

# SURFACING SUPERVISORY SIGNALS FROM QUARTERLY BANK DISCLOSURES

JALCO Insights  
Final Presentation

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# AGENDA

1. Introduction
2. Project goals
3. Strategic approach
4. Development & iteration process
5. Final pipeline architecture
6. Results achieved
7. Model performance
8. Technical walkthrough
9. Summary
10. Time for questions



# INTRODUCTION

The Prudential Regulation Authority (PRA) faces a challenge: how to extract early warning signals from unstructured quarterly earnings transcripts. These disclosures contain rich qualitative data, but manual review is slow and inconsistent.

Our project builds a reproducible GenAI/NLP pipeline that transforms raw transcripts into actionable supervisory insights.

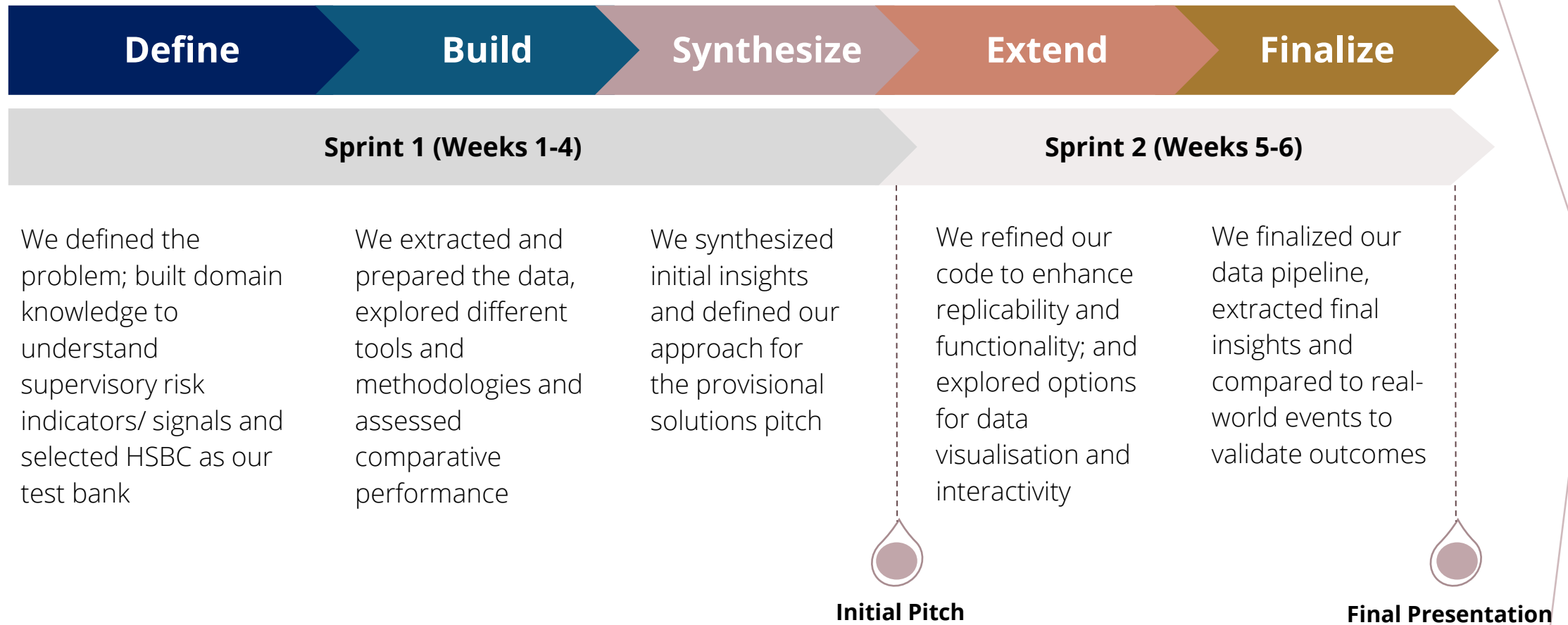
Our ambition was to surface indicators such as liquidity concerns, governance tone, and strategic confidence: enabling earlier, more consistent risk detection.

