Society of Actuaries in Ireland

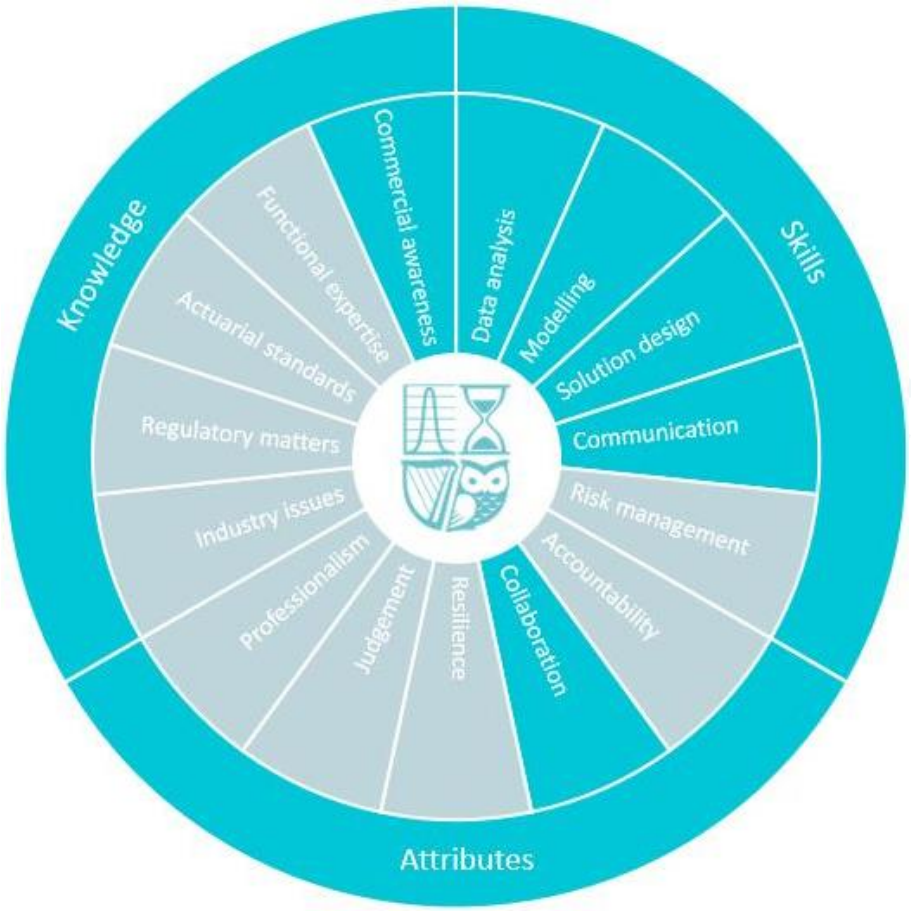
Application of Data Analytics in Insurance

24 October 2019

Disclaimer

The views expressed in this presentation are those of the presenter(s) and not necessarily those of the Society of Actuaries in Ireland or their employers.

Competency Framework



About the speaker

Bence Zaupper, FSAI

- Senior manager, life actuary in the Actuarial Services Group in PwC Ireland, Data Analytics Proposition Lead.
- Provides audit and actuarial services to PwC's financial services clients and supports clients in advisory projects such as risk and capital management and data analytics.
- Member of the Data Analytics Subcommittee of the Society of Actuaries in Ireland providing resources for members looking to upskill in this area.

Agenda

- Role of actuaries in the digital age
  - Actuaries of the future
  - Trends in the US
    - US Actuarial Modernisation Survey (PwC, 2018)
    - Top Actuarial Technologies (SOA, 2019)
  - Implications for actuaries in Ireland
- Analytics use cases in insurance
  - Behavioural analytics
  - Customer segmentation
  - Claims analytics and fraud detection
  - Other insurance use cases

Role of actuaries in the digital age

Actuaries of the future

- Key messages from the leaders of the Actuarial Association of Europe (AAE) in a recent press release* (June 2019):

  "Although traditional actuarial competence is essential, to remain a relevant partner, actuaries must extend their reach to new areas outside their comfort zone. These include sustainable finance, consumer protection, big data and modern data science and macro prudential issues." – Esko Kivisaari (former chairperson of the AAE)

**Source: AAE, link included in the Appendix*

Actuaries of the future

- In the same press release, Falco Valkenburg, current chairperson (former vice-chairperson) of the AAE describes actuaries of the future (or the "fifth kind of actuaries"):

  "…a data and model-driven, critical and socially responsible financial decision maker in an ever-changing world ruled by uncertainty".

- Previous "kinds" of actuaries in chronological order:
  1. Life 2. Non-life 3. ALM 4. ERM Actuaries

Actuaries of the future

- Questions:
  - What does this mean in practice?
  - Where are we now?
  - What do we need to get there?

Actuarial Modernisation Survey

- Actuarial Modernisation Survey* run in the US in 2018 by PwC with 56 respondents
- Key themes:
  - The elusive goal of Full Automation
  - The challenge of Data Management
  - The Actuary today and tomorrow

**Source: PwC, link included in the Appendix*

Actuarial Modernisation Survey

The survey

Purpose:

Survey to understand current state of Actuarial Modernization for both P&C and Life companies

Scope:

48 questions covering

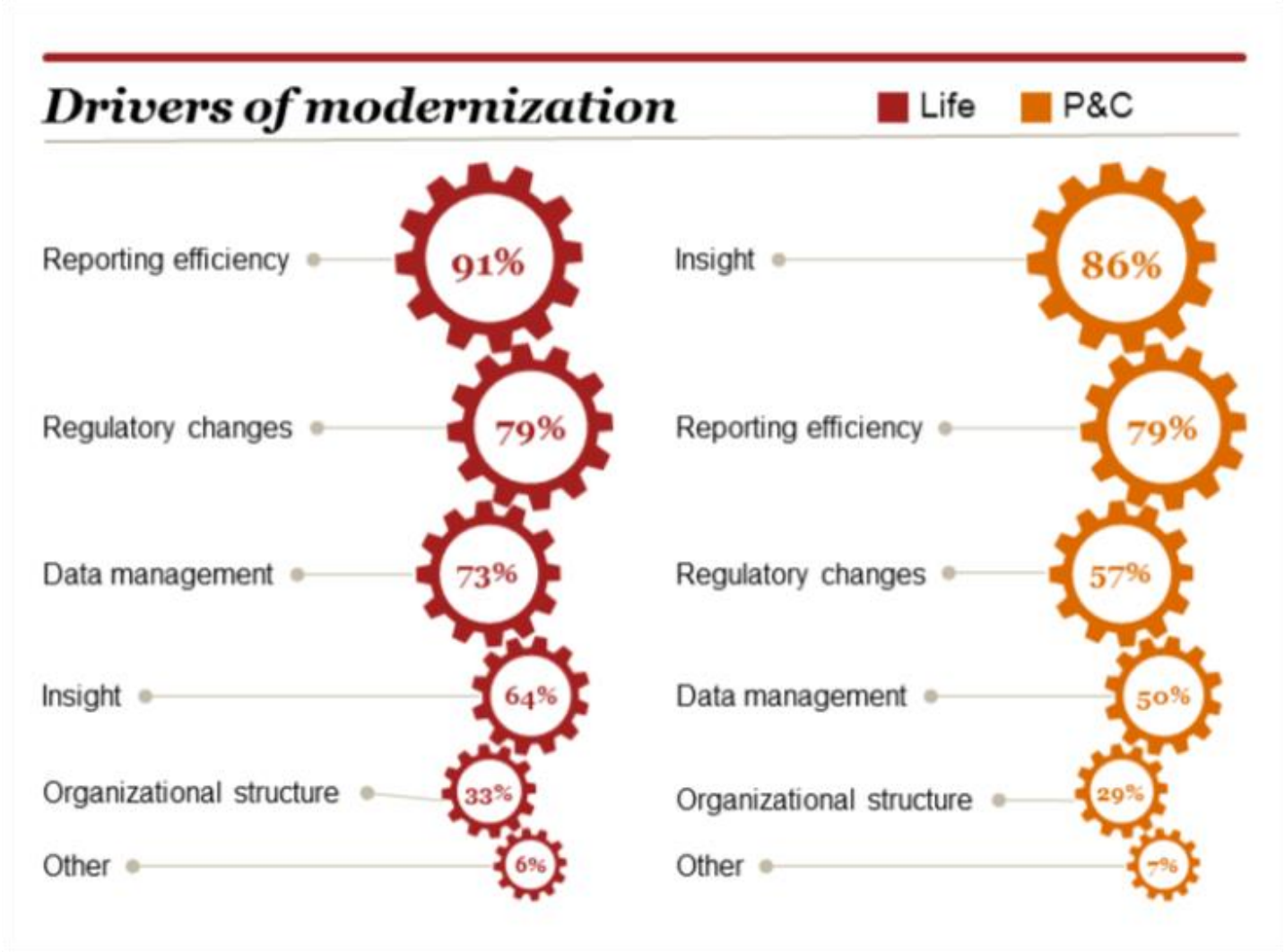
- Demographics
- Modernization
- People
- Process
- Technology

Responses:

37 Life and 19 P&C companies

- 40% are US national and regional insurers, 60% are international
- Actuarial team size: 18 have less than 50 FTE ("Small"), 18 between 50 and 100 FTE ("Medium") and 20 more than 100 FTE ("Large")

