SINGAPORE ACTUARIAL SOCIETY

SINGAPORE ACTUARIAL CONFERENCE 2023

# The Evolution of Actuarial Technology

Coherent

28 September 2023

# Coherent

## Spreadsheet-to-Cloud Service

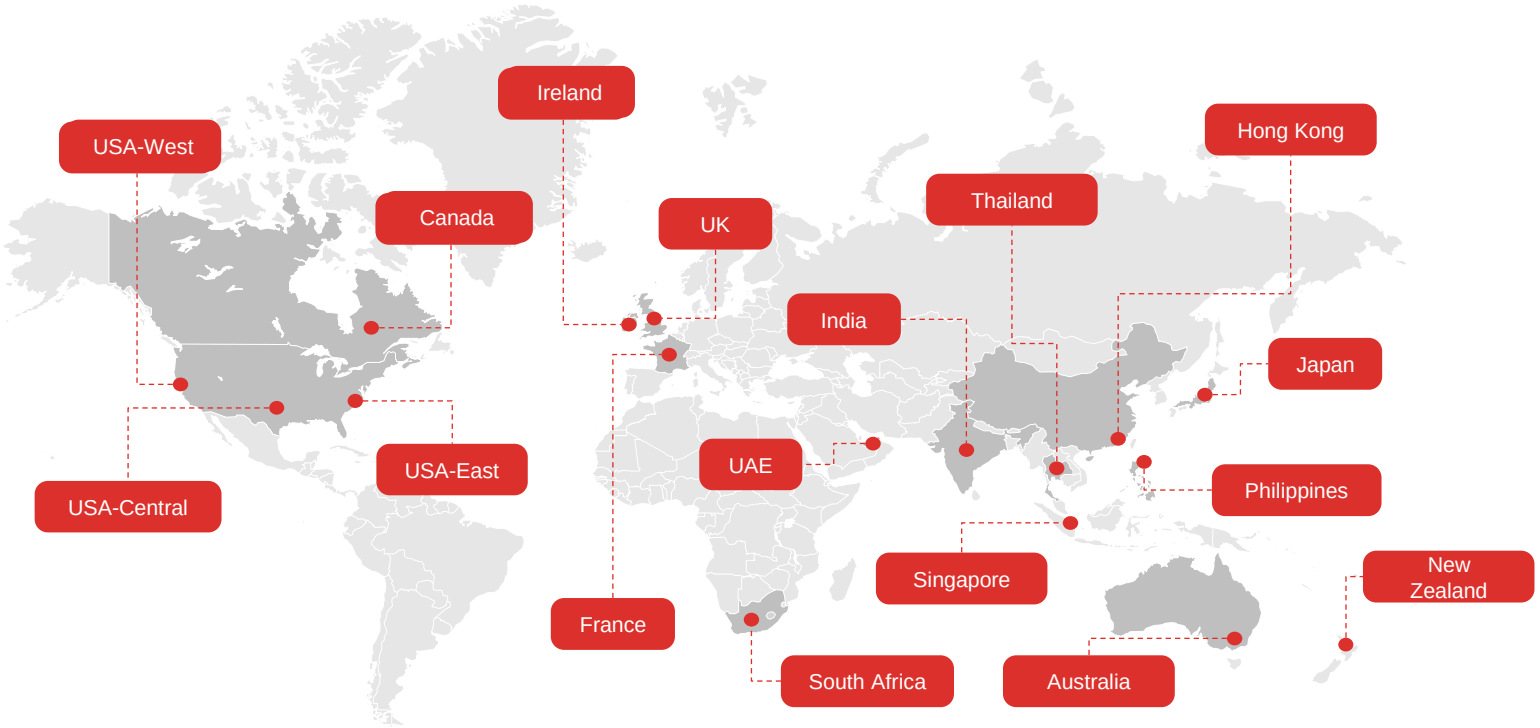
- A world-leading enterprise service, designed for scale

## Founded in Hong Kong in 2018

- One of the fastest-growing B2B software businesses

## Global Footprint

- Presence across US, UK, Europe and Asia Pacific




A selection of our growing **partner network**

snowflake, Microsoft, EY, salesforce, Capgemini, accenture, aws, cognizant

Sample of our **enterprise customers**

HSBC, TRANSAMERICA, Sammons FINANCIAL, PACIFIC LIFE, ZURICH, Prudential, CHUBB, FRANKLIN TEMPLETON, FWD, Manulife

