in life & health also becoming mainstream
 - Workplace wellness, Vitality
 - Wearables: the biggest data around (towards petabytes)

Will wearables revolutionize traditional insurance?



Physical activity - A walk a day keeps the doctor away

“Walking for at least an hour or two could cut a man’s stroke risk by as much as one-third [...] Taking a three-hour long walk each day slashed the risk by two-thirds.”

Source: American Heart Association Nov. 2013

“Chronic sitting has a mortality rate similar to smoking.”

Source: Diabetologia. 2013 Apr; 56(4): 942-3

“Walking for two miles a day or more can cut your chances of hospitalization from a severe episode of chronic obstructive pulmonary disease (COPD) by about half.”

Source: Respirology V.19(3) 330-338

“Research even shows getting up and walking around for two minutes out of every hour can increase your lifespan by 33 percent.”

Source: Clin J Am Soc Nephrol. 2015 Jul 7;10(7):1145-53

“Walking is a superfood.”

Possible customers’ concerns

- Not everyone wants to be monitored
- Data security is a concern
- Device accuracy (discrepancies depending on wearables and calculators)
- Target levels of physical activity may seem unachievable
- Submitting false data
- Lost interest / wearoff

... Most people don’t care about life insurance, but they do care about having a long and healthy life.

Wearables and continuous underwriting



Current practice	Current potential	Future potential
Snapshot	Continuously	
• Age • Gender • Chronic illnesses • Smoking status • Lab values and further medical information	• Steps • Activity minutes • Calories burned • Heart rate • Sleep	• Personal health advisor • Lung function • Hormone levels • Medicine intake • Calorie balance • Body temperature • Chronic disease management adherence

German statutory health insurance

- Government dictates to offer prevention courses or bonus programs to health insureds
- Running courses are subsidised by almost all health insurers
- Courses are usually reimbursed by up to 95% to a certain maximum per year
- Bonus programs: The more health activities have been performed the more is paid back
- Some health insurers offer own running events

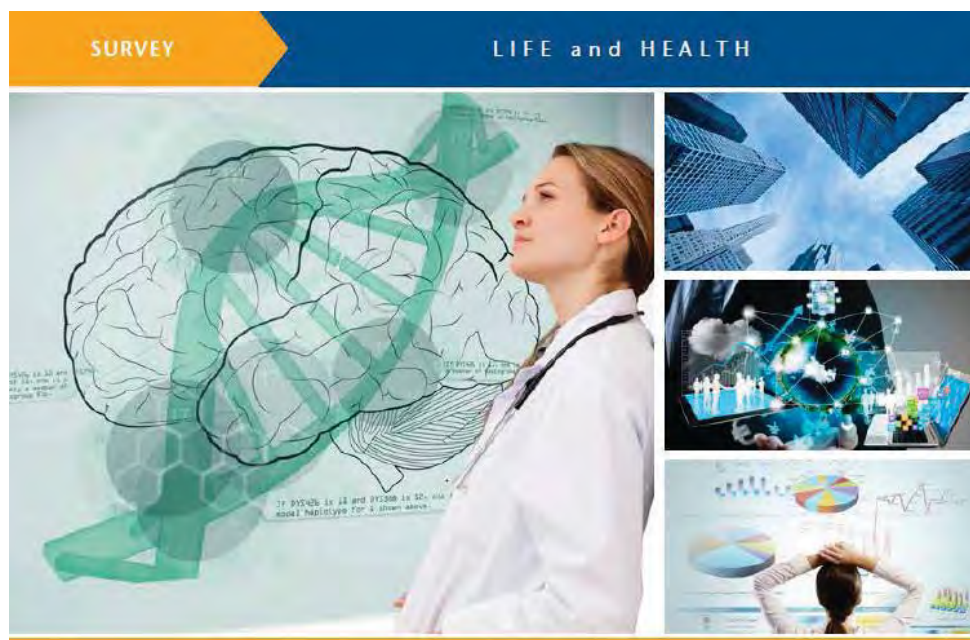
And it pays back!

