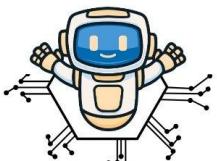




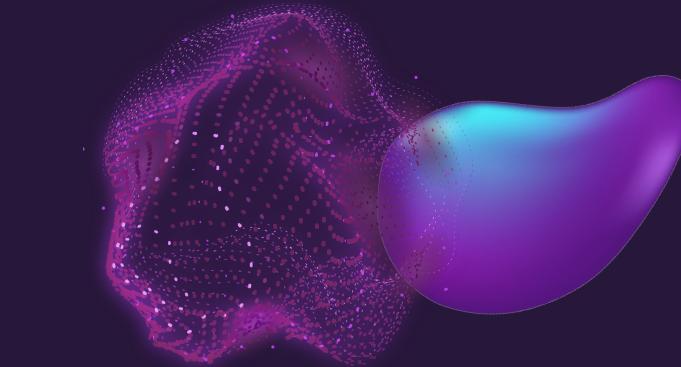
AI²

Artificially Intelligent Invoices



AI²

Team Copper
Fall 2025



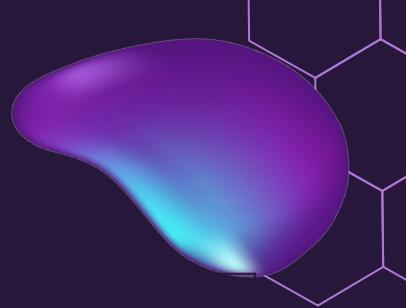
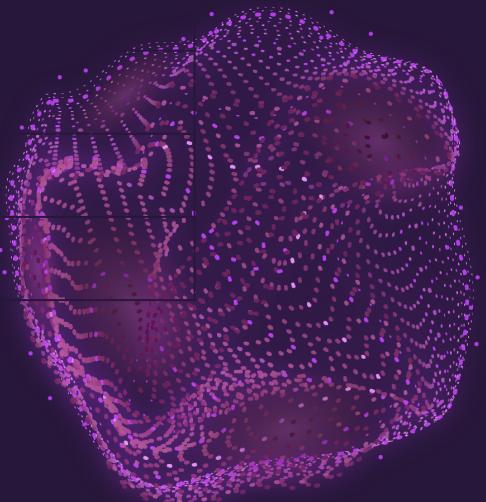


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Meet The Team



Dusan Djordjevic
Project Lead



Julian Diaz
Back-End Developer



Lynda Salinas Ascanova
Webmaster



Savannah Todd
Webmaster



Tommy Fuller
Full Stack Developer



Craig Grubb
Software Developer
and Database



Michael Nimitz
Software Developer
and Database

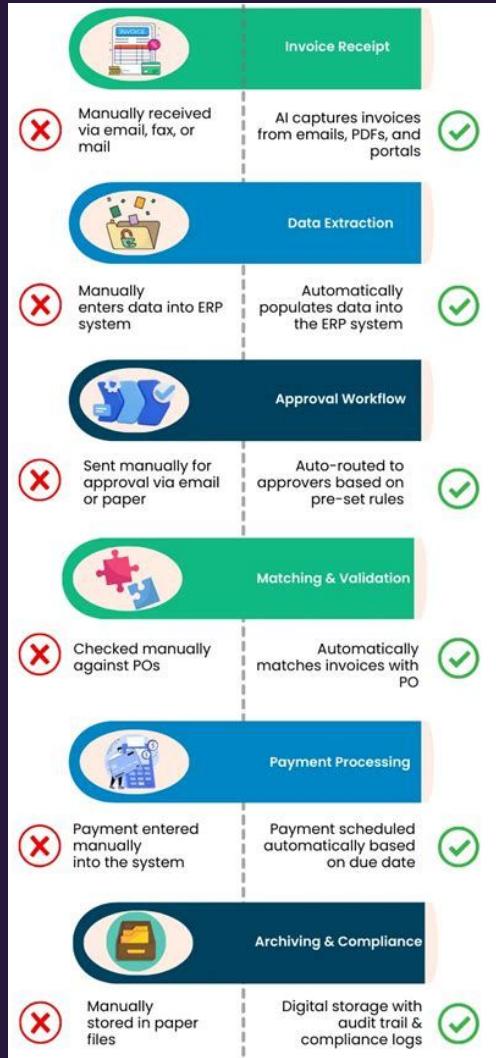


Quin Elson
Front-End Developer



Background

- ◆ Manual invoice processing is still widespread across a variety of industries: Approximately 90% of companies rely on manual processing
- ◆ Cost per invoice: \$12-\$40 (manual) as opposed to \$3-\$6 (automated) [3]
- ◆ Turn around time: 10-15 days for manual processing vs. less than 5 days with an automated system
- ◆ Errors are made an estimated 1%-3% of the time when manual processing is used, which can strain business relationships
- ◆ Overall: Manual processing is expensive, slow, and prone to errors



Background

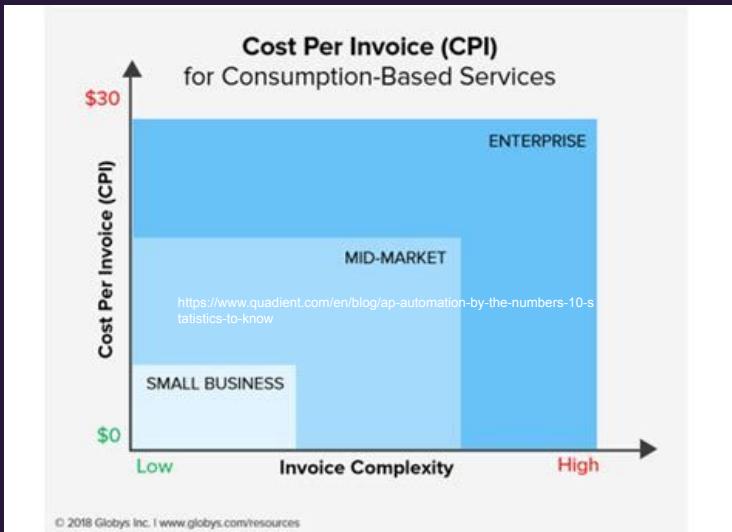
- ◆ 96% of employees report dissatisfaction with the AP tools that they have been provided with [4]. There is clearly a deficiency with the tools currently available.
- ◆ A Gartner study found that 59% of accountants make several financial errors monthly, and cited that many of these mistakes are caused by overextension at work [6].
- ◆ As part of the AP team, accountants and their coworkers would have their workload greatly reduced by automating invoice processing, with studies showing an 80% increase in productivity after adopting AP Automation [7].
- ◆ Automating invoice processing would not only let AP employees shift their focus back onto work utilizing their special skills, and reduce accounting errors, it would greatly boost employee morale as well.



[5]

Background ADS Case Example

- ◆ ADS processes 150,000 invoices annually from ~3,000 individual suppliers
- ◆ A small team of around 6 staff members handle invoices that are received in a variety of formats PDFs, spreadsheets, etc.
- ◆ Manual handling leads to
 - Delays and payment backlogs
 - Errors (duplicates, mismatches, etc.)
 - Staff overload due to (needless stress over inefficiency)
- ◆ Bottom Line: supplier frustration, compliance risks and potential penalties



Problem Statement

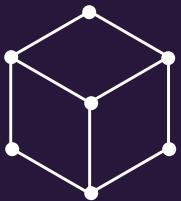
- **Accounts Payable (AP) manual processing** is costly and inefficient. Between labor costs, printing and mailing expenses, and accounting for errors, each manually processed invoice can cost between \$12 and \$40, which adds up across thousands of invoices. A manually processed invoice takes an average of 14.6 days to process.
- **Every year, ADS receives over 150,000 invoices from about 3,000 suppliers.** These invoices arrive mostly by email and come in many different formats (PDFs, scans, spreadsheets, etc.). The AP team, only 6 people, must manually review each invoice and compare it to the company's Purchase Order. This magnifies the issues of AP manual processing, leading to a high workload, potential for errors, delays, and difficulty with taking in more work.





Who is Affected

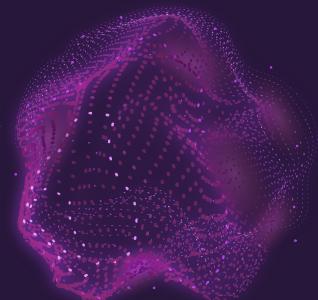
- **Users**
 - ◆ ADS Accounts Payable team, AP manager, and Finance/Accounting leadership are all looking to automate simple, common invoices.
- **Customers**
 - ◆ ADS, the company itself would be willing to provide compensation for a satisfactory product.
- **Stakeholders**
 - ◆ Vendors connected with ADS, ADS Finance, and ADS executives would all experience shorter turnaround times and more effective use of labor with automation of common, simple invoices.



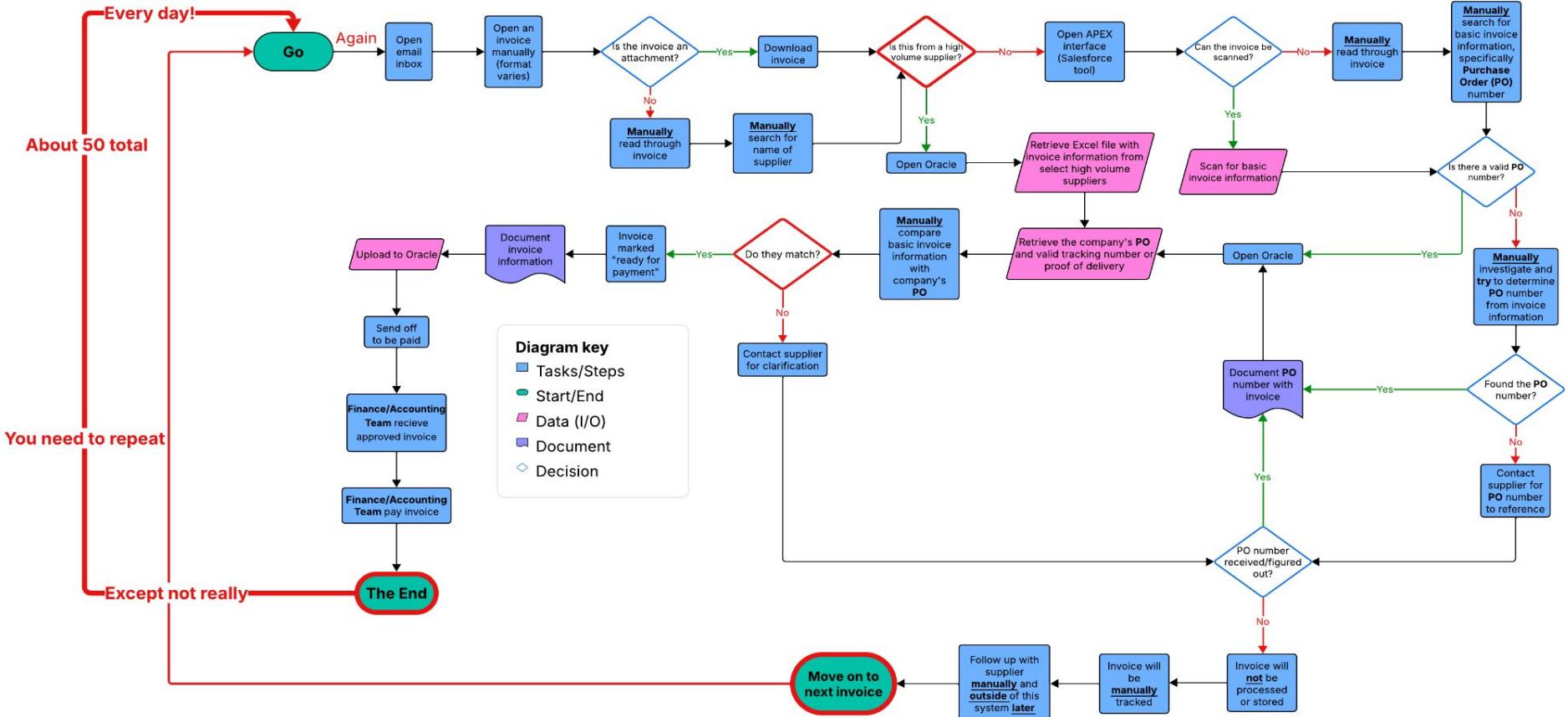


Problem Characteristics

- ◆ **Excessive Labor Hours:** Labor accounts for 62% of total AP processing costs, mostly consisting of repetitive checking rather than value-added work
- ◆ **High Error Potential:** 39% of invoices contain errors, and $\frac{1}{3}$ of businesses suffer from making duplicate payments
- ◆ **Delays:** Invoices take an average of 14.6 days to process, payments slowed down due to backlogs, leading to missed discounts and late fees
- ◆ **Scalability:** Already high pressure on the AP team makes it difficult for the company to take on additional clients, limiting financial growth

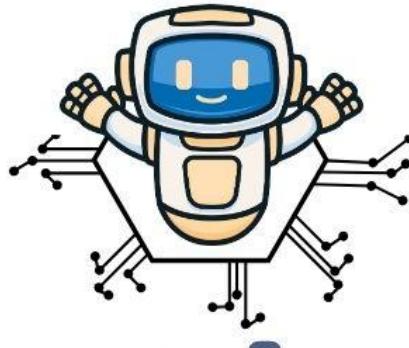


Current Process Flow



Our Solution: AI²

- ◆ AI² is a web-based platform that helps organizations manage high volumes of invoices with greater speed, accuracy, and transparency.
- ◆ Designed to integrate into existing financial workflows, it streamlines repetitive processing, prioritizes exceptions, and continuously adapts to diverse invoice formats across industries.
- ◆ By reducing manual workload while preserving oversight, AI² enables faster payments, fewer errors, and stronger financial compliance.