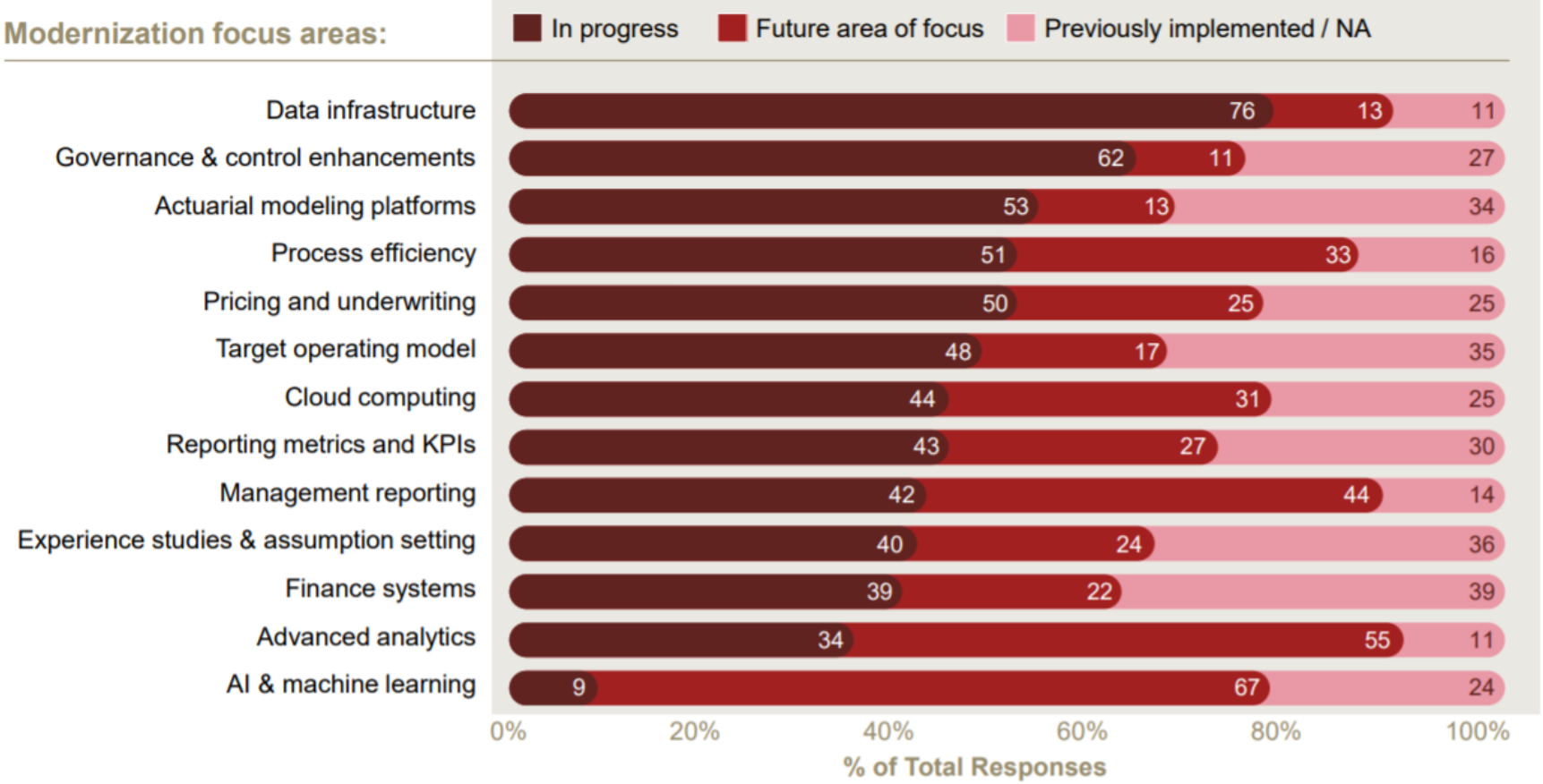
Actuarial Modernisation Survey



Actuarial Modernisation Survey

Focus area of modernization programs

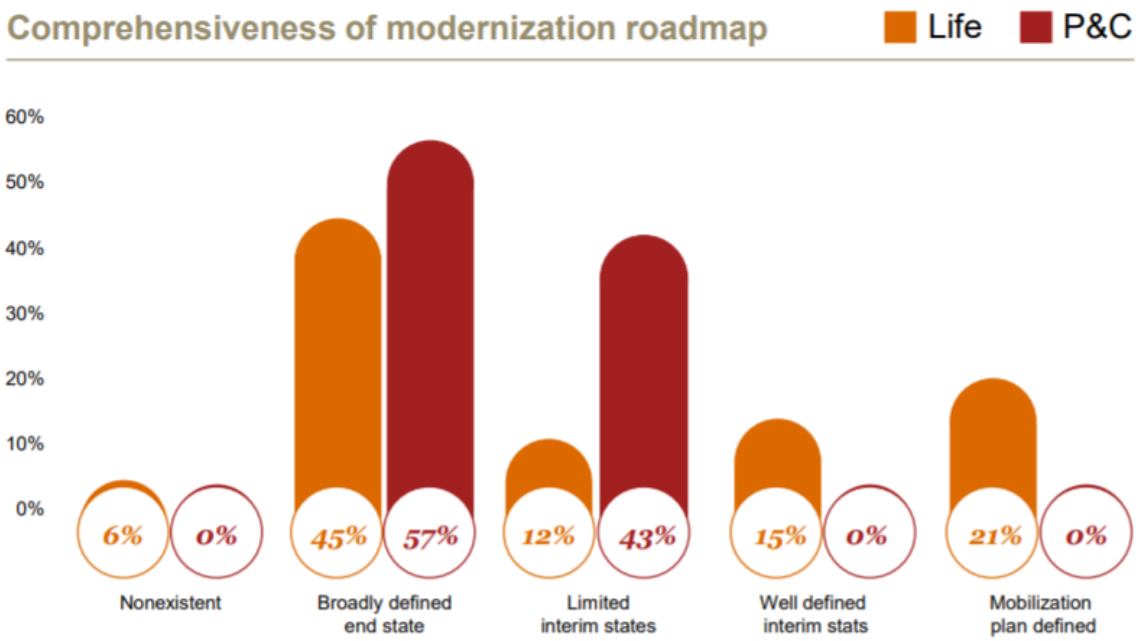
- Main focus areas are implementation of foundational capabilities, e.g. data infrastructure, governance/controls and actuarial modeling platforms
- For future focus AI/Machine learning, Advanced analytics and Management reporting are the three top categories



Actuarial Modernisation Survey

Maturity of modernization plans

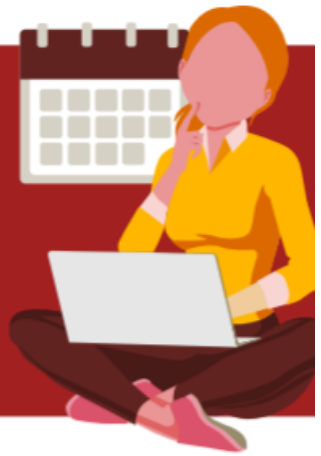
- The majority of insurers do not have a well articulated modernization plan
- Only ***25%*** of insurance companies have a detailed end state with well-defined interim states (***0%*** of P&C companies)

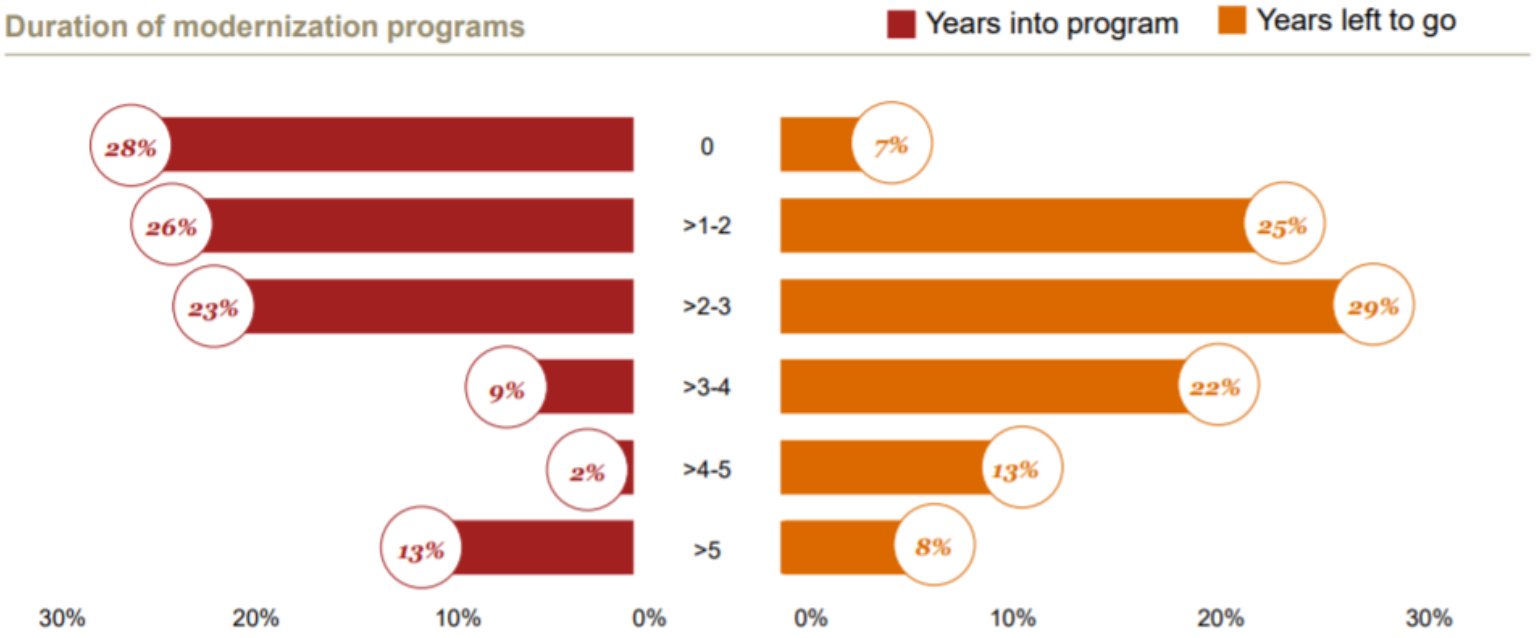


Actuarial Modernisation Survey

Duration of modernization programs

- The majority of companies expect modernization will take in excess of 3 years
- In general, Life companies reported being somewhat further into their modernization program when compared to P&C companies