„ For every Euro invested into bonus programs, health insurers saved 2.32€ in claims.“

Source: Runner's world about a study ordered by Barmer GEK

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Use of Predictive Analytics by Life and Health Insurance Companies

Global Survey, 2016 Results

Scope of the Survey

Predictive Analytics

"Statistically rigorous techniques (beyond conventional actuarial experience analysis) that are applied to data to model or predict future outcomes"

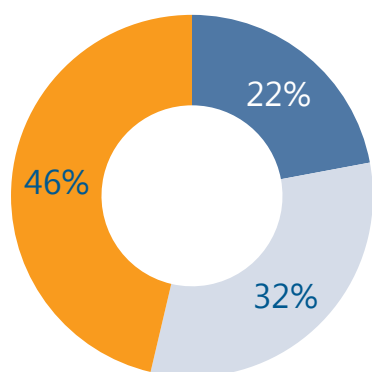
136 different companies

23 countries

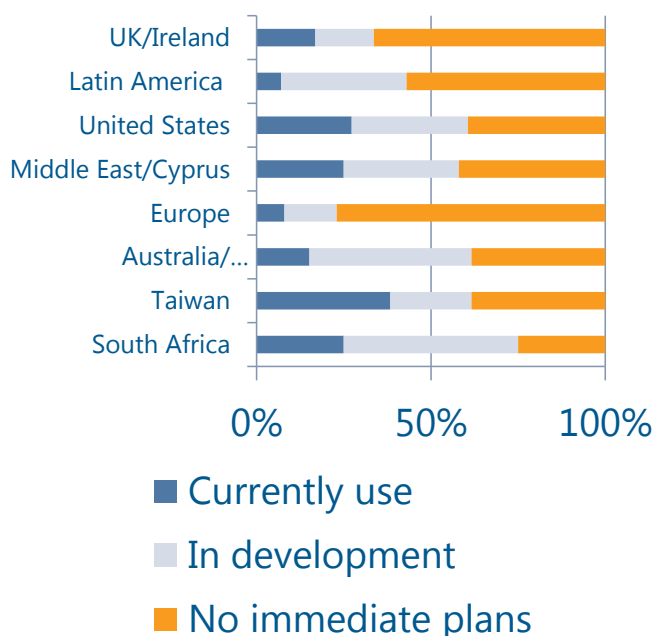
8 regions

Australia/New Zealand
Europe
Latin America
Middle East / Cyprus
South Africa
Taiwan
UK / Ireland
U.S.

Status of Predictive Analytics Usage



- Currently use
- In development
- No immediate plans



Status of Predictive Analytics Usage by Function

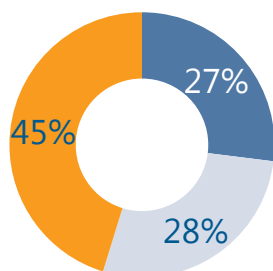
	Sales / Marketing	Pricing	Simplifying UW Requirements	Refining UW Decisions	Claims Management
Currently Using	20%	12%	9%	6%	6%
Not currently using, but likely in 2 years	24%	28%	32%	29%	17%
Not currently using, and unlikely in 2 years	56%	60%	60%	65%	77%
R=	131	129	129	128	128

Specialised Predictive Analytics Teams, by Region

	All Participants	South Africa	Taiwan	Australia / New Zealand	Europe	Middle East / Cyprus	U.S.	Latin America	UK / Ireland
Specialised Team	35%	40%	50%	38%	33%	14%	32%	17%	75%
R=	72	5	8	8	3	7	31	6	4