AI²

AI² and ADS

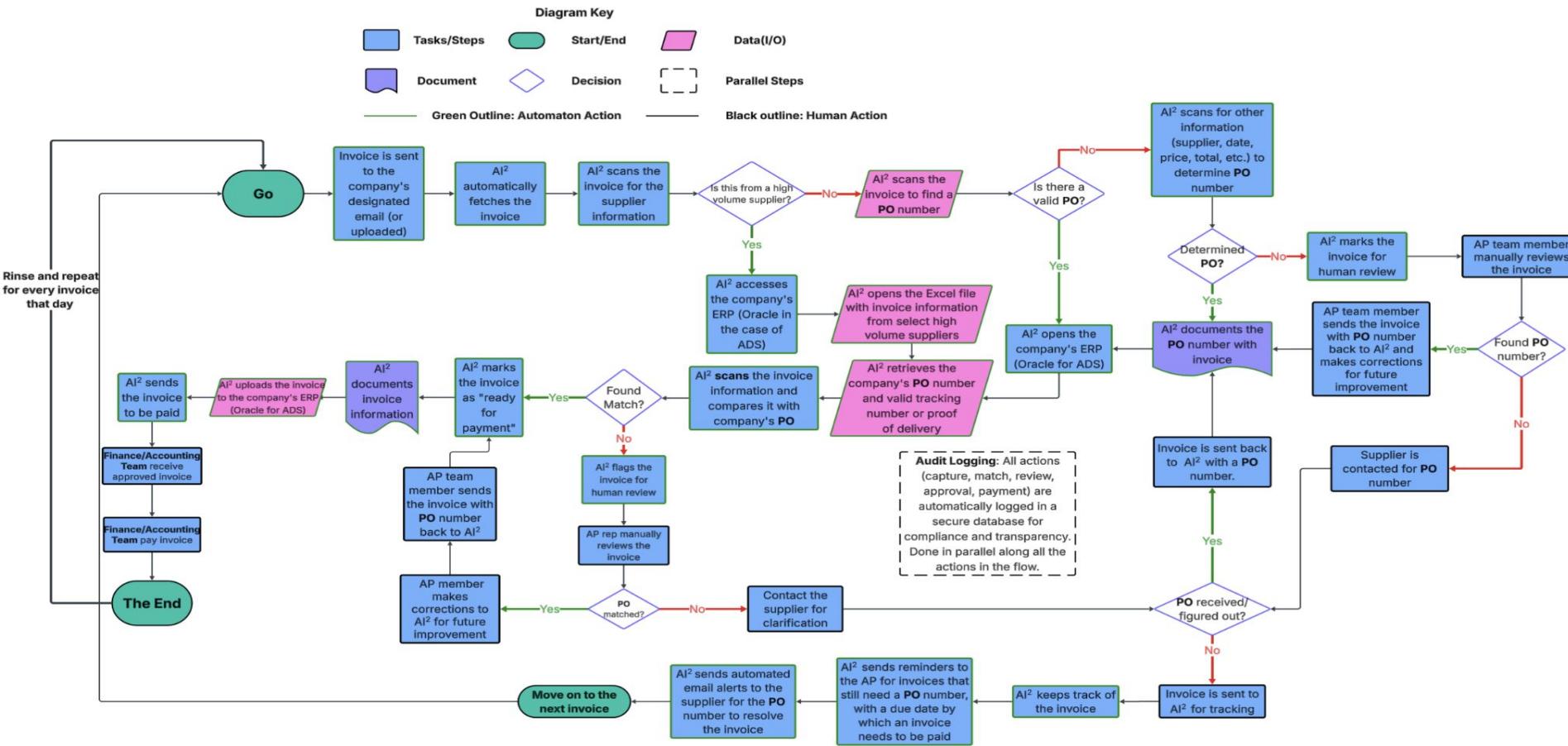
- ◆ For ADS specifically, AI² would relieve pressure on a small Accounts Payable team that currently faces over 600 invoices per day. The pressure will continue to grow as the company scales, leading to mistakes like mismatched data or “overreceipts”.
- ◆ By automating intake and matching, while routing edge cases for staff review, the system reduces backlogs and errors without removing human oversight.
- ◆ This allows ADS to accelerate payment cycles, strengthen supplier relationships, and improve overall financial health — outcomes that mirror the benefits other organizations can expect across the industry.



Solution Characteristics

- ◆ **Efficiency – Automated Invoice Capture and Organization**
 - All invoices are automatically captured from email and structured for review, reducing manual file handling.
- ◆ **Accuracy – Smart and Fast Matching**
 - AI² automatically compares invoices to purchasing orders, accelerating processing while minimizing errors and backlogs.
- ◆ **Adaptability – Learning from Corrections**
 - The system improves by learning from staff interventions, reducing redundant work and enabling staff to focus on complex cases.
- ◆ **Transparency – Auto Logging and Compliance**
 - Every invoice and action is tracked in the database, ensuring auditability, compliance, and organizational trust.
- ◆ **Scalability – Beyond just ADS**
 - Designed to adapt to new vendors, formats, and even other companies beyond ADS.

Solution Process Flow





What it Will Do

- ◆ **Email Intake and Storage:** Emails will be taken upon arrival and be sorted and prioritized.
- ◆ **Volume Handling:** AI² will considerably reduce the manual processing of individual invoices.
- ◆ **AI PO Matching:** Invoices will be matched to their corresponding purchase order.
- ◆ **AI Confidence Scoring:** Scoring system based on certainty of correct purchase order to invoice matches.
- ◆ **Error Matching:** PO matches with lower confidence scores will be prioritized for human intervention.
- ◆ **Continuous Learning from Human Interaction:** System updates matching based on staff corrections.
- ◆ **Supplier Notifications:** AI² will send email alerts to suppliers.
- ◆ **AP Team Reminders:** AI² will send reminders to the AP team.



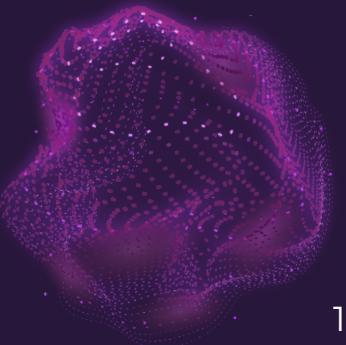
What it Will Do

- ◆ **Audit Logging:** Invoices and system decisions are saved in a database for subsequent reviews.
- ◆ **Error Reduction:** Strain on the AP team will be reduced, leading to less mistakes.
- ◆ **Quick Implementation:** Easy for client to plug in and begin using.
- ◆ **Tailored for client:** Specially configured to meet the needs of client.
- ◆ **Long-tail vendor handling:** Streamlines monitoring of invoices from vendors supplying lower-frequency products.
- ◆ **Easily customizable:** Staff will be able to make tweaks to prioritize certain invoices.
- ◆ **Adaptable:** Customizations can be made at any time.
- ◆ **Timeliness:** Automation allows AP team to shift focus to other tasks.



What it Will Not Do



- ◆ AI² will not instill a prioritization system for emails that are not invoice-related. The system will be set up to make priority-related decisions based on the invoice confidence scores, which will not translate to other email content.
- 

Competition Matrix

	AI ²	Tipalti	SAP Concur	QuickBooks	Manual Processing
Volume handling	■	■	■	■	■
Error reduction	■	■	■	■	■
Less human interaction	■	■	■	■	■
Timeliness	■	■	■	■	■
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User Interface

Major Functional Components

- **User Interface**
 - Website application and extension
- **Frequency Query**
 - Filter invoices -> PO based on frequencies, do they match?
- **Data-Field suggestions**
 - Based on pattern-recognition or context

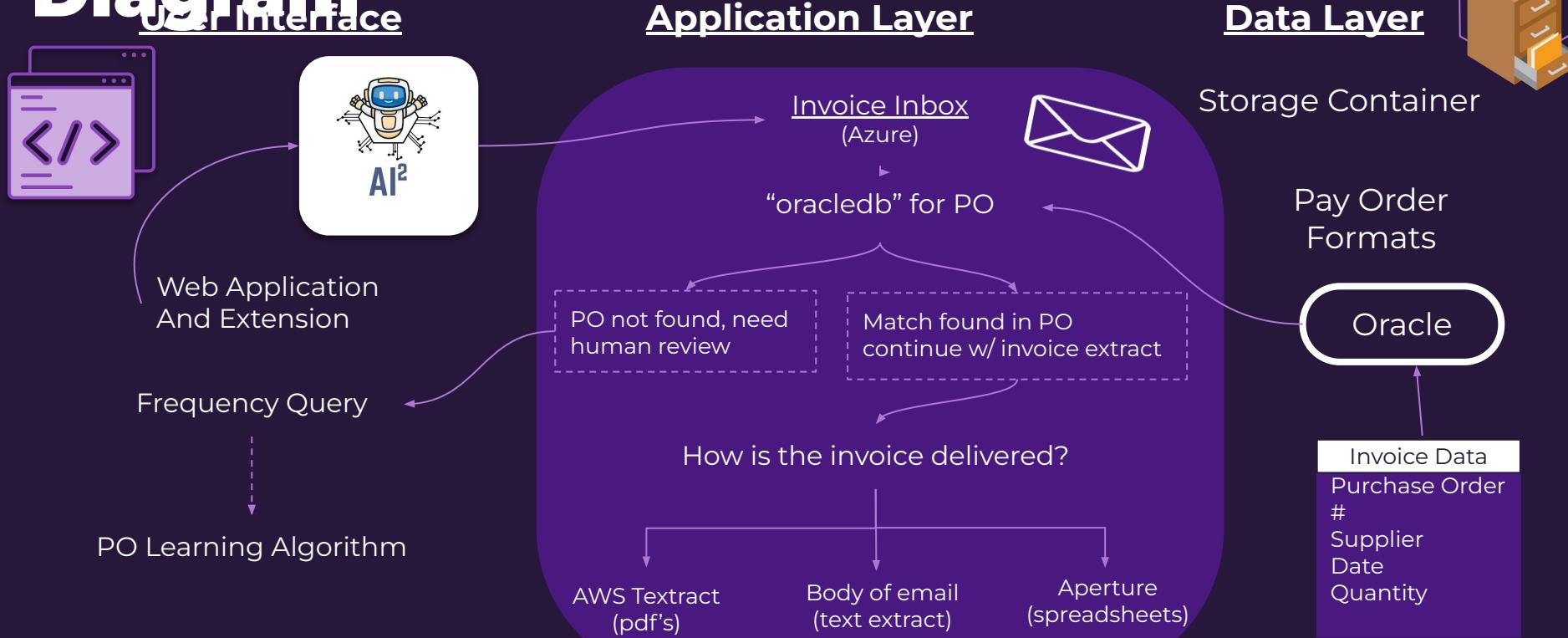
- **Invoice Inbox**
 - Azure (Microsoft Rest Api)
- **AWS Textract (pdf's)**
- **Aperture (spreadsheets)**
- **oracledb driver to access PO's**

- **Storage Container**
 - Cloud storage (Oracle)
 - Invoice's
 - PO'S
- **Record of previously used invoice formats**
 - And the ability to edit them

Data Layer

Major Functional Components

Diagram





Development Tools

- ◆ Communication: Discord
- ◆ IDE: VSCode
- ◆ Version Control: Github
- ◆ Website: Github Pages
- ◆ Team Management: Clickup



