**Frond-AI – AI-Driven Orchestration for Windchill PLM Change Management**

**Product Brief**

**Overview:**

Frond-AI is an intelligent orchestration platform designed to modernize and automate the **Engineering Change Management (ECM)** process within **PTC Windchill PLM**. Developed by Datafrond, it leverages **LangGraph** and **LangChain** frameworks to deploy modular AI agents that streamline change workflows, reduce cycle times, and enhance traceability.

**Target Users:**

- Digital Transformation Leaders
- Enterprise IT Architects
- Engineering, Manufacturing, and Supply Chain Executives
- PLM Administrators and Change Control Boards (CCB)

**Key Problems Addressed:**

- Manual, error-prone ECM workflows
- Fragmented tools and data silos
- Long approval cycles with limited visibility
- Lack of cognitive support in decision-making

**Core Features:**

1. **Conversational Change Initiation**
   Natural language interface for submitting change requests, replacing manual forms.

2. **AI-Powered Review & Summarization**
   LLM agents summarize stakeholder feedback and generate recommendations.

3. **Automated Impact Analysis**
   Identifies affected parts, BOMs, and downstream dependencies using Windchill APIs.

4. **Supplier & Sourcing Intelligence**
   Integrates procurement data to inform decisions with vendor, cost, and lead-time insights.

5. **Change Implementation Automation**
   Executes updates to BOMs, revisions, and records via Windchill REST APIs.

6. **Closure & Notification**
   Finalizes changes, issues notifications, and logs all actions for auditability.

## Architecture Highlights:

- **LangGraph Orchestrator**: Manages stateful workflows and agent coordination.

- **LangChain Agents**: Modular AI agents for each ECM phase.

- **Windchill REST API Integration**: Seamless interaction with PLM data.

- **Human-in-the-Loop**: Ensures oversight and trust in AI-generated outputs.

## Benefits:

- **50%+ Reduction in Approval Cycle Times**

- **Improved Data Accuracy & Traceability**

- **Enhanced Collaboration Across Teams**

- **Scalable, Modular, and Extensible Architecture**

- **Supports Digital Thread and Compliance Requirements**

## Validation Results:

- **Traceability**: Full audit logs of every agent action.

- **Performance**: Hours of manual work reduced to seconds.

- **Quality**: Fewer errors through automated data validation.

- **Scalability**: Supports concurrent changes and asynchronous workflows.

**Limitations & Considerations:**

- LLM hallucination risks mitigated by human review.

- No current feedback loop from human overrides.

- Limited real-time collaboration features.

- Emergency/deviation paths not yet modeled.

- Role-based access control handled externally via Windchill.

**Conclusion:**

Frond-AI transforms Windchill ECM from a fragmented, manual process into a streamlined, AI-orchestrated workflow. It empowers organizations to accelerate product changes, reduce errors, and maintain full visibility—paving the way for intelligent, integrated PLM ecosystems.