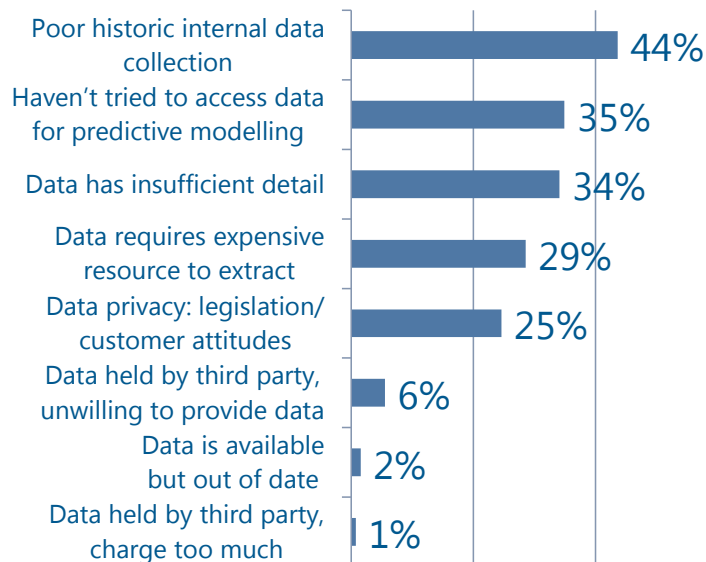
Challenges in Predictive Analytics Development

Most Significant Barriers to Predictive Modelling Attempts



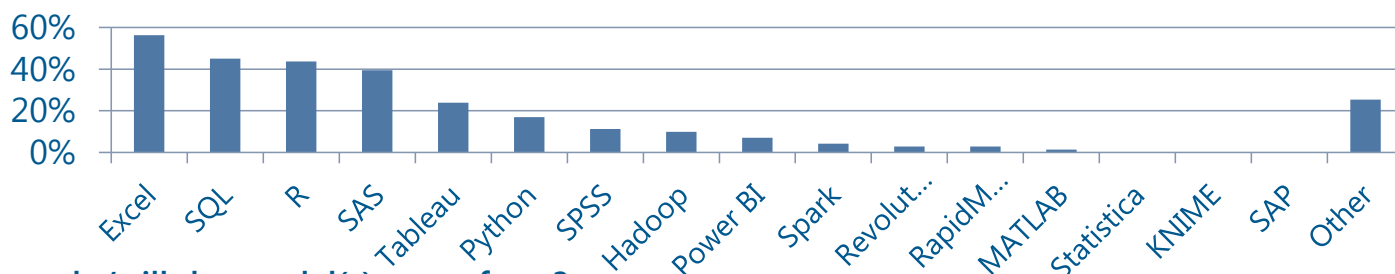
- Lack of Access to Suitable Data
- Lack of Expertise
- Lack of Priority/Budget

Barriers to Access Data



Tools Used

- What analytical software is used by your organization for the purpose of predictive analytics? (Check all that apply)

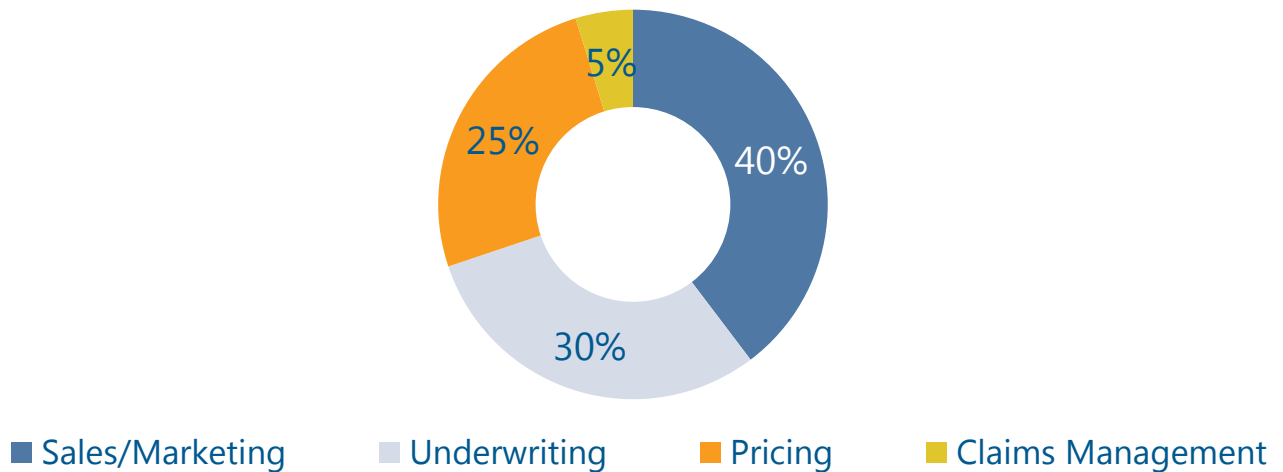


Where do/will the model(s) come from?

