ATHORA

The AI is confident. Should you be?

AI Can Accelerate Actuarial Work – If We Set the Boundaries

Big gains are possible when we stay alert to where models can fail

Athora is a full-focused pension and life insurer in the Netherlands

Our purpose

We are a Partner for Life,
taking care of your tomorrow.

2.1 Million customers

who entrust their financial future to us.

Familiar brands

Zwitserleven

Reaal

with > 130 years of experience.

820 employees

Highly committed and skilled.

Strategic partners

APOLLO

TATA CONSULTANCY SERVICES

cardano

ensuring growth, sound returns and service.

Proud partner

of Koninklijk Concertgebouworkest.

We are part of Athora Group

A pan European savings & retirements services group

- **Athora Life Re**. **AuM 2.5b** Risk transfer: offering a range of internal and third-party reinsurance solutions.
- **Athora Netherlands**. **AuM 55b** Open book: traditional life insurance, unit-linked, pensions and PRT's
- **Athora Belgium**. **AuM 9.05b** Open book: traditional individual/group business and unit-linked
- **Athora Germany**. **AuM 3.9b** Closed book: traditional annuities, endowments and small unit-linked portfolio
- **Athora Italia**. **AuM 5.75b** Open book: guaranteed, unit-linked and hybrid business.

Introduction

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AI Is Becoming Part of Everyday Work

Not a future concept but an everyday capability in tools and workflows

- Embedded in common software and processes
- Raising expectations for speed and clarity
- Creating new failure modes and blind spots

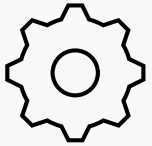
What AI allows us to achieve

AI is a capability multiplier helping in various areas

Understanding

The use of AI helps to quicker gain insight in complex subjects.

Example: Understanding models and matching to functional designs



Efficiency

Automation of repetitive work allows users to focus on analysis.

Example: Writing of documentation, PDF-data extraction, Excel analysis

New modelling options

AI can also be applied directly to (actuarial) problems.

Example: Replacing analytical formulas with AI.