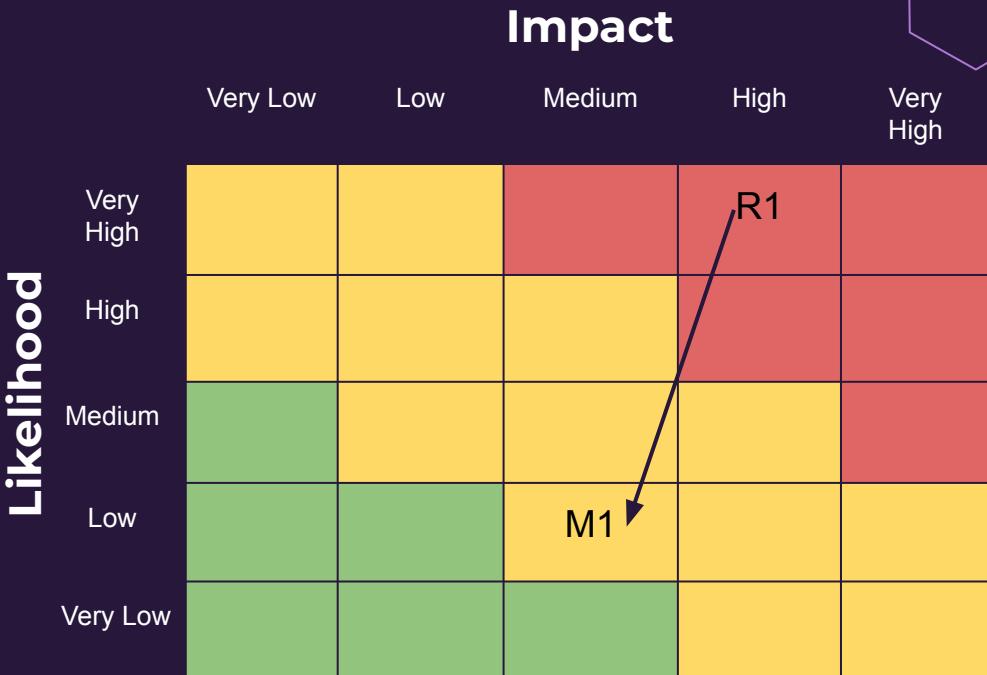
User Risks

Risk

- ◆ **R1:** Unassigned Low Confidence Invoices

Mitigation

- ◆ **M1:** Flagged invoices routed to manual review queue



Legend

High Risk

Medium Risk

Low Risk

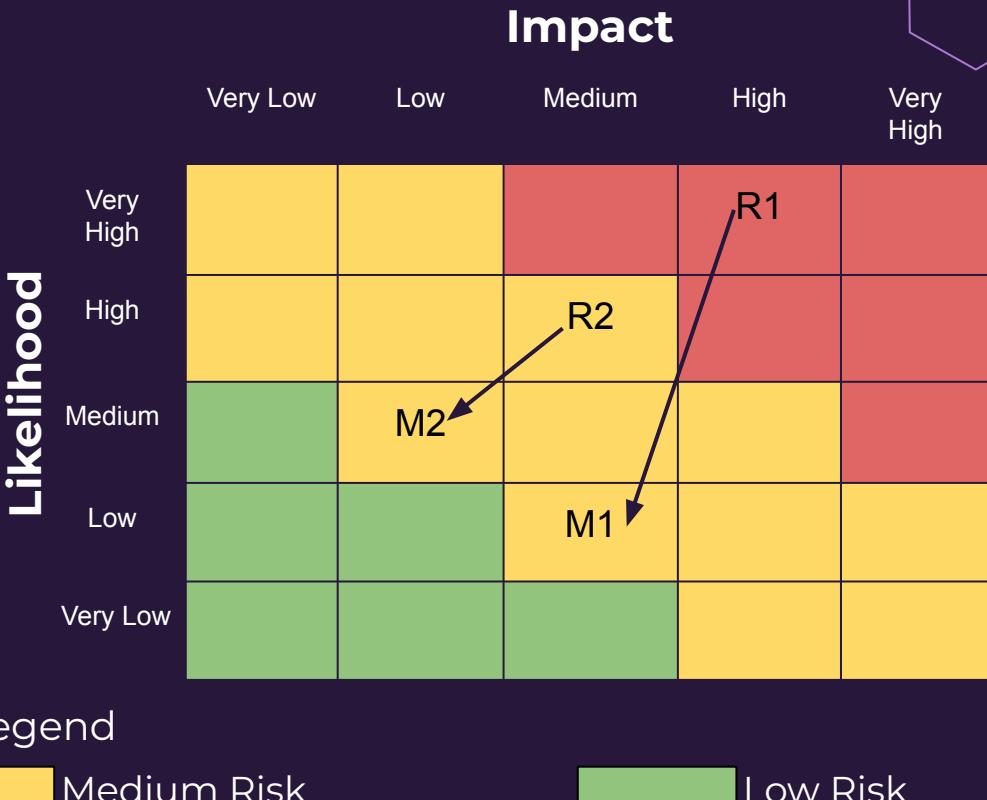
User Risks

Risk

- ◆ **R2:** Workflow disruption during transition

Mitigation

- ◆ **M2:** System integrates with existing ADS tools





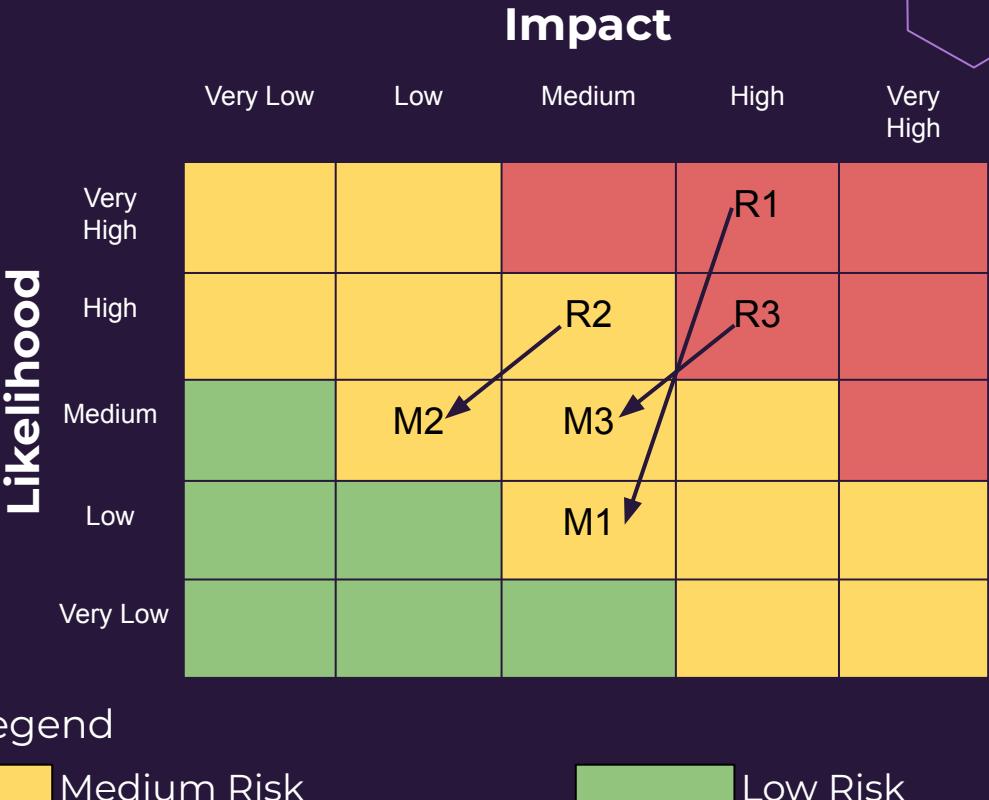
User Risks

Risk

- ◆ **R3:** Delayed Human Review of Flagged Items

Mitigation

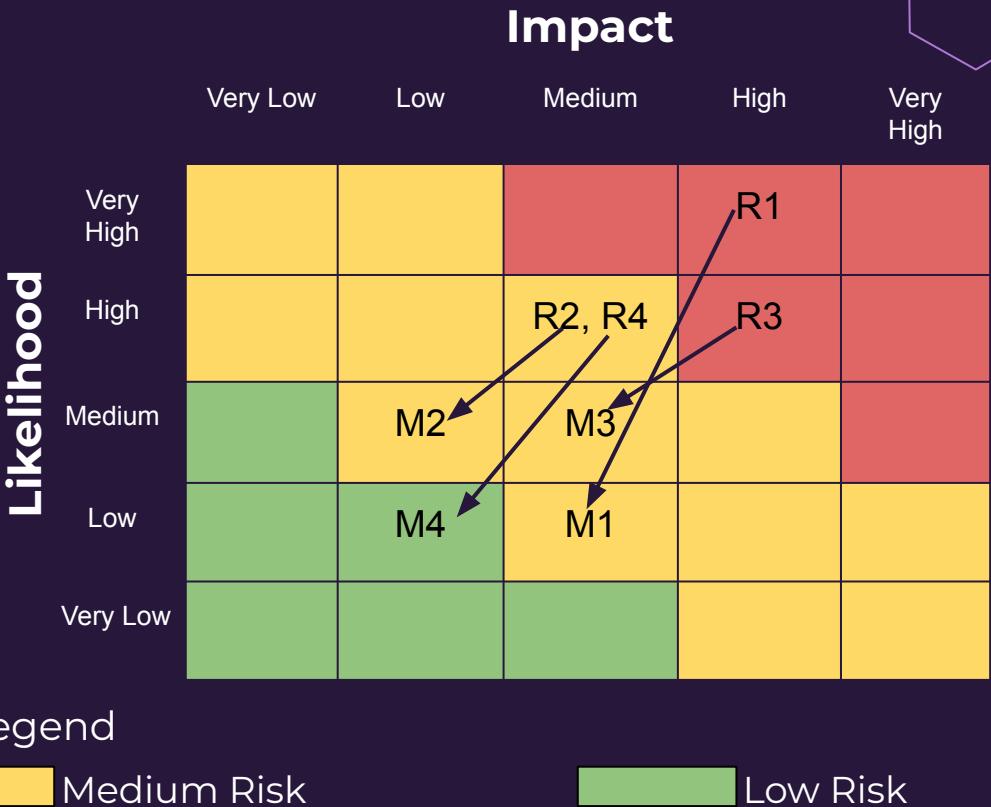
- ◆ **M3:** Offering real-time ingestion, auto-flagging, and reminders to the AP team





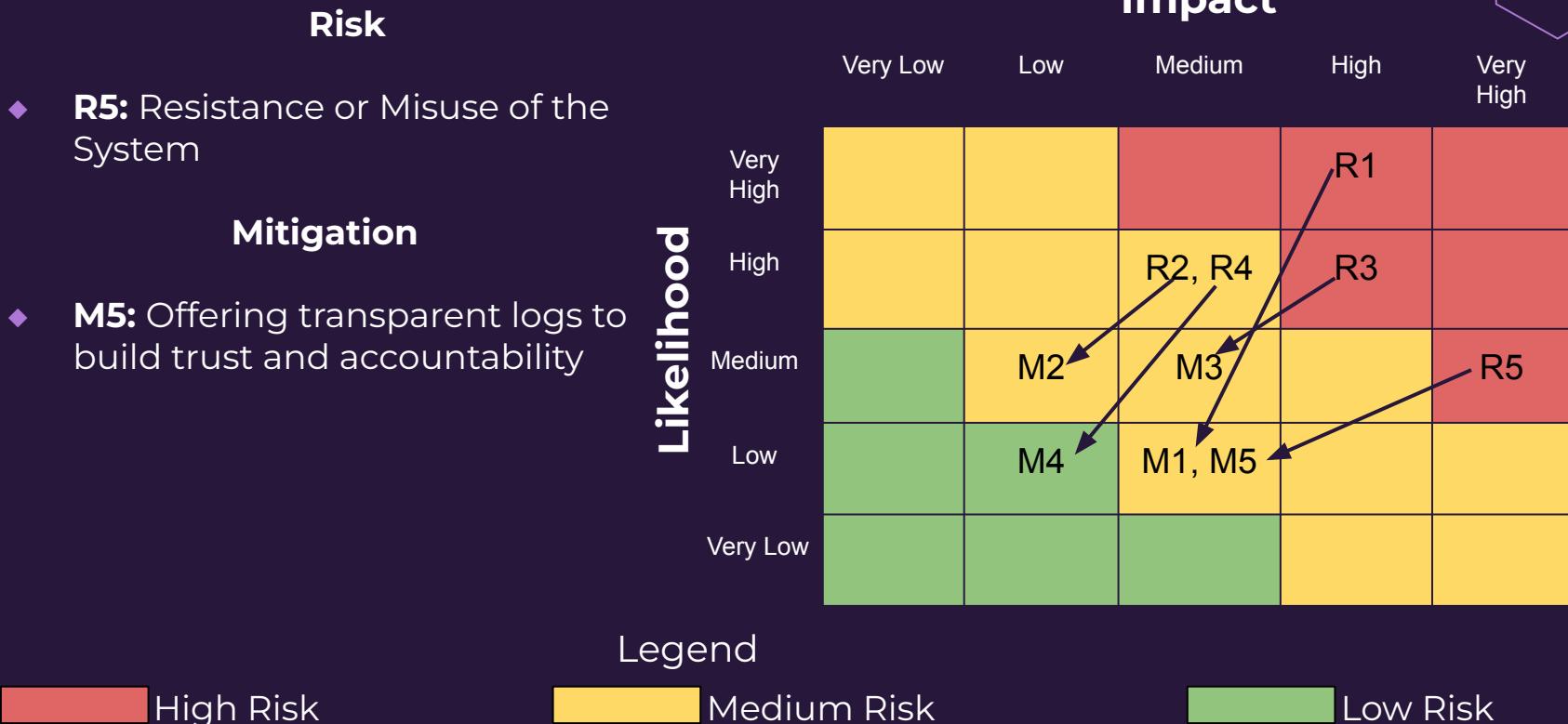
User Risks

- Risk**
- ◆ **R4:** Overdependence on automation
- Mitigation**
- ◆ **M4:** Confidence scoring will trigger human review automatically





User Risks





Customer Risks

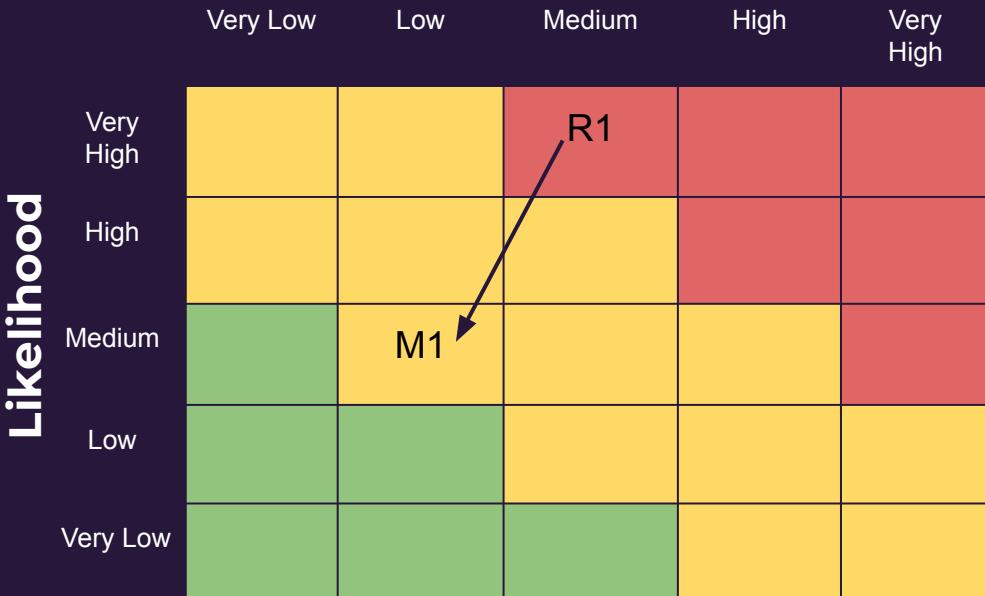
Risk

- ◆ **R1:** Compromised financial accuracy from incorrect invoice matching

Mitigation

- ◆ **M1:** Confidence scoring will trigger human corrections before payment for improved accuracy

