

AAAxAgents: Scalable Hybrid AI Agent for Industry

Benjamin Gigerl¹[0009-0005-4212-1796]

¹ AAAxAgents Limited, 102 Raddens Road, 7692 Ohoka, New Zealand
benjamin.gigerl@aaa-gigerl.com

Abstract. Many organizations still struggle to move AI from isolated pilots into governed, explainable, and repeatable execution. Domain experts know the business questions, but they often lack the tooling and secure workflows needed to turn heterogeneous enterprise data into decisions. AAAxAgents addresses this gap through a scalable hybrid AI agent framework that combines large language models (LLMs), specialized machine learning, and symbolic knowledge such as business rules and domain constraints. Built as a Snowflake-native application, the framework keeps data and execution inside the customer environment while enabling natural-language interaction, automated exploratory data analysis, predictive modeling, explainable outputs, and dashboard generation. From a Design Science Research (DSR) perspective, AAAxAgents is an artifact that bridges research and practice: it operationalizes hybrid AI and agentic orchestration in a form that creates tangible value for industrial users in pharma and automotive settings.

Keywords: Hybrid AI, Agentic AI, Industrial Decision Support.

1 Challenge

Enterprises manage growing volumes of structured and unstructured data, but they still struggle to convert this data into trustworthy, decision-ready insights at business speed. This is particularly relevant in pharma and automotive, where teams must combine transaction data, documents, expert logic, and external knowledge under strict governance. Manual analytics is too slow, while large language models (LLMs) approaches often lack grounding, reproducibility, and auditability. A key gap remains the translation of business questions into executable, production-grade AI workflows, especially for domain experts without deep technical expertise.

2 Solution Approach

AAAxAgents acts like a digital data scientists for domain experts. It combines sub symbolic methods such as LLMs and machine learning (ML) models with symbolic elements such as rules, ontologies, and validation logic in a closed loop from data to action. Users interact through natural language and receive outputs such as exploratory analyses, feature suggestions, predictive models, explainable drivers, and KPI dashboards.

The core novelty lies in modular agentic components for classification, regression, clustering, and EDA that are dynamically selected per use case. A use-case identifier continuously aggregates context, ensuring that model selection, execution, and explanations remain domain-specific and evolve during the workflow. The framework is designed for enterprise use: execution stays inside the customer's Snowflake¹ environment, role-based access is respected, and each relevant step can be traced and verified.

3 Traction

A current pharma sales use case shows the practical value. A sales team uses AAAX-Agents to prioritize opportunities based on order data in Snowflake. The system performs exploratory data analysis (EDA), prepares features, and trains a win-probability model using Tasks & Streams for repeatable execution. It explains key drivers through feature importance, outputs a ranked list of high-probability, high-margin opportunities, and generates a KPI dashboard in the embedded UI. Pilot interviews revealed three key requirements: usability, cost reduction, and improved decision performance. Additionally, results highlight that AI literacy and user empowerment are critical. AAAX-Agents enables faster exploration of innovations and insights within a governed framework while maintaining human-in-the-loop accountability.

4 Architecture

AAAXAgents² follows a modular hybrid-AI architecture built around a governed execution loop: (1) data (2) embeddings and symbolization (3) reasoning with constraints (4) validated action (5) user feedback. This design is consistent with current hybrid AI research showing the value of combining symbolic and sub symbolic methods for explainability, robust reasoning, and controlled decision-making. The framework contains four layers. **First**, a data layer integrates governed structured and unstructured enterprise data. **Second**, an agent layer orchestrates perception, reasoning, decision, and action. **Third**, an interaction layer provides natural-language access, explainable traces, and visual outputs. **Fourth**, a governance layer applies deterministic guardrails, audit trails, and validation before recommendations are shown.

5 Benefits

AAAXAgents turns enterprise AI into a governed operational capability rather than a one-off prototype. By bridging the gap between business problem formulation and executable AI pipelines, AAAXAgents enables domain experts to generate decision-ready insights faster while maintaining control and validation responsibility. **VIDEO:** <https://www.youtube.com/watch?v=TNH-EdvzcYg>

¹ Snowflake AI Data Cloud (<http://www.snowflake.com/en/>)

² AAAXAgents (<http://medium.com/snowflake/aaaxagents-your-hybrid-ai-agent-fc6cc65a8471>)