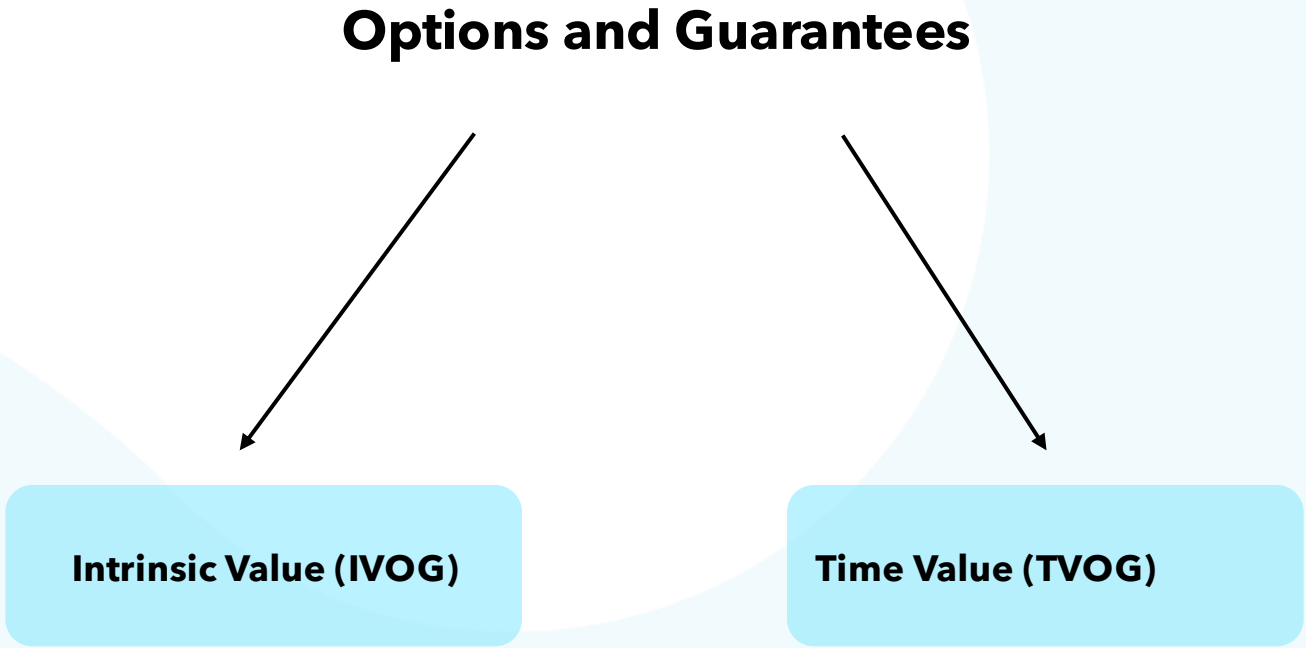
Use case 1

Valuation of options and guarantees using Neural Net

Definition of Options and Guarantees

- Insurance contracts typically have options and guarantees embedded
- Options: Grant the holder flexibility
- Guarantees: Provide security against market volatility or specific risks
- Assessment of their value is crucial for adequate risk management.

O&G Valuation



Explicit valuation using Monte-Carlo simulation is typically considered too computationally costly and is mainly used to calibrate analytical formulas

Analytical formulas: Clear, accepted – and still a lot of work

A trusted Monte Carlo shortcut – but it struggles with complexity and takes expert time

