

PROCUREMENT · FINANCE · DOCUMENT AUTOMATION

# AI-Powered Procurement, Finance & Document Automation

Dockerized platform for IDP, three-way match, HITL-gated Odoo writes, procurement agents, RAG, and finance ops — built for AP / procurement teams that need safe automation, not a FAQ chatbot or a single Zapier invoice→Sheets toy.

M0–M10  
MILESTONES CLOSED

PASS  
PHASE 1 / 2 / 3

1.0.0  
API VERSION

M10  
API MILESTONE

Built by **Abdul Basit** · AI Automation Engineer

BUSINESS IMPACT

Matched invoices · approved POs · audited AP ops

FR-34 quotation→PO · three-way match + dedupe · amount-tier HITL · dashboard RBAC · Phase gates Passed

## OVERVIEW

Business events (email, Slack PRs, uploads, schedules) are classified and extracted with field-level confidence, three-way matched and de-duplicated, routed through amount-tier HITL packages, written to Odoo-shaped ERP (plus certified multi-ERP stubs), and operated from an admin dashboard with eval scorecards, Prometheus metrics, and scheduled reports. A grounded financial assistant answers overdue / unmatched / payments-due questions with record IDs — and refuses unauthorized or mutating asks. FastAPI owns intelligence; n8n stays thin for ingress and side effects.

|          |                                                                                          |
|----------|------------------------------------------------------------------------------------------|
| TYPE     | Procurement / finance / IDP platform (not a single n8n flow)                             |
| ROLE     | AI Automation Engineer / AI Systems Architect                                            |
| DELIVERY | API 1.0.0 · Milestone M10 · Closeout 2026-09-11                                          |
| STACK    | FastAPI · n8n · Postgres · Redis · Qdrant · OpenAI · Odoo · Caddy · Prometheus / Grafana |
| BUYERS   | Mid-market AP / procurement / finance ops needing confidence, match, HITL, and audit     |

|                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                |
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| <div><div>THE PROBLEM</div><ul style="list-style-type: none"><li>Email + PDF chaos — no shared document pipeline</li><li>Manual 3-way match — PO / GR / invoice in sheets</li><li>No confidence / HITL — bad extracts post or stall</li><li>Duplicate ERP posts — retries create double POs</li><li>Silent failures — no DLQ, alerts, or cockpit</li><li>Script sprawl — OCR, Slack, Odoo each siloed</li></ul></div> | <div><div>THE SOLUTION</div><ul style="list-style-type: none"><li>FastAPI intelligence — IDP, match, agents, RAG</li><li>Thin n8n — ingress, notify, schedules</li><li>HITL packages — amount tiers + audit</li><li>ERP factory — Odoo + SAP/Oracle/Dynamics/NetSuite stubs</li><li>Admin SPA — RBAC, eval, reports, metrics</li><li>Idempotent writes — claim keys block duplicates</li></ul></div> | <div><div>WHO IT SERVES</div><ul style="list-style-type: none"><li>AP / procurement teams needing <b>safe automation</b></li><li>Operators needing one console for exceptions and HITL</li><li>Sandbox-first demos without live ERP credentials</li><li>Lead demo: <b>FR-34 quotation → PO</b></li><li>Secondary: invoice → match → HITL → ERP</li></ul></div> |
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**Demo lead:** FR-34 quotation → extract → policy/HITL → Odoo PO (idempotent) → notify + audit. **Secondary:** invoice → dedupe → three-way match → HITL → ERP. **Optional:** RAG policy ask · finance assistant refuse · admin RBAC flip.

## CAPABILITY SURFACES

| SURFACE           | FOCUS                            | SURFACE           | FOCUS                           |
|-------------------|----------------------------------|-------------------|---------------------------------|
| IDP               | Classify + extract ≥90% fields   | Match / dedupe    | ≥95% match · ≥98% dupe recall   |
| HITL              | Auto / manager / finance tiers   | Procurement agent | Quotes ≥2 vendors · PO draft    |
| Finance assistant | Overdue / unmatched · ACL refuse | RAG + graph       | Policy Q&A · kg_edges multi-hop |

**Architecture rule:** FastAPI owns AI / IDP / match / agents · n8n stays thin · money moves only after HITL · idempotent ERP writes.

ARCHITECTURE & CAPABILITIES

Architecture, FR-34, match/HITL, adapters

**Principle:** FastAPI owns intelligence (IDP, match, policy, agents, adapters); **n8n owns thin ingress and side effects** — no god-workflow. Match logic and confidence thresholds never live only in n8n.

