ProActuary

Colin Priest
Nexus Fellow, UNSW

THE AI ACTUARY VIRTUAL SUMMIT

Advanced Prompt Engineering for Actuaries

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Dino

Boomer Actuary

Don’t Be a Dinosaur

- LLMs Aren’t For Google Searches

Stop treating ChatGPT like a search bar. Use advanced prompt engineering to unlock deep actuarial analysis, scenario ideation, and stakeholder-ready summaries, or risk becoming an extinct spreadsheet fossil.

Join Us

ProActuary

01 Prompt Engineering Fundamentals.

02 Prompt Refinement Techniques

03 Advanced Ideation & Analysis

04 Applied Communication & Role-Play

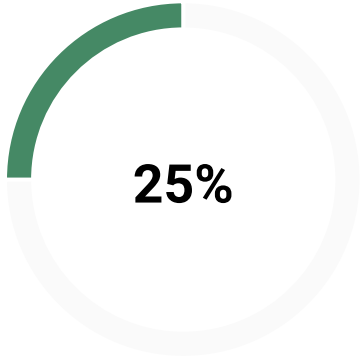
05 Quality Assurance & Next Steps

Today's Agenda

What you will learn

Master core prompt engineering, refine with few-shot/CoT, ideate via tree-of-thought, communicate insights through role-play and SMART frameworks, and ensure quality via self-critique .

What is Prompt Engineering?

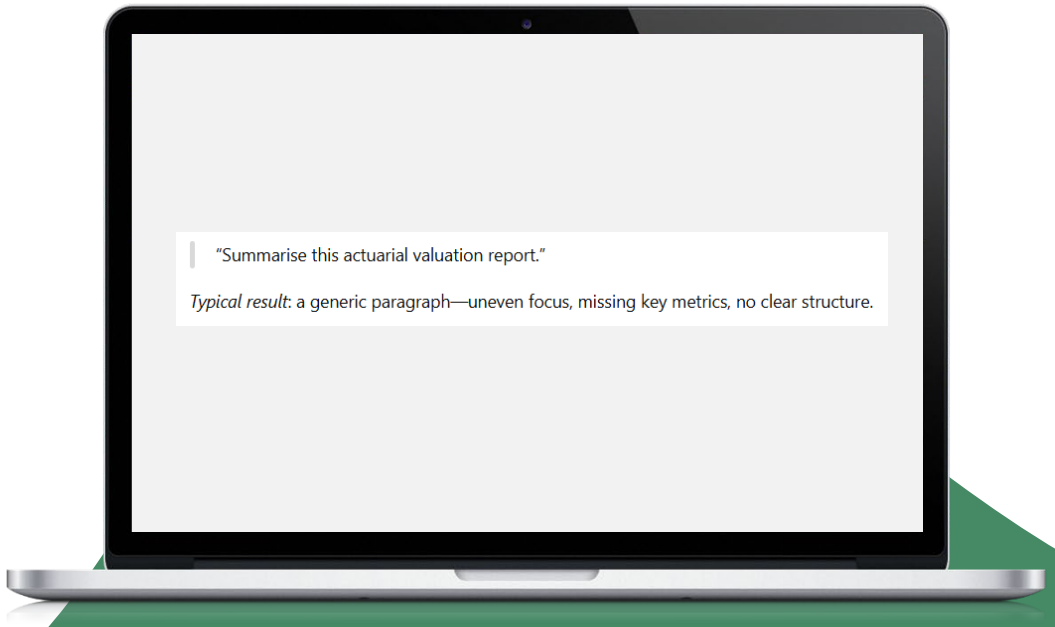


Definition

Crafting clear, explicit instructions so an LLM produces reliable, domain-specific output.

Success **Hallucinations**

Why actuaries care: boosts productivity, clarity, and analytical accuracy.



Simple Query

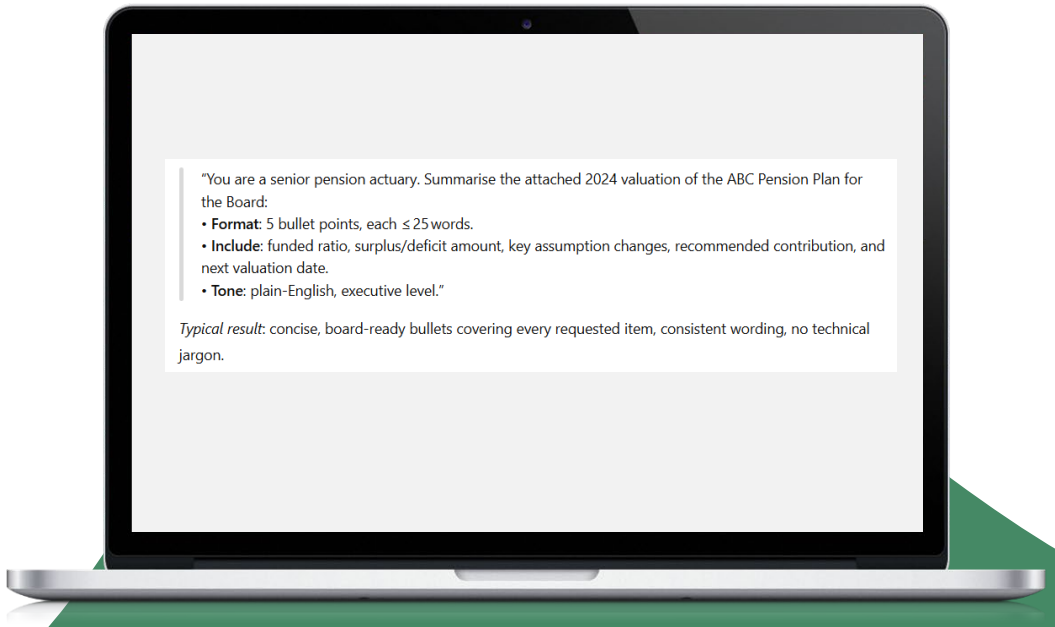
What is Prompt Engineering?

