



Angel Xie



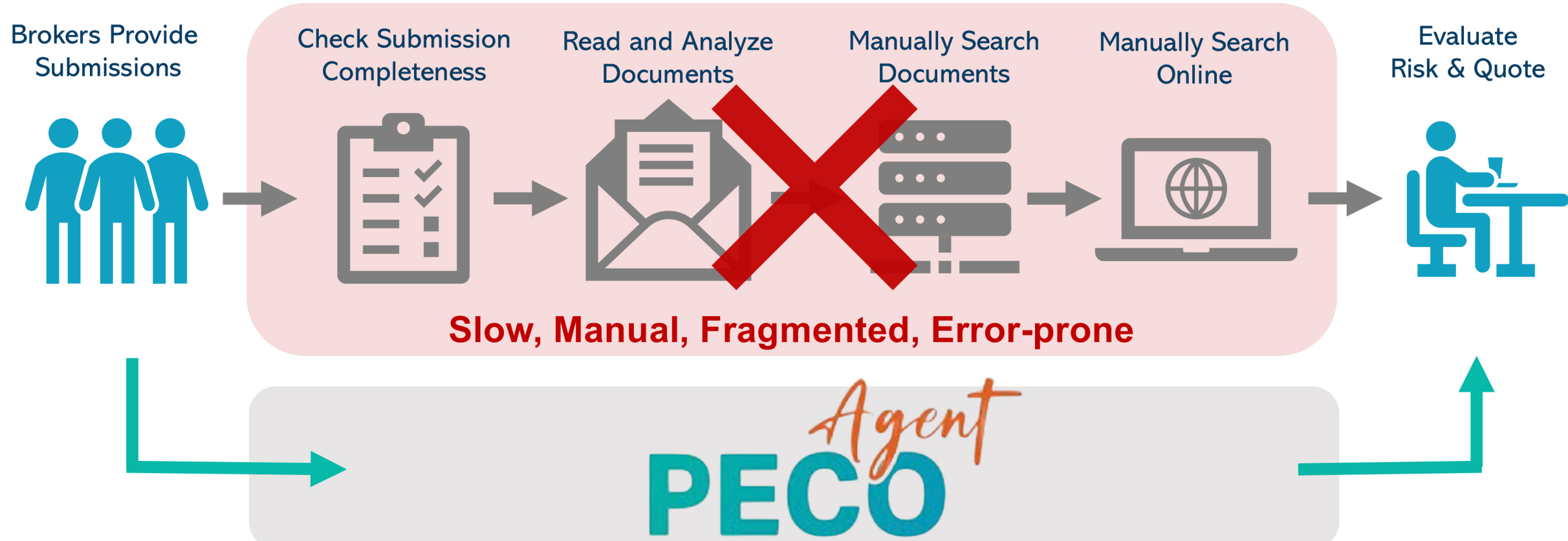
Ethan Zalasin

Agent Peco: Slashing Insurance Underwriting from Days to Minutes

Faculty Advisor: Professor Alexandre Jacquillat
CogniSure Sponsors: Sai Raman, Punitha Geetha



Problem Statement



Our project transforms **manual, slow, and low-trust** insurance underwriting into an **automated, fast, and high-confidence** workflow by deploying a **multi-agent LLM framework** that retrieves, validates, and synthesizes data across SQL databases, source documents, and online endpoints.

Data

*As of July 2025, from internal CogniSure production intake data



110
Snowflake Tables
+500/day
Files Ingested



+5K/day
Document Vectors
Embedded



15-20
Online Sources Queried
per Account

System optimized for scale:
high-volume ingestion across structured, unstructured, and web sources

Architecture & Implementation

Core Modular Agents

SQL Agent

- What:** Transforms broker questions into targeted SQL queries in Snowflake
- How:** Caches schema, decomposes, applies strict SQL rules, merges structured output

Source Doc Agent

- What:** Extracts key insights from unstructured PDFs and submissions in Qdrant
- How:** Decomposes queries, classifies document types, re-scores for relevance, retrieves + cites top vector chunks

Web Agent

- What:** Fills gaps with real-time web data
- How:** Uses targeted domain-specific search via Sonar, parses and cites trusted snippets

Supplementary Agents

Stitcher Agent

- Combines outputs from SQL, document, and web agents into a single, broker-ready narrative using predefined report templates