Channels (email / Slack / Teams / webhooks / schedules)  
→ Edge (Caddy, FastAPI, Redis idempotency, Admin SPA)  
→ IDP (classify, extract, confidence) → Match + dedupe → Policy / HITL  
→ Agents / RAG / graph → ERP / CRM factory → Data · /metrics · reports

| COMPONENT      | ROLE                                                                            |
|----------------|---------------------------------------------------------------------------------|
| API / webhooks | Auth, normalize, idempotency claim keys, domain APIs                            |
| IDP + match    | Extract with per-field confidence; PO–GR–invoice; duplicate detection           |
| HITL / agents  | Packages (summary, risks, payload); procurement, negotiation, finance assistant |
| RAG + graph    | Qdrant policy Q&A; kg_edges multi-hop (Neo4j optional)                          |
| ERP / Admin    | Odoo + stubs; dashboard RBAC, eval, DLQ, reports                                |

**DOCUMENT & AP**

- Email classify ≥85%
- IDP extract ≥90% required fields
- Invoice / quote / PO / contract schemas
- Three-way match ≥95%
- Dedupe recall ≥98%; blocks\_auto

**INTEGRATIONS**

|               |                                    |
|---------------|------------------------------------|
| Odoo          | Primary ERP (sandbox/live)         |
| ERP stubs     | SAP / Oracle / Dynamics / NetSuite |
| HubSpot       | CRM sandbox shape                  |
| Slack / Teams | Notify + approval webhooks         |
| n8n           | Thin schedules + webhooks          |

**SAFETY & OPS**

- Amount-tier HITL before ERP
- Negotiation send blocked w/o HITL
- Always-HITL: bank change / payment
- Eval scorecards + Prometheus
- Role RBAC (procurement vs ap)

**FR-34 QUOTATION → PO (LEAD DEMO)**

- Vendor quotation inbound (email/doc / n8n)
- Extract lines + per-field confidence / rules
- HITL when policy requires (manager/finance tiers)
- Create PO via Odoo sandbox with claim key
- Notify stakeholders + audit / AI decision rows
- Replay same key → no second PO

**INVOICE → MATCH → HITL → ERP**

- Extract invoice fields (vendor, totals, PO ref)
- Dedupe then three-way PO / GR / invoice
- Mismatch codes (qty/amount/vendor) → HITL
- Approve → ERP write with claim key
- Downstream fail → DLQ + alert stub
- Dashboard: exception + audit\_link

**HITL PACKAGE FIELDS**

Summary · risk flags · AI recommendation · proposed ERP payload · correlation id · SLA due. Actions: approve / reject / request-changes. Notify: Slack · email stub · Teams. Always-HITL for bank-change and payment-execute.

**WHAT OPERATORS SEE (/ADMIN/UI)**

Summary counts · PRs/invoices by status · exceptions + anomaly codes · AI decisions · failed workflows with dlq\_link · eval scorecards · daily/weekly/monthly reports.

**Demo arc:** FR-34 quotation→PO primary · invoice match/HITL secondary · optional RAG + finance assistant + admin RBAC.

RELIABILITY · MILESTONES · GATES

Reliability, M0–M10, Phase gates, closeout

RELIABILITY AND SECURITY

| AREA          | WHAT SHIPPED                             |
|---------------|------------------------------------------|
| Idempotency   | ERP / webhook claim keys — no double POs |
| Fail loud     | Retries, timeouts, DLQ, alert stubs      |
| HITL          | High-risk ERP / payment / send packages  |
| RBAC          | API key + X-Role dashboard / assistant   |
| Assistant ACL | Refuse mutate / wrong role (procurement) |
| Audit         | Correlation-linked decisions + DLQ links |
| Secrets       | Env-only · M10 prod checklist            |

MILESTONES M0–M10 (ALL COMPLETE)

| ID    | THEME                    | WHAT UNLOCKED                                                               |
|-------|--------------------------|-----------------------------------------------------------------------------|
| M0    | Kickoff & architecture   | Architecture v1, stack, HITL policy, Phase 1 scope                          |
| M1–M2 | Skeleton → email + IDP   | Compose, schema, classify/extract fixtures + eval baselines                 |
| M3–M4 | HITL + match + Phase 1   | Packages, SLA, three-way + dedupe, FR-34 Odoo PO, Phase 1 Passed            |
| M5–M6 | Procurement → PR / AP-AR | Agent tools, quote compare, negotiation drafts, multi-channel PR, contracts |
| M7    | RAG / Teams / Phase 2    | Cost routing, CRM sandbox, anomaly baseline, Phase 2 Passed                 |
| M8–M9 | Ops → assistant / graph  | Admin RBAC, eval/metrics/reports, finance AI, kg_edges, ERP stubs, CI       |
| M10   | Docs / UAT / KT          | Closeout pack, prod checklist, deliverables, API 1.0.0                      |

**IDP + MATCH**

Classify → extract → validate → confidence → HITL or auto.