Definition

Crafting clear, explicit instructions so an LLM produces reliable, domain-specific output.

Success **Hallucinations**

Why actuaries care: boosts productivity, clarity, and analytical accuracy.



Structured Prompt

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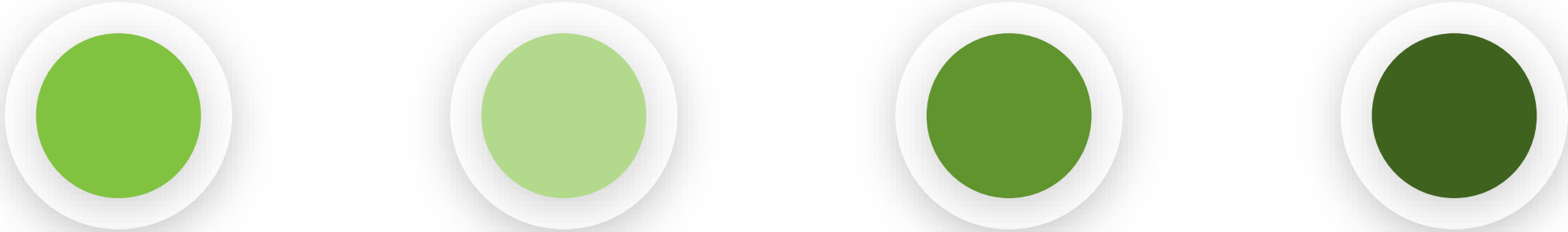
Structuring Effective Prompts

- Framework family: RACE / PAR / Role+Task / Output-Style.



Role

Define the AI's role, e.g., reserving actuary

Context

Provide context & data.

Goal

What you want back (scope) + specify format (e.g., bullet points, table).

Constraints

State constraints (e.g., max 150 words, cite assumptions).

Structuring Effective Prompts

- Framework family: RACE / PAR / Role+Task / Output-Style.

Role

[ROLE]
You are a senior pension actuary who briefs Boards.

Context

[CONTEXT]
Review the attached 2024 valuation report for the ABC Pension Plan (PDF pages 1–45).

Goal

[GOAL / EXPECTATION]
Produce an executive summary that includes:
• funded ratio and £ surplus/deficit
• drivers of change since 2021
• recommended contribution schedule
• material assumption changes
• next valuation date

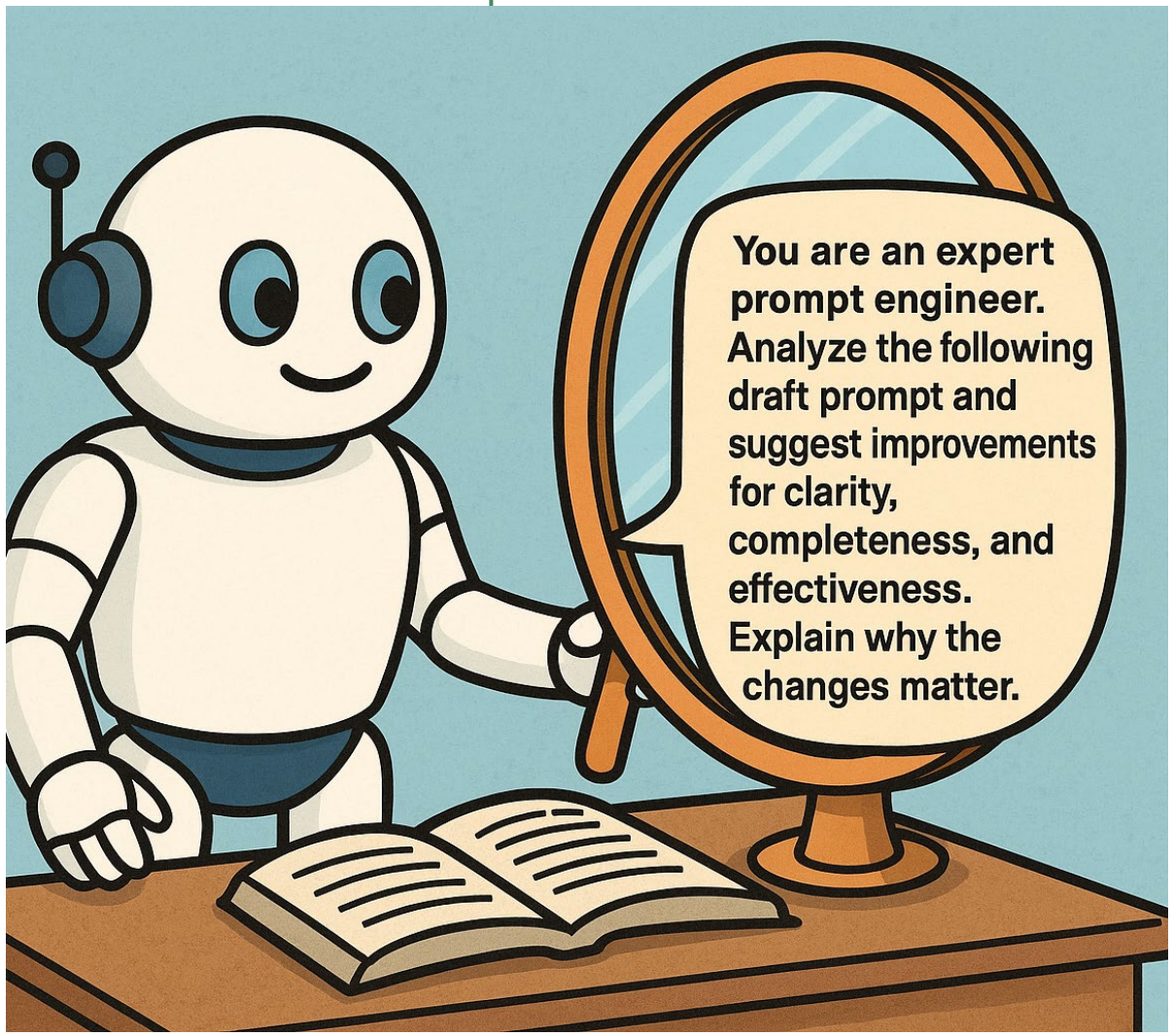
Constraints

[CONSTRAINTS]
Return exactly 5 bullet points, each ≤ 25 words, plain-English (no jargon).
Round all figures to 1 decimal place and reference report section numbers in brackets.