# As insurance changes, so must Actuaries

## Insurance is changing:

- Demographics drive the need for health and retirement solutions
- Customer centricity necessary for the industry to retain its mass market appeal
- New digital and partnership distribution channels
- Investment challenges proliferate
  - Volatility
  - Low real returns
- Regulatory complexity proliferates:
  - Accounting: IFRS 17
  - New and changing economic capital regimes (e.g., HK RBC)

## Actuaries in demand but at capacity

- Focused on compliance:
  - Are we a strategic risk & capital function?
  - Are we changing insurance for the better?
- CFO perspective:
  - Actuarial headcount expanding
  - It's a necessary cost, but is it efficient? Is it value adding?
- Tools of the trade are past their sell by date:
  - Old technology
  - Manual processes

# Evolution



## Web 1.0

- Static web pages
- One-way transfer of information

## Actuary 1.0

- Pricing and reserving: storehouse of expertise
- Calculations owner: output to other functions

## Web 2.0

- Interactivity
- Social networks
- Superapps

## Actuary 2.0

- Managing explosion of regulatory complexity
- Reliant on traditional actuarial systems whilst exploring new tools and techniques
- Communicating what drives risk and opportunity to other functions

## Web 3.0

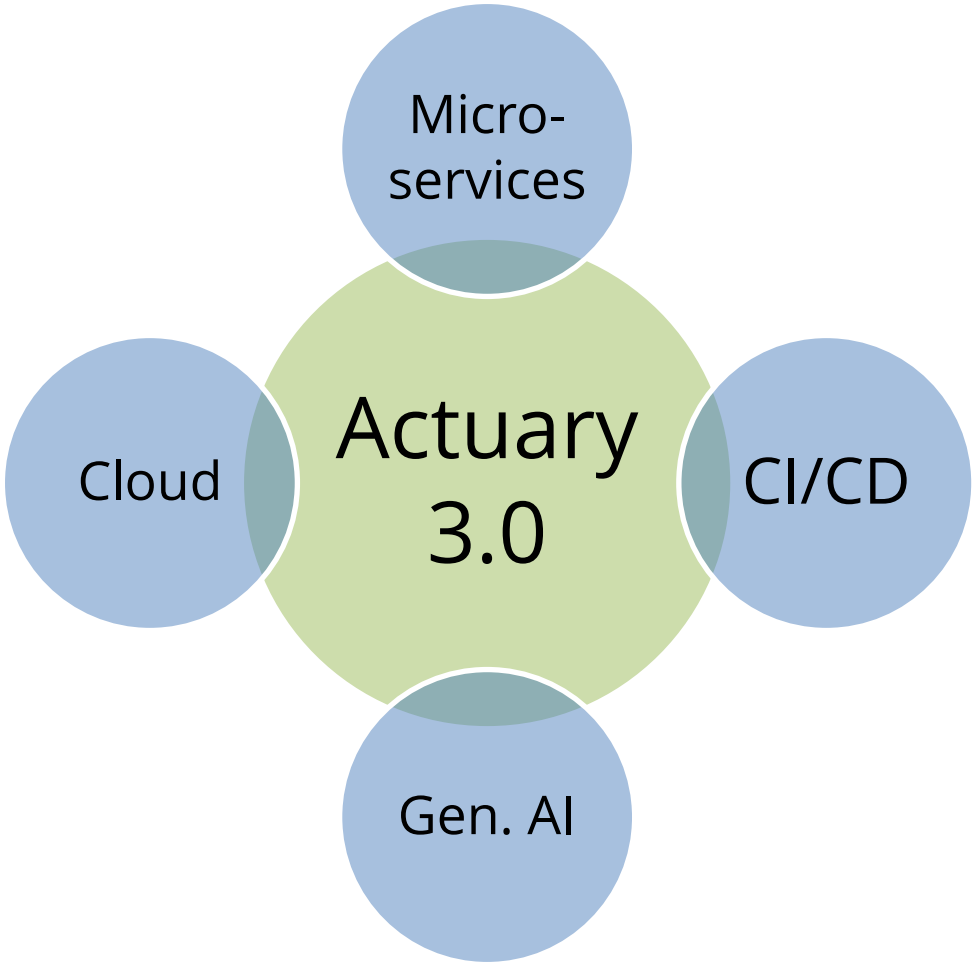
- Decentralization
- Openness and connectivity
- AI/ML