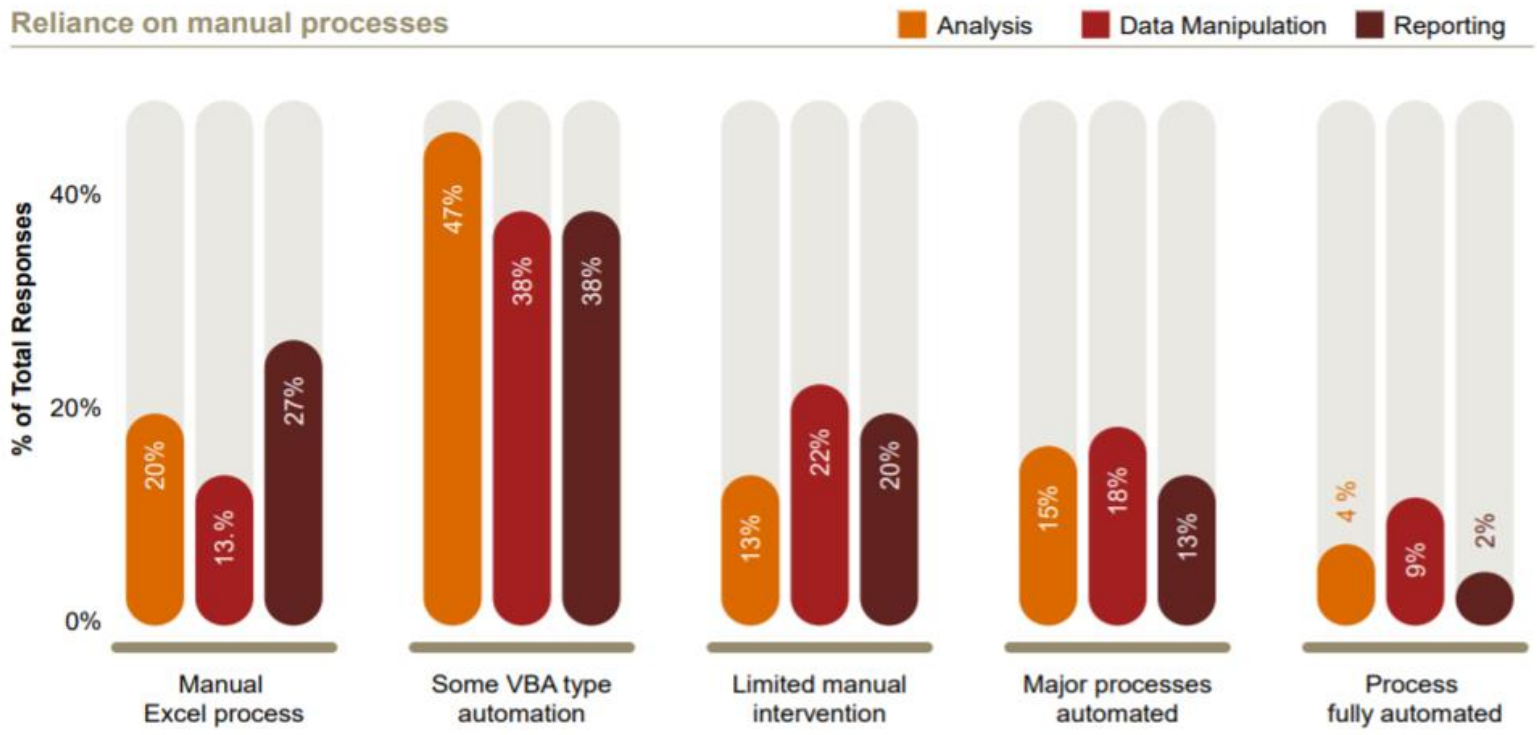




Actuarial Modernisation Survey

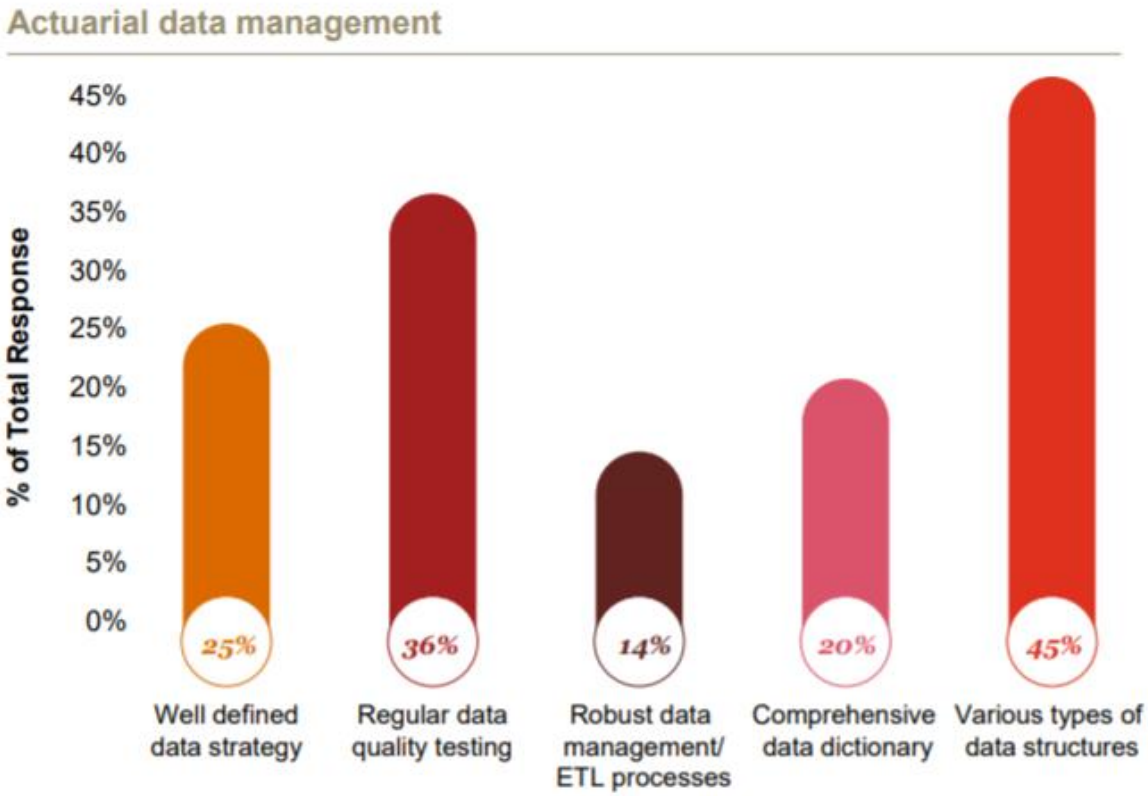
Complete process automation is very rare

- Surprisingly, the level of automation does not vary that much by the nature of activity - Data manipulation is slightly more automated
- Not surprisingly actuaries still rely on VBA type automation
- P&C companies in general have a lower degree of automation



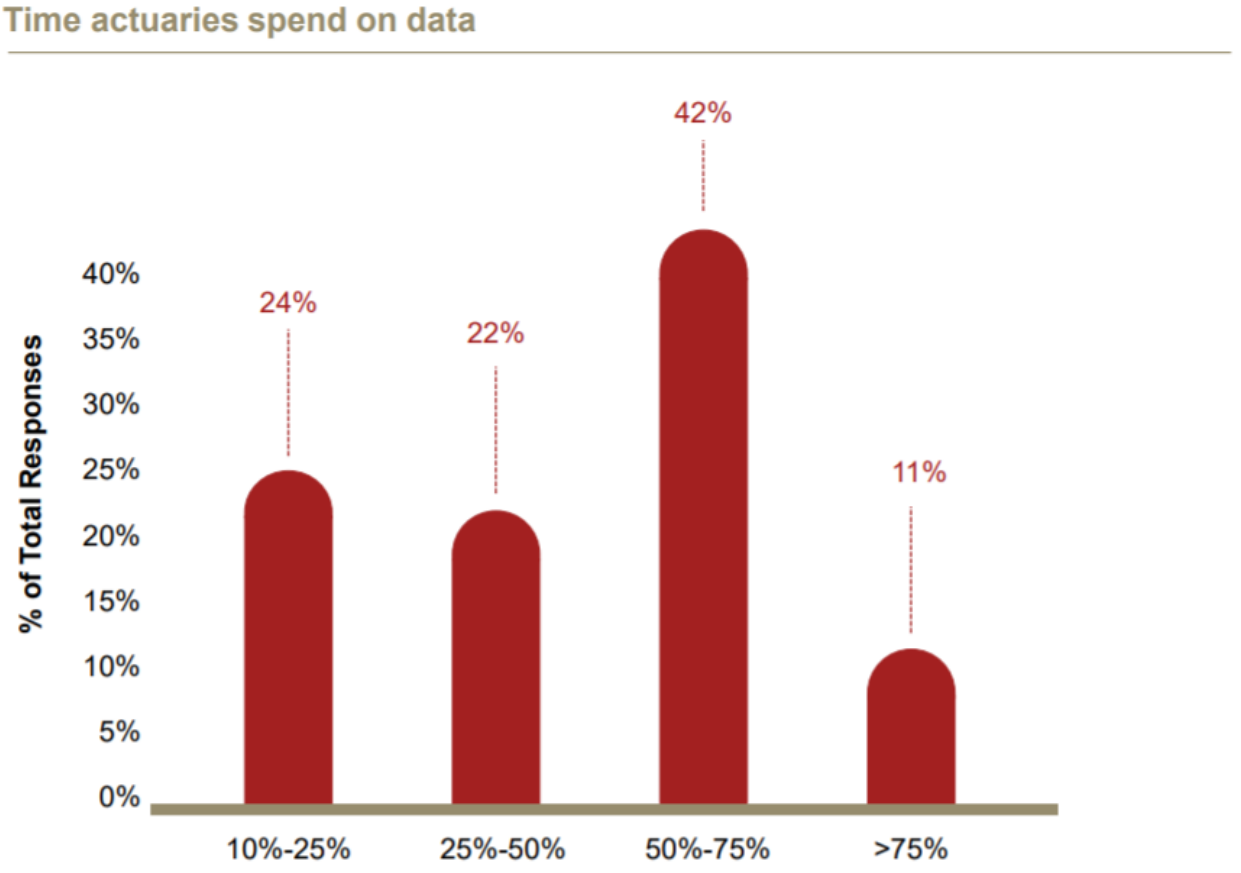
Actuarial Modernisation Survey

- Less than half of companies have a data strategy, data dictionary or robust data management
- Few insurers can support consistent ETL processes
- Inconsistently stored data causes inefficiencies



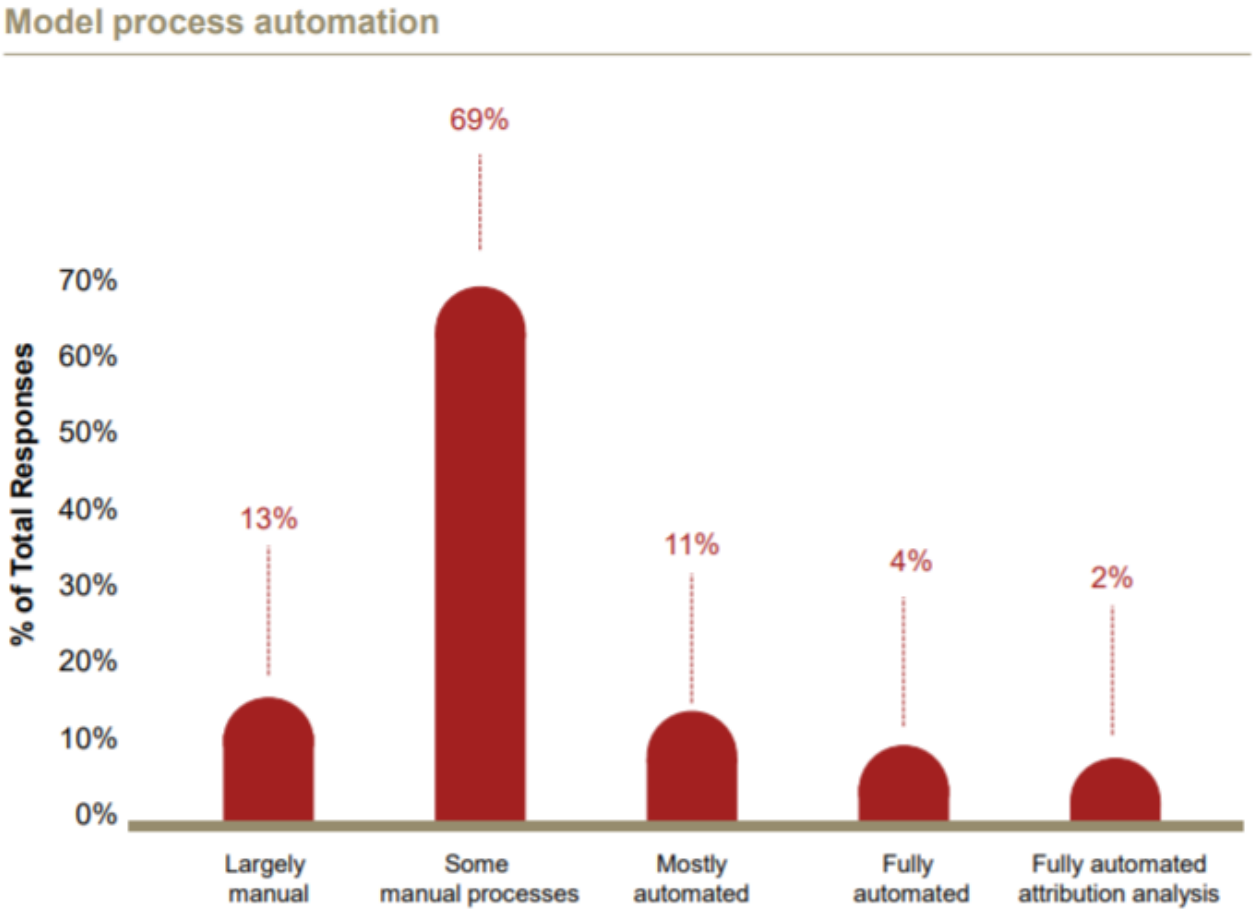
Actuarial Modernisation Survey

- The median actuary spends more than ***50%*** of the time on data manipulation rather than analysis or reporting
- Actuaries spend less than **25%** of their time on data in only **25%** of insurers.
- No company polled achieves less than ***10%***



