Data Science

Applications in Actuarial Work

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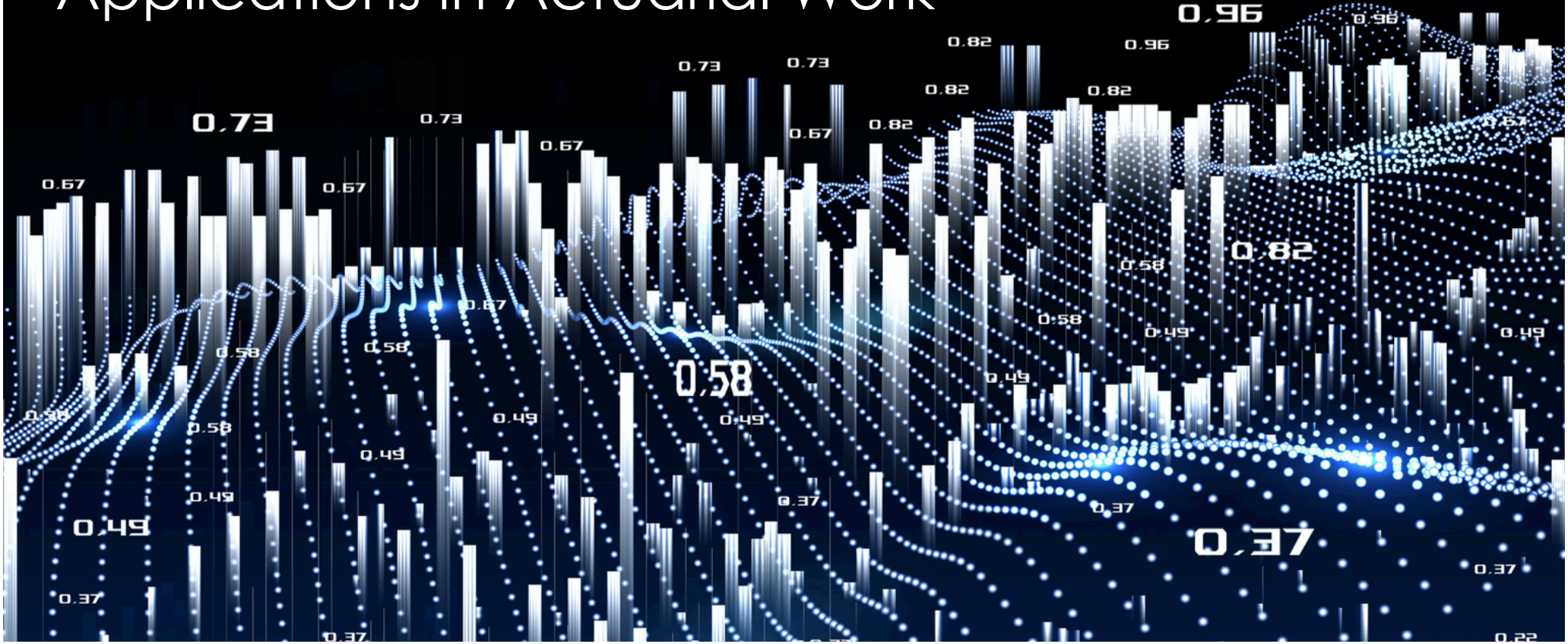

Agenda

- Introductions
- Opportunities of data science
- Challenges of data science
- Practical Case Study
- Where to start: learning data science hands on

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Opportunities of Data Science

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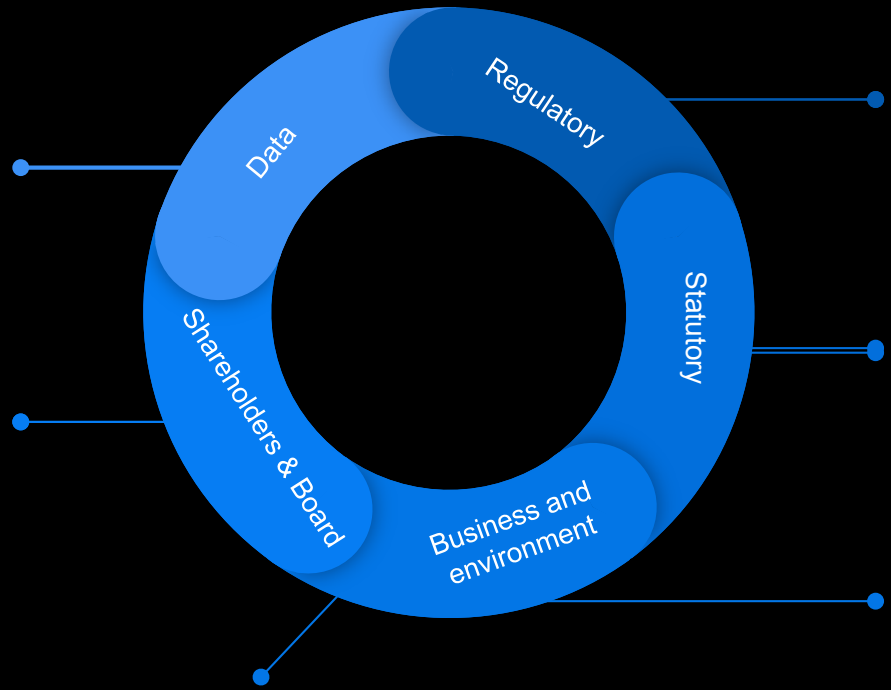
What are some of the pressures on insurers?