Meta Prompts

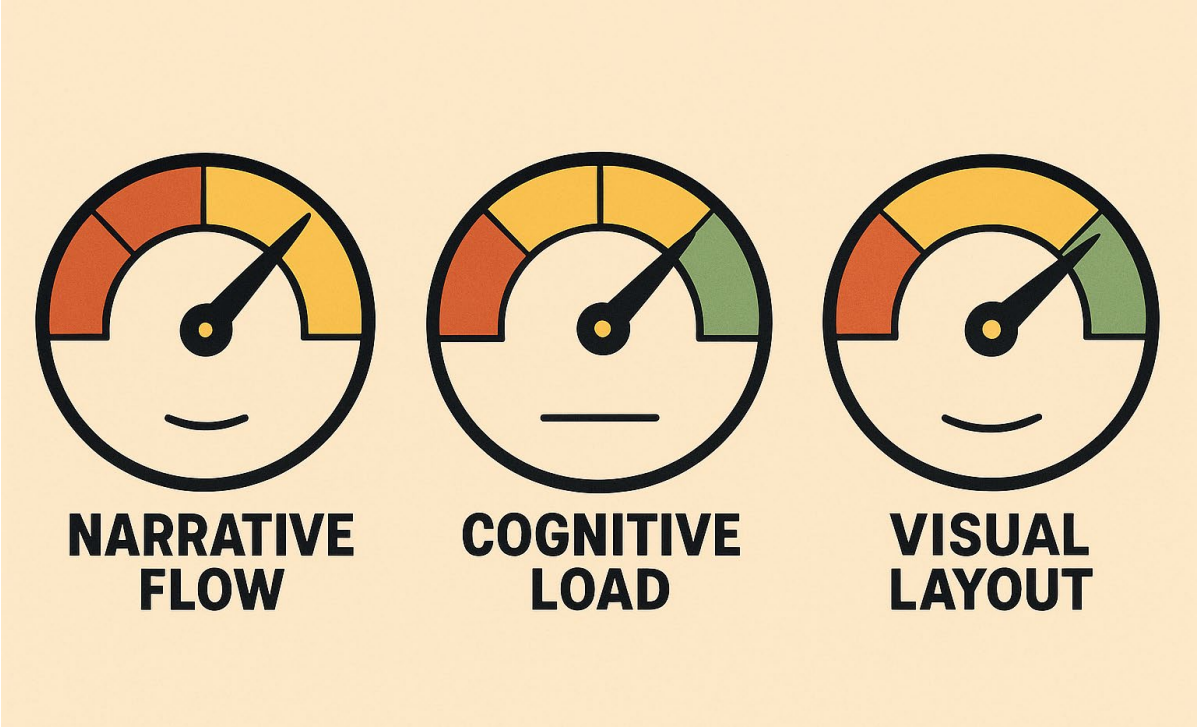
“You are an expert prompt engineer. Analyse the following draft prompt and suggest improvements for clarity, completeness, and effectiveness. Explain why the changes matter.”

Iteratively tunes your own prompts.
Encourages self-refinement & self-critique cycles.