Actuarial Modernisation Survey

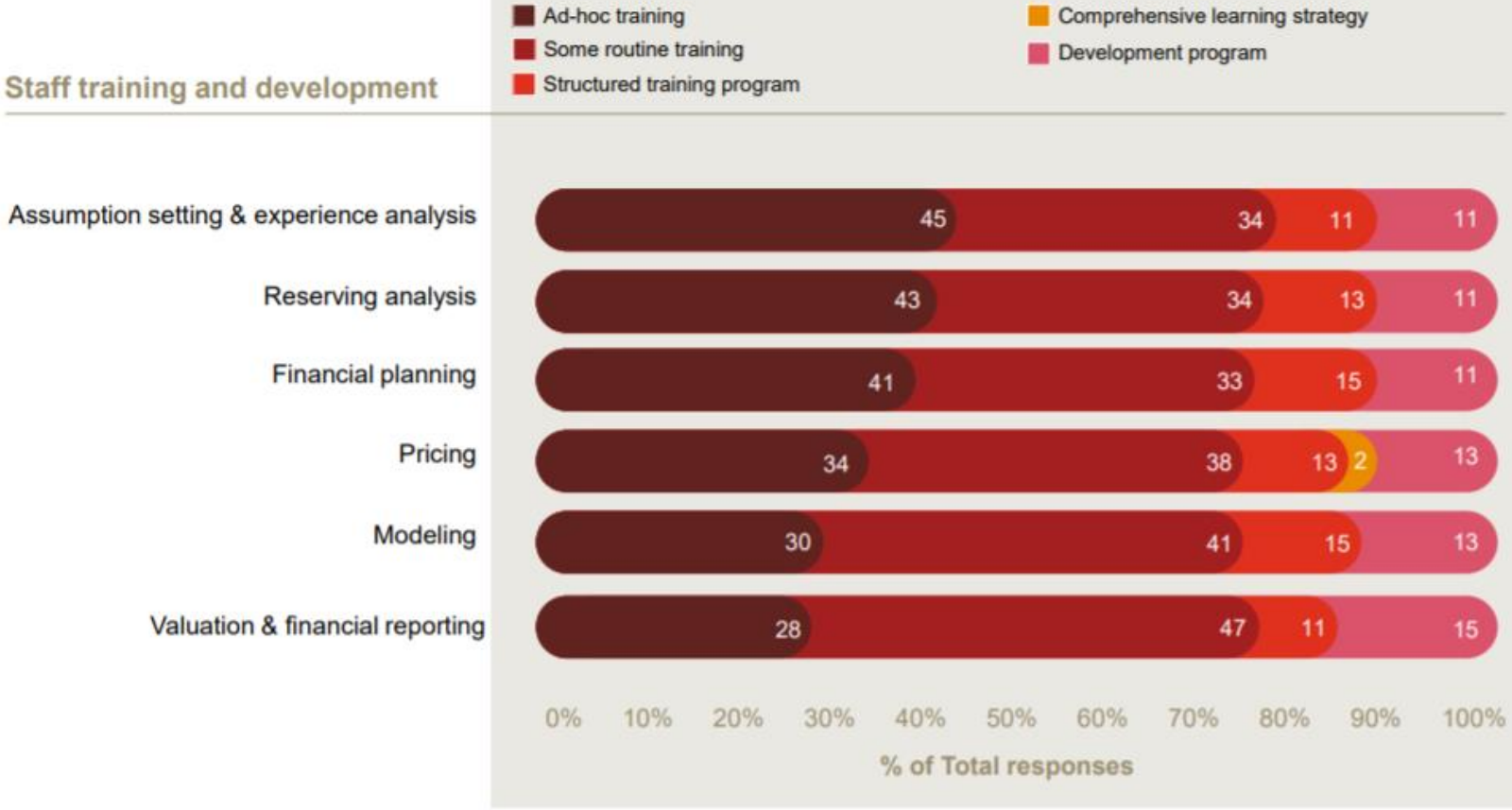
- Over 90% of companies have not fully automated their modeling processes
- To achieve reduction in working day timetables this is an area that should be targeted for further automation



Actuarial Modernisation Survey

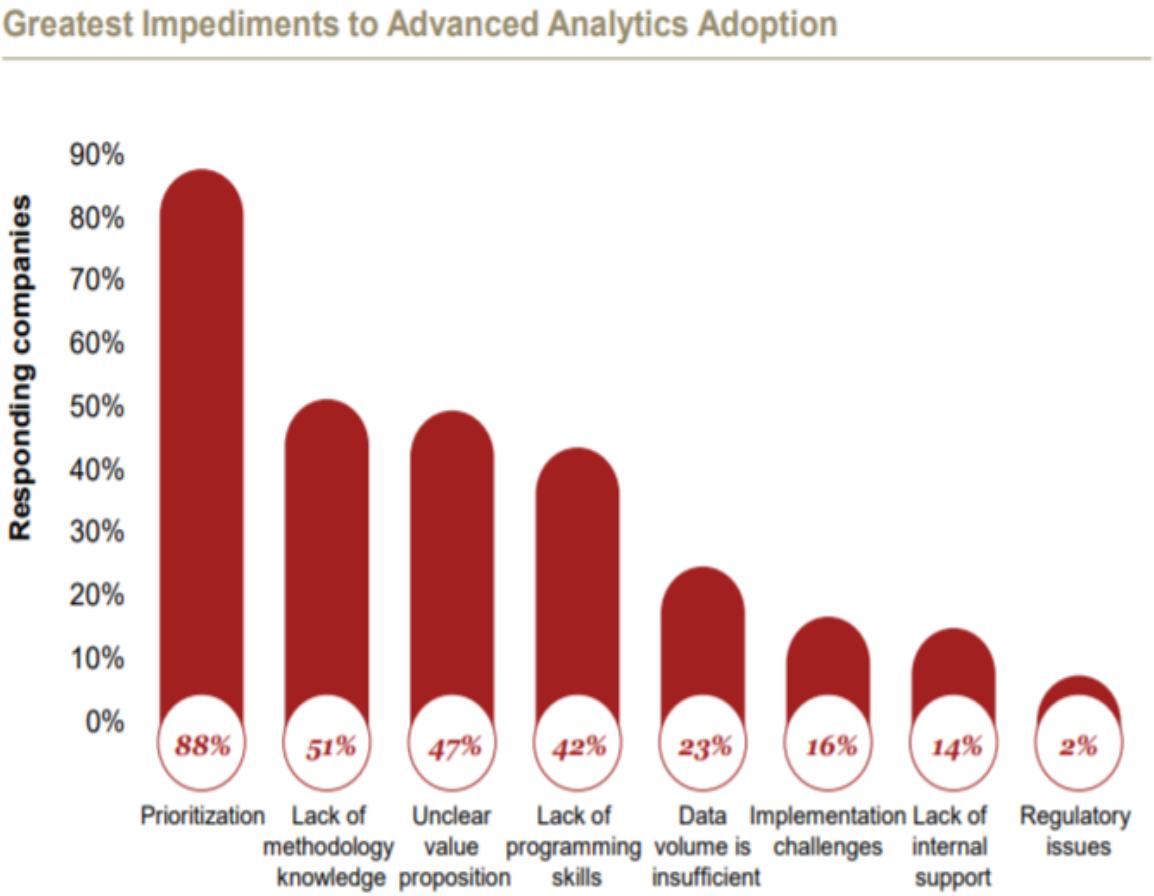
Training and development

- Only 20% of companies maintain a structured training program
- Further investment is needed to improve actuarial training and formalize current training programs



Actuarial Modernisation Survey

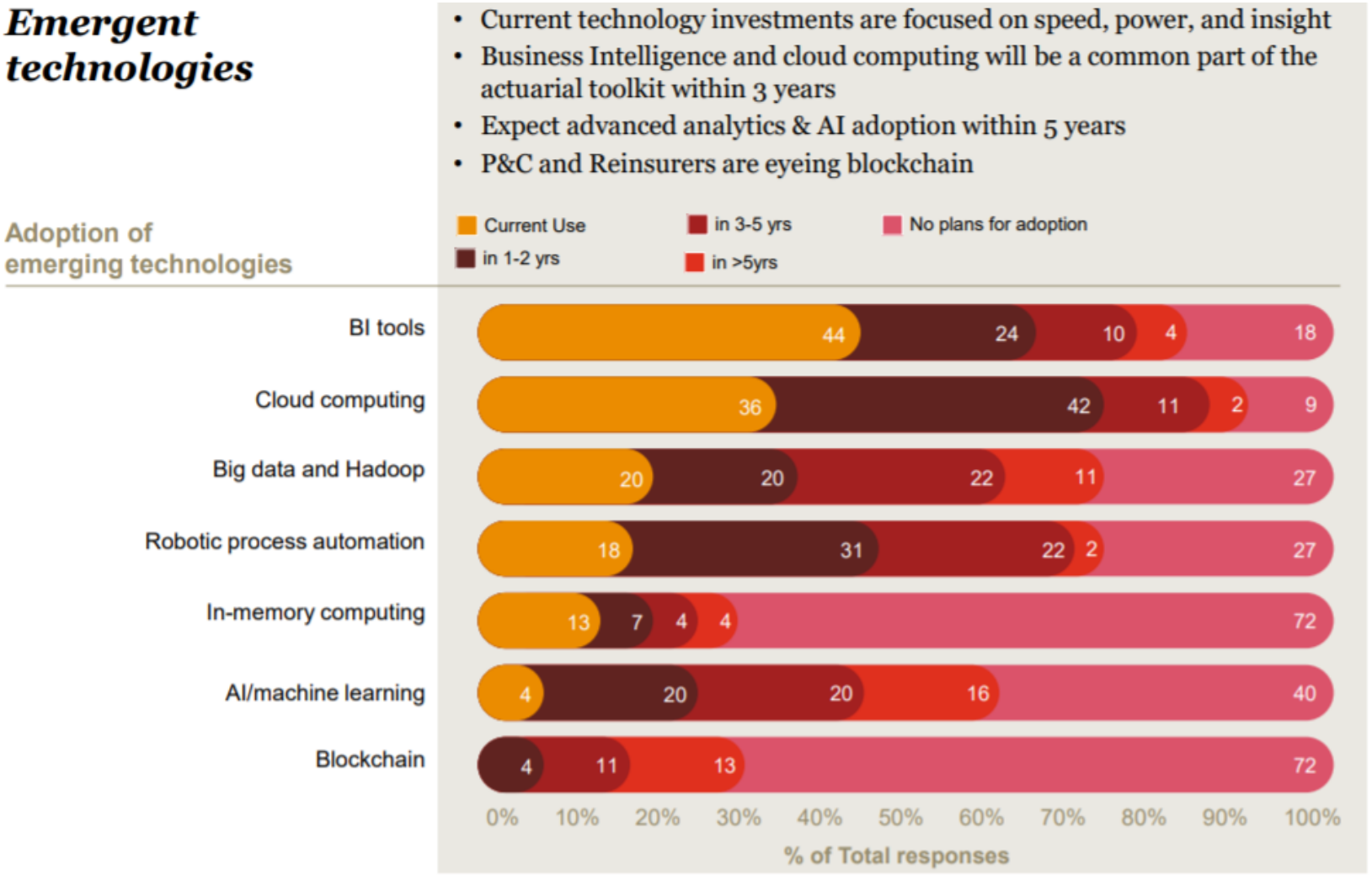
- **Project Prioritization** is the most common impediment in adopting advanced analytics
- Insurers are smart to focus on data cleanup first
- Lack of methodology knowledge and programming skills are other key challenges