Impact



Legend

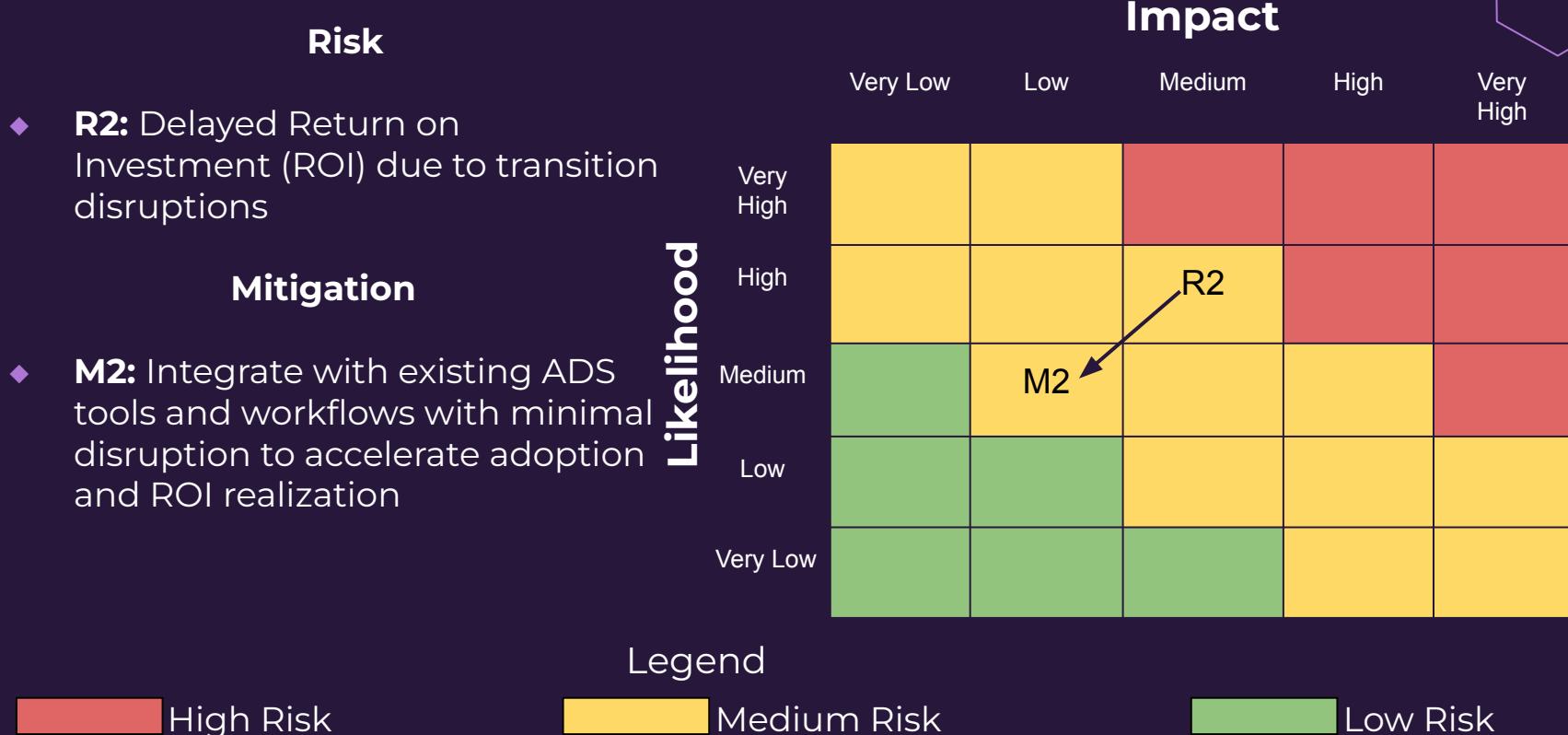
High Risk

Medium Risk

Low Risk

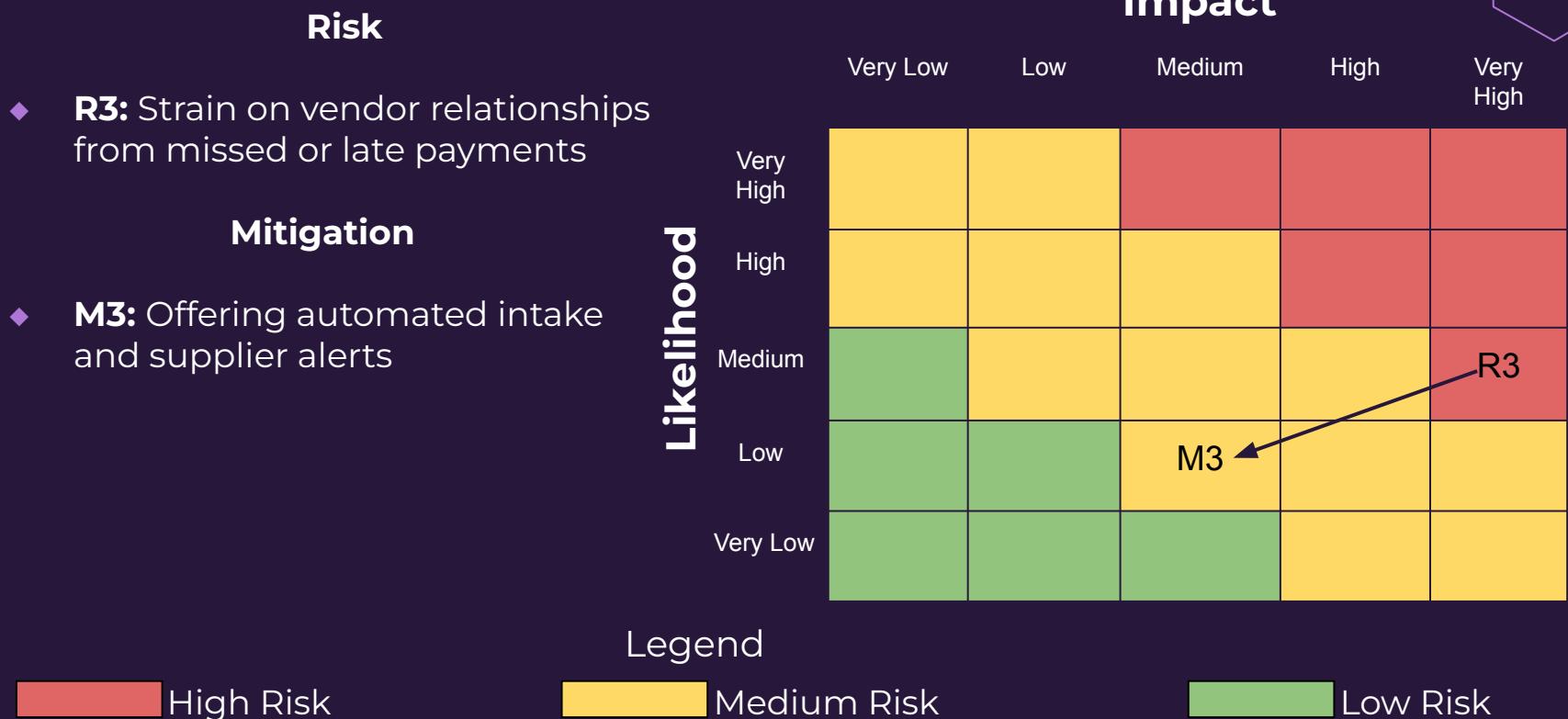


Customer Risks



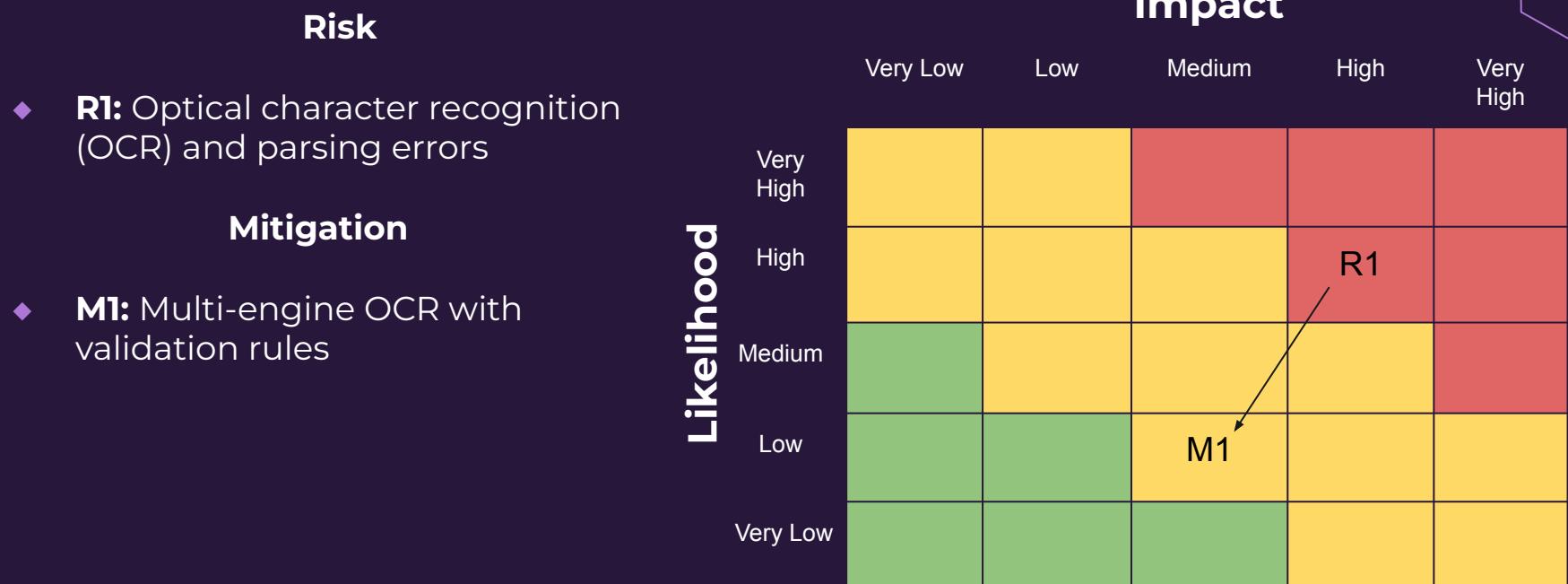


Customer Risks



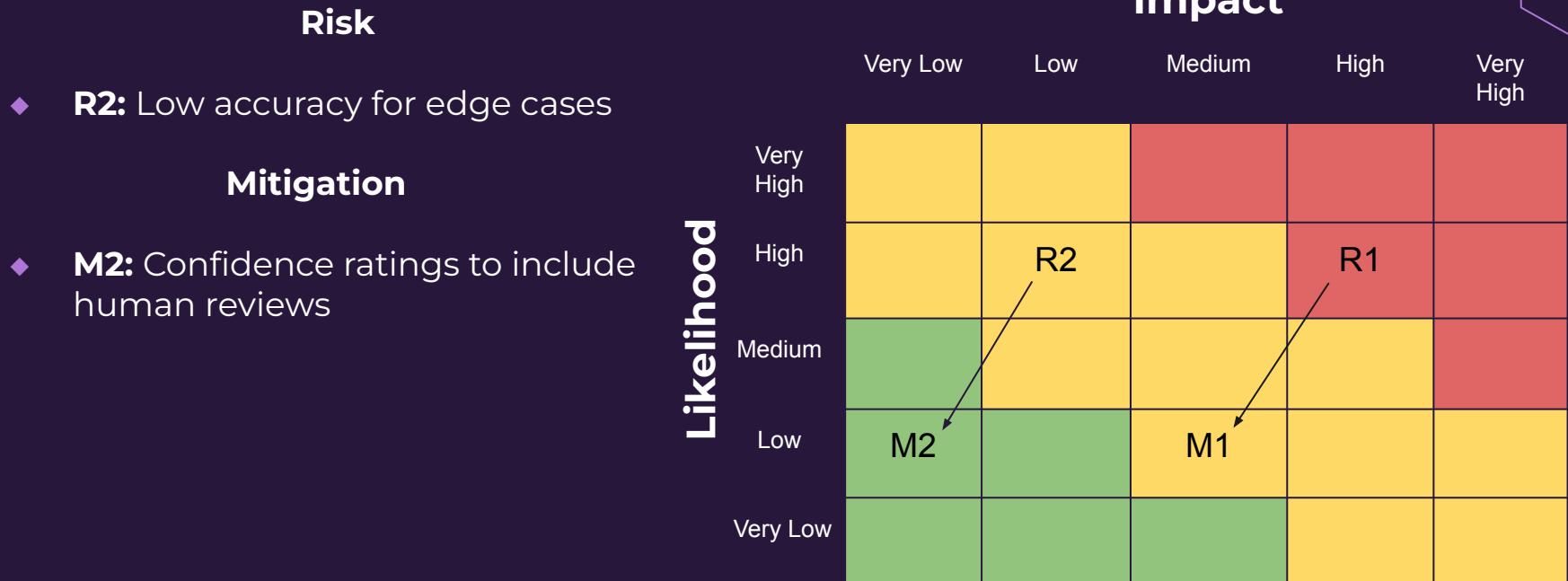


Technical Risks





Technical Risks





Technical Risks

Risk

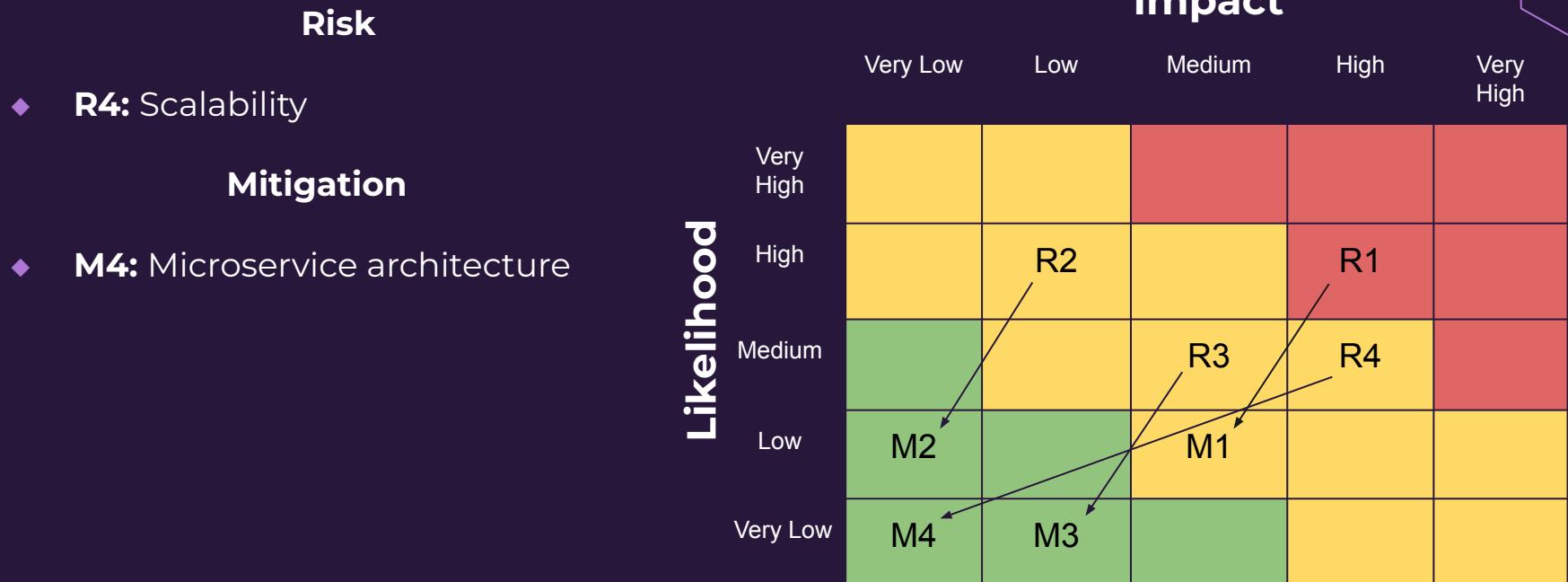
- ◆ **R3:** Integration failures
- ◆ **Mitigation**
- ◆ **M3:** Robust APIs that include sandbox testing