	Sales/ Marketing	Pricing	Simplifying UW Requirements	Refine UW Decisions	Claim Management
Internally only	46%	37%	29%	24%	43%
Intenal and external	36%	42%	33%	42%	30%
External only	5%	10%	25%	13%	3%

Opportunities in Predictive Analytics Development

- Areas of operation could benefit most from Predictive Analytics



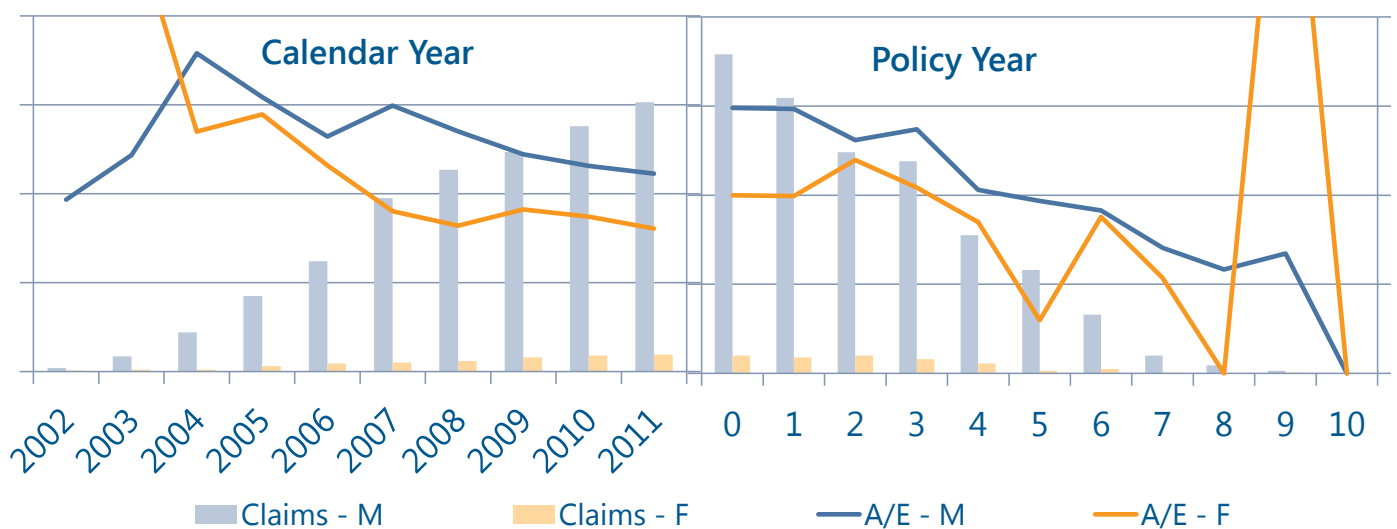
Opportunities in Detail

Pricing • New risk/rating factors • Initiate product differentiation • Other pricing refinements	Retention • Identify prospects more likely to lapse • Optimizing customer engagement • Upselling opportunities	Claims Management • Identify fraud / misrepresentation • Triaging investigations • Automating processing • Early intervention
Underwriting • Develop targeted uw • Reduce / simplify uw • Refine uw decisions • pre-select candidates, streamline uw	Marketing • Identify prospects more likely to buy • Target marketing efforts • Distribution management	