ACCESS TO THE RIGHT DATA, AT THE RIGHT TIME

A huge increase in data generation, data capture and data storage combined with significantly increased computing power is providing insurers with a unique opportunity to re-evaluate the value that their data can provide; and the technologies available to do that.

SPEED, GRANULARITY, MORE MI, REDUCED COSTS

Supporting initiatives around strategic direction, value add, insight ,intelligence and advanced risk management



ASSESSING IMPACT OF COVID 19

ADVANCED ANALYTICAL AND CONDUCT REVIEWS

BOE Transforming data collection from the UK financial sector. "The FCA's refreshed Data Strategy sets out a transformation plan to become a highly data-driven regulator."

IFRS 17 AS A STRATEGIC TRANSFORMATIONAL INITIATIVE?

Assess data infrastructure as well as analytical, modelling, data governance, storage and reporting capabilities.

PRESSURE TO OPERATE AS FUNCTION OF THE FUTURE

More review, more analysis, more challenge. Less handle turning, less processing and less manual data transfer activities.

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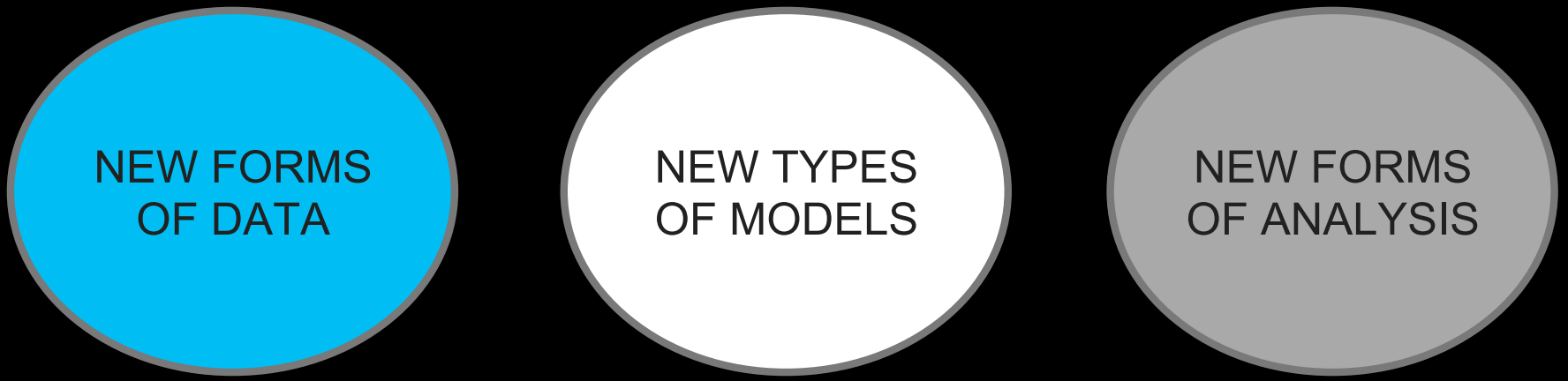
THE DATA OPPORTUNITY



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ENHANCED CYCLE OF ANALYSIS

The actuary's wish list?