## Actuary 3.0

- Right tech for the right job
- Traditional domain expertise enhanced by data science skills
- Key member of multidisciplinary teams

# Right technology for the right job





# Microservices

## Data layer

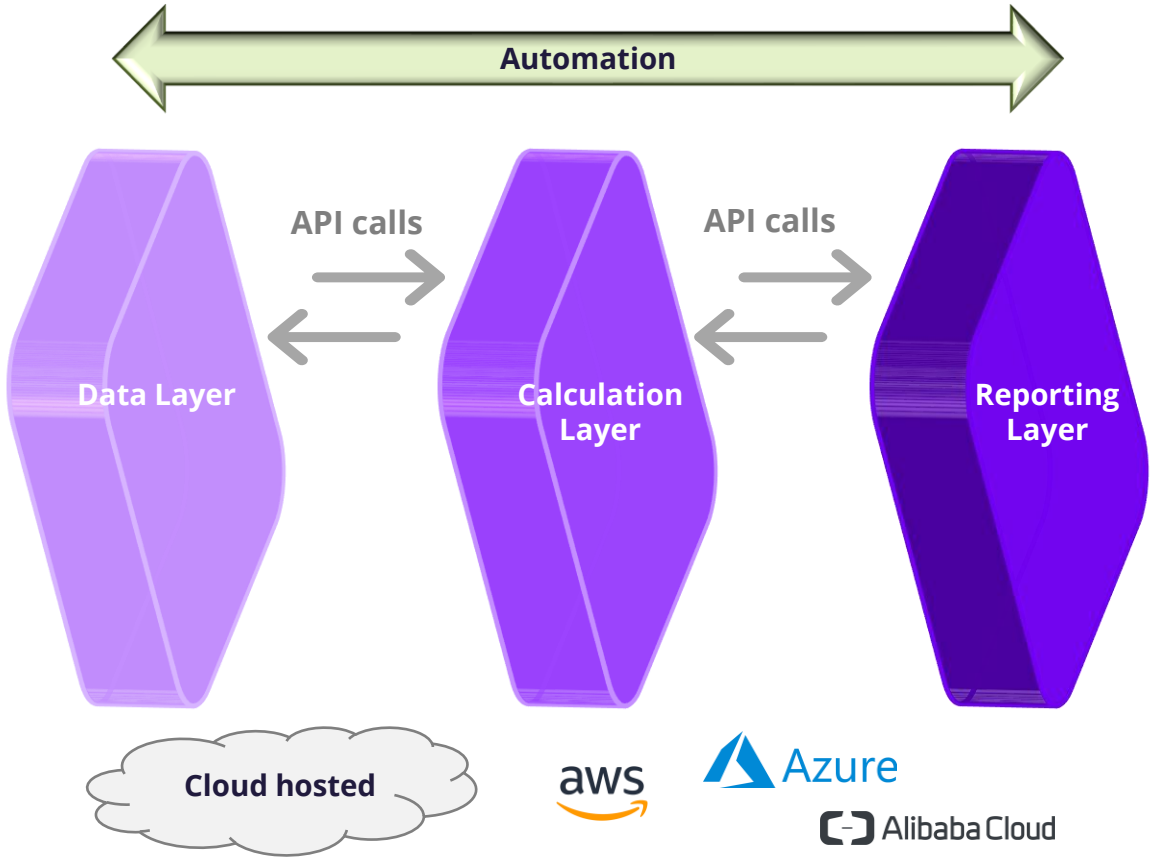
Collect and manage data from data lake or multiple sources

Airtable, snowflake, Microsoft SQL Server

## Calculation Layer

Heart of each actuarial process: Assumptions, parameters, projections, scenarios.