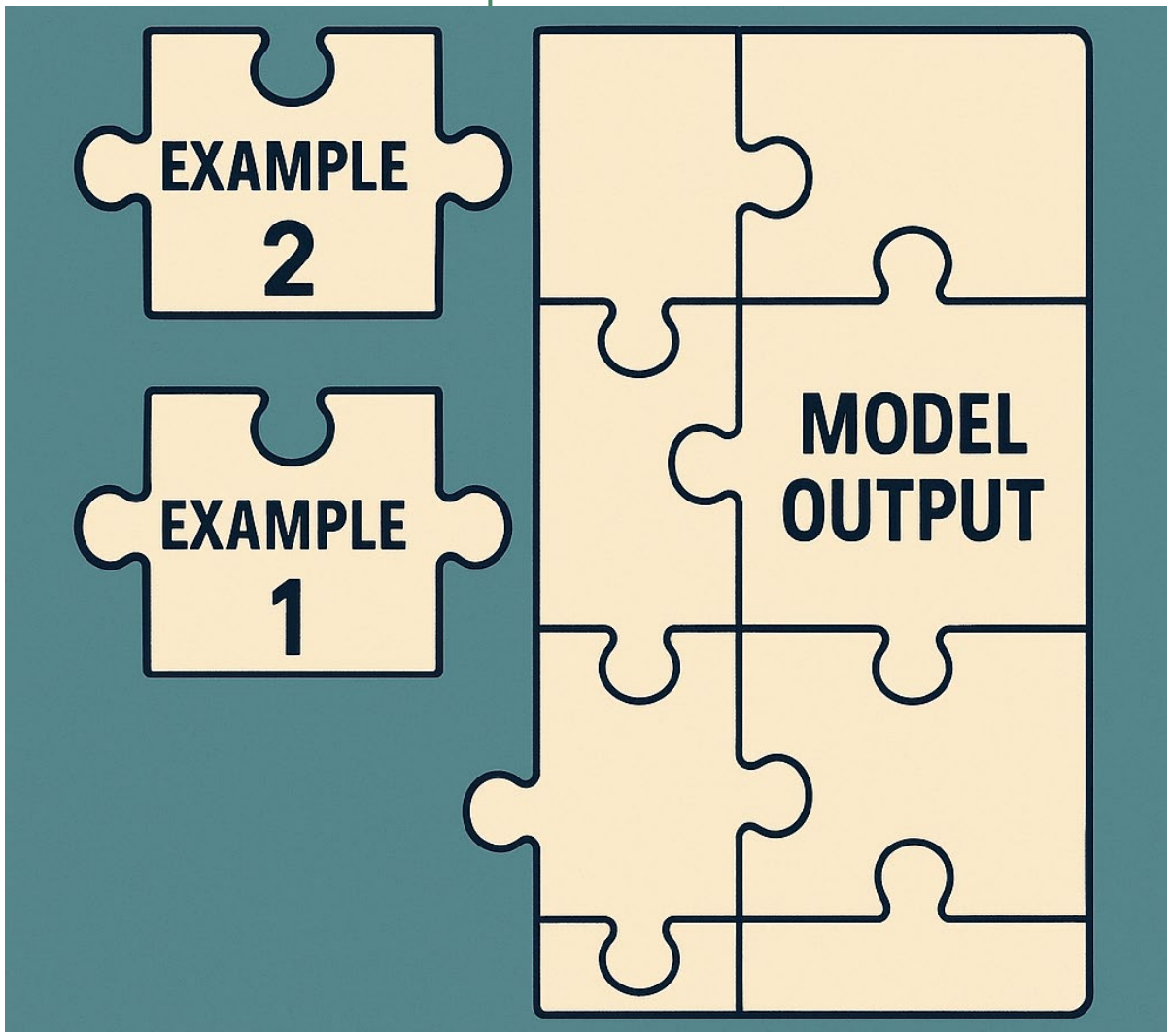
Slide Quality Prompts

Prompt asks ChatGPT to score Narrative Flow, Cognitive Load, Visual Layout (1–5 each) and recommend improvements.
Scorecard table + actionable suggestions.



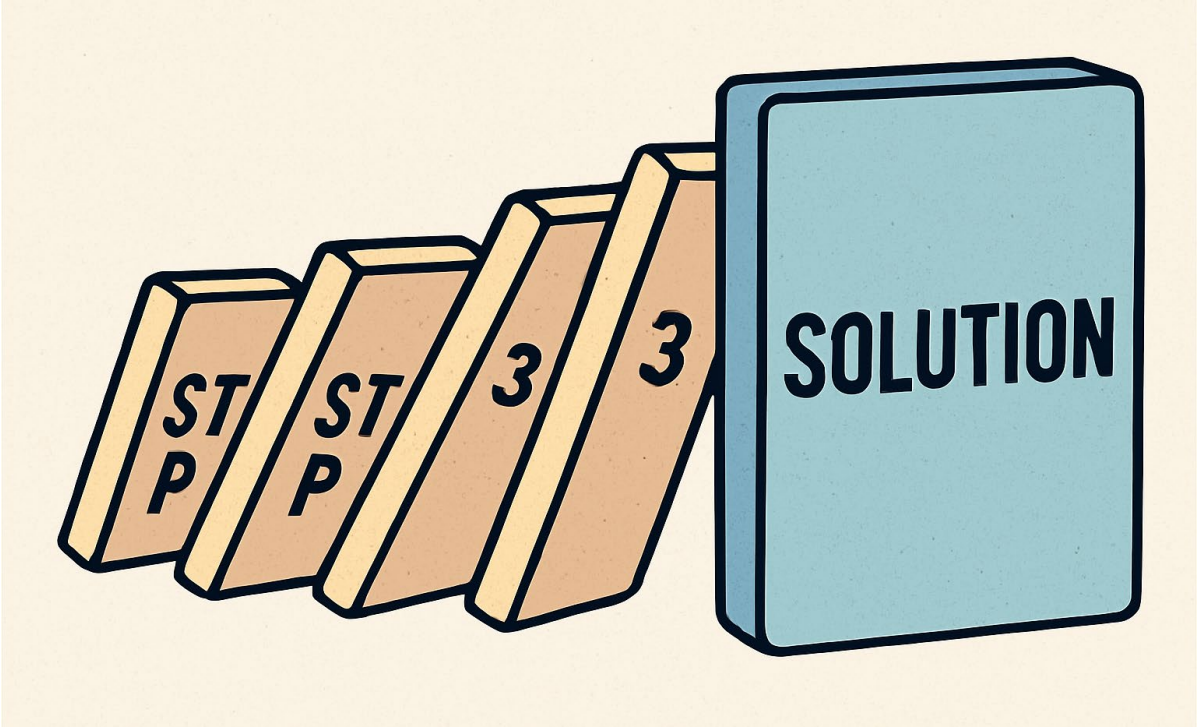
Few-Shot Prompts

Few-shot prompting shows the LLM one or two worked examples before asking it to solve a similar task. The examples act as a pattern, guiding the model's format and reasoning.