Actuarial Modernisation Survey

Emergent technologies

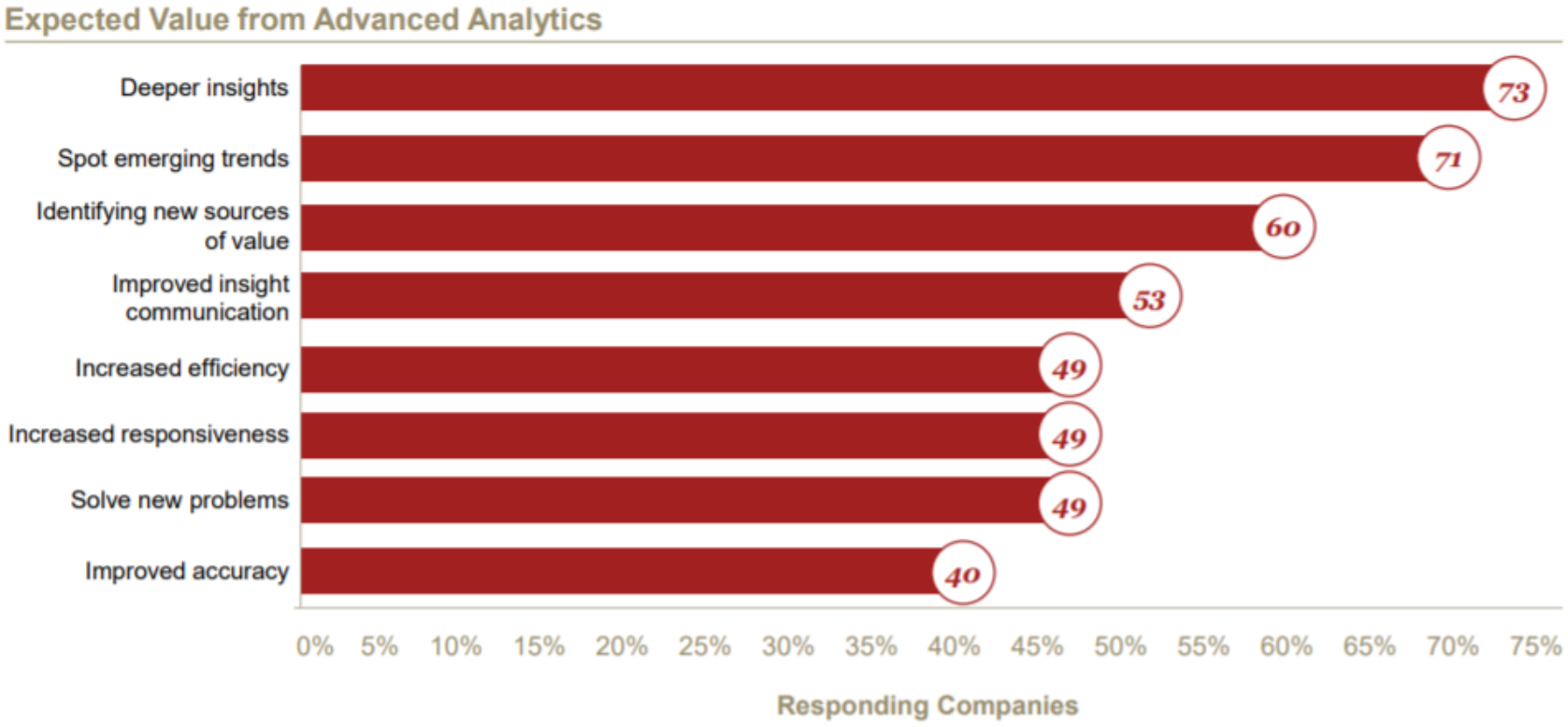
- Current technology investments are focused on speed, power, and insight
- Business Intelligence and cloud computing will be a common part of the actuarial toolkit within 3 years
- Expect advanced analytics & AI adoption within 5 years
- P&C and Reinsurers are eyeing blockchain



Actuarial Modernisation Survey

Advanced analytics

- Deeper insights and emerging trends are the two top drivers of advanced analytics
- P&C insurers cited 'identifying new sources of value' as their top driver
- Coupling advanced analytics with BI results in better clarity, faster results and greater responsiveness to management requests



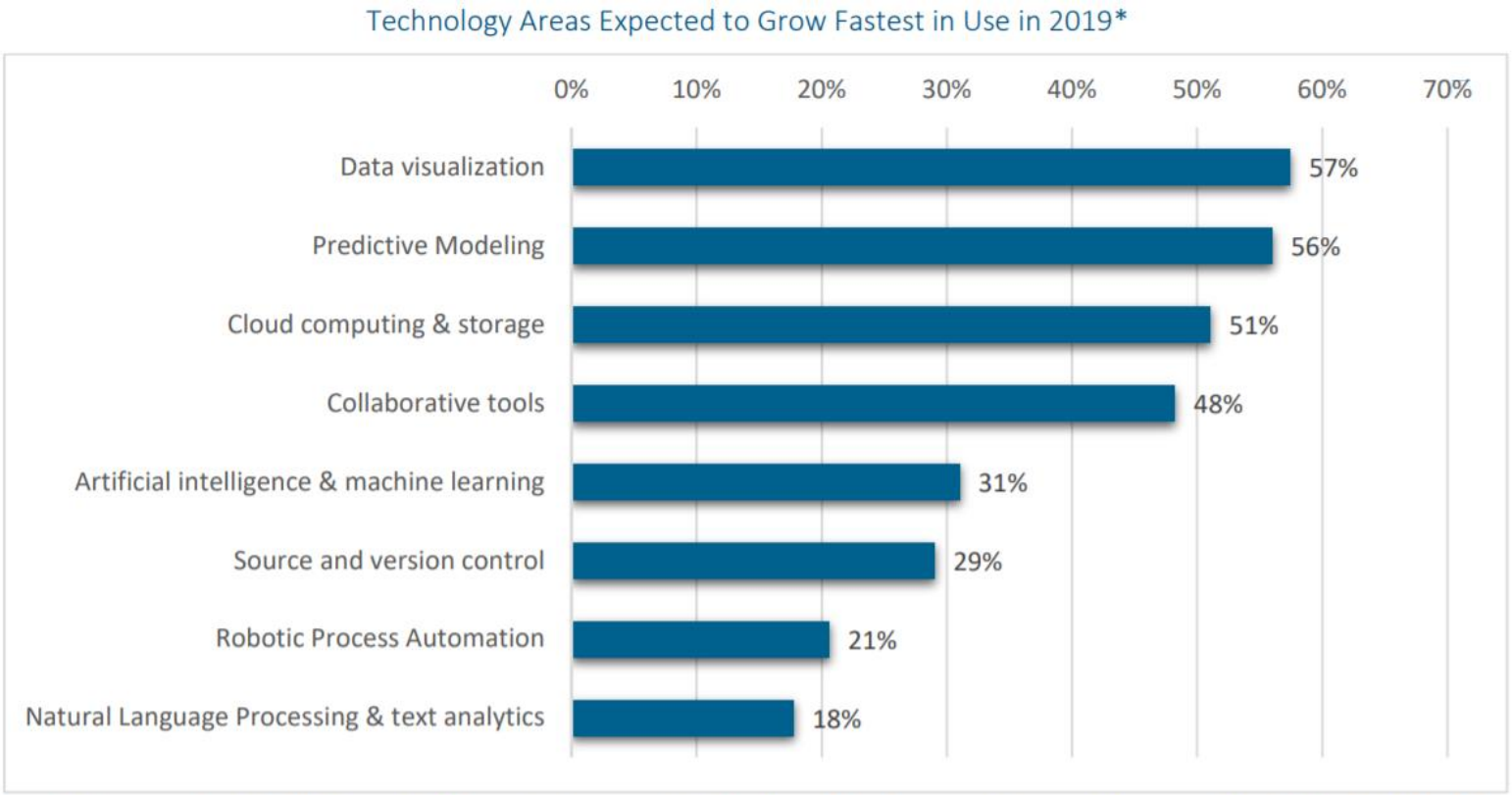
Actuarial Modernisation Survey

Actuarial Modernisation Survey

- Survey to be re-run in 2019 with a global coverage
- Global trends by region (incl. EMEA) analysed
- Interactive dashboards (Tableau) made available for participants enabling comparison to industry peers
- Public report summarising observations by 30 November
- Deadline for completion: 31 October 2019