Mindset

Skillset

Toolkit

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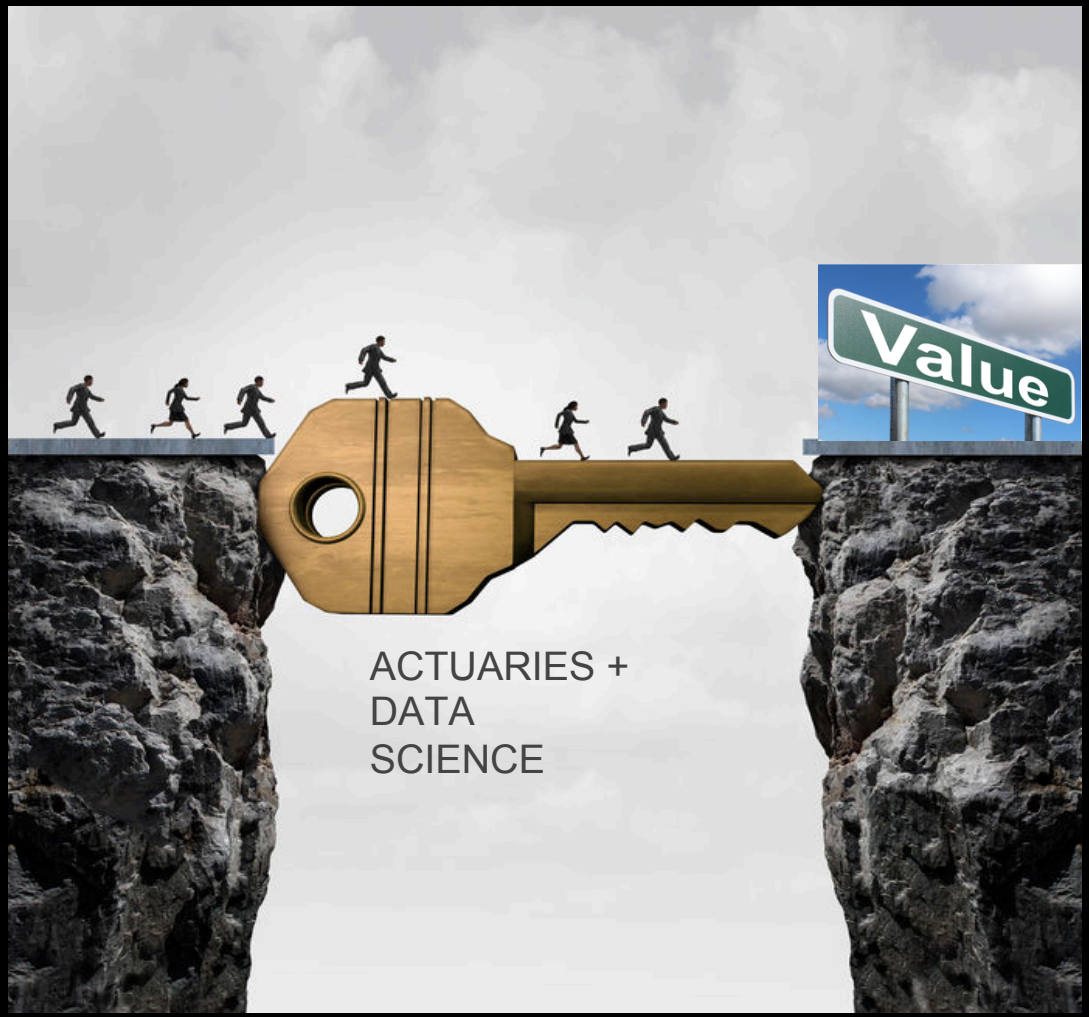
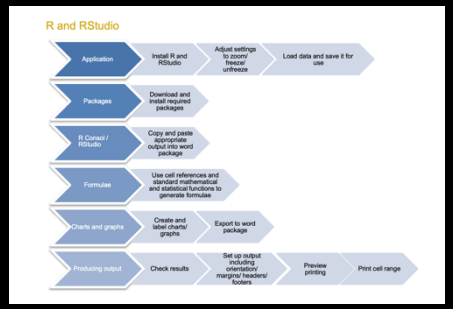

Value
ACTUARIES +
DATA
SCIENCE

EMERGING TRENDS IN THE FIELD OF DATA SCIENCE

Data Science Related Trends

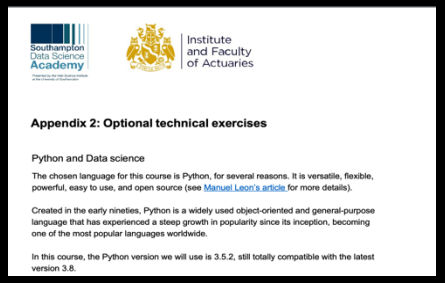
- Availability of Data increasing: more data, new sources
- Better & faster computing power
- More research in statistical fields and applications combined with computer science
- More pressure to use business knowledge to add value



https://www.actuaries.org.uk/system/files/field/document/CS1%20and%20CS2%20Guide.pdf

Institute and Faculty of Actuaries

- Modelling Analytics & Insights Data working party 2016
  - Practical Applications Papers
  - Collaboration between Life & Non-Life Actuaries
- Data Science Member Interest Group 2018
  - Virtual conference: Data Science and Opportunities for Actuaries
  - Optimise use of data science techniques
- Publishes 'A guide for ethical data science' 2019 (with Royal Statistical Society)
- Launches Data Science Certificate Course


Southampton Data Science Academy

Institute and Faculty of Actuaries

Appendix 2: Optional technical exercises

Python and Data science

The chosen language for this course is Python, for several reasons. It is versatile, flexible, powerful, easy to use, and open source (see Manuel Leon's article for more details).

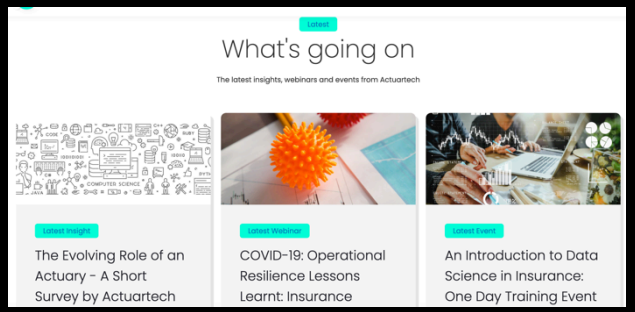
Created in the early nineties, Python is a widely used object-oriented and general-purpose language that has experienced a steep growth in popularity since its inception, becoming one of the most popular languages worldwide.