Impact





Technical Risks



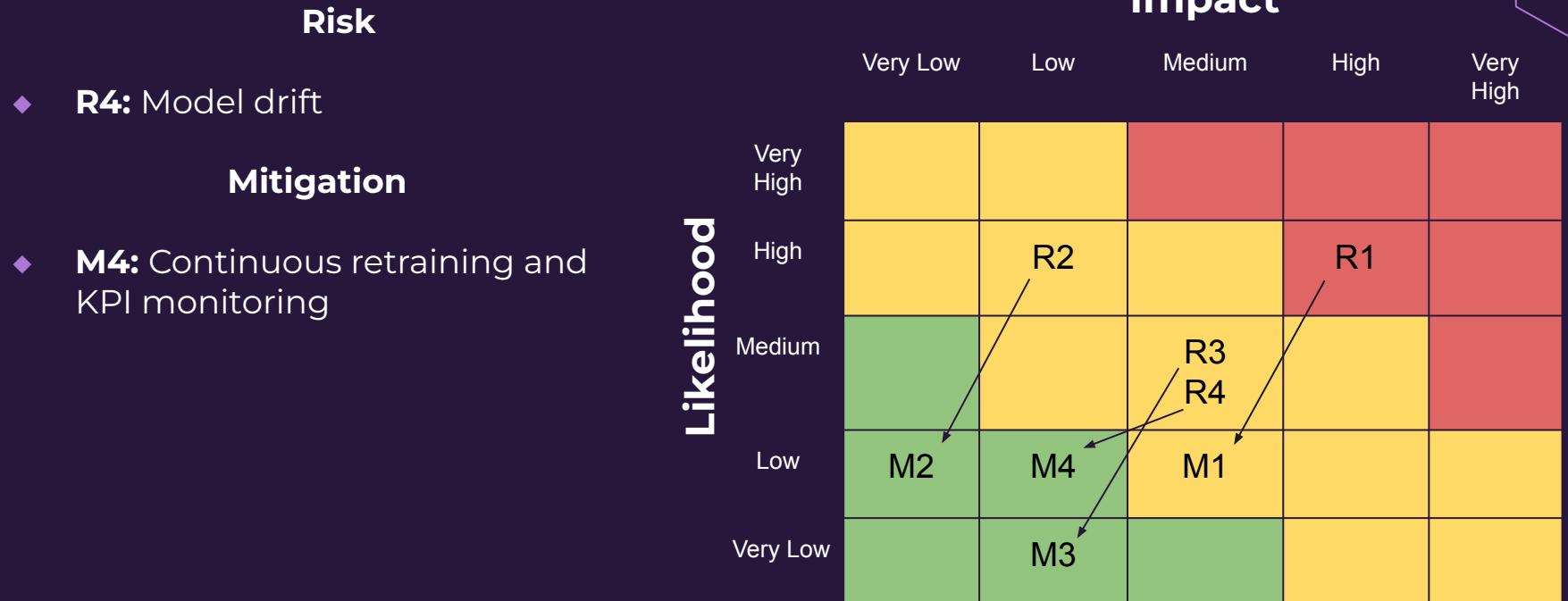
- ◆ **R4:** Scalability

Mitigation

- ◆ **M4:** Microservice architecture

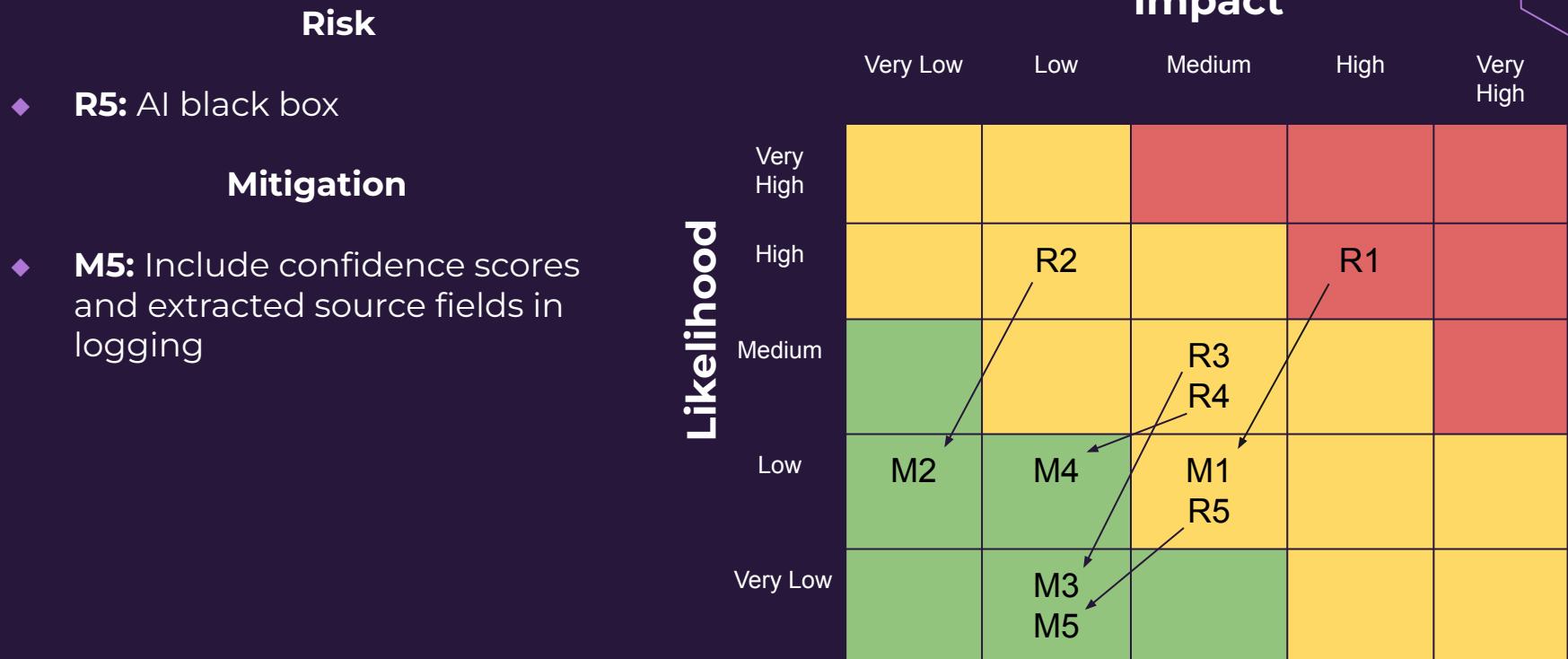


Technical Risks



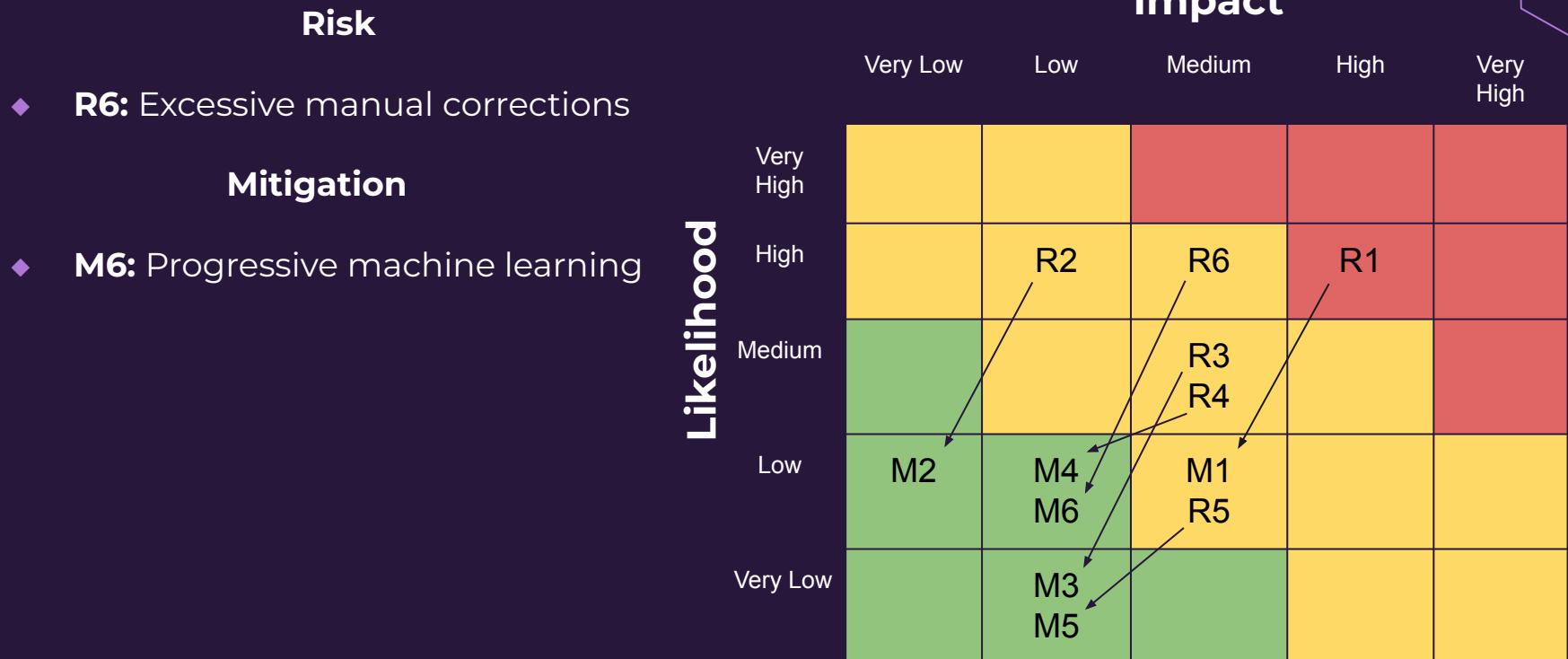


Technical Risks





Technical Risks



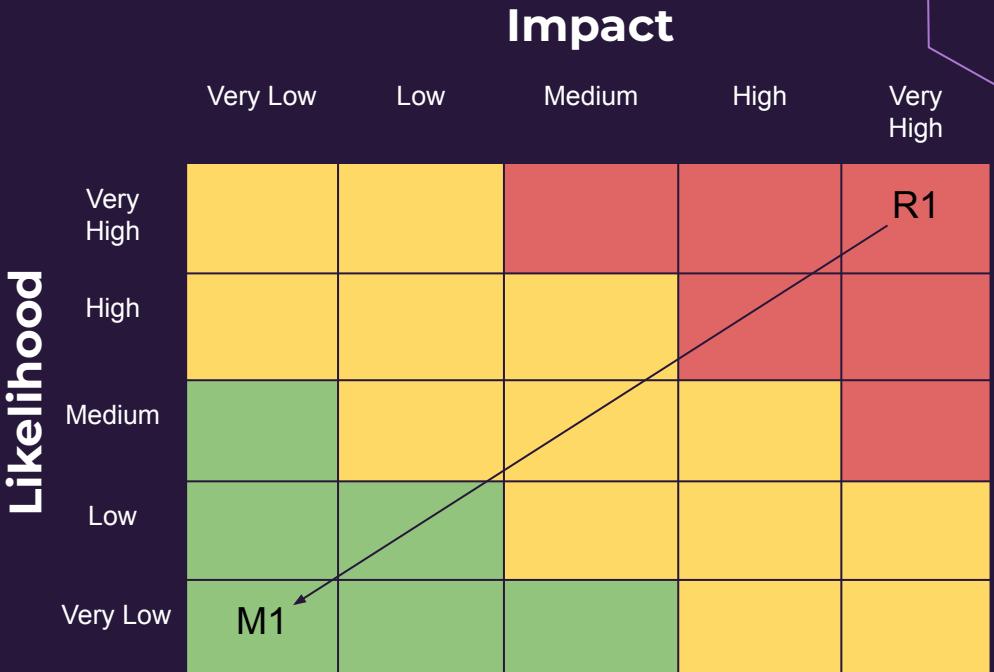
Security Risks

Risk

- ◆ **R1:** Data confidentiality

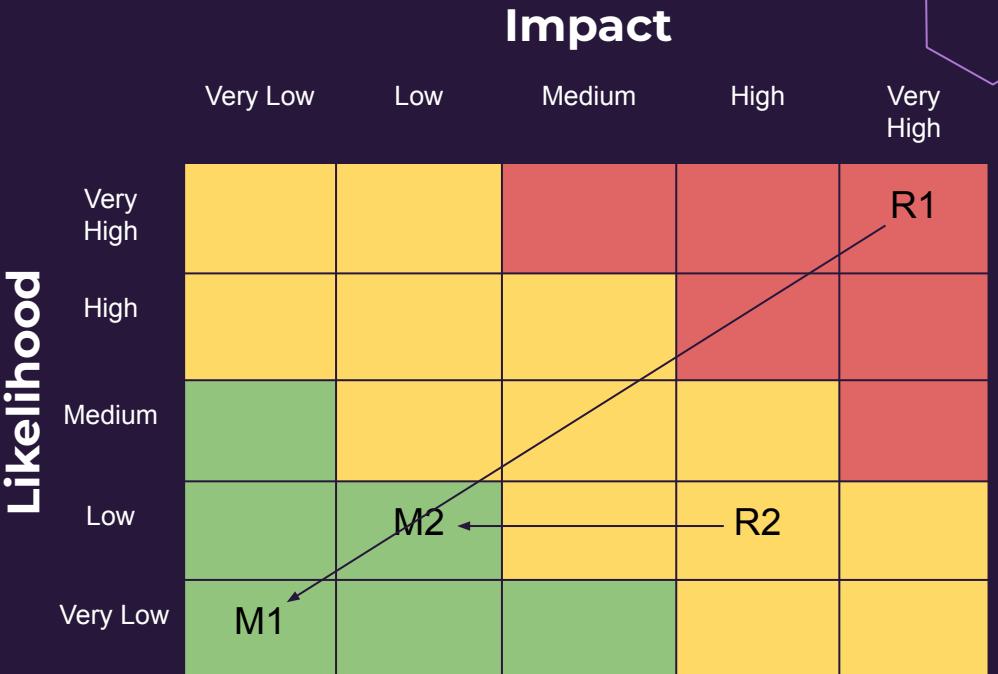
Mitigation

- ◆ **M1:** End-to-end encryption, multi-factor authentication, and clear role-based security groups



Security Risks

- ◆ **R2:** Data residency
- Mitigation**
- ◆ **M2:** Provide region-specific data hosting