Link:
https://pwc.qualtrics.com/jfe/form/SV_bQx42T4Ehm921o1

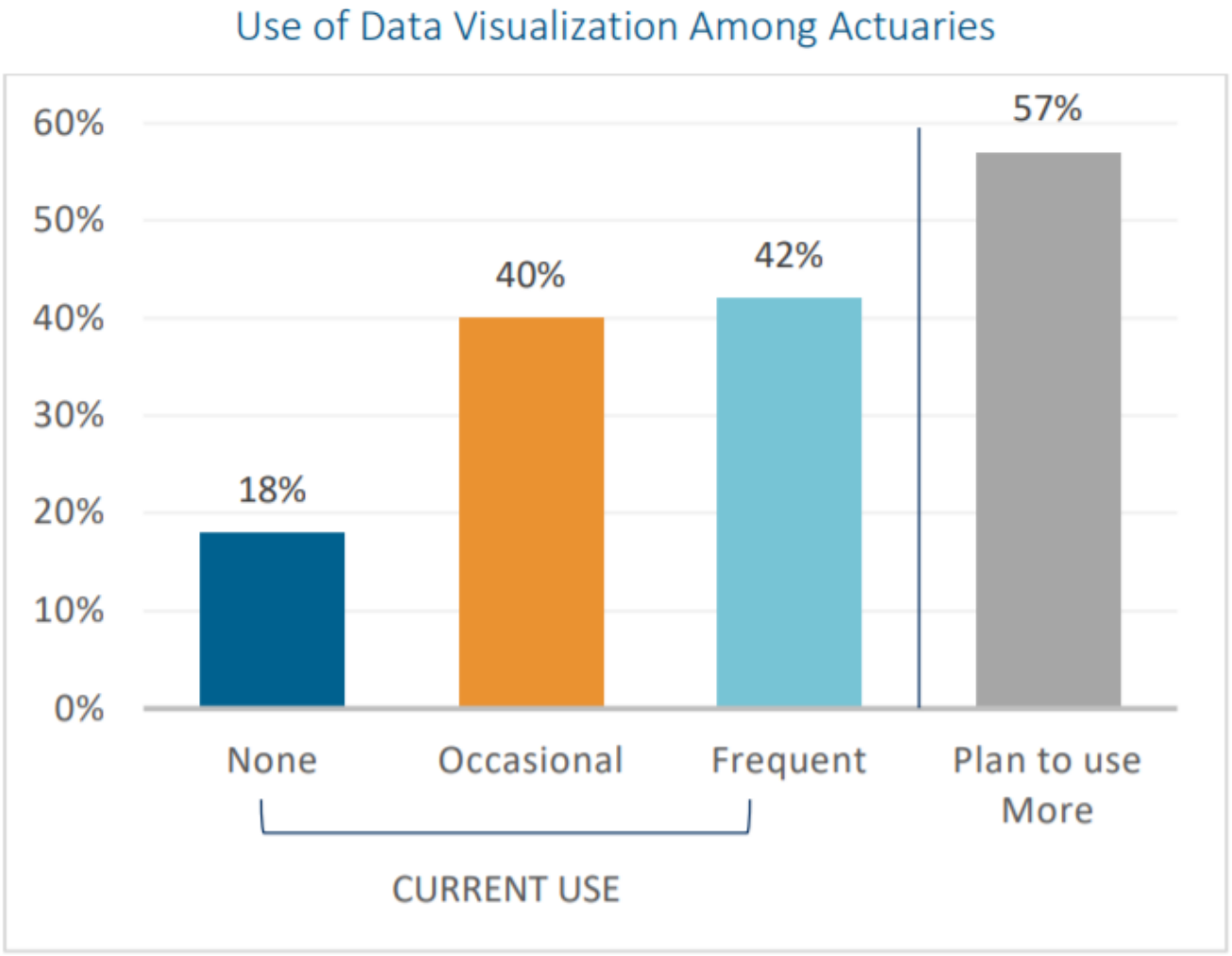
Top Actuarial Technologies of 2019** (SOA)



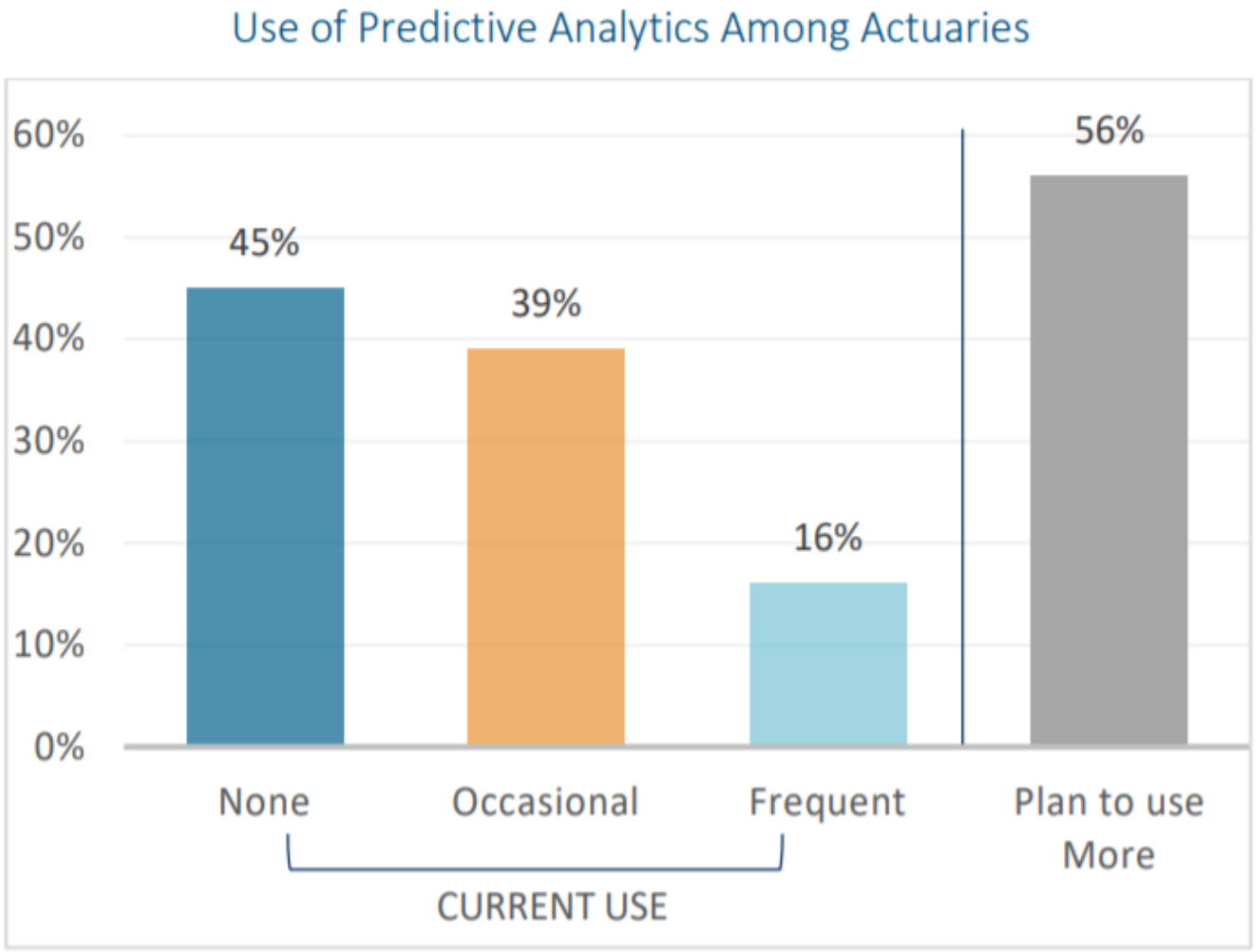
*Percentages represent the percent of actuaries surveyed who believe their usage will increase between March 2019 and March 2020.

***Source: Society of Actuaries (US), link included in the Appendix*

Top Actuarial Technologies of 2019 (SOA)



Top Actuarial Technologies of 2019 (SOA)



Implications for actuaries in Ireland

- Focus areas of digital initiatives
  - Short term: process automation and visualisation
  - Long term: predictive analytics and machine learning
- Training and upskilling
  - Actuarial skillset good basis
  - Still significant gap to be filled
  - Need to link training to solve practical problems
- Different mindset required
  - Collaboration
  - Business acumen

Implications for actuaries in Ireland

- Regulatory changes
  - IFRS 17 implementation and US GAAP changes (Long Term Contracts) over the next few years
  - Solvency II – Shorter timelines for submissions and regulatory push to run ORSA quicker (e.g. ad-hoc ORSA), plus Boards looking for more insights / scenarios
- Data and modelling platforms
  - Data strategies and revamping of modelling platforms (modernisation plan) driven by regulatory changes and analytics
  - Actuaries should contribute in a proactive way – aiming to maximise benefits for business (vs. minimising data requirements for valuation)

Examples of what we do – Firm wide

- Global technology training initiative
- Digital Fitness App, Digital Academies, Digital Labs
- Innovation challenges and Hackathons
- Think beyond campaign – just launched in national press, radio and Dublin airport

Financial Accounting News

PwC Global Chairman Robert Moritz, shown during an economic forum in Russia in June, said the Big Four firm will spend $3 billion on technology training.
Photographer: Andrey Rudakov/Bloomberg via Getty Images

PwC Pledges $3 Billion Technology, Training Investment Worldwide

**Source of article: Bloomberg, link included in the Appendix*

Examples of what we do - Actuarial

- Online coding programme for all actuaries (team of 25 learning 2+ tools each)
- One week course on data transformation and automation tool (Alteryx) for 2 people solving real life problems (process inefficiencies)
- Working on around non-life audit and SCR process automation, interactive dashboards
- Collaborating with other teams (e.g. data analytics and technology)
- Linked in global insurance data analytics network promoting pricing automation and fraud detection using machine learning

Analytics use cases

Analytics use cases

- Behavioural analytics
- Costumer segmentation
- Claims analytics – fraud detection
- Other insurance use cases

Behaviour Analytics

- Traditional actuarial techniques
  - Experience studies (lapse, option take up rates etc.)
  - Dynamic policyholder behaviour (as a function of economic indicators)

- Behaviour analytics
  - Churn analysis – predictive modelling applied to identify segments of policyholders most likely to churn (=lapse)
  - Connect with policyholder lifetime value (CLV)
  - Retention programmes for high value customers

Behaviour Analytics – example

Behavioral intervention model for a Fortune-100 global insurance company

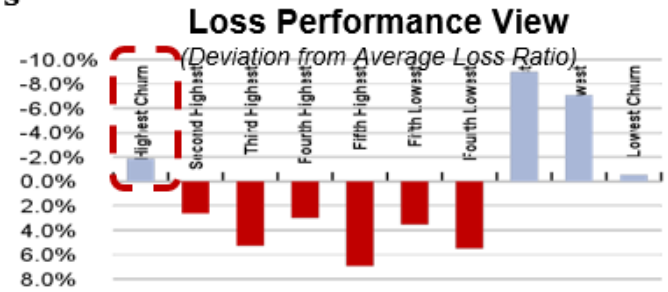
PwC used proprietary market research with agent-based modeling to understand consumer retention behaviors under varying economic and strategic scenarios

Created shortlist of specific retention interventions and developed suggested implementation roadmap

A

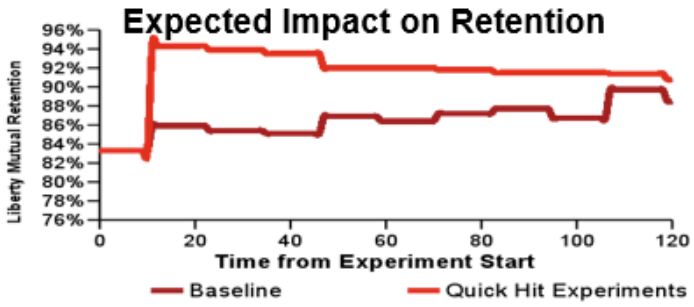
… Developed new customer segmentation based on churn indicators

B



Simulated impact of select retention experiments on both shopping as well as switching behaviors