# PROJECT GOALS

Develop an elegant data analysis solution that extracts supervisory-relevant insights from quarterly earnings disclosures, enables earlier risk detection and packages insights into accessible formats that support supervisory workflows. Specifically:

- See whether GenAI/NLP can extract supervisory-relevant signals from earnings transcripts
- Explore meaningful 'warning signals' like shifts in tone and sentiment
- Compare model performance and match retrospective analysis to real-world events to validate their accuracy
- Build a replicable approach that can be scaled to surface risk signals across institutions and timeframes
- Build an end-user interface to make insights accessible and actionable

# STRATEGIC APPROACH



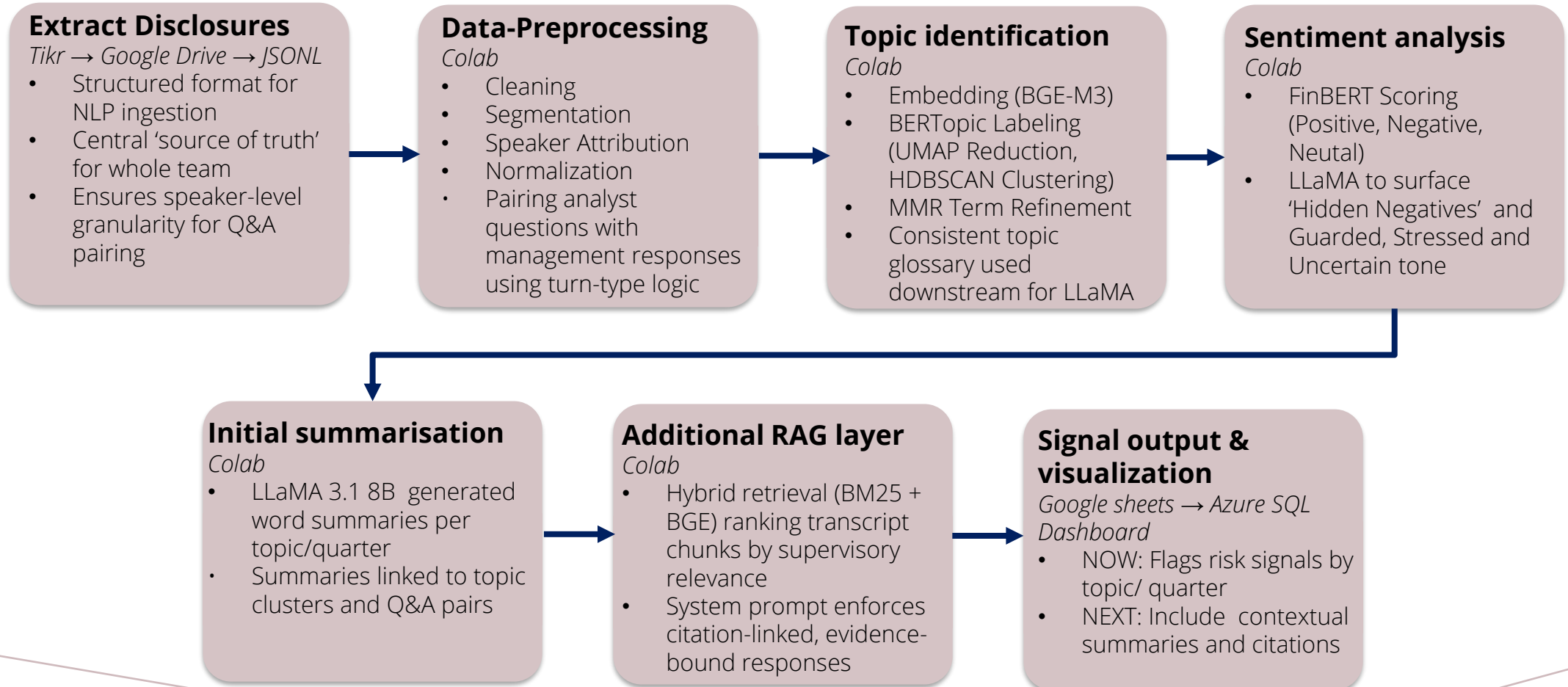
# DEVELOPMENT & ITERATION PROCESS

We designed our data solution through iterative experimentation and optimization. The goal was to achieve a high degree of statistical and 'real world' validity, while keeping resourcefulness and replicability front of mind.