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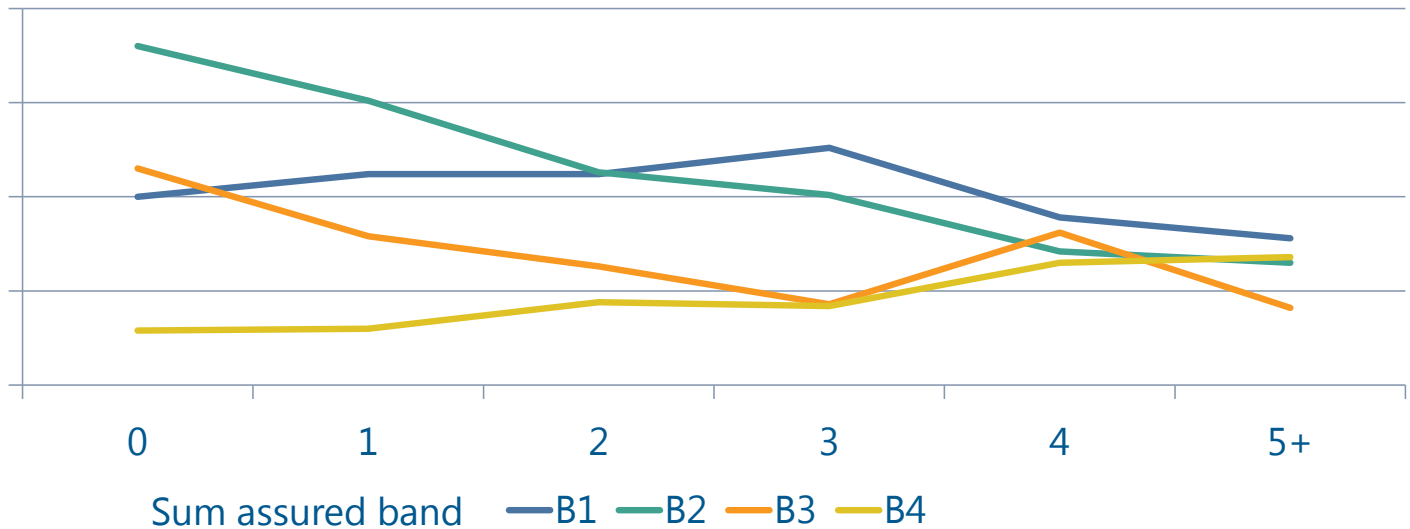
India: standard analysis shows mortality improvements



- GLM analysis shows anti-selection as key driver, though not evenly across sum assured bands

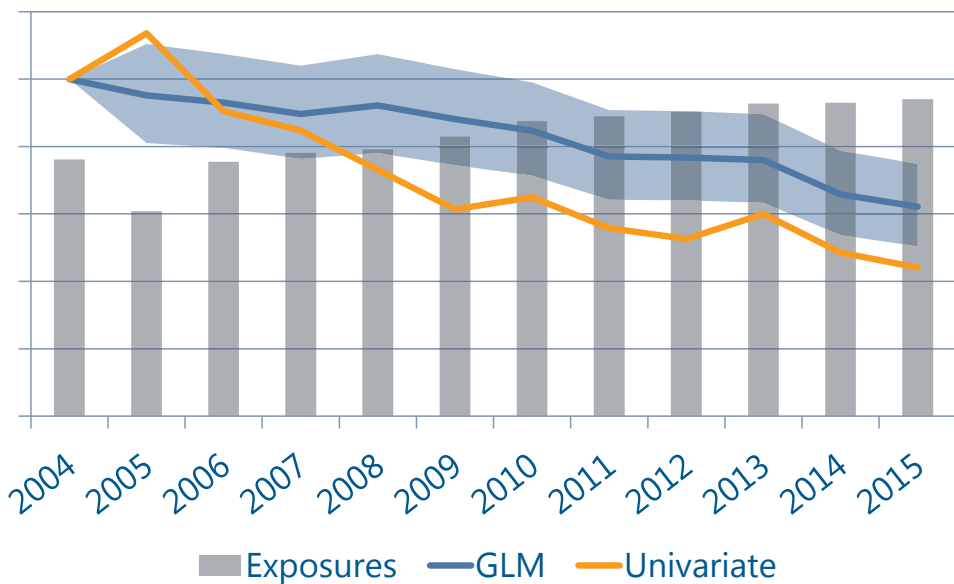
India: (Anti-)selection by sum assured band