C

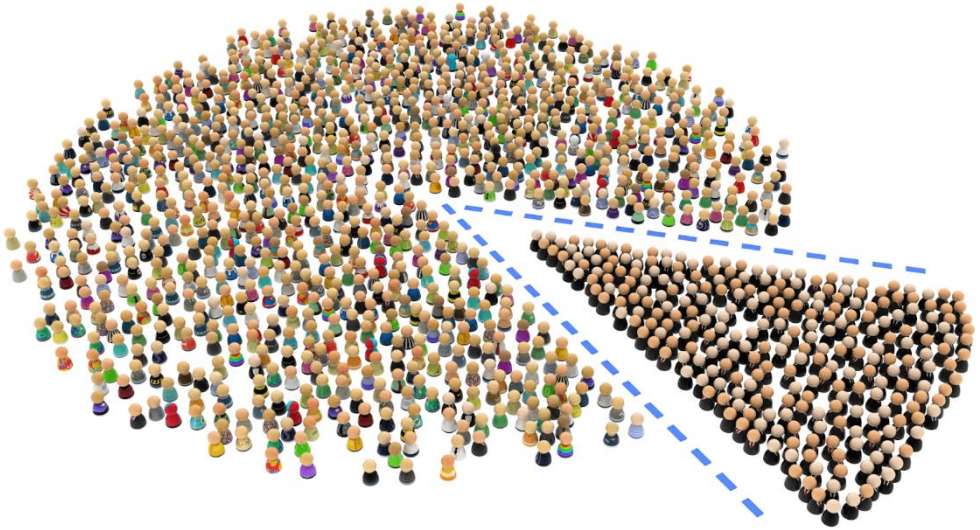


Helped the client stand up a 'Test and Learn' environment to test predictions before roll-out

D

Customer segmentation

- Key element of business strategy
  - Which customer segments should the company target?
  - Determine characteristics of most attractive segments
  - Tailor products and distribution strategies to satisfy the needs of these segments
  - Further enhance strategy to create personalised products



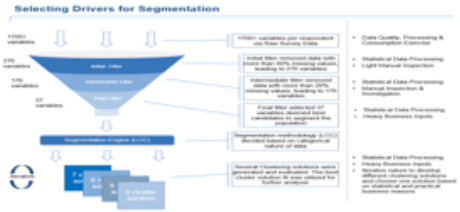
Customer segmentation - example

Customer Segmentation

PwC performed quantitative surveys, gathered data, performed key driver analysis and developed customer segments to finally design the various distinct customer personas

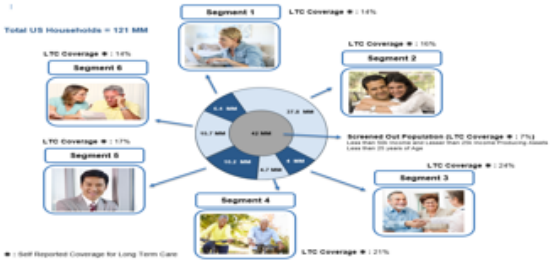
PwC consumed and validated client survey data for selecting drivers for market segmentation…

A



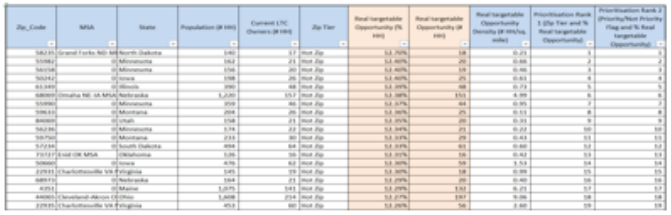
…developed market segments and built personas based on constructed segments…

B



…developed a predictive model to compute opportunity size across US geographies and identified priority of zips…

C



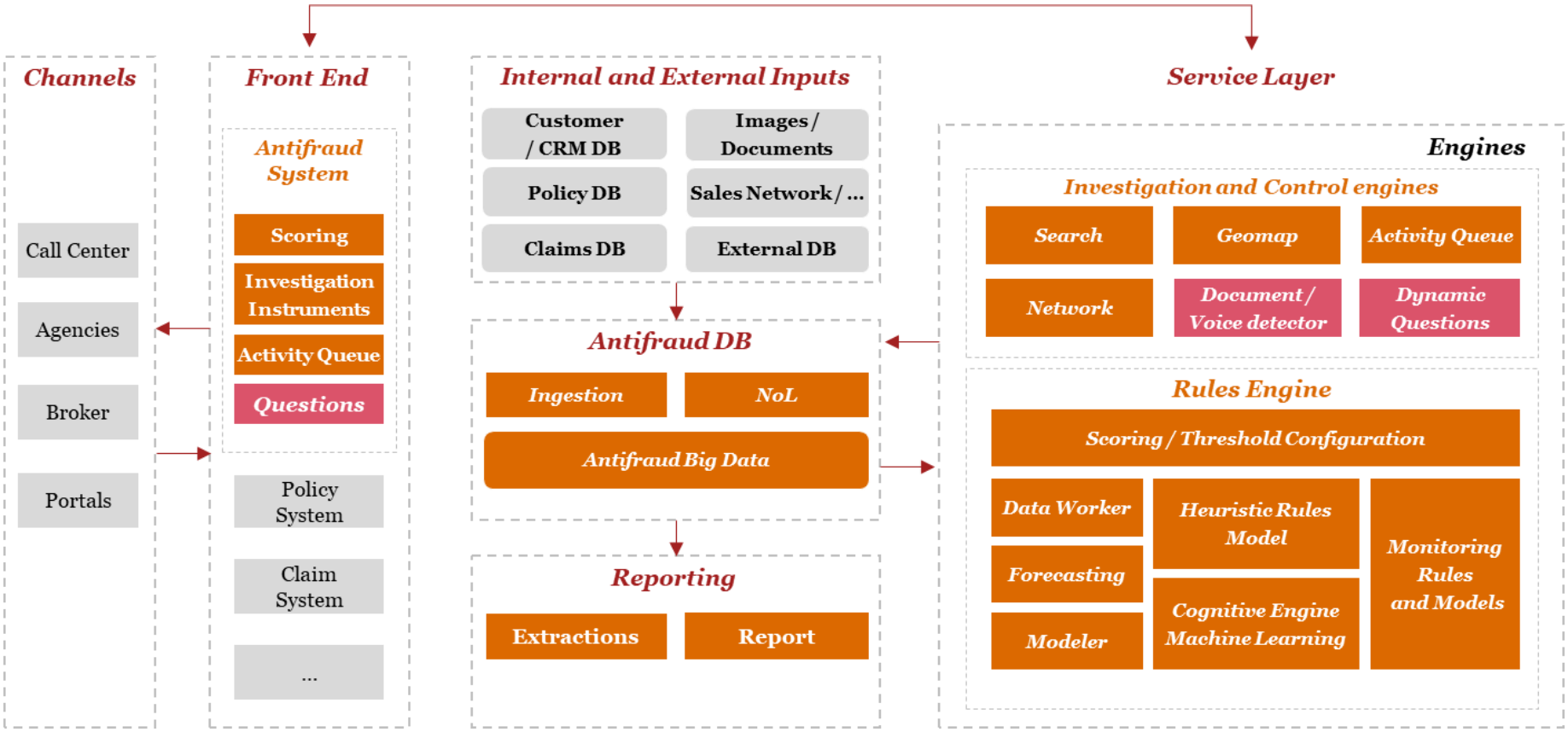
…constructed visuals to prioritize zip codes and areas to target

D

Fraud detection

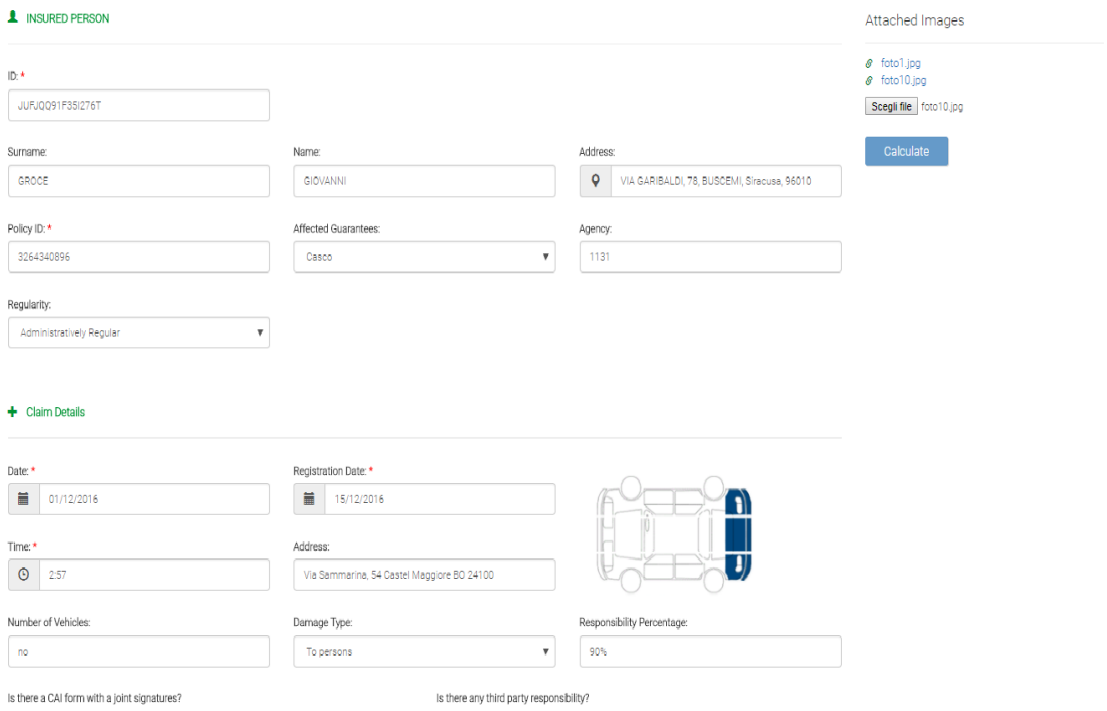
- Fraudulent claims represent upwards of 5-10% of non-life claims in Europe
- Innovative solution supported by approach developed by PwC in cooperation with technology firm GFT
- Focus on prevention, ability to learn, specialisation and transparency
- Aim is to detect all types of fraud real time using an anti-fraud database
- Scores produced by rule engine