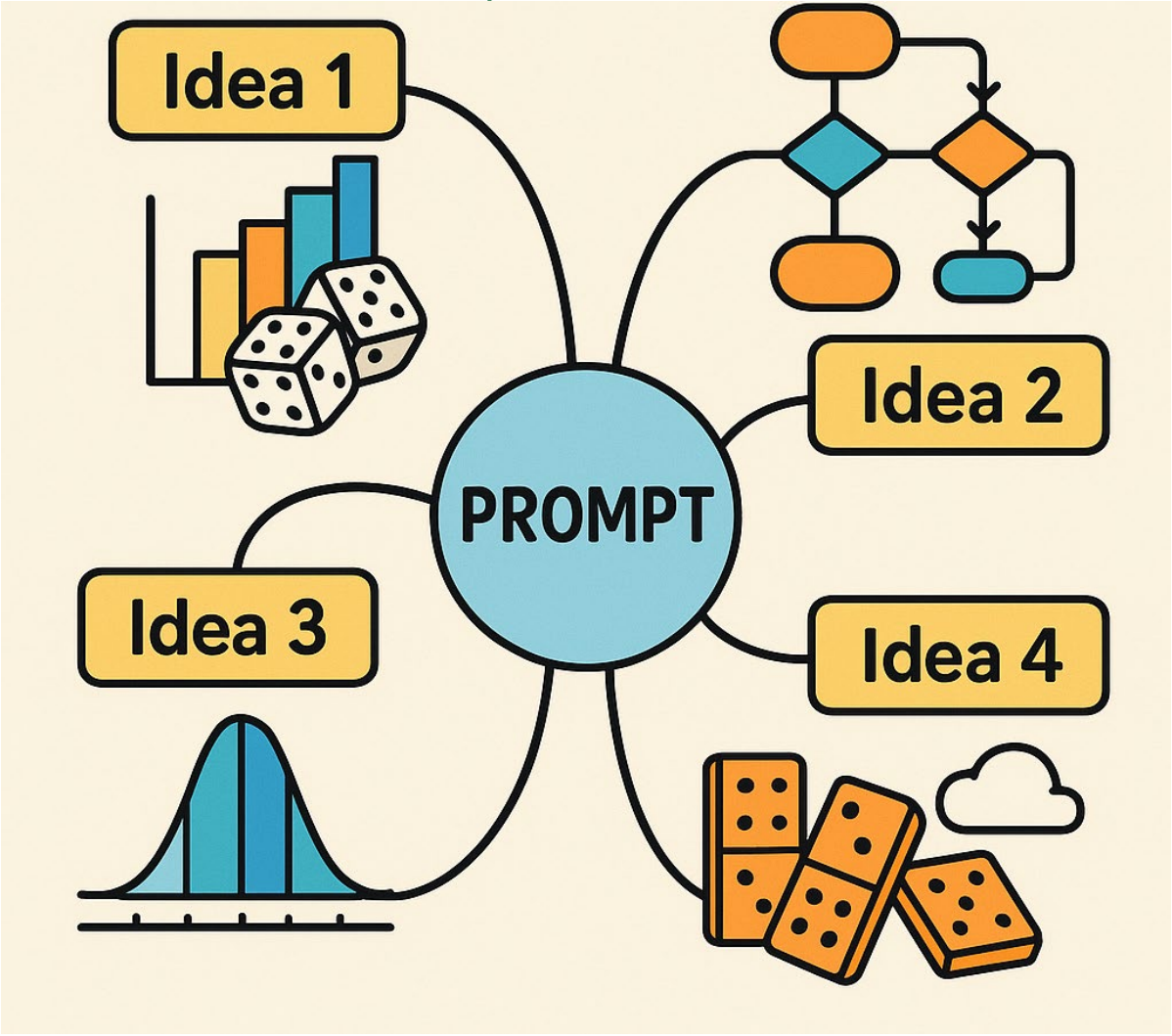
Chain-of-Thought Prompts

Chain-of-thought prompting tells the model to think through a problem step-by-step before answering. Showing its reasoning path often improves accuracy on multi-step or tricky tasks.



Tree-of-Thought for Ideation

Prompt: “You are preparing a slide on actuarial risk modelling. Explore ⩾3 distinct visual concepts, show reasoning paths, then rank the best idea.”
LLM returns branched options →user polls favourite.



Difficult - Conversation Role-Play

Prompt the AI to impersonate:

CEO: skeptical, time-poor.

Regulator: detail-driven, risk-focused.

Customer: confused, cost-sensitive.

Practice explanations, refine tone, and get AI feedback.

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ELI5 Research Explainer

Paper: “Marked Cox Models for IBNR Claims Count …”

Prompt: “Explain the key idea of this research paper like I’m five; use real-world analogies, no equations.”

Astin Bulletin (2025), pp. 1–29
doi:10.1017/asb.2025.10056

International Actuarial Association
Association Actuarielle Internationale

RESEARCH ARTICLE

Marked Cox models for IBNR claims count: continuous and discretized approaches with Dirichlet-driven reporting delays

Hassan Abdelrahman, Andrei L. Badescu, Radu V. Craiu and X. Sheldon Lin

Department of Statistical Sciences, University of Toronto, Toronto, ON M5G 1Z5, Canada
Corresponding author: Hassan Abdelrahman; Email: hassan.abdelrahman@mail.utoronto.ca

Received: 16 September 2024; **Revised:** 29 May 2025; **Accepted:** 2 June 2025

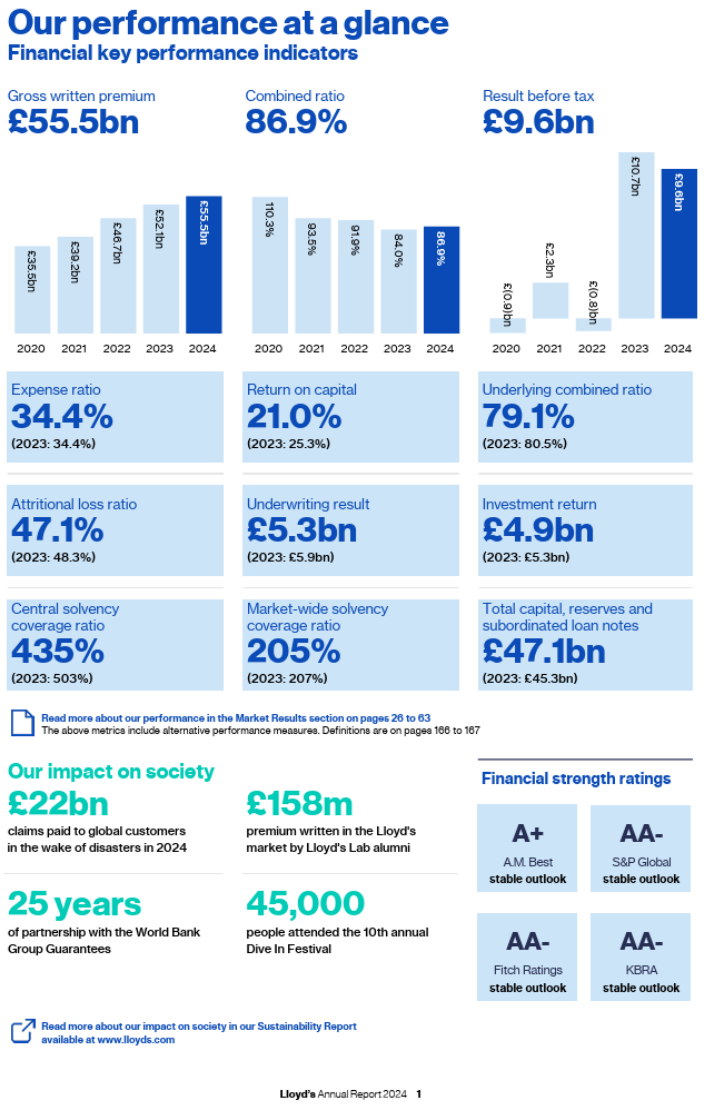
Keywords: Dirichlet distribution; EM algorithm; hidden Markov model; IBNR reserving; marked Cox model

