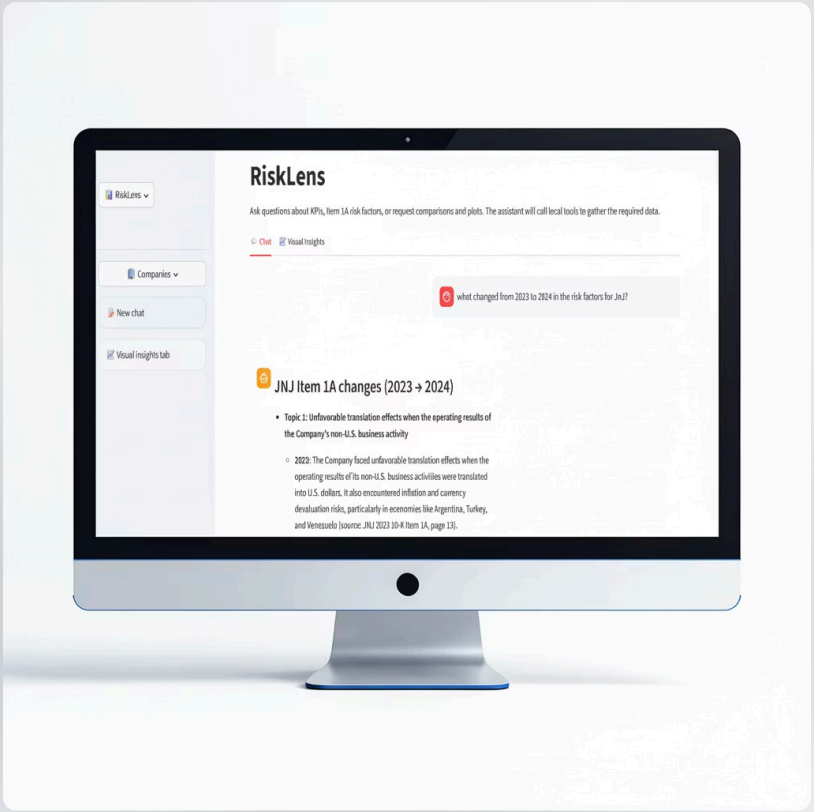


RiskLens: AI Assistant for Risk Analysis

Transforming 10-K disclosure review through retrieval-based AI

Business Analytics Practicum
George Washington University, School of Business

Team: Asma Tariq, Daniel Pinzon, Hsien-Chun Chen, Malak Al Mamary, and Surya Mukund

Business Problem: Manual 10-K Analysis is Slow, Inconsistent, and Costly

The reality for analyst:

- 10-K filings exceed **150 pages**, packed with regulatory and operational detail.
- Analysts usually spend hours per day reviewing filings for analysis.
- Subtle wording changes can materially shift risk exposure.
- KPI tie-outs require manual cross-referencing with financial tables.
- Manual review delays risk identification and financial insight.

Problem Validation

An investment analyst working at Citi shared:

"I reviewed 10-Ks **every day** - sometimes for minutes, sometimes for up to 2 hours."

"Tools like FactSet **generalize too much**; you still have to dig through the filing."

"Analysts make **$125K-$200K**, so the time saved directly impact cost."

Solution: RiskLens - A Purpose-Built AI Assistant for 10-K Disclosure Review

Core Capabilities

- **Risk Extraction:** Identifies and summarizes Item 1A risk factors.
- **YOY Change Detection:** Flags new or modified risks.
- **KPIs:** Computes metrics directly from SEC* XBRL* data.
- **Audit-Ready Citations:** Links every insight to verified sources.
- **Dashboard:** Visualizes risks and KPI trends instantly.

Designed for:

- Risk analysts
- Investment analysts
- Financial review teams

*KPI: Key Performance Indicators, *XBRL: eXtensible Business Reporting Language, *SEC: Securities and Exchange Commission

Why General AI Fails for 10-Ks and Why RiskLens Works?

General LLMs aren't built for 10-K review

Limitations of ChatGPT / General AI

- No document-bound retrieval.
- Cannot reliably cite or verify.
- Hallucinations risk.
- Misses company-specific nuances.
- Cannot link narrative → KPIs.