- Invoice / quote / PO / contract schemas
- Golden match + dedupe fixtures
- b1ocks\_auto on mismatch codes
- Example fields: vendor, totals, PO ref, tax

**AGENTS + KNOWLEDGE**

- Quote compare ≥2 vendors (logged tools)
- Negotiation draft; send HITL-gated
- Finance assistant 5 intents + refuse
- kg\_edges multi-hop (Neo4j optional)
- Usage attribution on LLM calls

**OPS + RECOVERY**

- Admin UI /admin/ui modules
- Eval harness suites → scorecards
- DLQ depth alerts + replay guidance
- Daily / weekly / monthly reports
- Concrete: same claim key ≠ second PO

**Concrete reliability:** replay quotation webhook with same claim key → no second Odoo PO · exhausted retries → DLQ + alert · assistant with role procurement or “create payment” → refuse (not a mutation).  
**Anomaly pack:** bank\_change · unusual\_payment · price\_spike · qty\_anomaly · suspicious\_pattern · ml\_assist\_score → HITL with evidence.

**Delivery truth:** M0–M10 complete · Phase 1/2/3 Passed · phase3\_closeout PASS · API 1.0.0 · cite live /health in demos.

OUTCOMES · TECH · DEPTH

Stack, UAT, journeys, n8n, residual risks

**TECH STACK + REPRODUCE**

FastAPI · n8n · OpenAI · Postgres 16 · Redis 7 · Qdrant · Neo4j optional ( kag ) · Odoo (+ ERP stubs) · HubSpot sandbox · Admin SPA · Caddy · Prometheus/Grafana ( observability ) · Compose project **pfda** · GitHub Actions

docker compose up -d --build · python scripts/phase3\_closeout.py

Surfaces: /admin/ui · /health · /metrics · /docs · n8n :5678 · Qdrant :6333 · Auth: X-API-Key + X-Role

**SCOPE HONESTY**

- Portfolio case study — no fake logos or fabricated reviews
- Sandbox-first Odoo / ERP stubs without live vendor tenants
- Waivers: live multi-ERP, mandatory Neo4j, live client UAT workshop
- Not the brief “Project 3” Invoice OCR→Sheets toy — this is full PFDA

M10 CLOSEOUT EVIDENCE INDEX

| DOC                            | PURPOSE                                                  |
|--------------------------------|----------------------------------------------------------|
| UAT_REPORT                     | Scenario results + formal waivers                        |
| DELIVERABLES_SIGNOFF           | PRD \$16 row signoff (complete / waived)                 |
| PROD_CHECKLIST / KT_SESSION    | Cutover checklist + knowledge transfer agenda            |
| OPERATOR_CHEATSHEET / RUNBOOKS | Day-2 operator paths and recovery                        |
| phase3_closeout.py             | Health M10 · OpenAPI 1.0.0 · admin UI · assistant refuse |

| DASHBOARD RBAC |                 |
|----------------|-----------------|
| procurement    | PR / PO views   |
| ap / ar        | Finance domains |
| admin          | Full ops        |
| readonly       | Read lists only |

| EVAL SUITES       |             |
|-------------------|-------------|
| classify          | ≥85%        |
| extract           | ≥90%        |
| match / dedupe    | ≥95% / ≥98% |
| rag / agent_tools | ≥80% / pass |

**ANOMALY + ERP**

- qty / suspicious / ML stub score
- Bank change / price spike → HITL
- Shared ERPAdapter contract tests
- Run stubs via compose exec

**N8N CATALOG (THIN CALLERS)**

email inbound · document process · HITL resume/SLA · invoice lifecycle · quotation→PO · procurement · negotiation · PR Slack · AP/AR · contracts · knowledge ingest · Teams approval · anomaly · reports · eval · finance assistant webhook — env API key only, no hardcoded secrets

**RESIDUAL RISKS (HONEST)**

Live mailbox/ERP credentials · Neo4j ops overhead · client UAT scheduling — tracked as M10 waivers; **none reopen Phase gates**. CI: compileall + offline anomaly + agent\_tools. Host DNS cannot resolve compose postgres for some contract tests.

SAMPLE JOURNEYS J1–J6

|                   |                               |                                  |
|-------------------|-------------------------------|----------------------------------|
| J1 FR-34 Quote→PO | J2 Invoice→match→HITL         | J3 Procurement agent (≥2 quotes) |
| J4 RBAC + reports | J5 Finance assistant + refuse | J6 Knowledge graph multi-hop     |

**PORTFOLIO ONE-LINER**

AI-Powered Procurement, Finance & Document Automation — FastAPI + n8n platform that turns invoices, quotes, and PRs into matched, HITL-gated, audited Odoo writes with agents, RAG, dashboard RBAC, and Phase 1–3 gates Passed (API 1.0.0, M0–M10).

SYSTEM VISUALS

Architecture & before / after