Report Agent

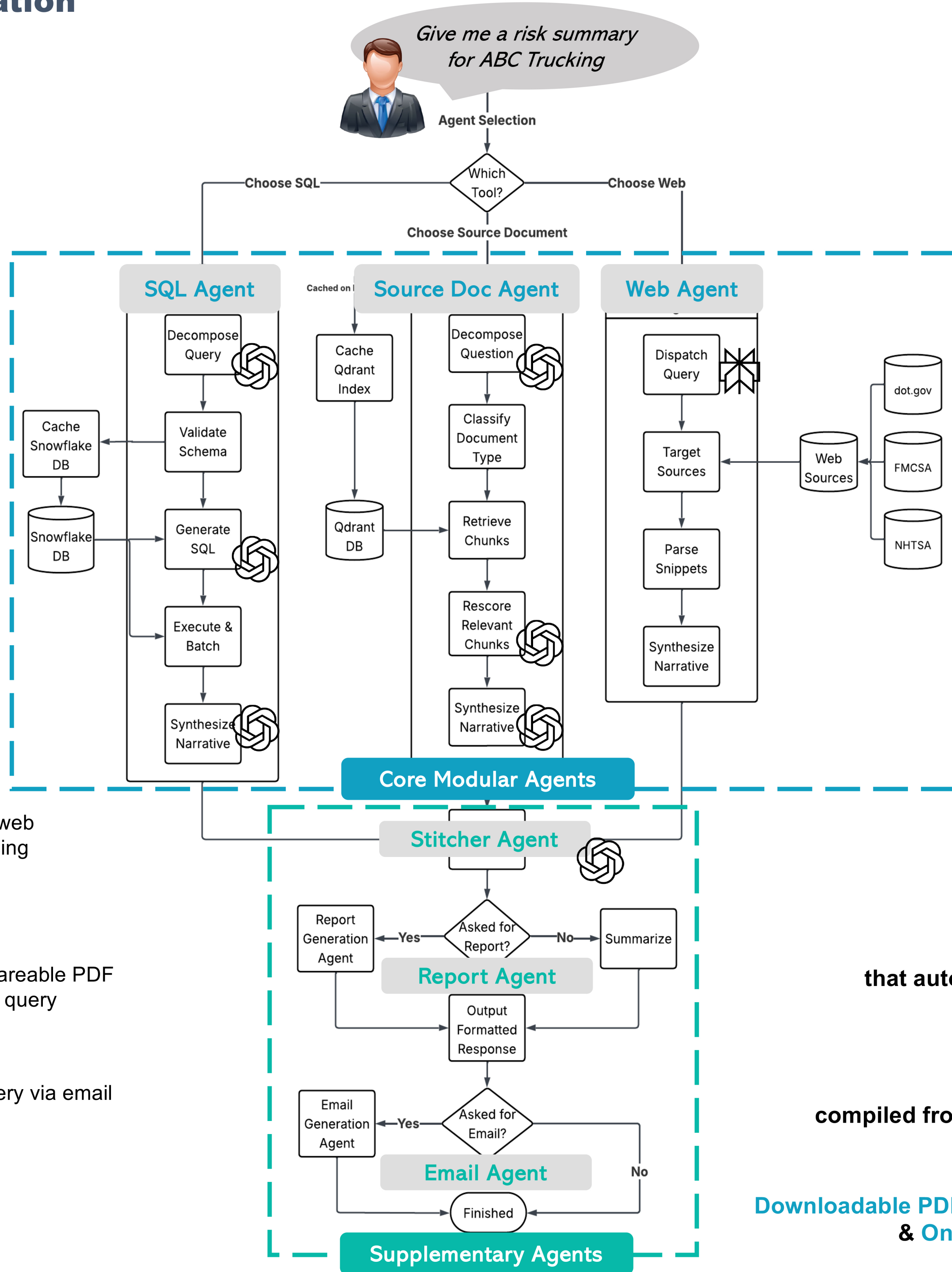
- Formats stitched outputs into professional, shareable PDF reports with dynamic sections tailored to each query