In this course, the Python version we will use is 3.5.2, still totally compatible with the latest version 3.8.

https://southamptondata.science/ugc-1/1/2/0/candidate_info_pack_and_policies_ifo.pdf

Other relevant trends

- R included in actuarial syllabus
- Need for Data Science skills growing
- Growing presence of online communities and availability of training courses
- Trends from actuartech.com: Interest from market: Interpretable Machine Learning
- Data & trend analyses and prediction of impact of COVID-19 pandemic



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Challenges of Data Science

Some Risks of Data Science

- Using open-source programming languages which could pose risk from a governance and security perspective
- Building models which are wrong, not validated or poorly understood
- Using incorrect, inappropriate or otherwise flawed data or drawing conclusions from data which may not be statistically significant
- Coded models being reviewed by inexperienced, un-skilled staff
- Models used and appraised out of context
- New Staff unfamiliar with context
- Not understanding data, data quality issues, validation
- Not enough governance in place when models are deployed

Important Considerations

Normal professional standards and ethical conduct apply

Data source, checks and controls need to be put in place

Assumptions need to be verified and document

Model approach and testing to be validated and documented

Results with limitations and uncertainty communicated

Tailor communications to audience, i.e.:

Avoid jargon

High level or detailed results as appropriate / possible

Ensure clear audit trail with version control, independent peer review and model validation and interpretation governance in place

Please note the Risks and practical considerations outlined here are examples of what needs to be considered and is not an exhaustive list. In addition these are largely relevant to all areas of data science, not just in respect of the use of R

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The use of data science

Benchmarking: key takeaways

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Key Focus Areas of benchmarking exercise

Actuarial Function specific

Operating Model	Data	Use Cases	Strategy
• People including skill set, training • Processes & Controls • Systems • Technical Nature & Maturity of Tools & Techniques • Policies	• Understanding data science pipeline • Monetising Data • Accountability for Data • Data Science Pipeline Impact • Marginal Value	• Application within actuarial context • Effort/Value Analysis • Impact of COVID-19 • Use of Machine Learning & Visualisation	• Role of the Function • Overcoming barriers to adopting • Ethics • Data Science Risks & Risk Management • Upskilling

Organisation Specific

Data Science Example Use Cases in Insurance

Pricing

- Predictive Underwriting
- Telematics
- Price Optimisation

Risk and Capital Management

- Assumption Setting
- Fraud and Anomaly Detection
- Audit and Review Tools

Customer Insights

- Predictive Persistency Management
- Recommender Systems
- Segmentation

Management Information

- Dashboarding
- Automated Reporting Analysis

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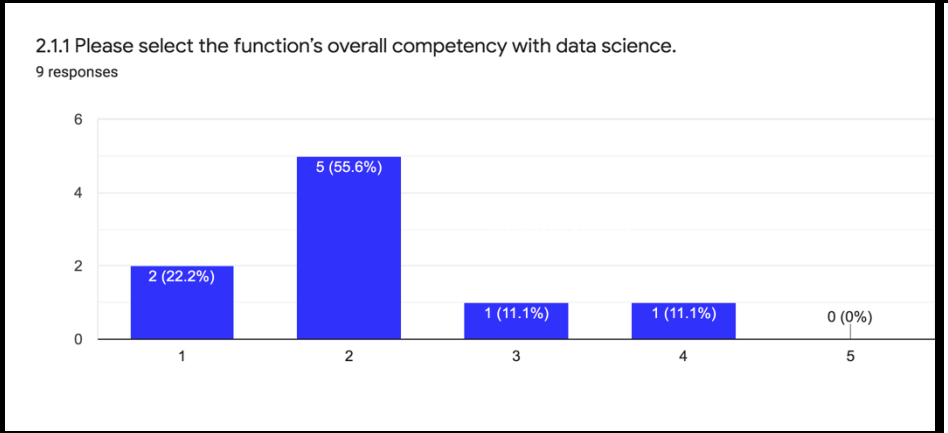
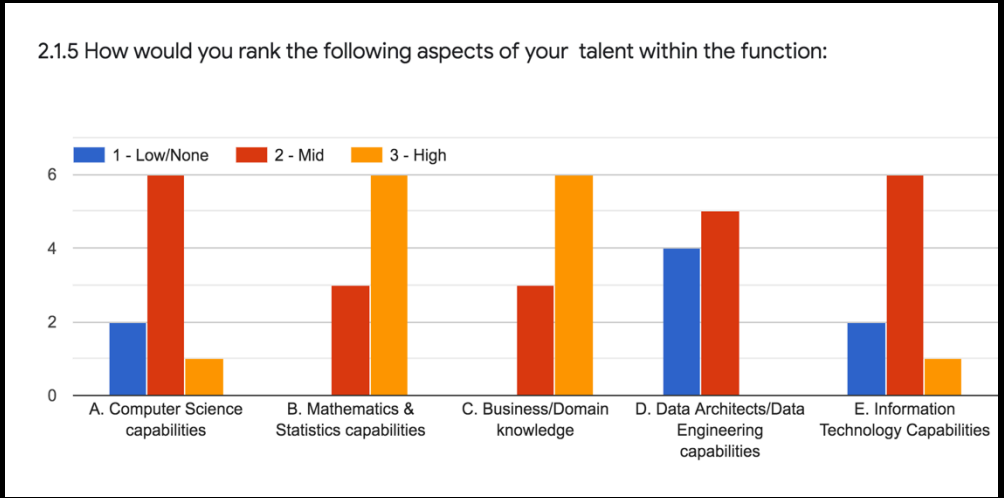
Trends in the use of data science