Task	Tools/ approaches tested	Final models selected	Rationale
Data pre-processing	Web scrapping with Selenium and BeautifulSoup4, Earning call transcripts from Data Base, Fin-ROBERTA, phi 4 mini instruct, pandas, regex, scikit learn	Pandas/regex: Splitting text blocks + speaker attribution + role/firm/position enrichment, + RAG chunking. BM25Okapi + SentenceTransformer embeddings via BAAI/bge-large-en-v1.5, FAISS IndexFlatIP: RAG hybrid retrieval. phi-4-mini-instruct (analyst) and phi-4 14B (supervisor): RAG enrichment	High recall and precision on finance transcripts, fewer hallucinations, and controlled latency/cost with deployable components.
Topic discovery	Transformer embeddings (intfloat/e5-large-v2, BAAI/bge-base-en-v1.5, BAAI/bge-m3, MiniLM); BERTopic with UMAP (n_neighbors = 30, n_components = 8, min_dist = 0.0, cosine) and HDBSCAN (min_cluster_size = 15, min_samples = 1, euclidean, leaf); PRA canonicalization; seed topic lists; outlier reassignment ( $\tau = 0.25$ ); optional topic merging (similarity 0.85); KeyBERTInspired for labeling;	BERTopic, with FinBERT and LLaMA 3.1 for topic optimisation and labeling  [BEST] embed=e5-large-v2 sent=finbert-tone seeded=False   topics=51 noise=38.6% cohesion=0.846 entropy=5.51	Benchmarked against a manually verified dataset, baseline model reached 74.84% recall, FinBERT reached 94.4% while LLaMA 3.1 achieved 100%  Produced coherent, domain-anchored topics. PRA canonicalization and seed lists stabilized clustering. Model selection based on cohesion, topic-size entropy, noise rate, and runtime
Sentiment analysis	Sentiment Analysis   FinBERT (yiyanghkust/finbert-tone, ProsusAI/finbert) for positive/negative/neutral classification	FinBERT (pos/neg/neu) + LLaMA 3.1 refinement to capture "hidden negatives"  [BEST] embed=e5-large-v2 sent=finbert-tone seeded=False   topics=51 noise=38.6% cohesion=0.846 entropy=5.51	FinBERT provides accurate, finance-specific sentiment.
Summarisation & retrieval	Meta LLaMA 3.1 8B Instruct via Unsloth (4-bit/BF16), deterministic inference, risk taxonomy-guided prompts, JSON-constrained outputs.	LLaMA 3.1 8B with JSON-constrained prompts, RAG: phi-4 14B	LLaMA 3.1 (8B), is more sensitive to "hidden negatives" improving granularity on Q&A language.  phi-4 14B: Good performance-to-latency ratio