Acceptance & control

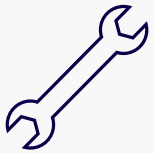
Widely used familiar approach

Speed & transparency

Fast to compute

Deterministic & reproducible

Logic is explainable



Work & scarce expertise

Calibration & market-data fitting

Product-specific tweaks & approximations

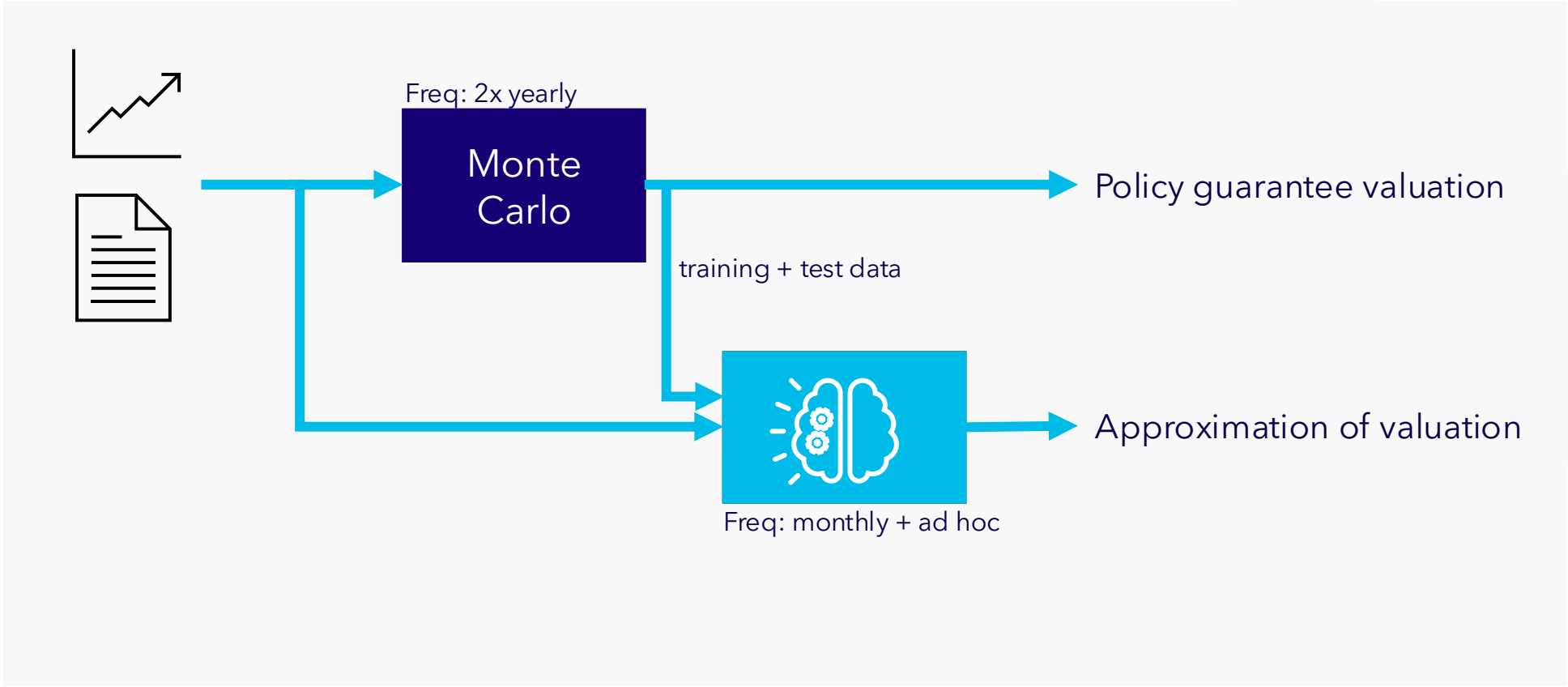
Expert review & sign-off

Breakdown points

Limited non-linear & complex

Poor in extreme scenarios

AI has the potential to replace analytical formulas for Guarantee Valuation



AI modelling has some upsides and some downsides

Comparison of the analytical formulas versus AI modelling:

Analytical formulas

- **Widely used** in interest rate/inflation modeling as a **simplification** of the Monte-Carlo process as it can be quite computationally intense.
- Provide **Speed, Transparency** and **Explainability**
- **Limited** Ability to Model **Nonlinear & Complex** Effects
- **Poor Performance** in **Extreme** Scenarios

AI modelling

- Alternative modeling as a **further simplification** of the Monte-Carlo process, but **not widely used**
- Provide even **more Speed** but **Transparency** and **Explainability** is **challenging**
- **Ability** to model **Nonlinear & Very complex** Effects
- **Performance** in **Extreme** Scenarios **not guaranteed**

AI extends modelling power – but weakens explainability

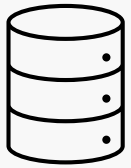
Analytical formulas		AI modelling
High	Modelling effort	Low
Medium	Complex modelling	High
High	Computational speed	High
High	Explainability	Low
High	Adoption & Maturity	Low
Low	Extreme scenario	Low

Neural Networks Start with Domain-Driven Data – Right Data Requires Process Knowledge