- GLM for CY 2011



Germany: mortality improvements

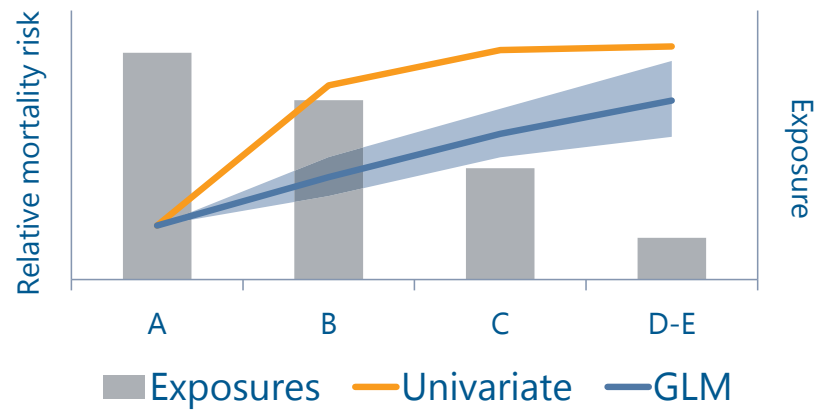
- Model for males, large life insurance product



- GLM result stabler than univariate
- Changing portfolio composition and participating insurers, smoking cessation

Germany: mortality levels by occupational class

- Model for males, large life insurance product
- Mortality in relation to Occ Class A
- Uniform increase by Occ Class
- Weaker influence of occupation in GLM analysis
- Occupational class strongly correlated with sum assured and smoker prevalence



New Zealand

Comprehensive market analysis of claims

- Mortality, disability, and critical illness
- Riders and base policies analysed, 15k claims over 2009-2014



Policy distribution by postal code

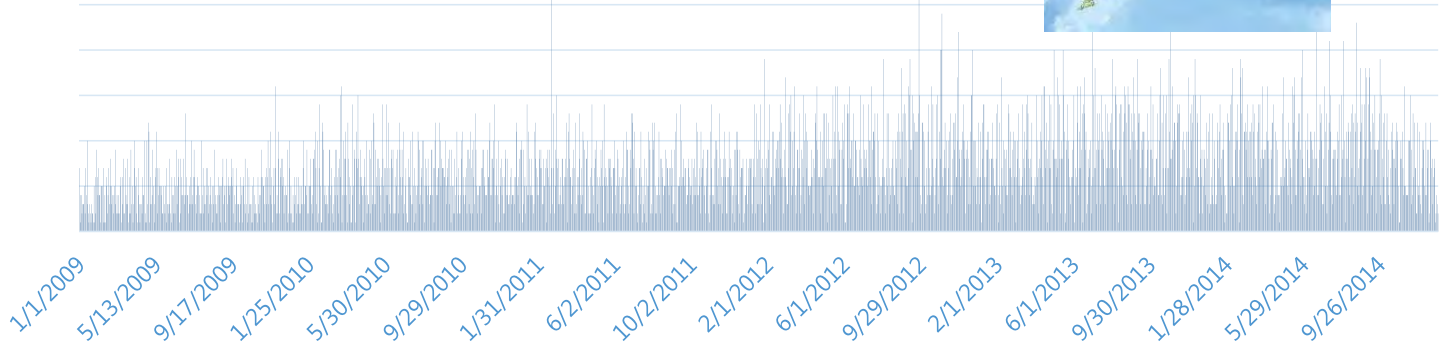
- Descriptive Analysis with easily accessible tools (Excel, Power BI Add-Ins)
- Data field only populated in ~50% of policies



... another “geographic” observation

Distribution of deaths by date

22. Feb. 2011





Australia & United Kingdom

Application data analysis of variables influencing

- Issue and take-up rates
- Disclosure modelling
- Improving underwriting efficiency