FIS, AXIS™, python, coherent, R, wtw




## Automation

End-to-end process runs without manual intervention

Power Automate, UiPath, alteryx, nintex K2

## Reporting Layer

Interrogate Calculation Layer to extract and visualise results

Shiny, Excel, Power BI, tableau

# Cloud



## Scalability

Parallel processing for significantly better performance

Expands range of potential computing tasks enormously

Assess cost of processing vs. Value obtained

## Security

Significant infrastructure out of the box

Reliance on third party

Requires different cyber security skills

## Model Architecture

Microservices for models

Orchestration of components

Order of operations

Models within wider processes

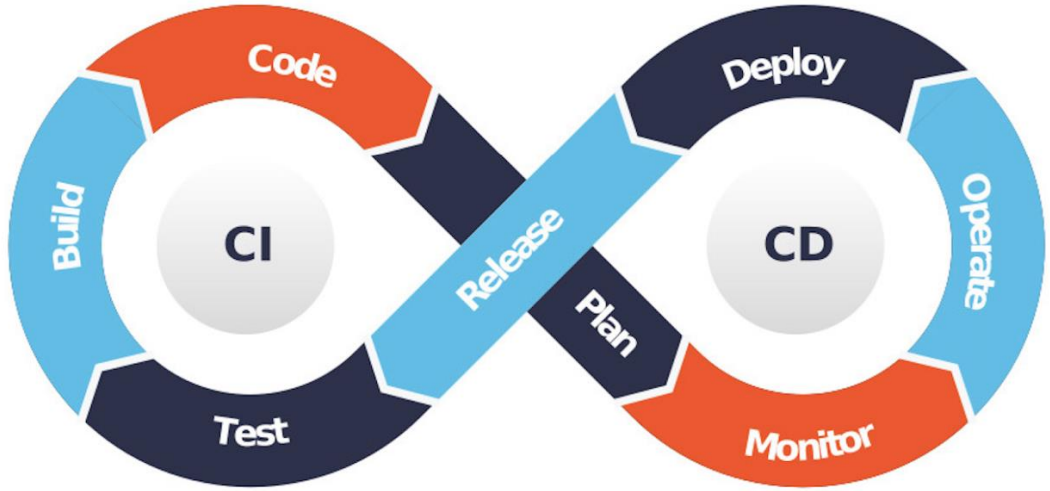
# Continuous Integration / Continuous Development

**Traditional way:**

- We have a computer system
- We train everyone to use it
- Once a decade we review the system – and decide it's too painful to change it!

**Microservices way:**

- Pick-and-mix the best tools for each part of the modelling process
- Connect them to create your end-to-end process (including to the existing system)
- Ongoing flexibility to upgrade and/or replace each tool without disruption



# AI

## What is Generative AI?

- New classes of problems: applications discovered rather than invented
- "AI is just Advanced Statistics"
  - Traditional statistics provides algorithms that summarize and compare data in useful ways
  - Machine Learning uses the descriptive statistics of large datasets to make predictions about new data points
  - Generative AI builds on descriptive statistics in a different way to create new (massively complex) data points that fit the set
- Tradeoff for the complexity: hard to understand, describe and test.