Domain knowledge

Intricate domain knowledge required to select and prepare training data

Analytical formulas as basis for data selection



Sufficient data

Monte Carlo simulations to provide the necessary prediction data

More training data will lead to better results

Relevant data

Do not provide more data unless the data is relevant

Additional features require a more complex neural network

Risk of overfitting in case of abundant features

Pre-process data

Strictly numeric input requires pre-processing

Convert data to numeric

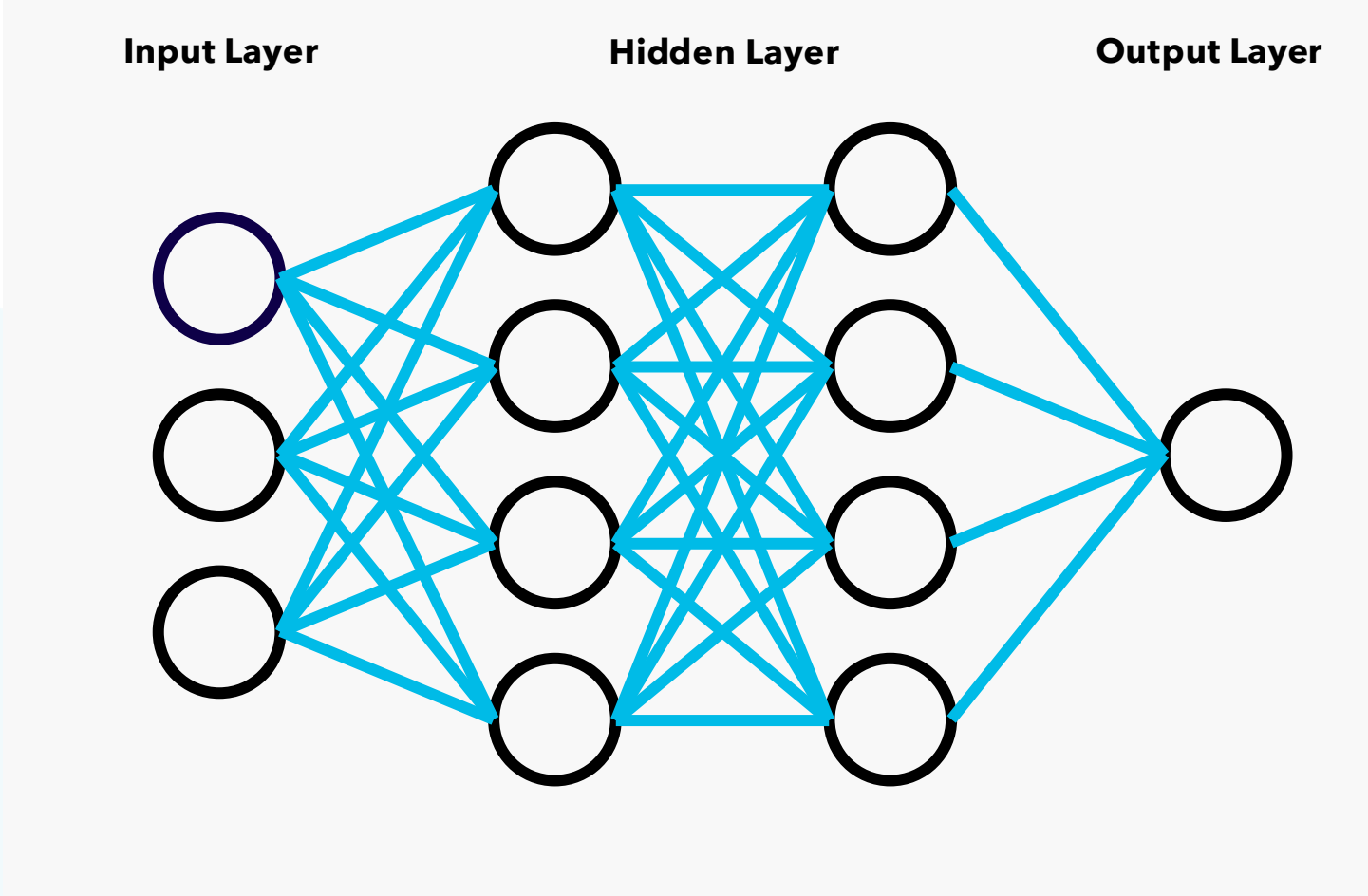
Take samples form curves

Neural Network Design: Product-Specific Choices Driven by Data

No one-size-fits-all model

- Find a model that works in your situation
- Many architecture choices available
- More complex ≠ better performance

Simple neural network



Ensuring Model Generalization: Train, Validation, and Test Discipline

Model development discipline

AI models are not judged on how well they fit data —but on how well they **generalize to unseen cases**.

Training set

Purpose: Learn patterns

- Model parameters are learned from historical data
- Optimization via gradient descent
- Risk: memorizing noise instead of signal

Validation set (unseen during training)

Purpose: Prevent overfitting

- Used to tune hyperparameters
- Monitors generalization during training
- Early stopping when performance degrades

Test set (held out)

Purpose: Final performance estimate

- Never used during training or tuning
- Used once for final evaluation
- Metrics: RMSE, MAE, stability

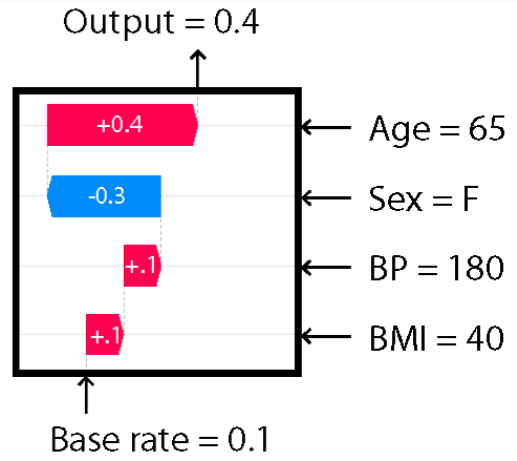
Assessing AI Results: Explainability & Performance Are Necessary – Not Sufficient