Actuartech analysis

The following areas of up-skilling required have been identified by our respondents

- High amount of up-skilling required in the business application of data science and validation & interpretation of data science results;

- Medium to High amount of up-skilling required in the use of programming languages and data science algorithms
- Medium to High amount of up-skilling required in data science risk management and communication

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What are the barriers to increasing the application of data science in your function?

The reality is that the data, tools, skills and resources are not readily accessible for use case design & development, decision making, risk management or to derive insight.

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Case Study

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Case Study – Data Science Process

1. Problem specification
2. **DATA COLLECTION**
3. Data Processing and Visualisation
4. Model Building
5. Model Validation
6. Reporting
7. Monitoring

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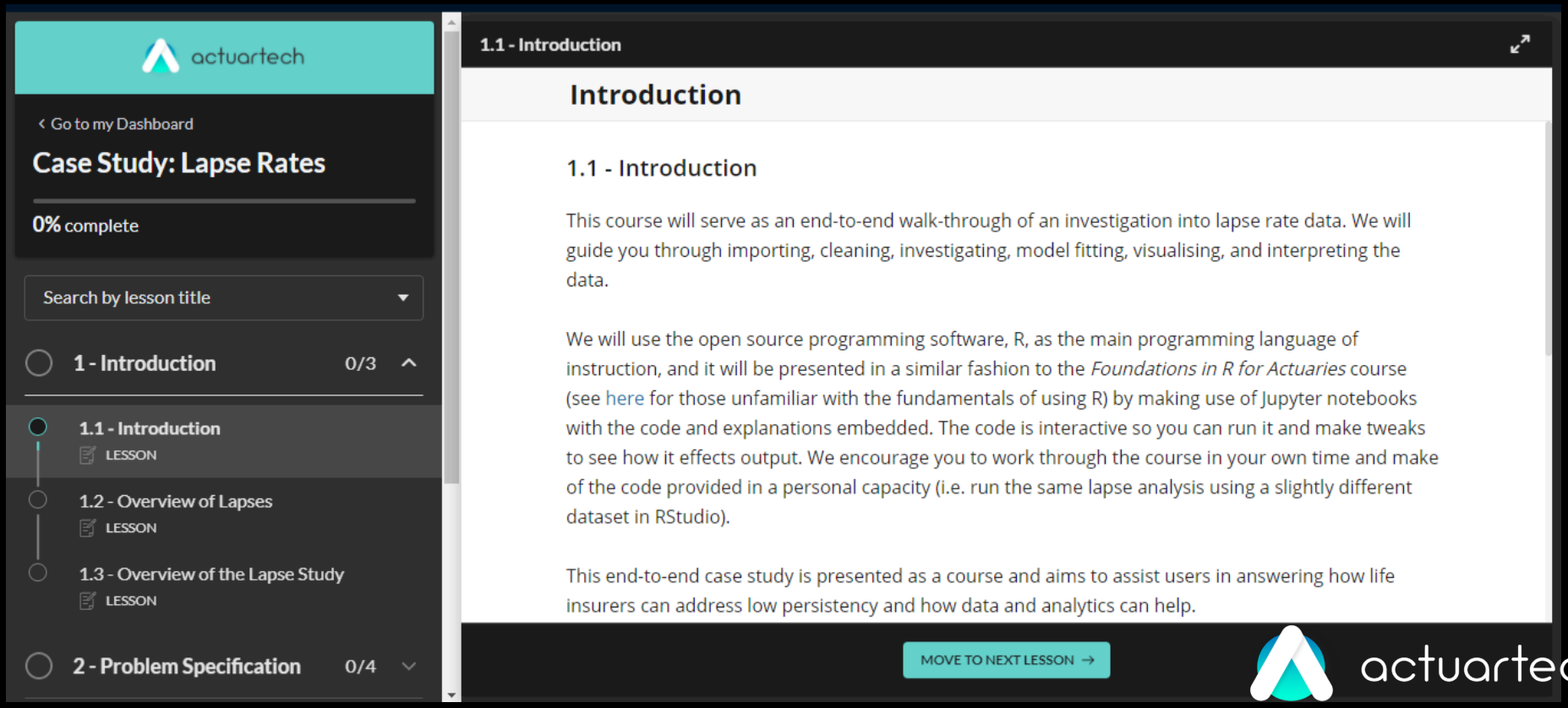
LAPSE CASE STUDY: Hands On