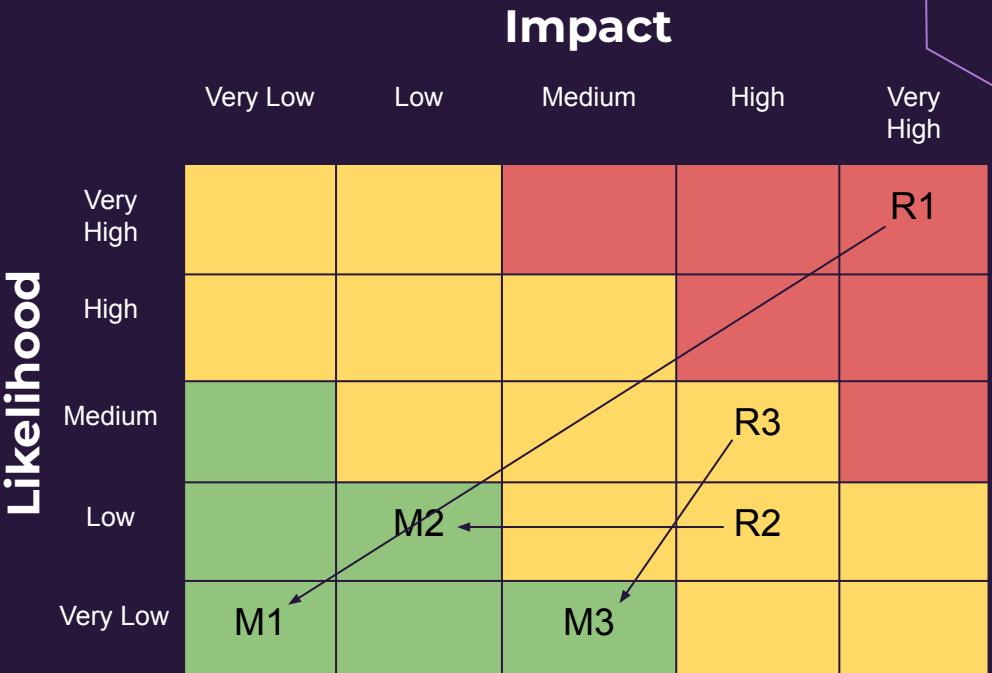
Security Risks

Risk

- ◆ **R3:** Supply chain attacks

Mitigation

- ◆ **M3:** Malware scanning on all libraries





Security Risks





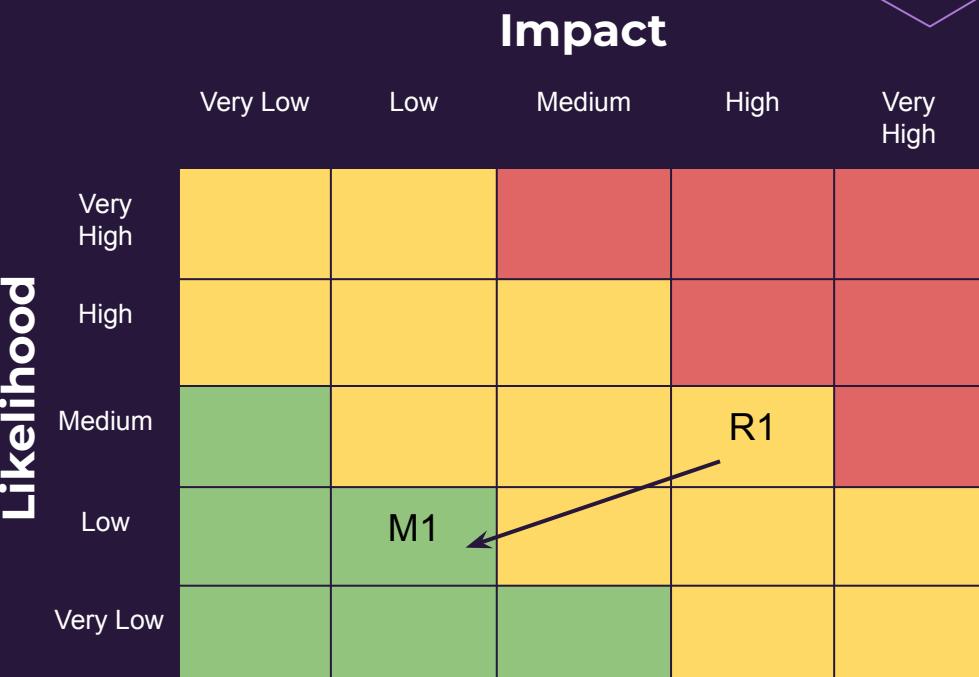
Legal Risks

Risks

- ◆ **R1:** Machine-generated incorrect results leading to financial loss

Mitigations

- ◆ **M1:** Keep human-in-the-loop for low-confidence cases, maintain full audit trails, define liability boundaries in contracts, consider professional liability insurance



Legal Risks

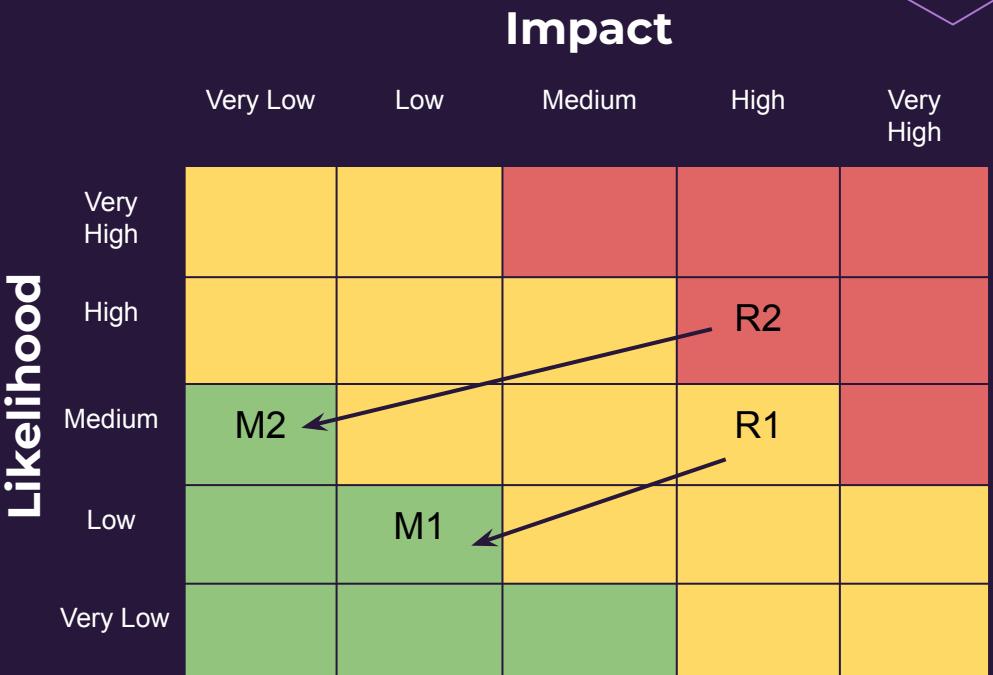


Risks

- ◆ **R2:** Clients' financial data may become vulnerable

Mitigations

- ◆ **M2:** Encrypt all data at rest and in transit, enforce role-based access



Legal Risks

Risks

- ◆ **R3:** Noncompliance with financial record-keeping laws can result in fines or failed audits

Mitigations

- ◆ **M3:** Implement automated record retention, ensure immutable audit logs, conduct regular compliance checks





Conclusion - Squaring up AI²

- ◆ **The Problem**
 - Manual invoice processing costs organizations time, money, and accuracy
- ◆ **Our Solution**
 - AI² automatically compares invoices to purchasing orders, accelerating processing while minimizing errors and backlogs.
- ◆ **The Difference**
 - Reduce processing costs by up to 80%
 - Easily scale AP operations
 - Free AP teams to focus on strategic, value-added work

Glossary

- ◆ **Atlantic Diving Supply (ADS):** An American federal contractor company that researches and provides equipments and logistics solutions to the Department of Defense, Federal Agencies, and First Responders.
- ◆ **Purchase Order:** The order list ADS sends to suppliers.
- ◆ **Invoice:** A list of goods sent or services provided, with a statement of the sum due for these; a bill.
- ◆ **Accounts Payable (AP):** The amount still outstanding that a business owes for goods and services purchased on credit, which typically comes due at intervals of 30, 45, 60, or 90 days, depending on the repayment terms.
- ◆ **Oracle:** The system of record for ADS.
- ◆ **APEX:** A strongly typed, object-oriented programming language that Salesforce developers use to execute flow and transaction control statements on the Salesforce platform.
- ◆ **Salesforce:** A robust Customer Relationship Management (CRM) platform allowing businesses to manage their customer relationships efficiently
- ◆ **Supplier:** A person or organization that provides something needed, such as a product or service.
- ◆ **Vendor:** A person or company offering something for sale.



User Roles

User Role	Responsibilities	Permissions
Administrator	<ul style="list-style-type: none">◆ Adjust AI² configurations to meet company needs◆ Review previous AI² decisions to monitor general performance◆ Ensure integrated systems remain compatible	<ul style="list-style-type: none">◆ Full System Access (read/write, modify).◆ Can manage configurations, user accounts and integrations
AP Team Member	<ul style="list-style-type: none">◆ Manually review invoices with low-confidence matches or no matches◆ Follow up on AI² reminders prior to their due dates◆ Note corrections for inaccurate matches to improve AI²	<ul style="list-style-type: none">◆ Limited data access to assigned invoices and queues◆ Accesses to AI² to make corrections for future accuracy.

User Roles Cont.

User Role	Responsibilities	Permissions
Compliance Officer	<ul style="list-style-type: none">◆ Reviews audit logs for regulatory and financial compliance◆ Verify that invoice handling adheres to internal policies and external frameworks (e.g., FedRAMP, DoD RMF).◆ Oversee data retention, access logs, and encryption practices.	<ul style="list-style-type: none">◆ Read-only access to audit trails and financial summaries.◆ No modification rights.
AI Model Trainer	<ul style="list-style-type: none">◆ Monitor model accuracy and retrain AI² using anonymized invoice data.◆ Evaluate false matches and adjust model parameters or retraining schedules.◆ Work with administrators to ensure model updates comply with data governance rules.	<ul style="list-style-type: none">◆ Access to anonymized datasets only.◆ No Access to live invoice or PO data.

User Stories

Administrator

As an Administrator, I want AI² to authenticate users through ADS's Okta SSO system so that access is secure, compliant, and consistent with ADS's existing authentication policies.

As an Administrator, I want to adjust AI²'s configurations—such as confidence score thresholds, routing rules, and notification preferences—so that the system aligns with the company's changing policies and workflows.

As an Administrator, I want to automatically assign incoming invoices to AP team queues based on supplier names, and reassign suppliers between queues when workloads are uneven, so that invoice processing is evenly distributed.

As an Administrator, I want to connect AI² to ADS's Outlook inbox using Microsoft Graph API and to Oracle NetSuite through the Alteryx API so that invoices can be automatically pulled, processed, and synced with existing systems.

User Stories

Administrator Cont.

As an Administrator, I want to view dashboards summarizing AI²'s matching accuracy, queue performance, and integration health so that I can monitor efficiency, detect errors, and ensure compliance with CMMC and FedRAMP guidelines.

As an Administrator, I want AI² to be hosted in a FedRAMP-compliant AWS GovCloud environment and maintain audit logs of all user and system actions so that the solution adheres to government security frameworks and can pass compliance reviews.

As an Administrator, I want to receive automatic alerts when integrations fail or when invoice routing encounters errors so that I can take corrective action promptly and maintain operational continuity.

User Stories

AP Team Member

As an AP Team Member, I want AI² to automatically pull invoice emails and attachments from the shared Outlook inbox using the Microsoft Graph API so that I can see all new invoices in one central dashboard without manually downloading them.

As an AP Team Member, I want AI² to flag invoices with low confidence scores and display the potential mismatched fields so that I can correct the data and help the AI learn over time.

As an AP Team Member, I want to view all invoices from my assigned suppliers in a personalized queue so that I can easily track, review, and complete my assigned workload.



User Stories

Compliance Officer

As a Compliance Officer, I want to perform routine reviews of AI²'s audit logs so that I can confirm that AI² is adhering to internal policies.

As a Compliance Officer, I want to verify that invoice handling adheres to federal and state regulatory requirements and guidelines (including but not limited to FedRamp and DOD RMF) so that I can ensure that AI² is maintaining compliance.

As a Compliance Officer, I want to ensure that invoice and user data is encrypted both at rest and in transit so that I can ensure AI² maintains required data protection standards under CMMC and FedRamp.

As a Compliance Officer, I want to generate periodic compliance and audit reports summarizing access, invoice activity and data handling practices, so that I can document adherence to regulatory requirements.

As a Compliance Officer, I want AI² to log all configuration or policy changes made by the administrators, so that I can ensure accountability and verify that no unauthorized adjustments compromise compliance.

User Stories

AI Model Trainer

As an AI Model Trainer, I want to document model training guidelines so that other members of my team or future AI Model Trainers have a standardized process to follow.

As an AI Model Trainer, I want to retrain AI² so that I can continuously improve upon AI²'s pattern recognition.

As an AI Model Trainer, I want to periodically assess AI²'s outputs so that I can evaluate how they align with company expectations and predetermined metrics.

As an AI Model Trainer, I want to clean and anonymize invoice data so that I can use it for retraining purposes.

As an AI Model Trainer, I want to collaborate with administrators so that I can guarantee that model updates remain compliant with data governance rules.

As an AI Model Trainer, I want to monitor model accuracy so that I can assess AI² is meeting internal standards.

As an AI Model Trainer, I want to adjust model parameters and/or retraining schedules so that I can help AI² improve accuracy.

Feature Table

Category	Feature	Administrator	AP Team Member	Compliance Officer	AI Model Trainer
Invoice Intake and Processing	Outlook Email Integration (Graph API)	<input type="checkbox"/>	<input type="checkbox"/>		
	Invoice Parser and Data Extractor		<input type="checkbox"/>		
	Smart PO Matching System / Algorithm	<input type="checkbox"/>	<input type="checkbox"/>		
Queue Assigning and Routing	Supplier-Based Assigning and Routing System	<input type="checkbox"/>	<input type="checkbox"/>		
	Queue Assignment Dashboard	<input type="checkbox"/>	<input type="checkbox"/>		

Feature Table Cont.

Category	Feature	Administrator	AP Team Member	Compliance Officer	AI Model Trainer
AI Model Management	Model Training and Deployment Pipeline				<input type="checkbox"/>
	Model Version Control				<input type="checkbox"/>
	AI Performance Dashboard				<input type="checkbox"/>
System and Configuration Maintenance	Admin Configuration Dashboard	<input type="checkbox"/>			
	System Health and Performance Dashboard	<input type="checkbox"/>			
	Error Logging and Recovery Module	<input type="checkbox"/>			

Feature Table Cont.

Category	Feature	Administrator	AP Team Member	Compliance Officer	AI Model Trainer
Notification System	Automated Supplier Notifications	<input type="checkbox"/>	<input type="checkbox"/>		
	Automated AP Team Reminders	<input type="checkbox"/>	<input type="checkbox"/>		
Confidence Scoring and AI Learning	AI PO Matching		<input type="checkbox"/>		<input type="checkbox"/>
	AI Confidence Scoring Module		<input type="checkbox"/>		<input type="checkbox"/>
	Continuous Learning From Human Interaction		<input type="checkbox"/>		<input type="checkbox"/>
	Human Review Panel		<input type="checkbox"/>		<input type="checkbox"/>

Feature Table Cont.

Category	Feature	Administrator	AP Team Member	Compliance Officer	AI Model Trainer
Compliance and Security Monitoring	Encryption Verification Tool	<input type="checkbox"/>		<input type="checkbox"/>	
	AWS GovCloud Integration Tool	<input type="checkbox"/>		<input type="checkbox"/>	
	Audit Log Management System	<input type="checkbox"/>		<input type="checkbox"/>	
	Compliance Changelog System	<input type="checkbox"/>		<input type="checkbox"/>	
	Auto Generated Compliance Report	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Compliance Regulations Monitoring Tool	<input type="checkbox"/>		<input type="checkbox"/>	

User Interface Mockups

Invoice Processing System
Upload, extract, and match invoices with purchase orders

Logged in as: Michael Torres

Automated Reception Manual Upload Review & Match (3)

Automated Invoice Reception

Invoices are automatically received and processed from configured sources

✉️ ⌚ active
Invoice Inbox (invoices@company.com)
247 received
5m ago

🔗 ⌚ active
Vendor Portal API
156 received
15m ago

FTP ⌚ paused
Shared FTP Server
89 received
2h ago

Processing Queue

Real-time invoice processing from all sources

?