Why RAG Solves This

- Pulls from exact filing text + XBRL.
- Guarantees traceable, audit-ready answers.
- Detects subtle company-specific changes.
- Enables consistent comparison across years.
- Scalable ingestion of new filings.

Why General AI Fails for 10-Ks and Why RiskLens Works?

Example Query: "What new risks did Pfizer add in its 10-K filing in 2024"?

ChatGPT (General LLM)

🔎 **Key new/heightened risks in 2024 10-K**

- **Climate-related risks** — Pfizer explicitly calls out both "transitional" and "physical" risks related to climate change. Transitional risks include possible increased energy costs, regulatory changes (carbon pricing, emissions restrictions), shifts in customer preferences, and pressure to decarbonize. Physical risks include supply-chain disruptions and damage to manufacturing infrastructure from climate-linked extreme weather events. content.edgar-onl...
- **Supply-chain disruption** — As part of the climate-risk disclosure, Pfizer notes that events such as natural disasters (e.g., a tornado at a facility in Rocky Mount, NC) could materially affect its supply of medicines. content.edgar-onl... +1
- **Global economic and geopolitical risk intensification** — The 2024 10-K expands discussion of risks from macroeconomic instability: currency and interest rate fluctuations; inflation; recession; capital-market volatility; trade restrictions; and political or civil unrest. They highlight that ongoing global conflicts (e.g., in Ukraine and the Middle East) and geopolitical instability can adversely affect Pfizer's global operations. Fintel +1

RiskLens (RAG + SEC Grounded)

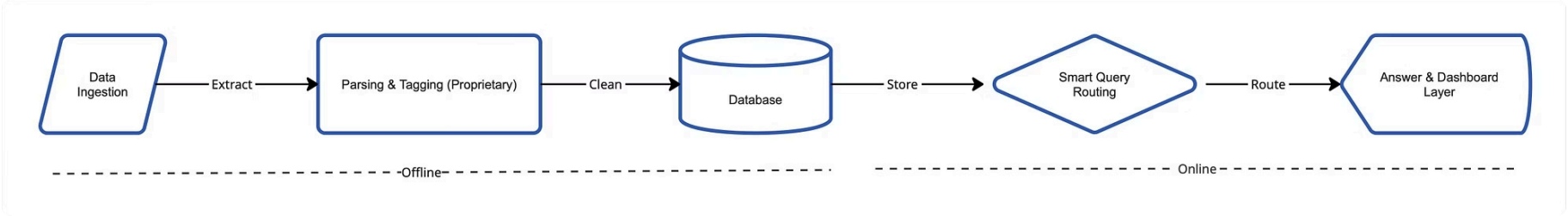
1. Business Development Risks

- **2023**: The success of business development transactions, including acquisitions, depended on realizing anticipated benefits, which were subject to numerous risks and uncertainties, including unsuccessful clinical trials and regulatory hurdles (PFE 2023 10-K Item 1A, pages 22).
- **2024**: Similar concerns were reiterated, with an added emphasis that rising indebtedness or interest rates could further increase these risks (PFE 2024 10-K Item 1A, pages 21).

KPIs Comparison

- **Revenue**:
  - **2023**: $59,553 million
  - **2024**: $63,627 million
- **Operating Income**:
  - **2023**: $1,280 million
  - **2024**: $12,411 million

How RiskLens Works: High-Level Architecture



Data Ingestion

- 10-K filings (text + XBRL).
- Extract risk narratives.
- Extract financial tables.

Parsing and Tagging

- Clean + chunk Item 1A text.
- Compute KPIs from XBRL.
- Align years.

Database

- Unstructured: Item 1A risk text chunks with page markers
- Structured: KPI tables in SQL
- Embeddings: Bright between queries and item 1A text.

Smart Query Routing

- Detects intent (risk / KPI / hybrid).
- Routes to risk or KPI engines.

Answer and Dashboard

- Cited 10-K outputs.
- YOY risk summaries.
- KPI charts & insights.

Demo: RiskLens in Action

Implementation: Piloted in the Pharmaceutical Sector

Validated RiskLens using 10-K filings from four leading pharmaceutical companies to test data accuracy, retrieval precision, and KPI consistency.