Model assessment layer

Before using AI outputs, we assess **performance** and **behaviour** —but judgement remains human

Explainability (SHAP)

- Identifies key drivers of each prediction
- Shows direction & relative importance of features
- Supports local, case-by-case analysis



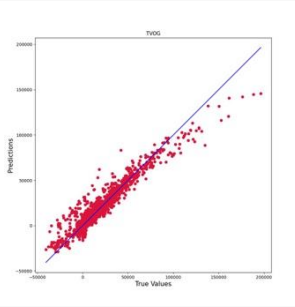
Model performance (quantitative)

- Metrics on validation data e.g. RMSE / MAE
- Stability across time slices
- Back-testing against known outcomes

Good fit ≠ safe use

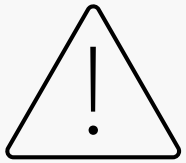
Visual diagnostics (qualitative)

- Actual vs predicted
- Residual patterns
- Drift over time



AI Reality Check for Guarantee Valuation

AI models are powerful predictors– but only inside their trained domain



Feature range risk

Models are trained on historical ranges

Extreme markets still produce a number

Extrapolation is unreliable by definition

Explainability challenge

AI gives an answer, but not the reasoning

SHAP still requires financial expertise

We cannot outsource “why” to a neural network

Governance response

Automated out-of-distribution checks

Confidence & stability measures

Validation against traditional models

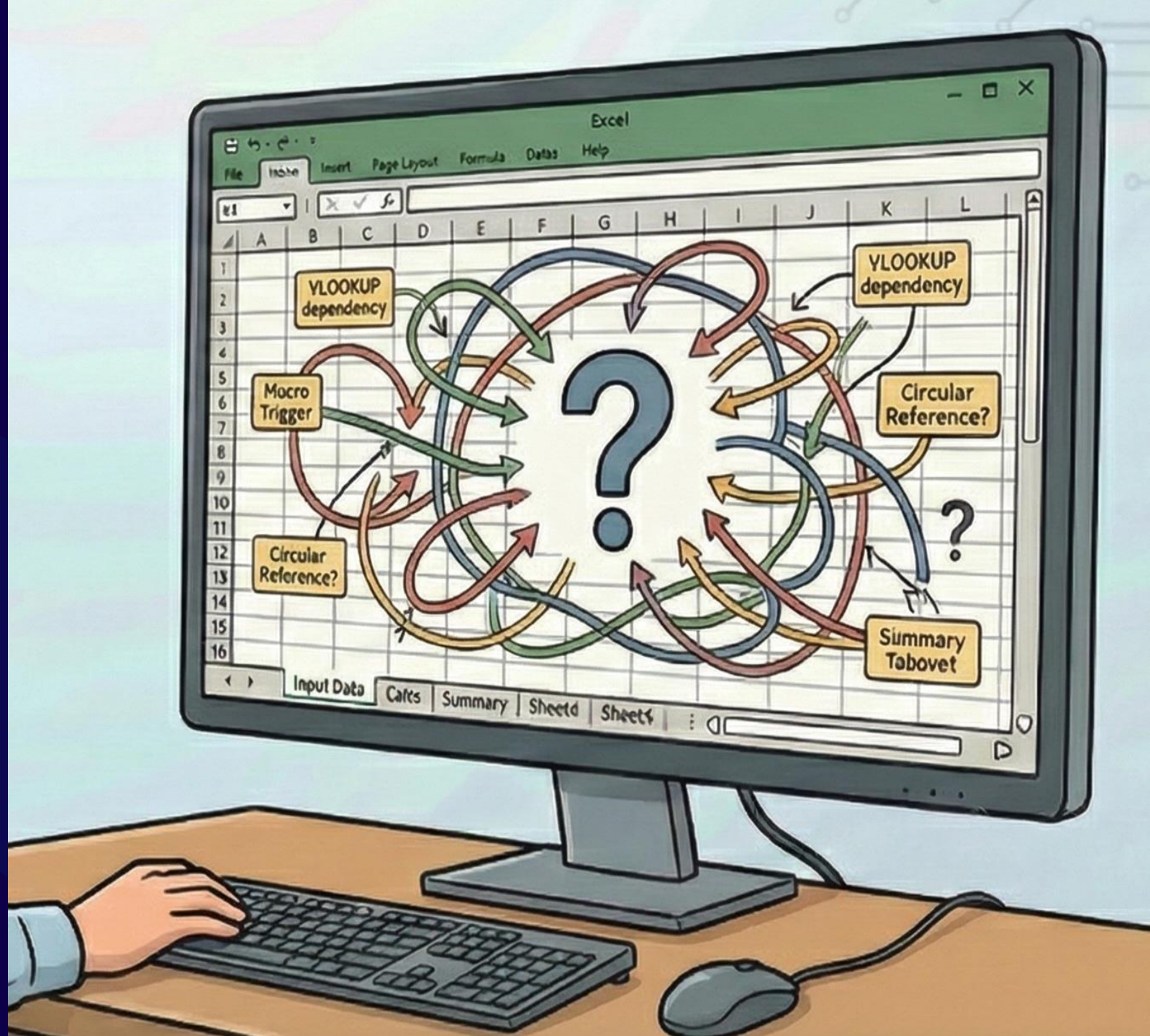
Use case 2

From Excel Chaos to Clarity

The Excel Model Labyrinth

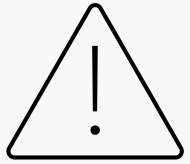
Understanding dependencies, data flow and logic in multi-sheet workbooks is hard

- Logic is spread across sheets, links and macros
- Initial understanding and review can take a lot of time
- Explaining ‘why’ a number changes is difficult



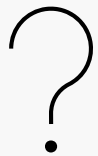
Can we leverage AI? The first attempt

We tried Copilot directly on the workbook



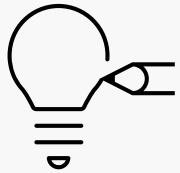
1. Reality

- the workbooks are often **too large** and **too complex** to process reliably