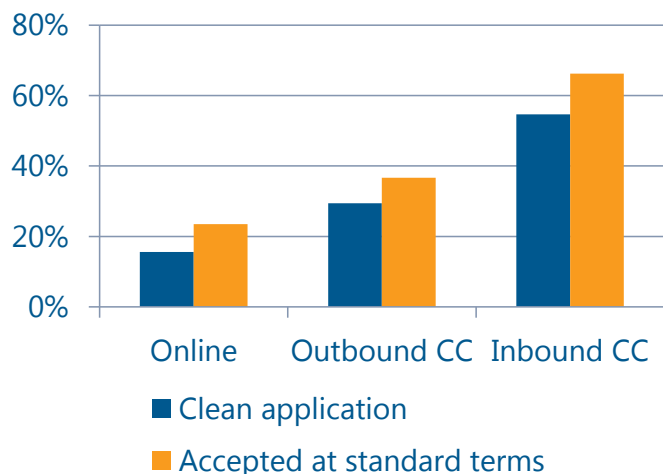


Scope of analysis

Two products	Distribution channels
• Mortality • Disability	• Direct – Online • Inbound- call center • Outbound- call center
Underwriting	Policy issue
• 30+ questions • Dynamic (cascading) • (Family-) history • Different by product	• Accept at standard • Loading • Exclusions • Offer reduced coverage

Clean applications for term life

Take-up rates



- Significantly lower take-up rate among clean applications
- Are clean applications really from healthy applicants? Or rather less engaged or less prepared to disclose?
- Are applicants, who accepted at standard terms but with some disclosure, actually the more healthy applicants?
- Criterion "Clean application" is relevant for analysis of claims experience

Which variables influence rate of issuance?

Of over 30 questions – which factors matter?

Models for both product types

- Age band
- gender
- BMI
- Distribution channel
- Underwriting decision
- Health disclosures
- Occupation

Top 2 influences – term life

Health question	Pr(> z)	%	Coefficient	95%-CI	
Psychological, psychiatric, or mental health disorders	0,0000	12%	129%	119%	140%
Non-prescribed drug use in last 5 years	0,0000	2%	149%	127%	176%

Disproportionally high take-ups due to

- Disclosure-friendly clientele

OR

- Underwriting philosophy of the insurer vis-a-vis the competition

Significant influence – disability by occupation

Occupation	Pr(> z)	%	Coefficient	95%-CI	
Construction	0,002	30%	212%	180%	250%
Police	0,003	1%	189%	127%	281%
Transportation	0,003	7%	141%	112%	177%
Media	0,003	2%	156%	115%	212%

Higher take-up rate due to

- Shier reference group (finance sector)

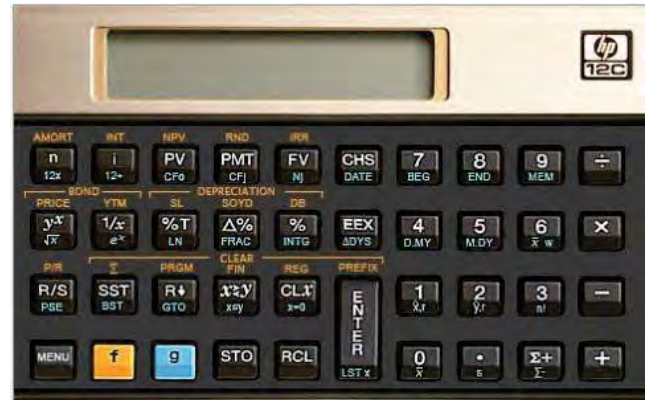
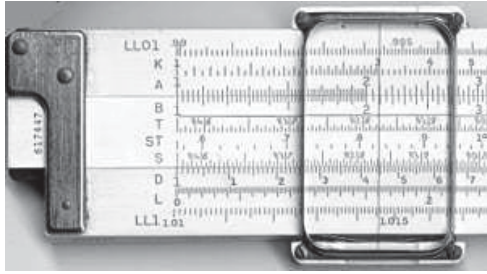
OR