# FINAL PIPELINE ARCHITECTURE

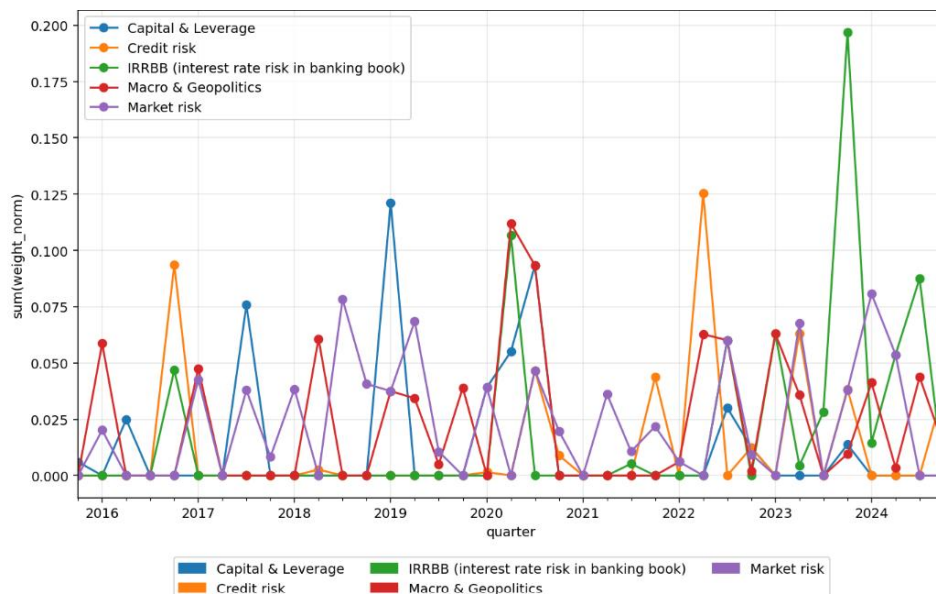




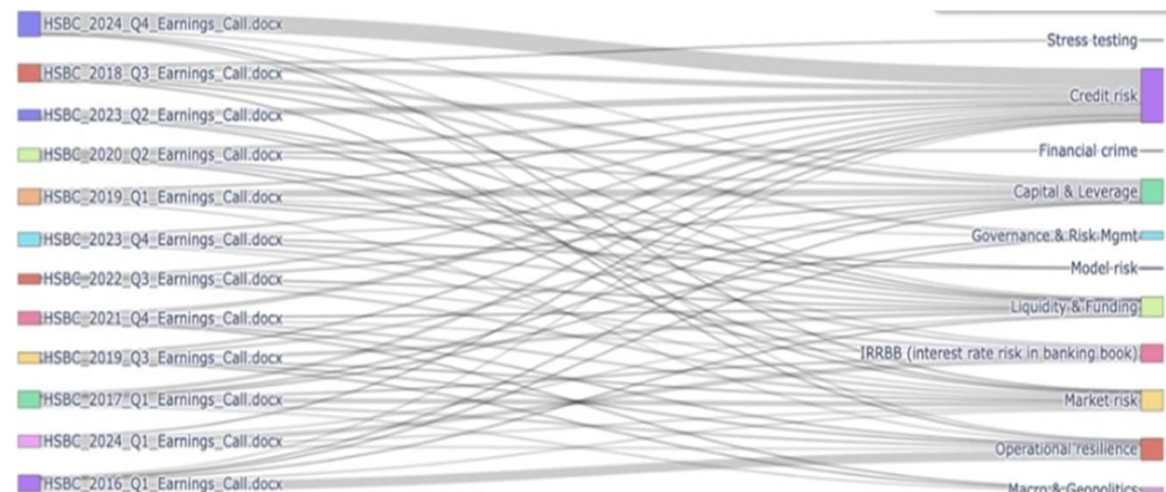
# RESULTS (I) - BIGGEST RISKS OVER TIME

Our model successfully determined the top 5 risk areas over a ten-year period, with Capital & Leverage, Credit Risk, IRRBB, Macro & Geopolitics, and Market Risk each showing sharp quarter-on-quarter volatility. Credit Risk was the risk area flagged across the highest number of quarters, followed by Capital & Leverage.