## How do I use it?

1) Accept the Limitations
2) Choose the right model
3) Pay attention to change

# Transformation of Actuarial Technology

Evolution of actuarial technology

**Actuary 1.0**

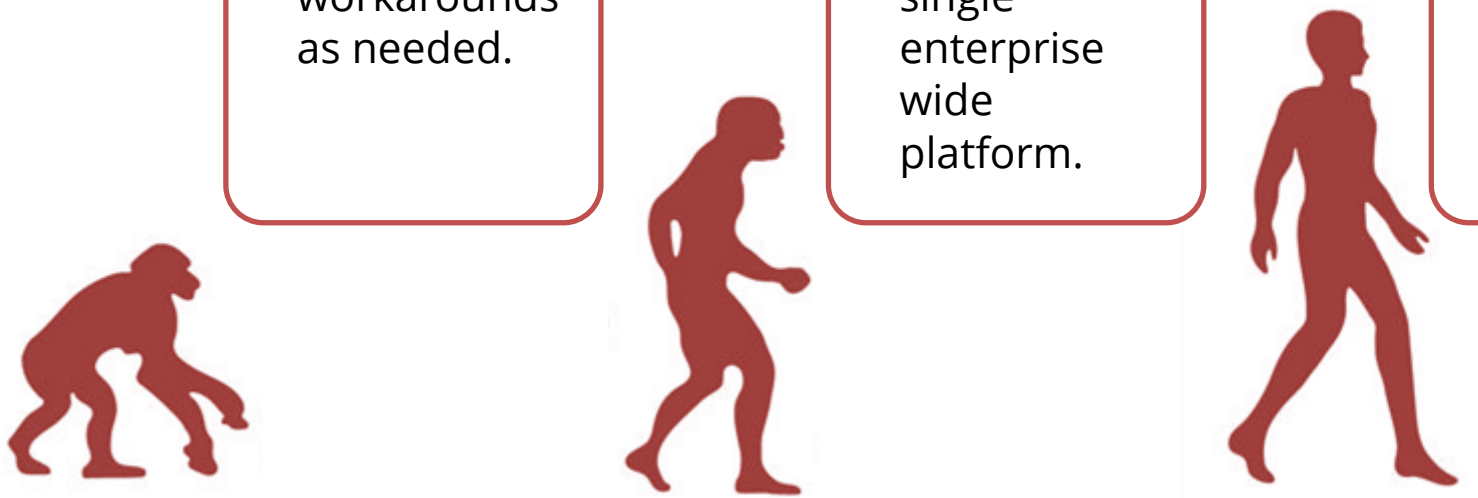
- Excel only with workarounds as needed.

**Actuary 2.0**

- Move towards single enterprise wide platform.

**Actuary 3.0**

- Best of Excel with power of cloud-based platform.



# Actuaries and Excel

— A Love-Hate Relationship

- According to the Casualty Actuarial Society's First Annual Technology Survey, over 94% of actuaries reported that they use Excel at least once a day.
- Excel is readily available, easy to use, and capable of creating remarkably complex actuarial models.
- Actuaries have grown dependent on Excel to do heavy lifting beyond what it was designed to do.
- But Excel has limitations. There is still considerable debate amongst actuaries on whether the strengths of Excel outweigh the drawbacks.

**"Running Excel models in production on local machines is no longer 'leading-edge', if it ever was."**

Stephen Mathys, Small Talk, March 2021

# Actuary 1.0

Excel only with workarounds as needed

- The actuarial profession evolved with limited reliance on programming skills as actuaries were self-sufficient in creating complex business logic and models in Excel.
- When limitations arose, actuaries learned to create workarounds.
- Ultimately, those workarounds and limitations led to too many mistakes and inadequate processing time to be sustainable.

## Limitations of Excel

**Limited processing power**

**Lack of version control and governance**

**Limited automation to replicate formulas reliably**

**Difficulty meeting regulatory requirements**

**Security risk**

# Actuary 2.0

Move towards single enterprise-wide platform

- Complex models inherently led to more human error in manual spreadsheets.
- Shared models, lacking version control, easily led to one person overwriting formulas that impacted other parts of the model.
- Enterprise-wide actuarial modeling systems seemed promising for replacing Excel. However, enforcing the use of a single solution tech stack had many unanticipated challenges.