Data Sources

- SEC 10-K filings (Item 1A Risk Factors).
- XBRL financial data.
- 2021-2024 fiscal years.

Why Pharma?

- Dense regulatory, clinical, supply-chain risks.
- Rich text + consistent XBRL tags → ideal for testing.
- High-stakes industry where disclosures drive valuation.
- Consistent risk themes → reliable YOY comparisons.
- Validated KPI set (Revenue Growth, Operating Margin, FCF Margin, ROIC, Net Debt/EBITDA).

Validation Results: How We Tested RiskLens

- Risk extraction
- YOY change detection
- KPI consistency from XBRL

Results Across 16 Test Cases

Company	Queries	Exact Matches	Partial	Accuracy
Pfizer	4	4	0	100%
J&J	4	4	0	100%
Lilly	4	4	0	100%
BMS	4	3	1	75%

Overall accuracy: **93.75%**

Time: 16 test cases completed in under 5 minutes (each query in a few seconds) - significantly faster than manual multi-hour review.

Pilot Validation: Key Qualitative Learnings

What we learned from 4 pharma companies (PFE, JNJ, LLY, BMS):

10-K structure varies significantly by company

- Section formatting and XBRL consistency differ.
- Parsing must adapt dynamically to each filing's structure.

Risk language changes subtly across years

- YOY phrasing shifts are often nuanced.
- Context-aware comparison outperforms keyword-only methods.

Linking KPIs to narrative disclosures adds strong review value

- Helps analysts verify if risk narratives align with financial performance.
- Provides a more complete picture of company fundamentals.

Material risk changes were reliably detected

- Modified sections surfaced consistently.

Business Impact: Time & Cost Savings for Analysts

Time Savings

Analyst Workload

- ~2 hours/day spent reviewing 10-Ks.
- ≈ 520 hours/year of manual searching, comparing, and validating disclosures.

With RiskLens

- ~0.5 hours/day.
- ≈ 130 hours/year.

Time Savings

- 390 hours saved per analyst per year.
- 75% reduction in repetitive review time.

Cost Impact

Analyst Compensation

- ~$150,000/year salary (≈ $72/hour).

Productivity Gain

- 390 hours × $72/hr = $28,125 saved per analyst per year.

Business Value

- Time shifted from low-value manual review → high-value modeling, valuation, client work, and risk analysis.

Assumptions and benchmarks based on interview with Analyst

- Analyst reported ~2 hrs/day reviewing 10-K filings.
- RiskLens reduces redundant tasks (searching, comparison, KPI tie-outs).
- Compensation benchmarks from industry averages (~$150K/year).

Current Limitations and Technical Constraints

Current Limitations

- Pharma-only pilot (not yet evaluated across other industries).
- KPI visualizations limited to predefined metrics.
- Prototype relies on SEC public filings (no proprietary/internal data ingestion yet).

Technical Constraints

- 10-K structure & XBRL tag usage vary widely across companies.
- LLM context window & chunking may miss nuance despite RAG.
- Small validation dataset (16 test cases) — needs broader testing.
- Dependent on EDGAR ingestion for up-to-date filings.

Future Enhancements and Roadmap

Near-Term Enhancements

- Custom KPI definition and dynamic KPI dashboards.
- Improved multi-company comparison & narrative benchmarking.
- Expand ingestion logic to other industries with different 10-K structures.
- Semantic chunking over fixed-length chunks to keep retrieval aligned with topic boundaries and boost answer accuracy.

Longer-Term Roadmap

- Enterprise upload of internal/proprietary filings.
- Continuous data feed with automated EDGAR ingestion.
- Scalable RAG framework across multi-industry datasets.

Purpose: To evolve RiskLens from a pilot prototype → enterprise-ready assistant.

Closing

Key Takeaways

- Manual 10-K review is slow, inconsistent, and expensive.
- RiskLens delivers **cited, verifiable, YOY-aware insights** that outperform general LLMs.
- Strong pilot validation across 4 pharma companies.
- Architecture is scalable and designed for enterprise integration.
- Clear roadmap for broader industry expansion and enhanced analyst tooling.

RiskLens shows how domain-specific AI can make financial disclosure analysis faster, more transparent, and more reliable.