**Risk weight over time (top 5 areas)**



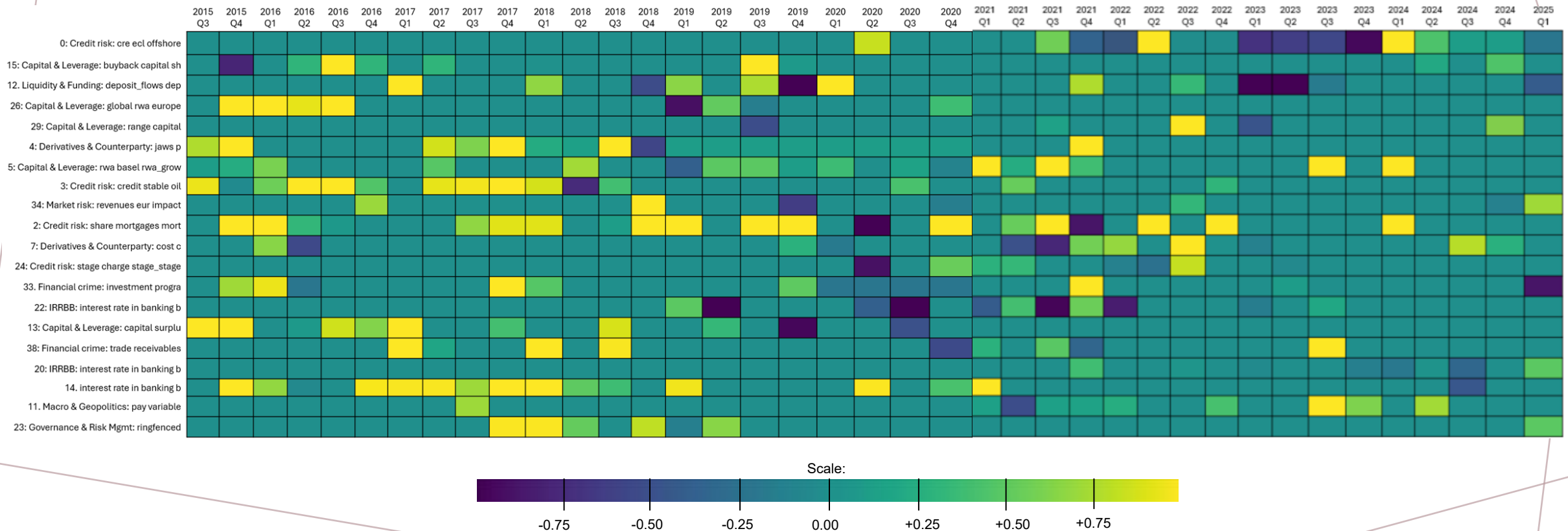
**Footprint by quarter (all areas)**



# RESULTS (II) - HEAT MAPPING BY QUARTER

Dark blues and purples indicate topics with most negative sentiment. Topics flagged in the past 2-3 years covered areas like Credit Risk (Q1-Q4 2023 & Q1 2024), Liquidity & Funding (Q1 & Q2 2023) and Financial Crime (Q1 2025).

Mean sentiment by quarter (top 20 topics)



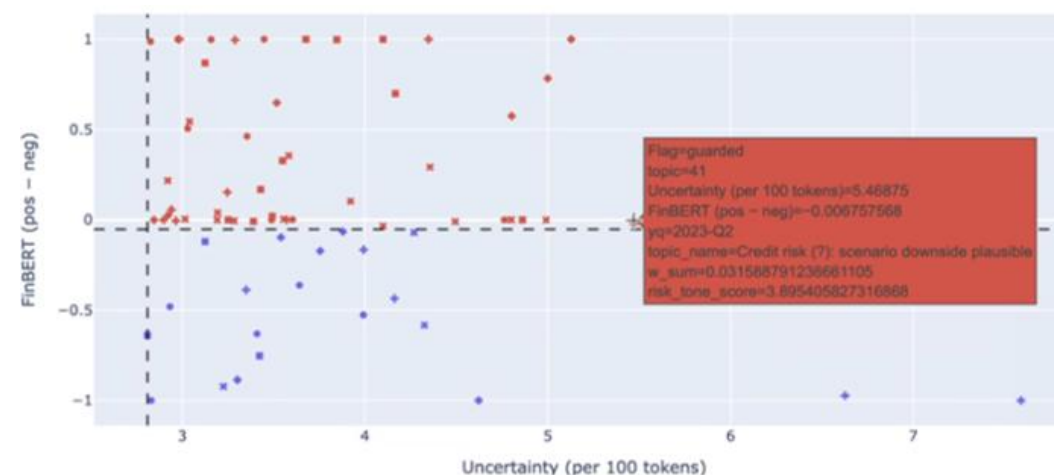
# RESULTS (III) - SURFACING 'HIDDEN' SIGNALS

Beyond negative sentiment, the model also flagged instances of executive stress, guardedness or uncertainty. In the past 2-3 years, Liquidity & Funding, Credit Risk and IRRBB stood out again as noteworthy topics for HSBC.

## Stress & Guardedness - High-priority risks flagged

Area	Quarter	Topic	Tone	Confidence	Score	Explanation
Liquidity & Funding	2023 – Q1	Liquidity & funding: dep	Guarded	0.25	1.65	Term deposit growth may decide liquidity
Credit risk	2023 – Q2	Liquidity & Funding: dep	Guarded	0.25	1.38	Subdued loan growth may impact credit portfolio
Credit risk	2023 – Q2	Credit risk: cre ecl offsho	Guarded	0.35	1.42	Economic uncertainty impacts ECL
Credit risk	2023 – Q2	Credit risk: scenario	Guarded	0.45	1.31	Potential loan impairment
Liquidity & Funding	2023 – Q2	Liquidity & Funding: dep	Guarded	0.35	1.41	Deposit costs and migration uncertainty impact funding conditions
Liquidity & Funding	2023 – Q3	Liquidity & Funding: dep	Guarded	0.35	1.34	Pressure on deposits may impact liquidity
Liquidity & Funding	2024 – Q3	IRRBB (interest rate ris	Stress	0.35	1.40	Argentine-related uncertainty impacts NII

## Instances of negative sentiment AND uncertainty signals



# RESULTS (IV) - SUMMARIES ON DEMAND

Our RAG-powered chatbot helped drill into flagged topics to understand what was discussed and in which moments.

## Example chatbot output

**You:** What issues did HSBC disclose in 2023 regarding credit risk and liquidity and funding? Specifically look for executives responses.