Abstract

We propose a novel micro-level Cox model for incurred but not reported (IBNR) claims count based on hidden Markov models. Initially formulated as a continuous-time model, it addresses the complexity of incorporating temporal dependencies and policyholder risk attributes. However, the continuous-time model faces significant challenges in maximizing the likelihood and fitting right-truncated reporting delays. To overcome these issues, we introduce two discrete-time versions: one incorporating unsystematic randomness in reporting delays through a

Communicating Results

Present findings using the What, SoWhat, Now What framework, then craft actions as SMART goals: specific, measurable, achievable, relevant, time-bound, so stakeholders receive clear context and concrete next steps.



Our performance at a glance

Financial key performance indicators

Gross written premium
£55.5bn

Combined ratio
86.9%

Result before tax
£9.6bn

Expense ratio
34.4%
(2023: 34.4%)

Return on capital
21.0%
(2023: 25.3%)

Underlying combined ratio
79.1%
(2023: 80.5%)

Attritional loss ratio
47.1%
(2023: 48.3%)

Underwriting result
£5.3bn
(2023: £5.9bn)

Investment return
£4.9bn
(2023: £5.3bn)

Central solvency coverage ratio
435%
(2023: 503%)

Market-wide solvency coverage ratio
205%
(2023: 207%)

Total capital, reserves and subordinated loan notes
£47.1bn
(2023: £45.3bn)

Read more about our performance in the Market Results section on pages 26 to 63
The above metrics include alternative performance measures. Definitions are on pages 166 to 167

Our impact on society

£22bn
claims paid to global customers in the wake of disasters in 2024

£158m
premium written in the Lloyd's market by Lloyd's Lab alumni

25 years
of partnership with the World Bank Group Guarantees

45,000
people attended the 10th annual Dive In Festival

Financial strength ratings

A+ A.M. Best **stable outlook**
AA- S&P Global **stable outlook**
AA- Fitch Ratings **stable outlook**
AA- KBRA **stable outlook**

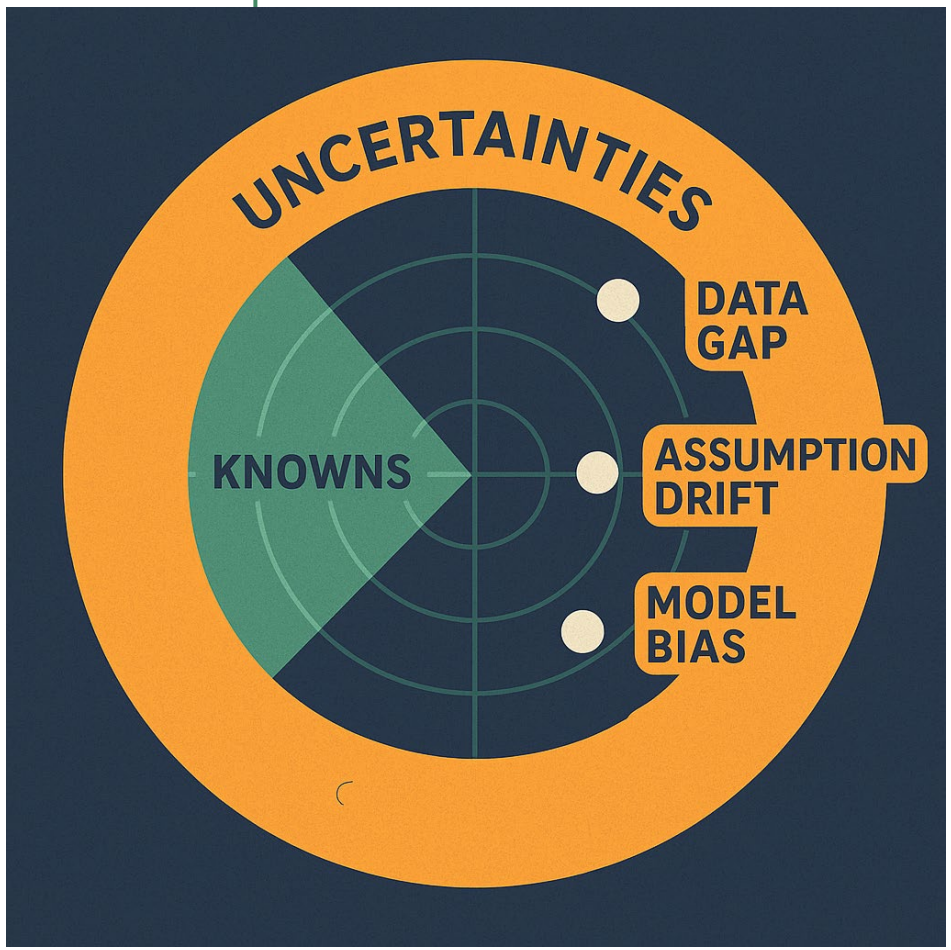
Read more about our impact on society in our Sustainability Report available at www.lloyds.com

Lloyd's Annual Report 2024 1

Mitigating Errors & Managing Uncertainty

Prompt pattern: “Give answer → self-check assumptions →highlight uncertainty →suggest verification steps.”