Fraud detection



Fraud detection – Data collection

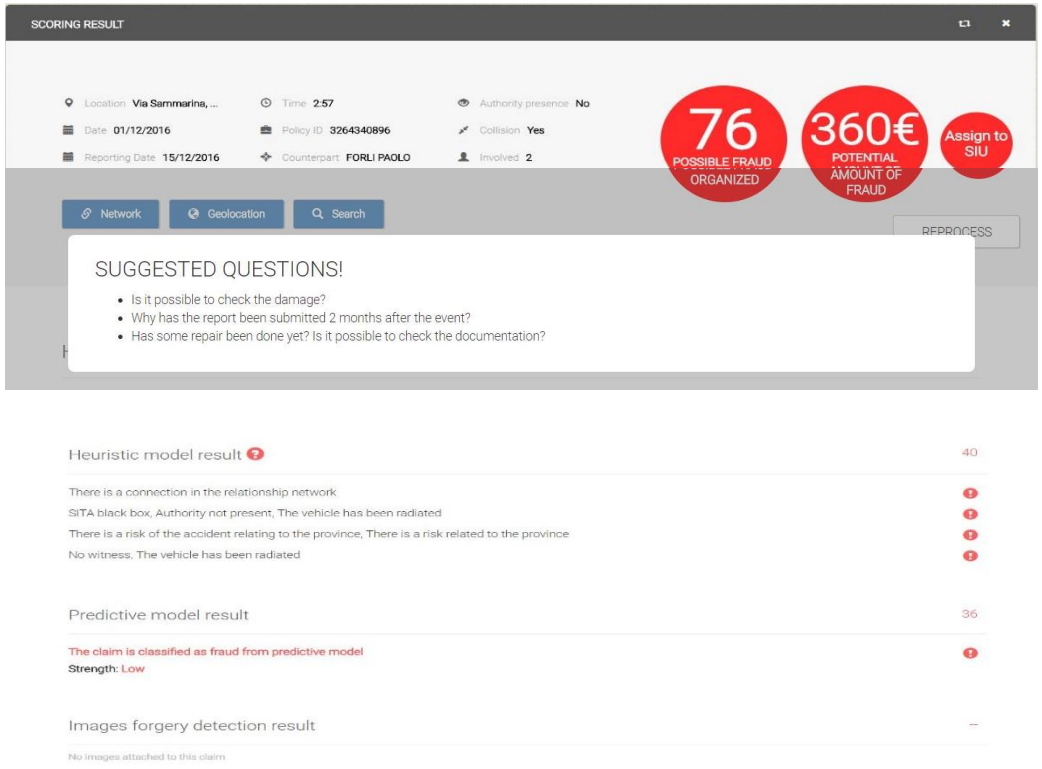
- We collect real time claims data from the customer. All these data and documents are analysed real time against all data in the antifraud database.



- Real time check of notified claims data
- Real time check of uploaded documents
- Usually the antifraud tool is integrated in the company's IT landscape (claims systems and underwriting systems) through our service layer

Fraud detection - Scoring

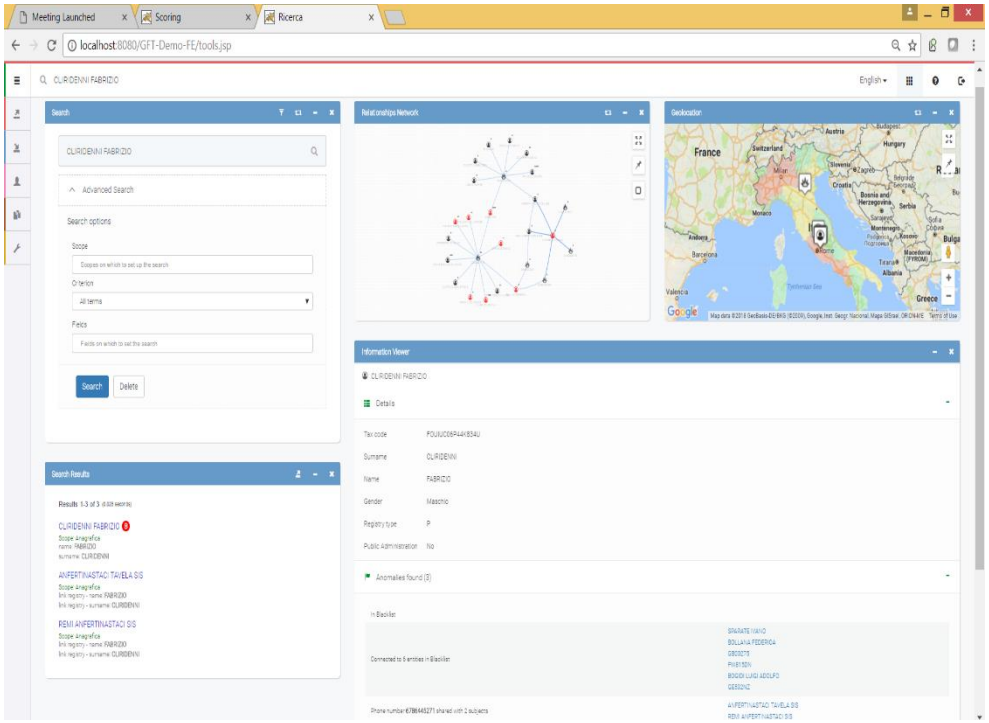
- We calculate the antifraud score real time and we give the users a first set of information to manage the claims properly: antifraud score, type of fraud, possible amount of fraud, next best action



- Real time antifraud score that sums heuristic rules, predictive models and investigation checks
- Real time alerting whenever the score is updated
- Dynamic questions to discourage potential fraudulent clients and collect more information
- Detailed information for the adjuster to manage the claim properly such as possible amount of fraud and type of fraud and next best action

Fraud detection - Investigation

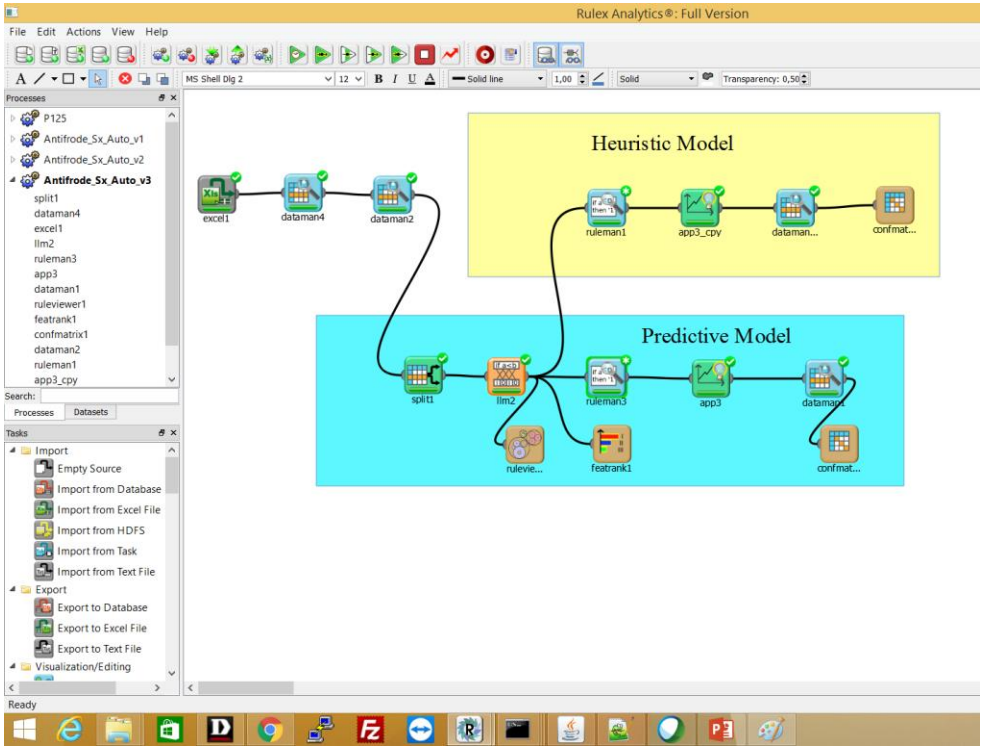
- Set of investigation tools in a unique solution. These are the best of the breed in the market and leverage on a unstructured database that is able to collect and search on structured and unstructured data



- Document search engine (Elasticsearch)
- Real time network analysis
- Geo mapping powered by Google
- Out of the box reporting and case manager
- Real time creation of documents with indication of anomalies found, connections and recurrences

Fraud detection – Machine learning

- Cognitive machine learning technology embedded. This technology enables running parallel heuristic models and different predictive models for each scenario.



- Cognitive machine learning to test heuristic models and to elaborate predictive models
- Different predictive models can be run in parallel
- White box with predictive models that can explain to customers how data are used and by whom
- Predictive models include both rules that explain why it is a potential fraud and why it isn’t

Costumer Insight Platform

DATA PREPARATION

Clean and import data from in-house and external sources.

ADVANCED ANALYTICS

Use advanced analytics to discover patterns and make predictions to plan and forecast.

DATA-DRIVEN BUSINESS

Adopt artificial intelligence, machine learning to become a data-driven enterprise.

Data Science Tools - Potentiate your Analytics team with collaborative tools

Modularised Analytics Applications - Ready-made applications

Enriched Datasets - Specific data models for insurance and data to enrich analysis

PwC's Insights Platform - In-house or Cloud hosted

Other insurance use cases

Pricing automation	*Automation of the non-life pricing process using machine learning and challenger models*
Telematics	*Smart motor insurance products using telematics to achieve competitive pricing and to help people become better drivers*
Distribution channel management	*Optimise agent and broker performance and incentives*
Customer lifetime value (CLV)	*Reliable indicator produced for CLV across the business and used in customer loyalty programs*

Practical hints

- Encourage and reward innovation
- Help people upskill & link training to solving real life problems
- Start with small projects close to actuarial skillset – sandbox / pilot approach
- Measure success, clear KPIs
- Start with projects that pay off immediately and use them to upskill your team

Appendix

References

- AAE press release “Actuary 2020 - A profession on the move” on actuaries of the future (June 2019): https://actuary.eu/wp-content/uploads/2019/06/AAE-PR-ECA2019-FINAL.pdf
- PwC Actuarial Modernisation Survey report 2018 (US Only): https://www.pwc.com/us/en/industries/insurance/assets/pwc-actuarial-modernization-survey-2018.pdf
- Actuarial Modernisation Survey 2019 (Global) – deadline for completion 31 October 2019: https://pwc.qualtrics.com/jfe/form/SV_bQx42T4Ehm921o1
- Top Actuarial Technologies of 2019 (SOA): https://www.soa.org/globalassets/assets/files/resources/research-report/2019/actuarial-innovation-technology.pdf
- PwC Pledges $3 Billion Technology, Training Investment Worldwide (Bloomberg Tax, October 2019): https://news.bloombergtax.com/financial-accounting/pwc-pledges-3-billion-technology-training-investment-worldwide

Links are clickable in Slide Show mode only, otherwise please right-click and select “Open Hyperlink”. You can change mode on the Task Bar in the bottom-right corner of the PowerPoint window.

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Dublin 1, Ireland

Upcoming events

Upcoming Events

OCT
Wed
30
14:00

Professionalism Training

Venue: The Davenport Hotel, 8-10 Merrion Street Lower, Dublin
Speakers: Sally Calder, Education Actuary at the IFoA

OCT
Wed
30
18:00

M&A from a Practitioners Perspective

Venue: The Richmond Education and Event Centre, 1 Brunswick Street North, Smithfield, Dublin 7
Speakers: Waheeda Narker, Director at Willis Towers & Fergal O'Shea, Senior Director at Willis Towers

NOV
Fri
01
19:00

SAI Inaugural Student & Recent Qualifiers' Ball

Venue: Radisson Blu Royal Hotel, 8 Golden Lane, Dublin 8

Upcoming Events

- Students & Recent Qualifiers Ball
  - Hosted on Friday, 1st November 2019. In the Radisson Blu, Golden Lane.
  - Ticket price of €65 includes:
    - Drinks Reception
    - 3 Course Meal
    - Live Band
  - Limited Tickets still available for sale on SAI website.