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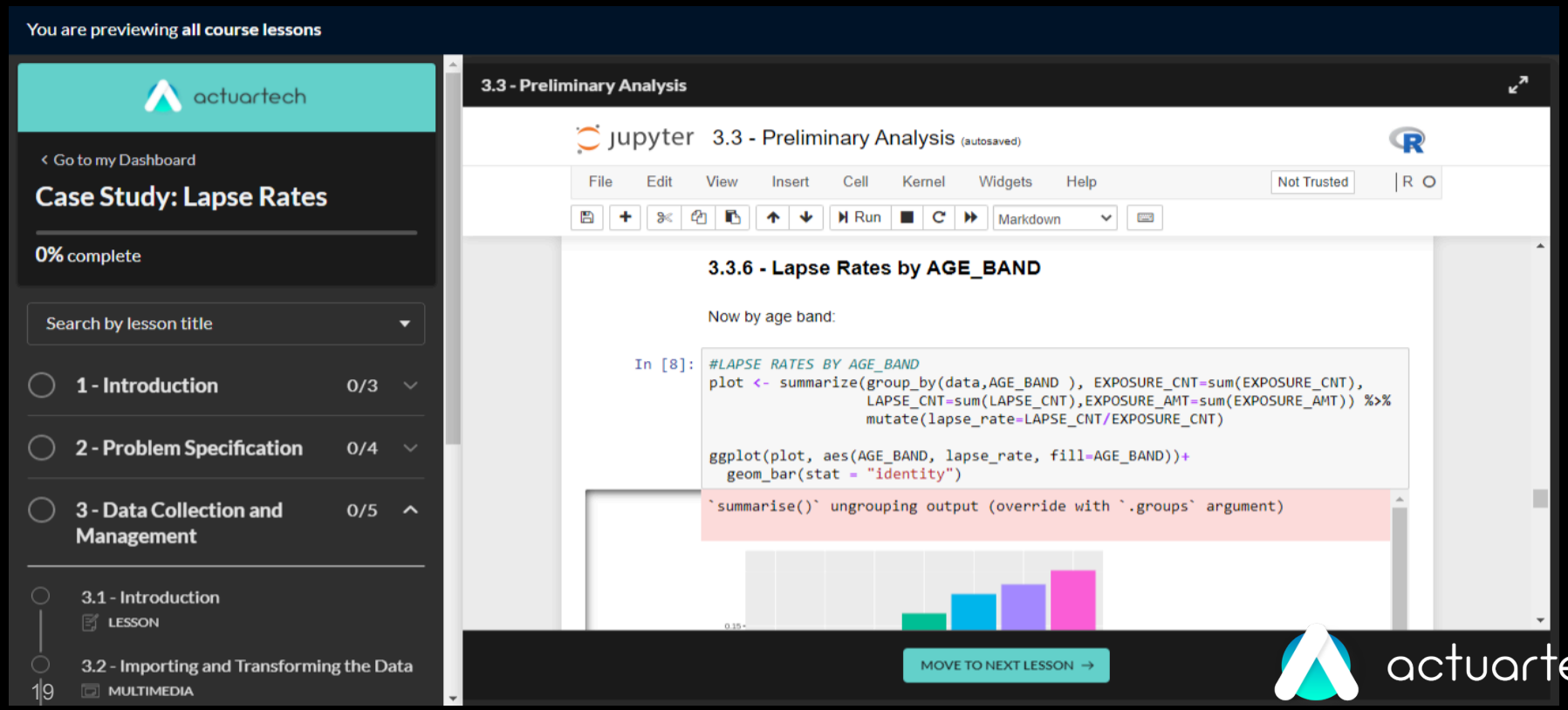
Interactive coding: understanding lapse rates



Comparison To Traditional Approach

	Traditional Lapse	Predictive Modelling
Data	• Internal data • Lower volume	• Internal and external data • Suited to large datasets
Feature Selection	• Limited by internal data sources • Incorporates judgment that could lead to bias	• Model based • Explores wider feature set
Modelling	• Grouped data analysis • Average experience data cell	• Policy level modelling • Wider model toolbox • Multivariate analysis
Communication	• Limited	• Richer and transparent analysis of drivers • Incorporates visualisations

Where do you start?