Reduces hallucination risk, flags data gaps.



Key Takeaways

- Framework family: RACE / PAR / Role+Task / Output+Style.

Structure

Structured prompts = clarity & control.

Refine

Meta-prompting + self-refine boost quality.

Power

Few-Shot, CoT & ToT unlock reasoning & ideation.

Coaching

LLMs can coach presentations & tough conversations.

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Cheat Sheet!

Actuarial Prompt Engineering Cheat-Sheet (PDF link).

SCAN ME

The AI Actuary Virtual Summit 2025

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Prompt Perfect

A custom GPT that helps you write better prompts.

SCAN ME

Q&A

Thanks for Joining.

Colin will be answering questions in the discussion forum.

Example Prompts

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Meta Prompt

You are recognised as an expert in prompt engineering, with a deep understanding of how to craft effective and engaging prompts for AI models. I would like you to conduct a thorough analysis of the following draft prompt.
In your evaluation, focus on identifying areas where the prompt could be improved in terms of clarity, completeness, and overall effectiveness.
As you review the draft, please provide specific suggestions for enhancements. For each proposed change, explain the rationale behind your recommendations, detailing how these adjustments could lead to better outcomes when the prompt is utilised.
Additionally, if you find that the original prompt lacks sufficient information or context to develop a high-quality revised version, please outline the specific questions or details that are necessary to fill in those gaps. Your insights will be invaluable in refining this prompt for optimal performance.

Slide Quality Prompt

As part of our ongoing efforts to enhance the effectiveness of our presentations, we need a comprehensive evaluation of the attached slide deck. Your task is to assess three key aspects of the presentation: Narrative Flow, Cognitive Load, and Visual Layout.

Narrative Flow (1–5): Evaluate how well the content of the slide deck tells a cohesive and engaging story. Consider how effectively the slides transition from one idea to the next and whether the overall message is clear and compelling.

Cognitive Load (1–5): Assess the complexity of the information presented. Determine whether the slides are overloaded with information or if they strike a good balance, making it easy for the audience to process and retain the key takeaways.

Visual Layout (1–5): Analyse the design elements of the slides, including the use of colours, fonts, images, and overall layout. Consider whether these elements enhance or detract from the clarity and professionalism of the presentation.

After scoring each of these aspects on a scale from 1 to 5, please compile your findings into a Scorecard table for clarity. Additionally, provide actionable suggestions for improvement in each category. Your feedback will be invaluable in refining this presentation to ensure maximum impact and audience engagement.

Here is the scoring rubric for each category (Narrative Flow, Cognitive Load, Visual Layout) to standardise the evaluation of a slide deck.

🔹 **Narrative Flow (1–5)**

Assesses storytelling clarity, logical progression, and message alignment.

Score	**Description**
1	Disjointed, lacks coherence; unclear purpose or message.
2	Some flow exists but ideas jump around; message is muddled.
3	Basic structure present; transitions are functional but could be smoother.
4	Well-organised and generally smooth; storyline is engaging.
5	Exceptionally cohesive; compelling narrative with flawless transitions.

🔹 **Cognitive Load (1–5)**

Measures how easily the audience can understand and retain information.

Score	**Description**
1	Overwhelming amount of text/data; very hard to follow.
2	Dense content with limited visual support; requires significant effort.
3	Adequate balance; some complexity but manageable.
4	Mostly clean and digestible; information well-prioritised.
5	Effortlessly clear; minimal mental effort needed to grasp content.

🔹 **Visual Layout (1–5)**

Evaluates design quality, consistency, and visual appeal.

Score	**Description**
1	Chaotic or outdated; poor use of visuals, fonts, or spacing.
2	Some structure but inconsistencies disrupt readability.
3	Acceptable design; minor alignment or aesthetic issues.
4	Visually appealing; well-structured with good use of design elements.
5	Polished, modern, and highly professional; enhances comprehension.

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Few-Shot Prompt

You are a senior claims triage actuary with extensive experience in assessing and classifying insurance claims based on their severity. Your task is to analyse each claim narrative provided and classify the claim into one of three categories: Minor, Moderate, or Severe loss.
For each claim, please provide the following:
* Severity Tag: Clearly indicate the classification of the claim as either Minor, Moderate, or Severe.
* One-Sentence Rationale: Provide a brief explanation for your classification, highlighting the key factors that influenced your decision.
* Estimated Loss Range (USD): Offer an estimation of the potential financial loss associated with the claim, presented in a range of US dollars.

EXAMPLES
1) Narrative: "Small kitchen fire extinguished quickly; minor smoke damage.“
* Severity: Minor
* Reason: limited to one room, no structural damage
* Est. Loss: $1k–$5k

2) Narrative: "Burst pipe on 3rd floor flooded two apartments, affecting drywall and flooring.“
* Severity: Moderate
* Reason: multi-unit water damage requiring remediation
* Est. Loss: $15k–$40k

TASK
Now, please classify the following claim narrative:
Narrative: "{{NEW_CLAIM_TEXT}}“

Ensure that your analysis is consistent, data-informed, and justifiable. Prioritise clarity and conciseness in your rationale.

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Chain of Thought Prompt

As a reserving actuary tasked with estimating the Incurred But Not Reported (IBNR) losses for the Accident Year 2024, you will employ the Bornhuetter-Ferguson method, which combines both the reported losses to date and the expected ultimate loss ratio to arrive at an estimate of the ultimate losses.

Objective: Calculate the IBNR for Accident Year 2024 using the Bornhuetter-Ferguson method, and present your findings in a clear, step-by-step format.
Data Provided:
* Reported Loss to Date: $12,500,000
* Expected Ultimate Loss Ratio: 72%
* Earned Premium: $25,000,000
* Selected Percent Reported to Date: 40%

Instructions:
1) Think through the estimation process step-by-step. Explain your reasoning conversationally as you go.
2) After completing your reasoning, provide the final IBNR rounded to the nearest $100,000.
3) Conclude with a concise, one-sentence interpretation suitable for management—highlighting the financial implication of the IBNR estimate.