**Assistant:**

- **Credit Risk and ECL (Expected Credit Losses):**
  - In Q2 2023, HSBC reported a more normalized level of ECL at \$0.9 billion, compared to an unusually low level in Q1 2023 [HSBC\_2023\_Q2\_Earnings\_Call::item23::sub0].
- **Basel III and RWAs (Risk-Weighted Assets):**
  - HSBC noted that based on current draft rules, there would be a minor improvement in RWAs initially, but the output floor could have a material impact starting 5 years into the Basel III timeline [HSBC\_2023\_Q2\_Earnings\_Call::item23::sub0].
  - U.S. draft rules were more severe than expected, impacting U.S. operations with a single-digit RWA uplift [HSBC\_2023\_Q2\_Earnings\_Call::item23::sub0].
- **Liquidity and Funding:**
  - Lending balances increased by 32 billion in Q1 2023, with 25 billion from reclassification of balances related to France and \$7.3 billion from SVB U.K. [HSBC\_2023\_Q1\_Earnings\_Call::item1::sub1].
  - Deposits also increased in Q1 2023 due to similar factors [HSBC\_2023\_Q1\_Earnings\_Call::item1::sub1].
- **Executives' Responses:**
  - Georges Elhedery's tone was neutral to positive, with cautionary notes about Basel III rules and U.S. regulations [HSBC\_2023\_Q2\_Earnings\_Call::item23::sub0].
  - Noel Quinn expressed confidence in HSBC's strategy and growth potential, with a positive tone [HSBC\_2023\_Q1\_Earnings\_Call::item0::sub0].
- **General Financial Performance:**
  - HSBC reported strong revenue growth across all global businesses in

**Citations:**

- Paragraph 24 • Part 1 (Q2 2023) — score=0.689
- Paragraph 31 • Part 1 (Q1 2023) — score=0.651
- Paragraph 1 • Part 4 (Q3 2023) — score=0.644
- Paragraph 2 • Part 2 (Q1 2023) — score=0.640
- Paragraph 1 • Part 5 (Q2 2023) — score=0.635
- Paragraph 2 • Part 2 (Q2 2023) — score=0.616



# MODEL PERFORMANCE V REAL WORLD

Media analysis of flagged topics found them consistent with financial media's commentary at the time, both in terms of material concerns and executive guardedness/ evasiveness. This, alongside statistical benchmarking carried out through our development process, suggested excellent validity for our model.



## Risk category: Credit Risk Flagged as an ongoing issue in 2023

- Q2: *Interactive Investor* highlighted heightened uncertainty and opaque credit exposures, particularly linked to Chinese commercial real estate. Commentary pointed to underlying stress signals not fully addressed in the disclosures.
- Q3: *Shares Magazine* flagged HSBC's \$1.1bn in expected credit losses as a material risk. Executive tone was described as "non-committal" when pressed on provisioning strategy and exposure management.



## Risk category: Liquidity & Funding Flagged in Q1 & Q2 2023

- Q1: *Interactive Investor* noted "muddy headline numbers" due to disposals and restructuring. Analysts flagged \$900M in impairment provisions and warned of underlying fragility, suggesting liquidity buffers and funding costs warranted closer scrutiny.
- Q2: *Financial Times* reported investor unease over deposit outflows and rising wholesale funding costs in the context of tightening global monetary policy. Commentary described HSBC's tone as "measured but evasive" in terms of their liquidity positioning.



## Risk category: Financial Crime Flagged in Q1 2025

- *AlInvest analysts* referenced HSBC's Q1 2025 disclosures and executive tone, highlighting ongoing AML scrutiny and legacy reputational risks. They described HSBC as remaining in a "higher-risk category" despite reforms and flagged the lack of transparency in executive responses as a concern for valuation and supervisory attention.

# HOW WE ACHIEVED IT: OUR TECHNICAL WALKTHROUGH

Google Colab



# IN SUMMARY

By building and tuning a model for one bank, HSBC, we were indeed able to extract useful supervisory-relevant signals from earnings transcripts:

- Identifying early warning signals including increased mentions of risk-related topics, changes in sentiment over time, nuances of speech such as executives 'hedging' information or giving ambiguous data, plus analyst questions that resulted in a negative exchange
- Analysing model performance, including face validity, utility, statistical analysis and matching 'red' signals surfaced to real-world events
- Taking a replicable approach that can be scaled to surface risk signals across multiple institutions and timeframes
- Making insights chatbot and dashboard ready for integration into daily supervisory practice



# TIME FOR QUESTIONS

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# THANK YOU

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