2. Result

- This leads to **incomplete understanding** and **unreliable answers**

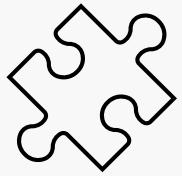


3. Lesson

- **Translate Excel** into an **AI-readable** summary first — then ask AI

AI Excel Analysis Tool: Divide & Conquer

Sheet-by-sheet analysis → consolidated text summary



Extract structure

- Workbook map: sheets, defined names, key ranges
- Logic inventory: formulas, links, macros
- External touchpoints: data connections & queries

Analyse using AI

- Interpret code & queries
- Infer sheet purpose
- Carry context forward

Consolidate

- One structured text summary (LLM-friendly)
- Workbook-wide narrative
- Ready for further analysis (Copilot chat, Python).

Overview
Input Data & Extrapolation
CSSR Calculation
VA Term Structures
Disclaimer

Disclaimer

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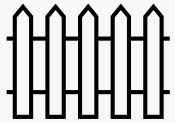
Closing remarks

Key lessons: risk, guardrails, and why actuarial judgement remains central

Athora's View: AI Requires Guidance – and Actuarial Accountability



Governance

Documentation & traceability

Independent review / model risk checks

Human sign-off & accountability

Explainability expectations

Guardrails

Monitoring & drift detection

Input range / out-of-domain checks

Versioning & reproducibility

Fallback & escalation rules

Actuarial judgement

Sense-check behavior

Spot extrapolation & tail issues

Own regulatory & uncertainty interpretation

AI predicts. Governance controls. Actuaries remain accountable.

Key takeaways

Four key messages we want to transfer today

Tech is here

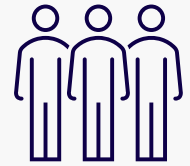
Adoption is the next challenge

AI will boost productivity

You cannot stay behind

AI comes with risks

Governance and controls become even more important



Not everything is AI

Expertise remains crucial