## Limitations of enterprise-wide actuarial systems

**Limited customization**

**Limited support for certain data types and extreme events**

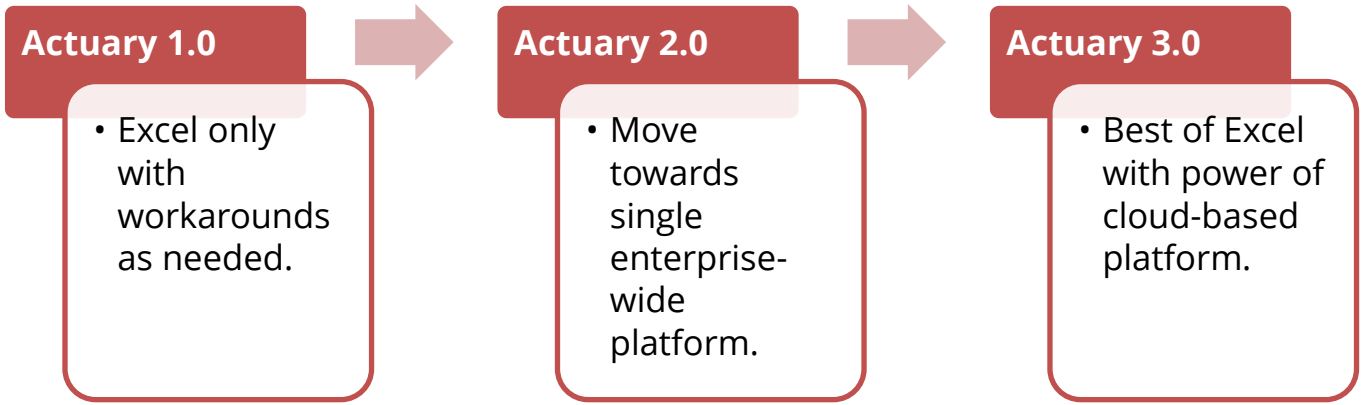
**Black box models**

**Slow cycle time for new model creation**

# Actuary 3.0

Best of Excel with power of cloud-based platform

- Neither Excel on its own, nor a forced system that eliminates Excel entirely, is feasible long-term.
- To achieve complete actuarial financial transformation, **actuaries must use Excel for its intended use while automating other pieces of the process to bring much-needed scale, control, and governance.**



# Example




**Interactive Modelling using Spark**

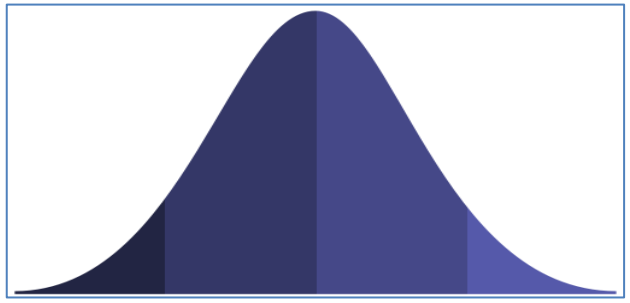
# Vision of Actuary 3.0

"Best of both worlds" solution, harnessing the flexibility of Excel and the power of enterprise-grade cloud computing.

| Actuary 1.0 and 2.0 | Actuary 3.0 |
| --- | --- |
| Model complexity and scalability | Flexibility of Excel with enterprise grade platform capabilities for running and managing models |
| Fragmentated systems and lack of transparency | Automate spreadsheets and integrates with RPA and other tools without specialized IT teams |
| Accuracy, risk, and errors | Provides version control and auditability |