Email Agent

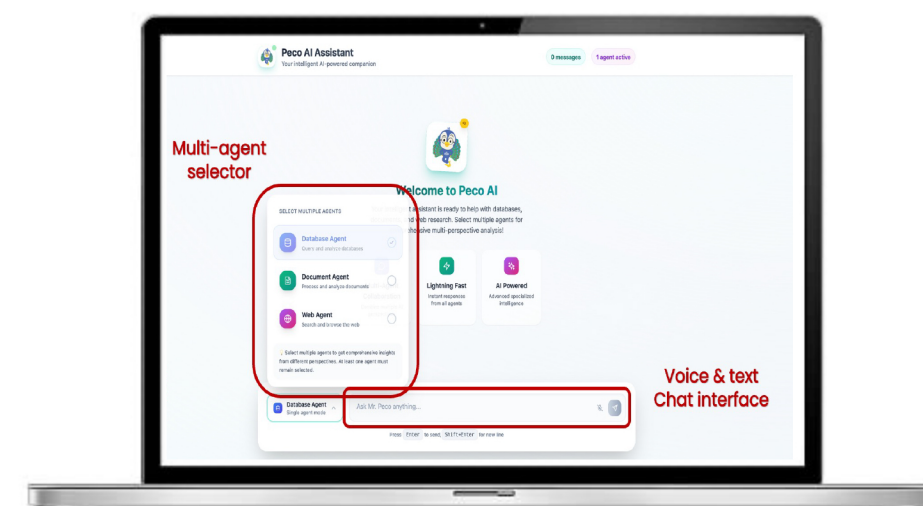
- Automates session-specific direct report delivery via email

Tech Stack

- Frontend:** React
- Backend:** FastAPI + LangChain/LangGraph

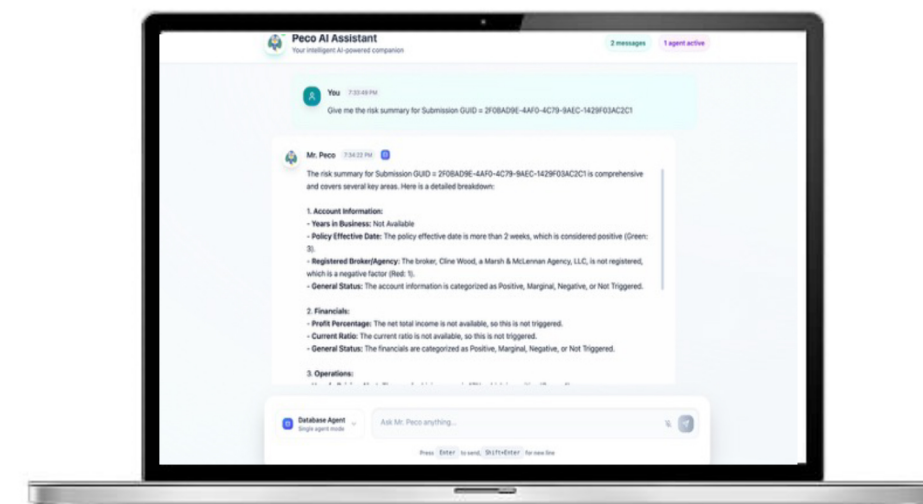


Deliverables



Chat UI Showcase

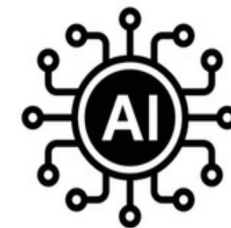
Conversational Interface
– Users can ask free-form questions using natural language or voice



Generated Output Showcase

Structured Summaries
– Peco responds with fully synthesized, citation-backed summaries using multiple data sources

Agentic AI Platform
that automates structured and unstructured retrieval



Stitched Risk Reports
compiled from multimodal sources

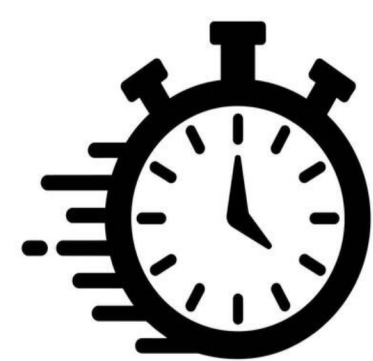


Downloadable PDFs with inline citations
& **One-click Email Dispatch**



Business Impact

Scaling efficiency. Saving costs. Transforming underwriting.



95%
processing time
per submission



96%
cost
per submission



\$7M
annual savings
per 10 providers

1. Speed-to-Quote

2. Underwriter Capacity

3. Bind Ratio

4. Audit Readiness

5. Decision Confidence

6. Client Satisfaction



Peco Demo

