Al-Powered DPR Automation PlatformHackathon Proposal

1. SOLUTION OVERVIEW

What We're Building

Sector-agnostic Al-powered DPR Automation Platform (Hackathon POC)

- 9 3 specialized Al agents SPV, Technical, Financial
- Language Sector-agnostic design (Printing used as POC configuration)
- Illustration (no frontend/backend dependencies)
- File-based input (Excel/CSV/JSON)
- Istreamlit demo UI for presentation only
- â End-to-end DPR generation (MSE-CDP compliant)
- Real-time financial validation (NPV, IRR, DSCR)

Why Printing? Mature MSME sector, structured data, and standardized DPR formats make it ideal to demonstrate a sector-agnostic architecture.

System Architecture

```
User Input (File Upload)

↓

Streamlit Demo UI → LangGraph Orchestrator

↓

SPV / Technical / Financial Agents

↓

Knowledge + Validation Layer (ChromaDB + Python)

↓

DPR Generation + Rule Validation

↓

Final DPR (Download)
```

Agent Specialization

Agent	Role	DPR Sections
SPV	Promoter & SPV structure, governance	3–4
Technical	Machinery selection, capacity planning	8–9
Financial	NPV/IRR/DSCR, projections	10, 14, 19–20
Supervisor	Orchestrates and manages state	_

Technology Stack

Component	Technology
Orchestration	LangGraph (Standalone)
Al Model	Gemini 2.5 Pro
Knowledge Base	ChromaDB
Financial Engine	Python (NumPy/Pandas)
Document Generation	python-docx
Demo UI	Streamlit
Cloud	Google Cloud Platform
Planned Frontend	Node.js
Planned Backend	Python FastAPI

ightharpoonup Standalone core ightharpoonup easy future integration with Node.js frontend and FastAPI backend.

Core Technical Innovation

AI Generation (Gemini) → Rule Validation (Python) → Feedback/Assemble

✓ Deterministic finance • ✓ Rule-based compliance • ✓ Sector-agnostic • ✓ Extensible.

2. TECHNICAL ARCHITECTURE

Multi-Agent Workflow

```
LangGraph Standalone Application \rightarrow SPV / Technical / Financial Agents \downarrow Validation Engine (Python) \rightarrow DPR Assembly \rightarrow Final Output
```

Future-ready architecture: Plug-and-play frontend/backend without altering core flow.

Agent Interaction & State

Agent	Inputs	Processing	Outputs
SPV	Cluster info	SPV validation	spv_data
Technical	Sector knowledge, capacity	Machinery lookup	technical_data
Financial	Costs, SPV+Tech outputs	NPV/IRR/DSCR	financial_data
Supervisor	Global state	Orchestration	Final assembly

Sector Knowledge Module (Configurable)

- Preloaded domain knowledge
- Sector-specific cost norms
- Capacity benchmarks
- DPR templates & rules
- POC: Printing sector; extensible to other MSME sectors.

Technology Justification

Component	Choice	Reason
LangGraph	Orchestration	Built-in state mgmt, extensible
Gemini	LLM	Large context, cost-efficient
ChromaDB	Vector DB	Low latency, scalable
Python	Finance	Deterministic calculations
python-docx	Docs	Mature Word generation
GCP	Cloud	Native Gemini integration
Node.js	Frontend (planned)	Lightweight, fast
FastAPI	Backend (planned)	High performance

3. FEASIBILITY PROOF

3.1 POC Scope & Deliverables

- **3** specialized agents
- La Printing sector POC configuration
- File-based input
- Streamlit for demo only
- II Real-time financial validation



3.2 Risk Mitigation

Risk	Probability	Mitigation	Contingency
Agent integration	Medium	Early testing	Sequential fallback
API limits	Low	Quota + caching	Gemini Flash
Finance bugs	Medium	Unit tests	Manual calc
Streamlit demo	Low	Local backup	Pre-record
File format issues	Medium	Templates	Multiple format support

3.3 Why This Works

- No custom infra → Managed GCP & ChromaDB
- ✓ No research phase → Proven tools
- Clear requirements → MSE-CDP format
- ✓ Modular architecture → Parallel work
- Streamlit UI → Fast demo setup
- Sector-agnostic design → Reusable core

3.4 Architecture Advantages

- Standalone Core: Fast, testable, no API complexity
- File Input: No form validation, easy testing
- Streamlit Demo UI: Lightweight presentation layer
- Sector-Agnostic: Printing is configuration, not hardcode

3.5 Success Criteria

Area	Target
Technical	3 agents run, compliance ≥85%, 0 financial errors
Demo	Upload file → Generate DPR in <5 min
Quality	Expert-validated DPR, proper formatting
Scalability	Same architecture works for other sectors

Oct 28–30 testing & rehearsal planned; Oct 31 presentation.

4. EXPECTED OUTCOMES

Tomparative Metrics

Metric	Current	Platform	Impact
Prep Time	6 months	48 hours	₹ -98%
Cost per DPR	₹2L	₹10K	♦ -95 %
Approval Rate	30%	75%+	≥ 2.5×
Compliance	Manual	Automated	85% +
Speed	Weeks	Minutes	

Stakeholder Benefits

Stakeholder	Benefit
MSME Clusters	Low cost • Fast access • Self-service
Government	Higher utilization • Faster approvals
Banks	Better quality DPRs • Standardized data

Stakeholder	Benefit
Ecosystem	More clusters • Job creation

IN Mission Alignment

- Make in India
- Atmanirbhar Bharat
- **V** Digital India
- Z Startup India
- Skill India
- Printing POC proves feasibility; platform scales horizontally across MSME sectors.

Measurement Framework

Category	Metric	Target
Technical	Compliance score	≥85%
User	Pilot clusters	10+
Govt./Bank	Approved DPR	≥1
Turnaround	Time	<48 hrs
UX	Satisfaction	≥8/10

✓ Strong impact • Measurable outcomes • Hackathon-fit scope.

SECOND SECOND S

- Sector-agnostic DPR automation platform
- Printing sector POC
- Standalone LangGraph architecture
- Plug-and-play Node.js frontend & FastAPI backend (future)

- Production-ready stack: Python + Gemini + ChromaDB
- Real-time validation + compliance
- Scalable to multiple MSME sectors post-hackathon