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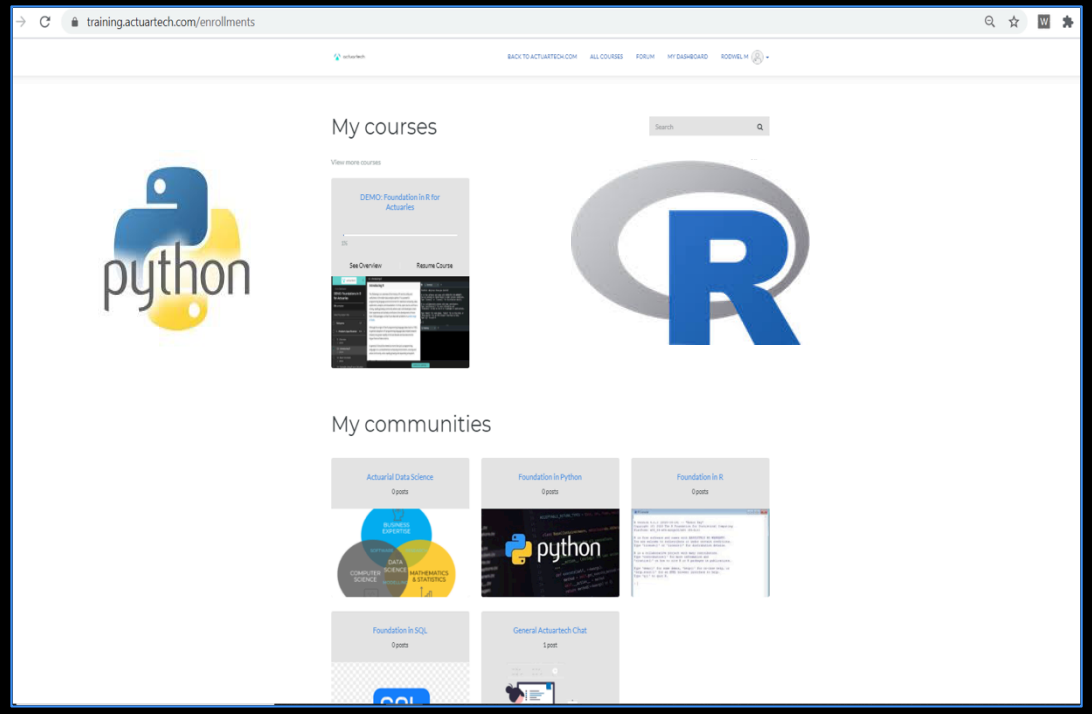
TRAINING PLATFORM



- Training Platform designed by actuaries for actuaries
- Web based interface supporting multiple languages-no need to install software
- Case studies and Assignments relevant to actuarial work, based on relevant datasets provided
- Track your progress
- Learn in your own time
- Option to interact and network with peers