Human Review

Invoice Processing System

Upload, extract, and match invoices with purchase orders

Logged in as: Michael Torres

Automated Reception Manual Upload Review & Match 3

Queue Overview

Confidence Distribution	⚠️	Queue Status	👤	Total Value	↗️	Performance	🕒
Low (<50%)	1	Claimed	1	\$22,609		Avg Wait: 2.5h	
Med (50-79%)	2	Available	2	Avg: \$7,536		Oldest: 5 days	
High (≥80%)	0	Total Pending	3				

Review Queue

Michael Torres

📄 Available 2	👤 My Queue 1	📄 In Review 0
----------------------------	---------------------------	----------------------------

Sort by: Match Confidence

Flagged for Review
No matching PO found

📄 Invoice Number	📅 Invoice Date
INV-2024-1956	Oct 29, 2024
💵 Vendor	\$ Total Amount

UI Invoice Upload

Invoice Processing System

Upload, extract, and match invoices with purchase orders

Logged in as: Michael Torres

Automated Reception Manual Upload Review & Match 3

Upload Invoices

Upload invoices from PDF files, Excel spreadsheets, or paste email content

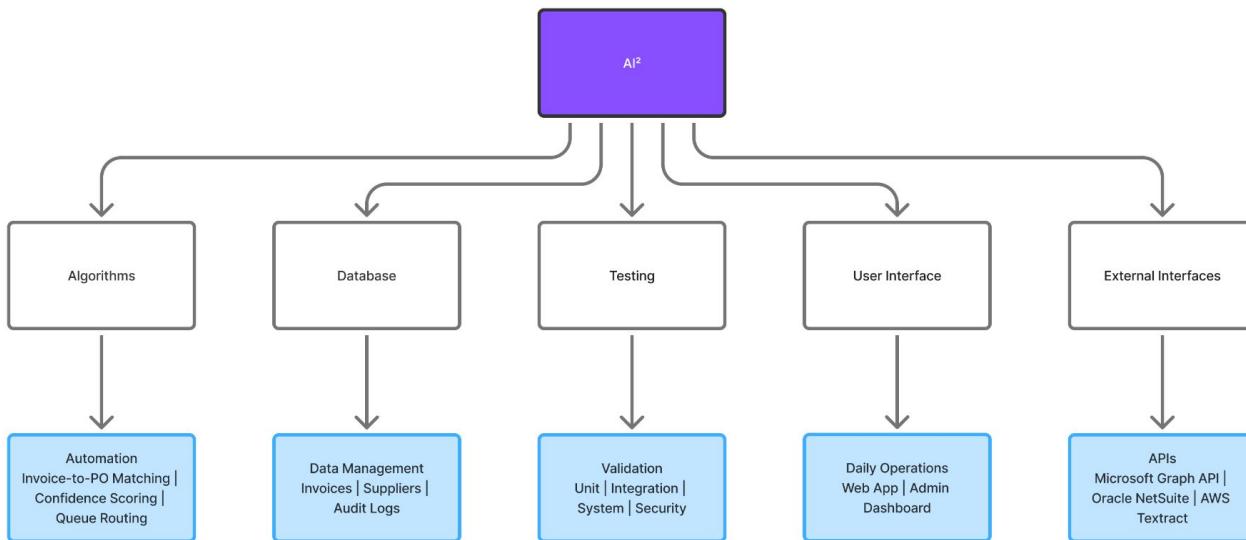
PDF Files Email Excel

Click to upload or drag and drop

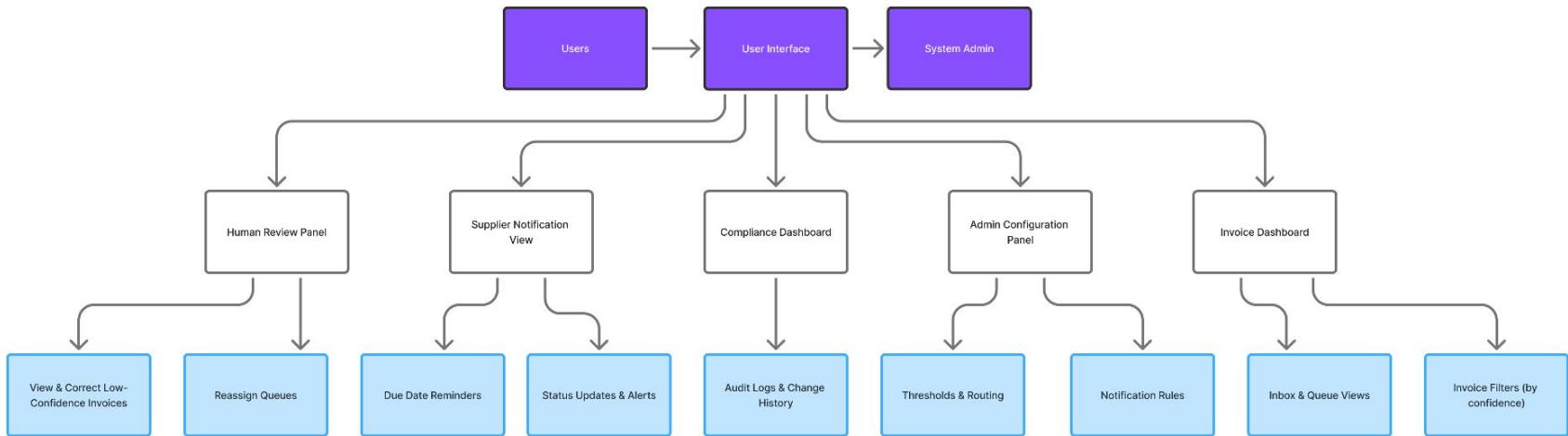
PDF files up to 10MB

?