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I am preparing a presentation geared toward actuaries and would like to enhance my visual aids to engage my audience effectively. Specifically, I am looking for five creative image concepts that can be used for a slide highlighting the challenges some seasoned actuaries may face in adapting to new technologies, particularly regarding their understanding of artificial intelligence and how to interact with it effectively.

The central theme revolves around a humorous portrayal of an outdated, “boomer” actuarial dinosaur who struggles with the nuances of prompting AI. The images should evoke a sense of nostalgia, while also subtly emphasising the need for modernisation and adaptation in the actuarial field. Ideally, these visuals should be engaging and relatable to the audience, fostering a light-hearted discussion about the importance of embracing new technologies in our profession.

Please provide ideas that are visually striking, relevant, and capable of sparking conversation among actuaries about bridging the gap between traditional practices and modern technological advancements.

Tree of Thought for Ideation

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Practising Difficult Conversations

Imagine you are an Occupational Health and Safety (OH&S) Manager at a manufacturing factory, a role you have held for the past 18 months. You were hired following a particularly troubling period for the factory, during which it recorded its worst safety performance in history. Since your arrival, you have implemented a range of new safety protocols and training programs that have successfully reduced the number of workplace accidents by 20%. As a result of these improvements, the factory has also seen a significant 5% decrease in total workers' compensation claim costs over the past year.

Today, you are preparing for an important meeting with the user, the workers' compensation pricing actuary for ABC Insurance. The main agenda for this meeting is to discuss a proposed 10% increase in your insurance premium for the upcoming year. This increase incorporates credibility weighting of the factory's three-year claims history and broader industry trends.

As the OH&S Manager, you firmly believe that the factory should not be facing a premium increase, but rather a reduction, given the substantial improvements you have made in safety practices and the consequent decrease in accident rates. You feel strongly that the insurer is not adequately recognising the positive impact of your initiatives and the factory's commitment to enhancing workplace safety.

In this meeting, your goal is to articulate your case compellingly, demonstrating how the factory's improved safety record should be rewarded rather than penalised. You intend to present data and examples from your tenure, highlighting the changes you've made and their positive outcomes, while also addressing the actuarial perspective on claims history and industry standards.

TASK: Roleplay the OH&S Manager during this meeting. Speak directly to the user (the actuary), pushing back on the 10% proposed premium increase and advocating for a fairer, data-informed adjustment. Be persuasive, professional, and firm in your position.

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ELI5 Research Explainer

Please provide a clear and comprehensive summary of the main concepts presented in the attached research paper, tailored to my background as an actuary with a university degree. I would appreciate an explanation that uses relatable real-world analogies to illustrate the key ideas, while avoiding any complex equations or technical jargon. This will help me grasp the fundamental insights of the research and understand how they might apply to my work in the field of actuarial science.

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Communicating Results

Please conduct a thorough analysis of the numerical data presented in the attached annual report from Lloyds. Utilise the "What, So What, Now What" framework to structure your findings effectively:

1) What – Identify and summarise the key figures, trends, and performance indicators from the report. Highlight significant movements in metrics such as underwriting profit, investment returns, combined ratios, reserve changes, and capital adequacy.

2) So What – Interpret what these numbers mean for Lloyds. Assess performance vs. previous years and industry benchmarks. Explain implications for profitability, competitiveness, strategic positioning, and risk exposure.

3) Now What – Translate the insights into a set of SMART goals:

* Specific: Define targeted actions or improvements.
* Measurable: Include KPIs or quantifiable indicators of progress.
* Achievable: Base actions on current capacity and context.
* Relevant: Align recommendations with Lloyds' strategic priorities.
* Time-bound: Specify when each action should be completed or reviewed.

Your analysis should provide stakeholders with both contextual clarity and a roadmap of concrete next steps informed by the financials. Present your findings in a structured, executive-friendly format that balances clarity, insight, and practicality.

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Mitigating Errors & Managing Uncertainty

[ROLE]
You are an experienced UK Defined Benefit (DB) pension actuary, commissioned to perform an independent peer review of a scheme's actuarial valuation.

[CONTEXT]
You are reviewing the funding position of the scheme as at 31 March 2025. The relevant details are:
* Technical Provisions liabilities (at 31 Mar 2023): £820 million
* Market value of assets (31 Mar 2025): £780 million
Proposed valuation assumptions:
* Discount rate: Gilt curve + 1.00% (spot-rate term structure)
* RPI–CPI wedge: 0.9% p.a.
* Pension increases: min(5%, max(0%, CPI))
* Mortality: S3PA base table; 95% males, 98% females;
* CMI 2023 with 1.25% long-term improvement

[OBJECTIVE]
Your peer review should include:
1) Recalculation of the Technical Provisions liability at 31 Mar 2025 using the proposed assumptions.
2) Calculation of funding level (assets ÷ liabilities) and determination of deficit or surplus.
3) Stress testing of the liability with a 90% confidence interval, based on:
* ±50bps parallel shift in discount rate
* ±5% scaling shock to the mortality base table

[REVIEW STRUCTURE & UNCERTAINTY HANDLING]
* Explain your reasoning step-by-step, including roll-forward approach, discounting methodology, and treatment of inflation-linked benefits. Use a clear, chain-of-thought format to show how each assumption impacts the calculation.
* After completing the analysis, include a Self-Audit section covering:
• At least 3 potential error sources (e.g. benefit data lag, inflation modelling, longevity calibration)
• Any step with <85% confidence, and why
• Suggested validation checks, such as:
– Comparison to a discount rate of gilts + 0.75%
– Sensitivity to alternative longevity projections
– High-level reconciliation to previous valuation
* End with an Overall Confidence Rating: High / Medium / Low
* Provide clear recommendations to trustees for potential refinements, adjustments, or further review.