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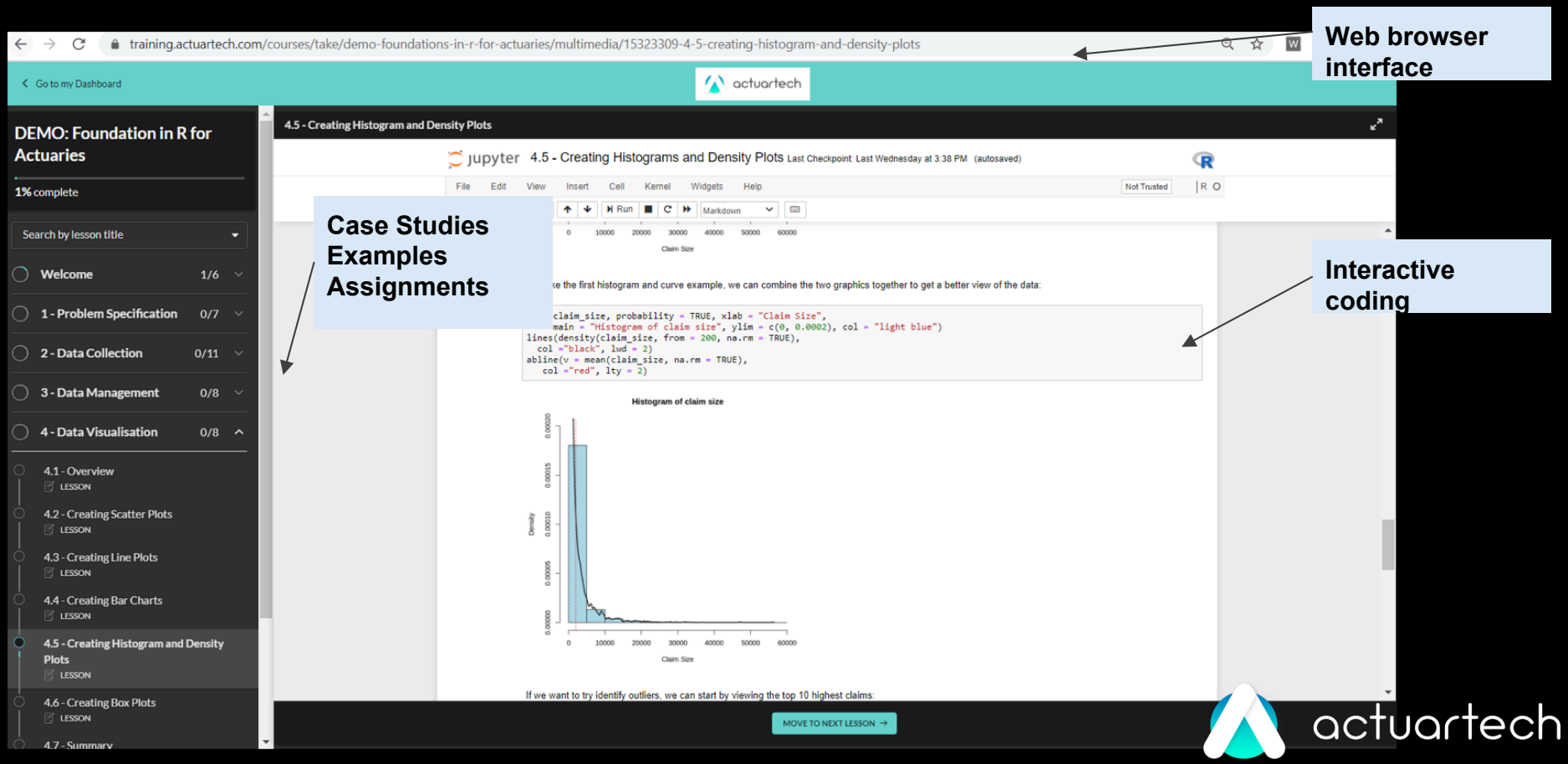
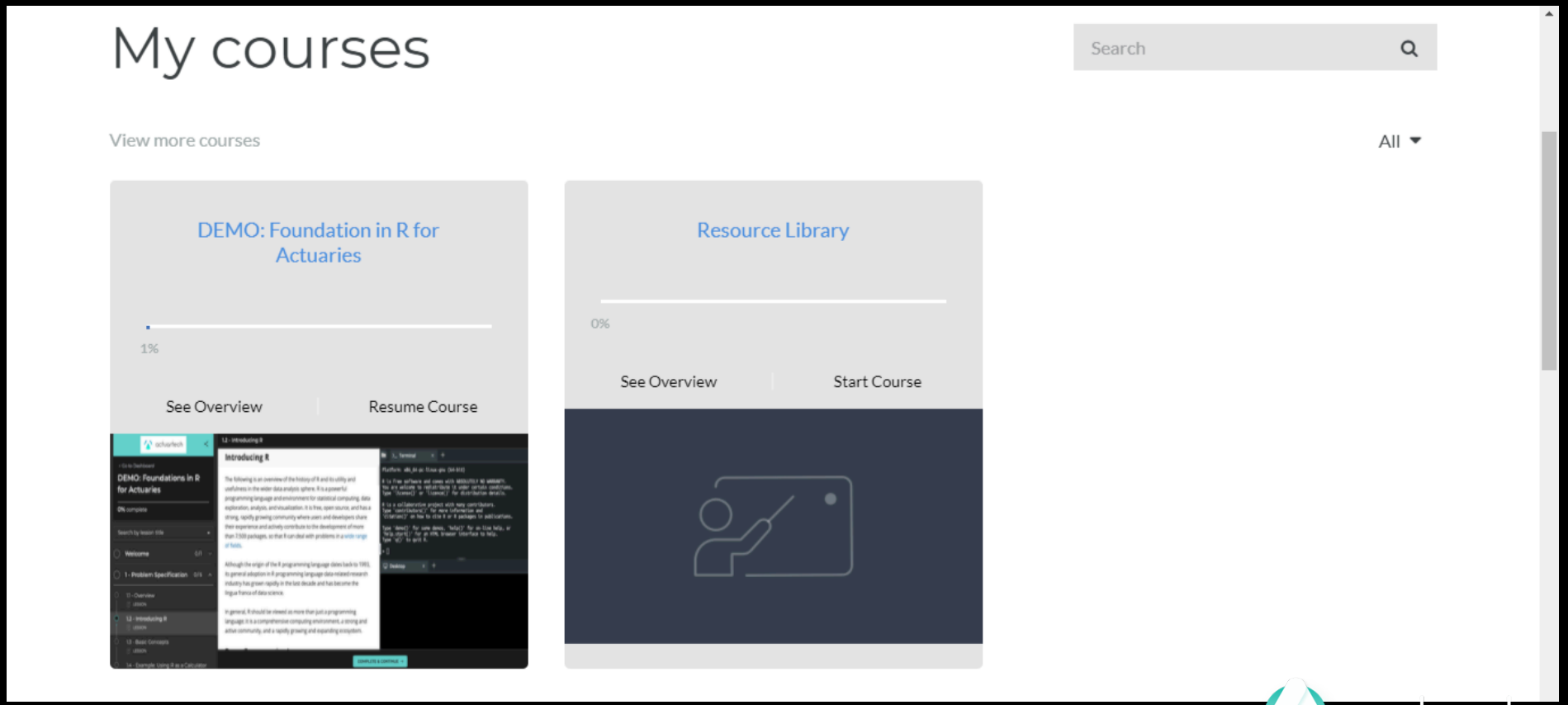
ACTUARTECH TRAINING PLATFORM



VIEWING YOUR COURSES ON THE PLATFORM



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Q&A

Contact us on info@actuartech.com for any questions.

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