# Actuary 3.0 in Action

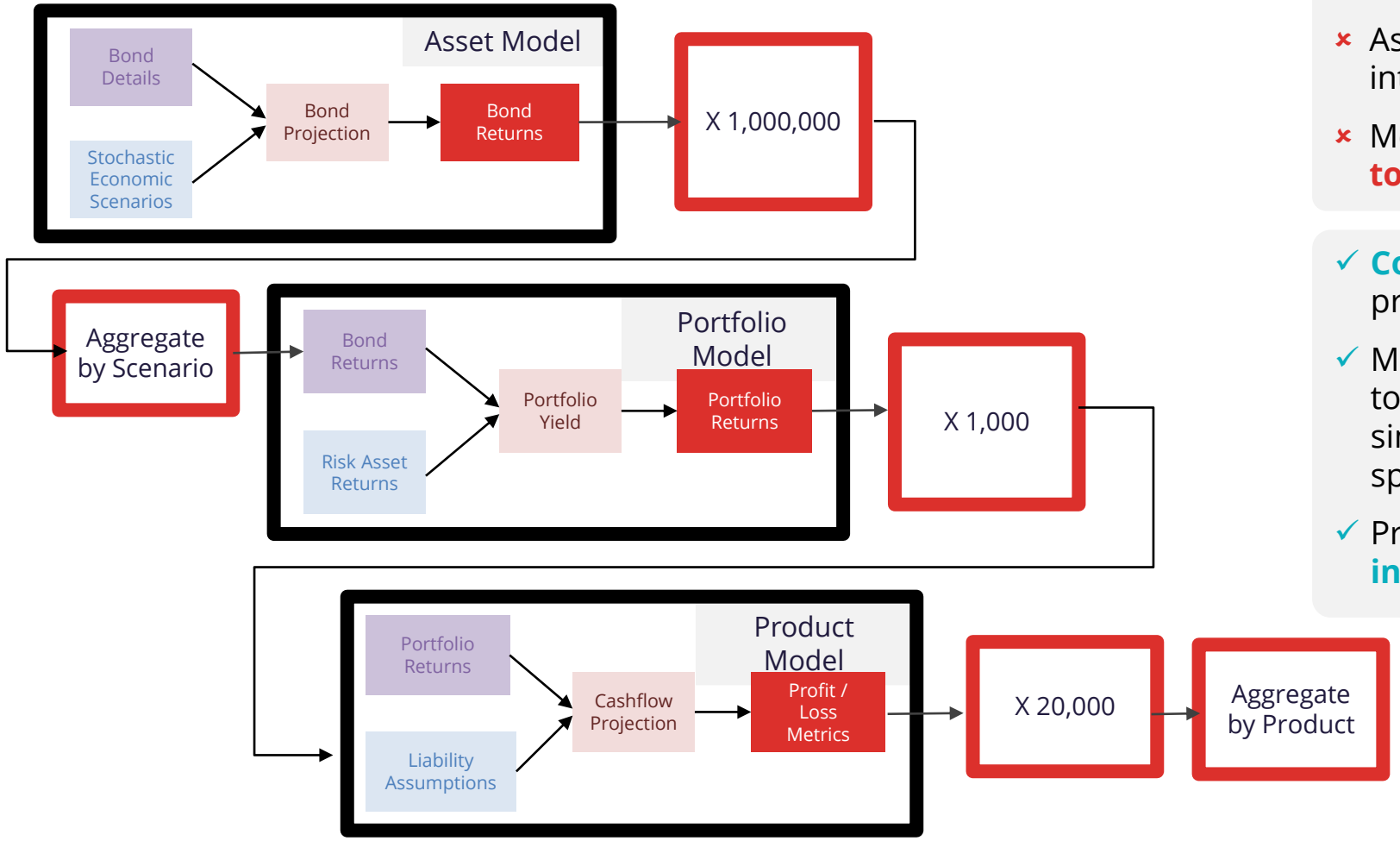
Case Study 1: ALM modelling for cost of guarantees



| Actuarial Challenge | Spark Solution | Results |
|---|---|---|
| × Complex stochastic Asset-Liability Excel model for valuing cost of guarantees | ❑ Replaced the VBA | ✓ **Reduced run time** for 1,000 simulations from 8.5 hours to under 2 minutes |
| × Scenario generation sub-models created a large set of possible future economic outcomes | ❑ Created templates to enable easy review of stochastic results | ✓ **Eliminated need to purchase** ALM module of actuarial platform |
| × Runtime of 8.5 hours for 1,000 scenarios | ❑ Created model governance | ✓ Enabled **better model testing, control, and assumption management** |
| × Significant use of user-defined functions in VBA made model hard to control | ❑ Externalized assumption set in asset-liability model with automated connectivity to pull the right assumptions | |

# Actuary 3.0 in Action

## Case Study 2: Modular model construction




- × **Billions of simulations** over a 3-stage process
- × Assumptions and calculations intertwined in **massive spreadsheets**
- × Models evolved over several years: **hard to test new versions**

- ✓ **Controlled, automated** end-to-end process with validated version control
- ✓ Modular process enables actuarial team to **easily make changes** to the models, simulations, and processes without special programming.
- ✓ Provides a great **complement to the insurer's actuarial system**

# Actuary 3.0 in Action

Case Study 3: Automate a calculation-heavy model within a process workflow

- Spark converts Excel models to code in seconds with API connectivity to RPA tools.
- Issues within the spreadsheet can be found and fixed fast for quick and accurate diagnostics.
- Use of Spark to perform the calculations while enjoying version control and auditability features.
- Avoids heavy coding & testing in RPA tools.

## Explore Spark

Here are a few ways to learn more:

Check out our demo video

Request a demo for a guided tour of Spark

Try out Spark yourself in our demo sandbox and see it in action

# Questions

# Thank You

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