Technical Specification: Agentic Supplier Quote Automation

1. System Overview

An automated multi-agent system that:
- Extracts supplier-related commercial data.
- Compares spend vs. contract.
- Generates supplier quote requests.
- Orchestrates supplier interaction and human approval.
- Updates downstream [database] and potentially ERP systems.

2. Core Modules & Agents

Module	Agent/Component Name	Functionality
Data Extraction Layer	Contract Intelligence Agent	Extract terms from contracts (PDF/DOCX), structure them into PGK (Neo4j).
	Spend & Commitment Agent	Extract line items, match POs ↔ invoices ↔ receipts from ERP via APIs.
Evidence Generation	Comparative Evidence Agent	Generate comparative analytics from spend and contract data.
Supplier Interaction	Proposal Drafting Agent	Draft supplier email using LLM templates, embed smart form + proposed terms.
	Supplier Interaction Agent	Send/track email, parse response from embedded form. Includes multiple iterations.
Human Approval Layer	Internal Decisioning Agent	Summarize evidence and supplier response, present to human approver.
	Approval Gateway	Interface for go/no-go decision with audit logging.
Feedback Loop	Feedback & DB Update Agent	Update ERP, notify supplier, log outcome to PGK.

3. Technology Stack

Agent Framework

• Orchestration: LangChain, Temporal.io
• Agent Memory & Tools: Custom DSL for procurement actions + LangChain tools

Document & Spend Data Handling

• NLP & Extraction: OpenAI GPT-4 (via API), spaCy
• OCR: Tesseract
• Data Analysis: Python (pandas, NumPy)

Knowledge & Context

• Procurement Knowledge Graph (PGK): Neo4j
• Vector DB: Weaviate / FAISS for RAG pipelines

Communication & UI

• Smart Form Generator: HTML+JS or Google Forms
• Email Agent: SMTP, Office 365, Google Workspace
• Human-in-the-loop UI: Streamlit or React with Slack/Teams integration

System Integration

• ERP Connectors: REST/gRPC to Oracle, SAP, Ariba, Coupa
• Data Sync: PostgreSQL / Snowflake
• Notification Gateway: Slack, MS Teams Bot, Email

4. Workflow Execution Steps

1. 1. Document Ingestion: Contracts parsed via LLM + regex; spend data extracted via ERP API.
2. 2. Evidence Generation: Misalignments detected; comparative report drafted.
3. 3. Proposal Creation: Email + embedded form generated.
4. 4. Supplier Communication: Email sent; form submitted; response parsed.
5. 5. Approval Flow: Human reviews deal summary and makes decision.
6. 6. System Update: New terms saved to ERP + PGK; audit trail logged.

5. APIs & DSL Schema (Sample)

Agent DSL Example:

```
agent: ProposalDraftingAgent
task: generate_supplier_email
inputs:
  supplier_id: SUPP123
```

```
  evidence_summary: {...}
  form_link: https://form.io/form123
  proposed_terms:
    - price: 10.99
    - volume_commitment: 1000 units
outputs:
  draft_email: "Dear Supplier..."
```

ERP API Example:

```
POST /erp/updateSupplierTerms
Content-Type: application/json

{
  "supplier_id": "SUPP123",
  "terms": {
    "price": 10.99,
    "volume": 1000,
    "validity": "2025-12-31"
  },
  "approved_by": "j.doe@company.com"
}
```

---

6. Security & Governance

Concern	Solution
Access Control	Role-based access (RBAC) across agents and human UI.
Data Privacy	PII masking in logs; encrypted database fields.
Audit Logging	Immutable log of agent actions, decisions, and messages.
Model Output	Human-in-the-loop checkpoints for key agent outputs (email, quotes).