- Rating for occupations of the insurer vis-a-vis the competition

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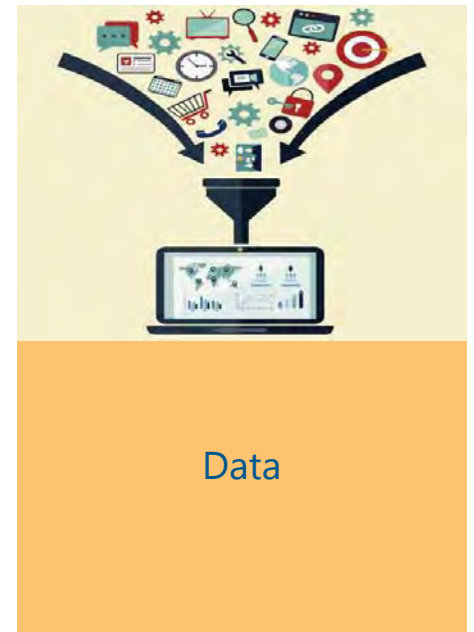
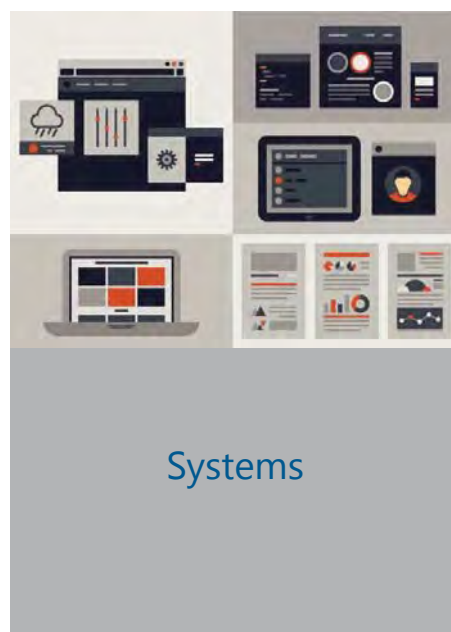
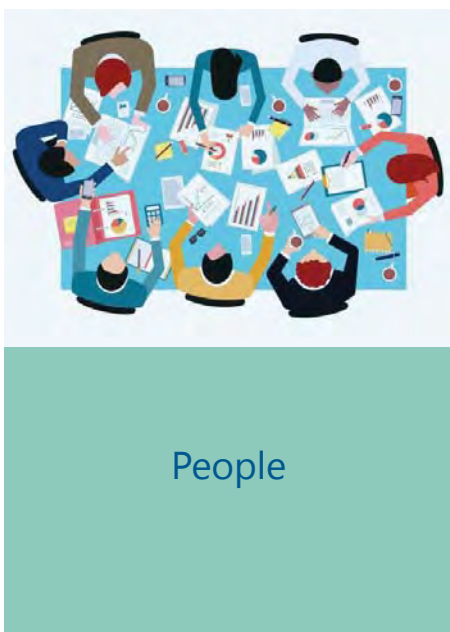
- McKinsey report predicts 25% decline in insurance FTEs over next decade
 - “Sales agents are among the most vulnerable... as many of 60% of the tasks sales agents perform could be done by automation. For underwriters, that percentage is 35%. Even CEOs aren’t immune as robots or computers could do 25% of what they do. Actuaries are among the safest.”
 - “But some positions will be engines of job creation—these include marketing and sales support for digital channels and newly created analytics teams tasked with detecting fraud, creating “next best” offers, and smart claims avoidance. To meet these challenges, insurers will need to source, develop, and retain workers with skills in areas such as advanced analytics ... and the ability to translate such capabilities into customer-minded and business-relevant conclusions and results.”



SOA roster	Total Members (Fellows & Associates)	Annualized Growth Rate
1889 Charter Members	38	
1909	283	10.6%
1929	618	4.0
1949	1,069	2.8
1969	3,544	6.2
1989	11,784	6.1
1995	16,942	6.2
2016	27,000	2.2

<https://www.soa.org/about/historical-background/>

We need all three





Thank You

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