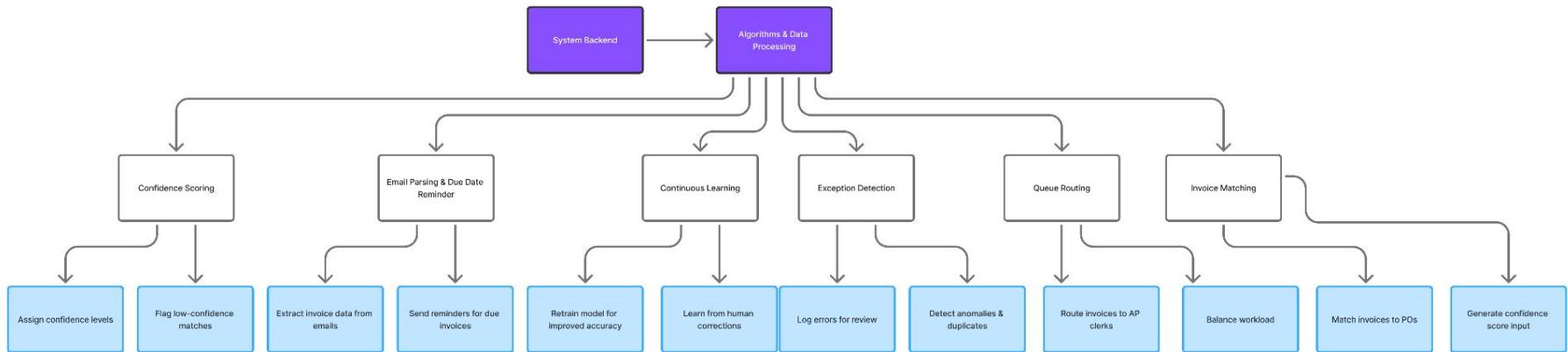
WBS: System Overview



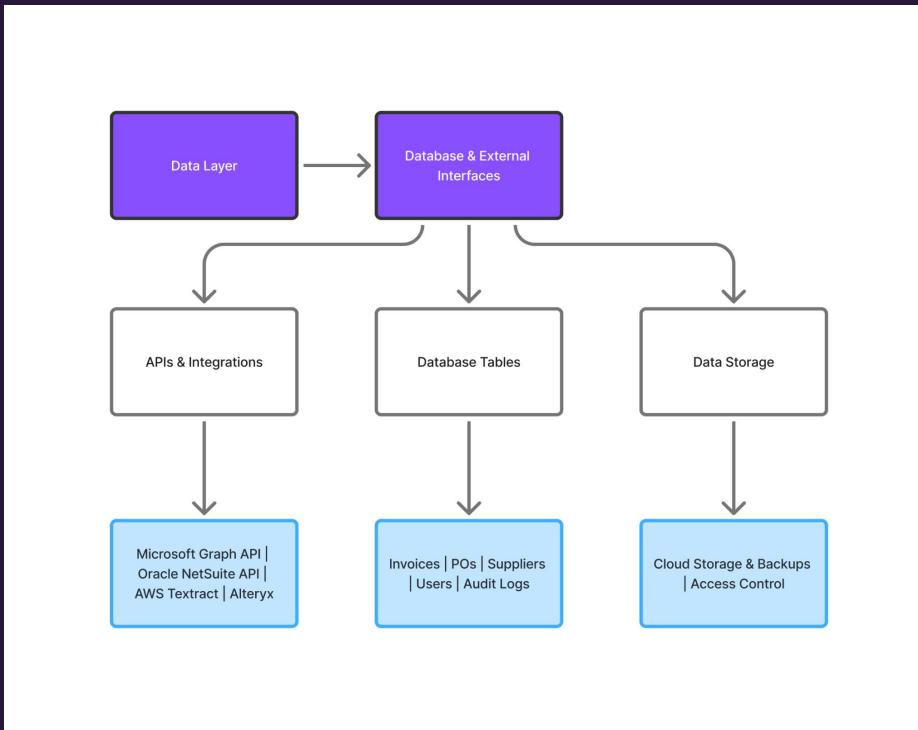
WBS: User Interface



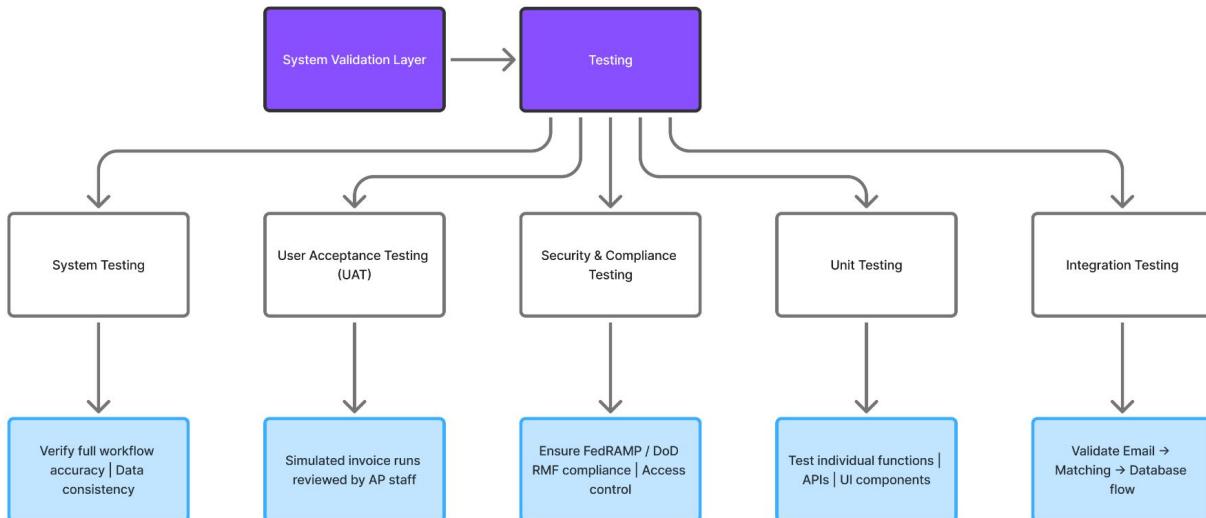
WBS: Algorithms & Data Processing



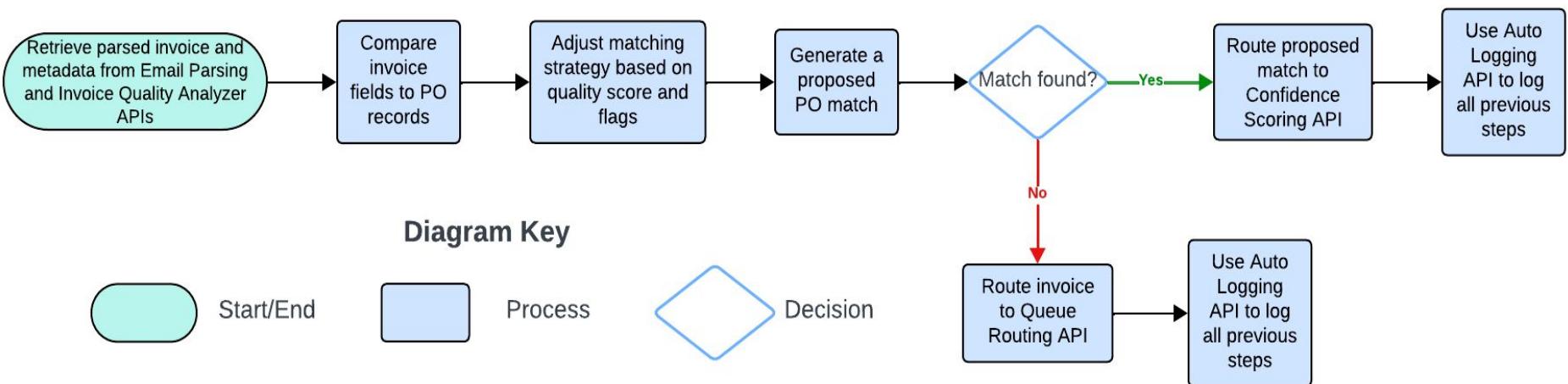
WBS: Database and External Interfaces



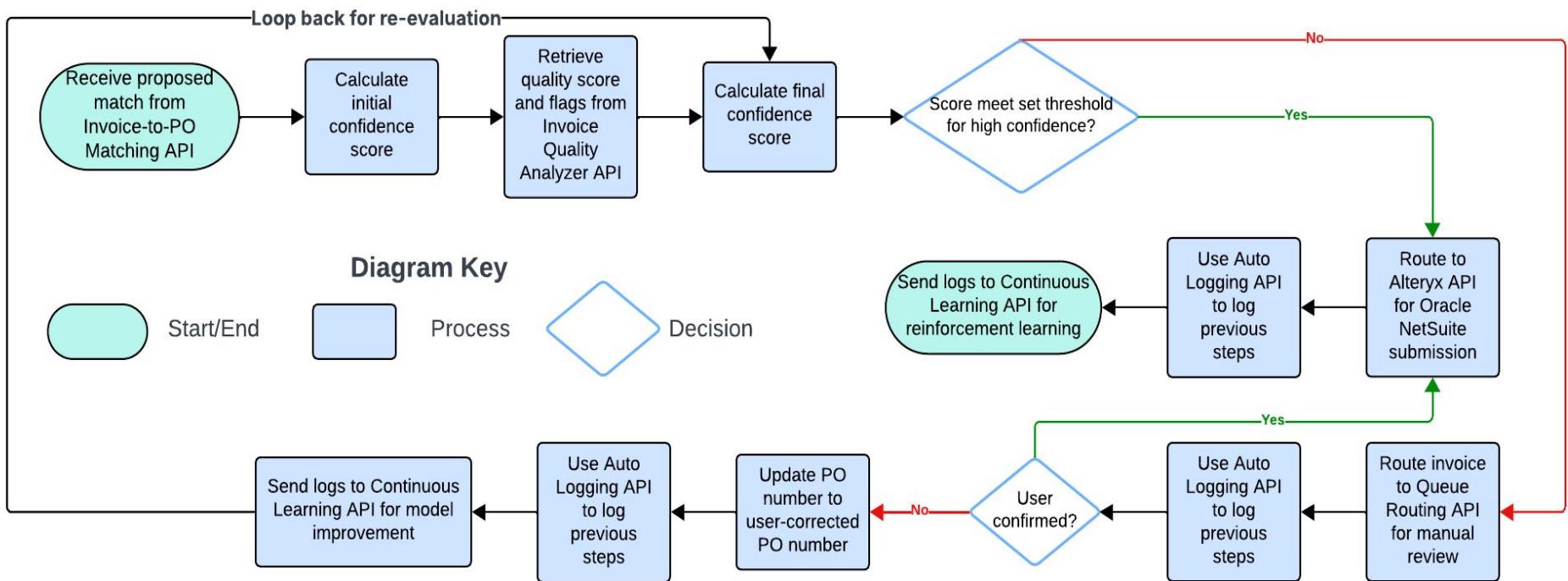
WBS: Testing and Validation



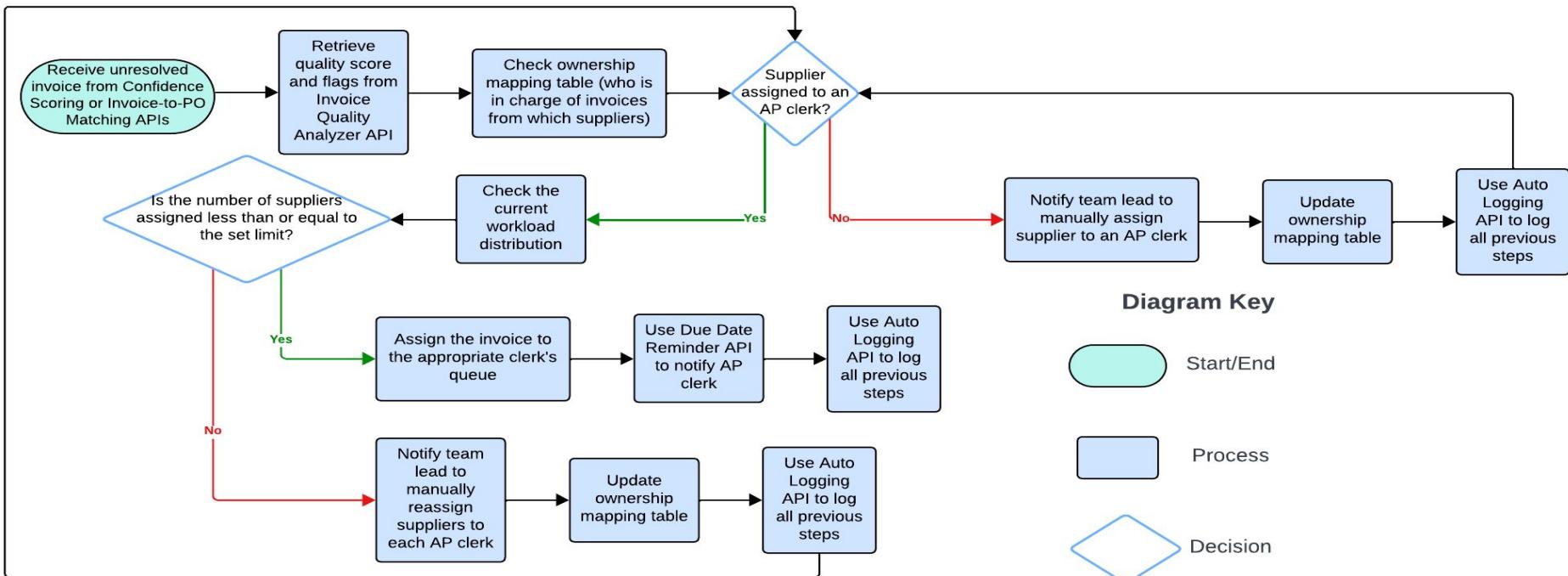
Invoice-to-PO Matching Algorithm



Confidence Scoring Algorithm



Queue Routing Algorithm



Invoice Quality Analyzer Algorithm

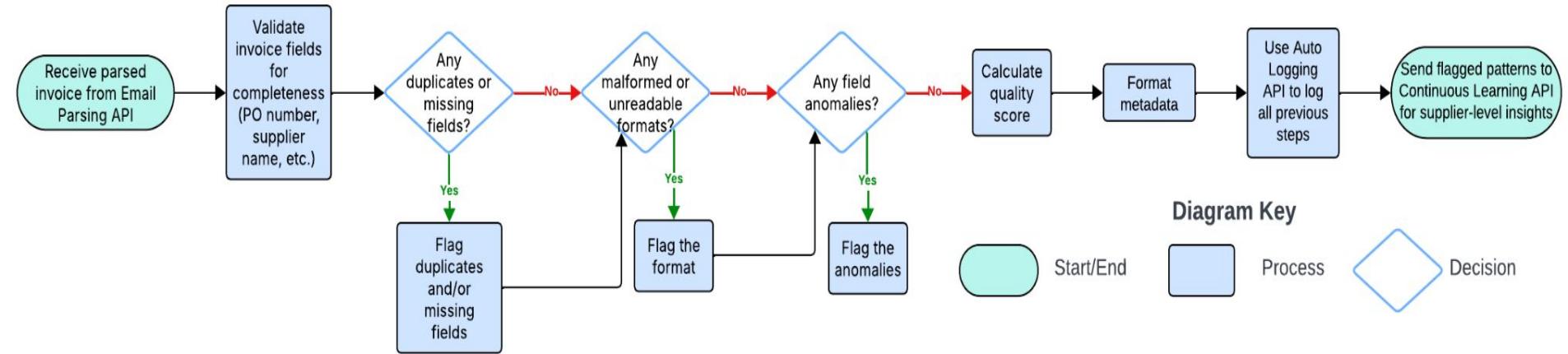


Diagram Key



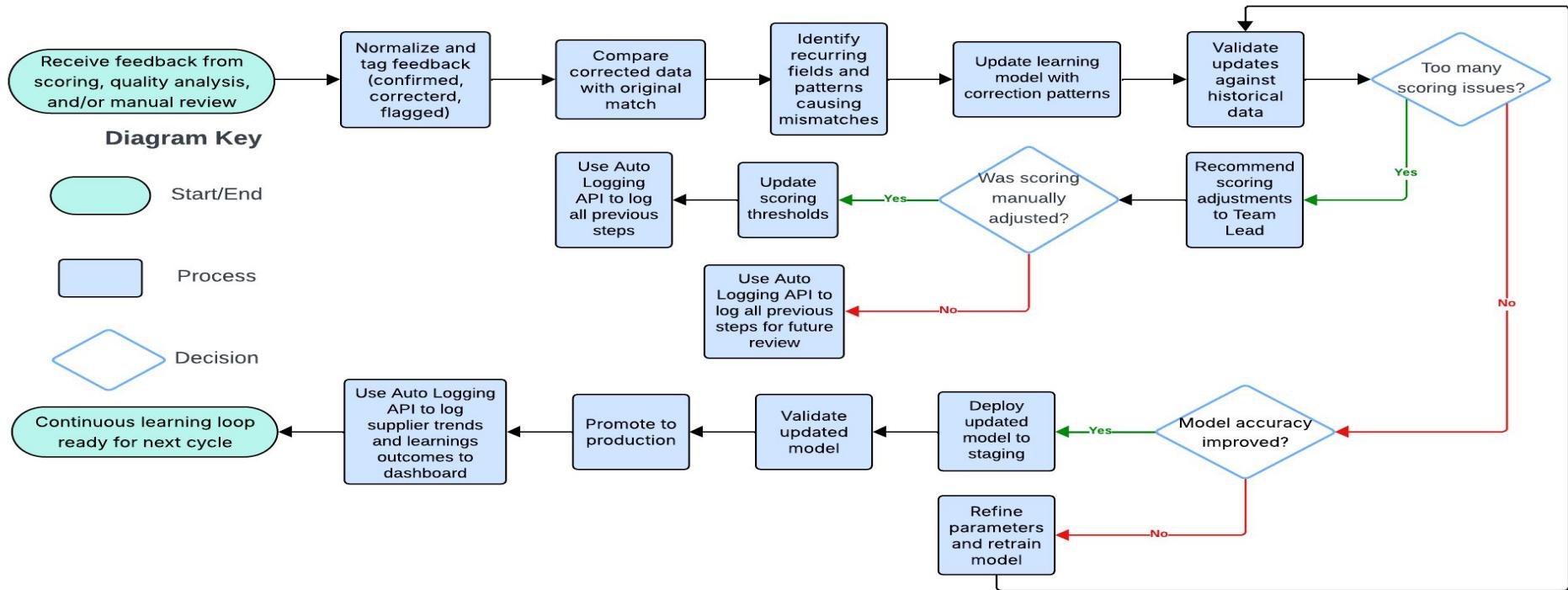
Start/End

Process



Decision

Continuous Learning Algorithm



Email Parsing Algorithm



Diagram Key



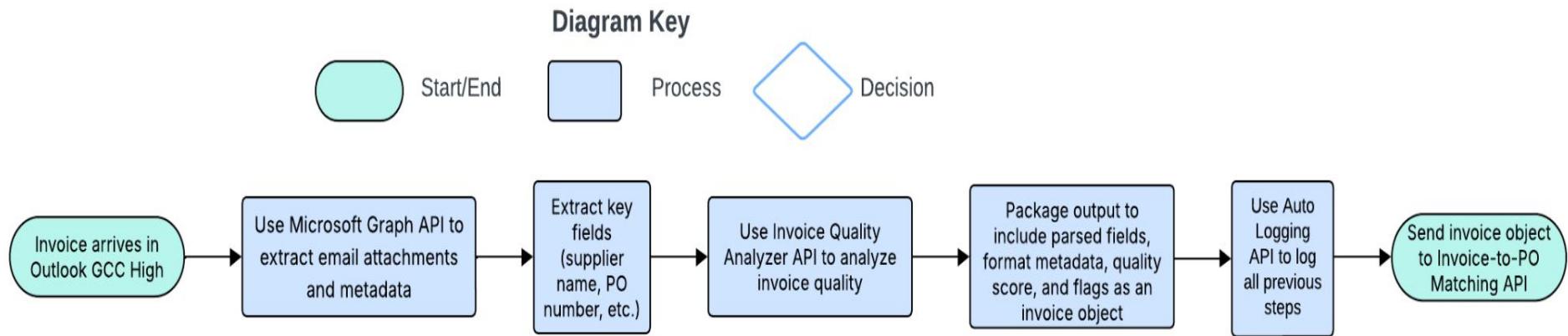
Start/End



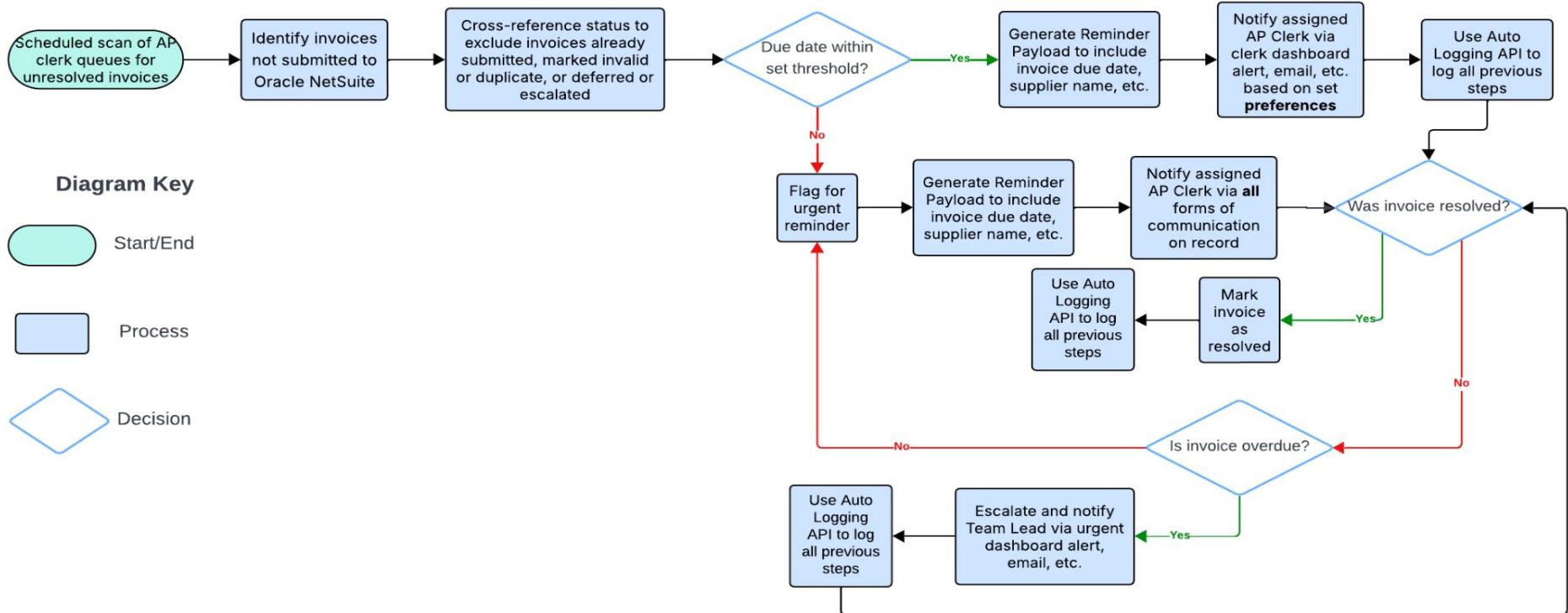
Process



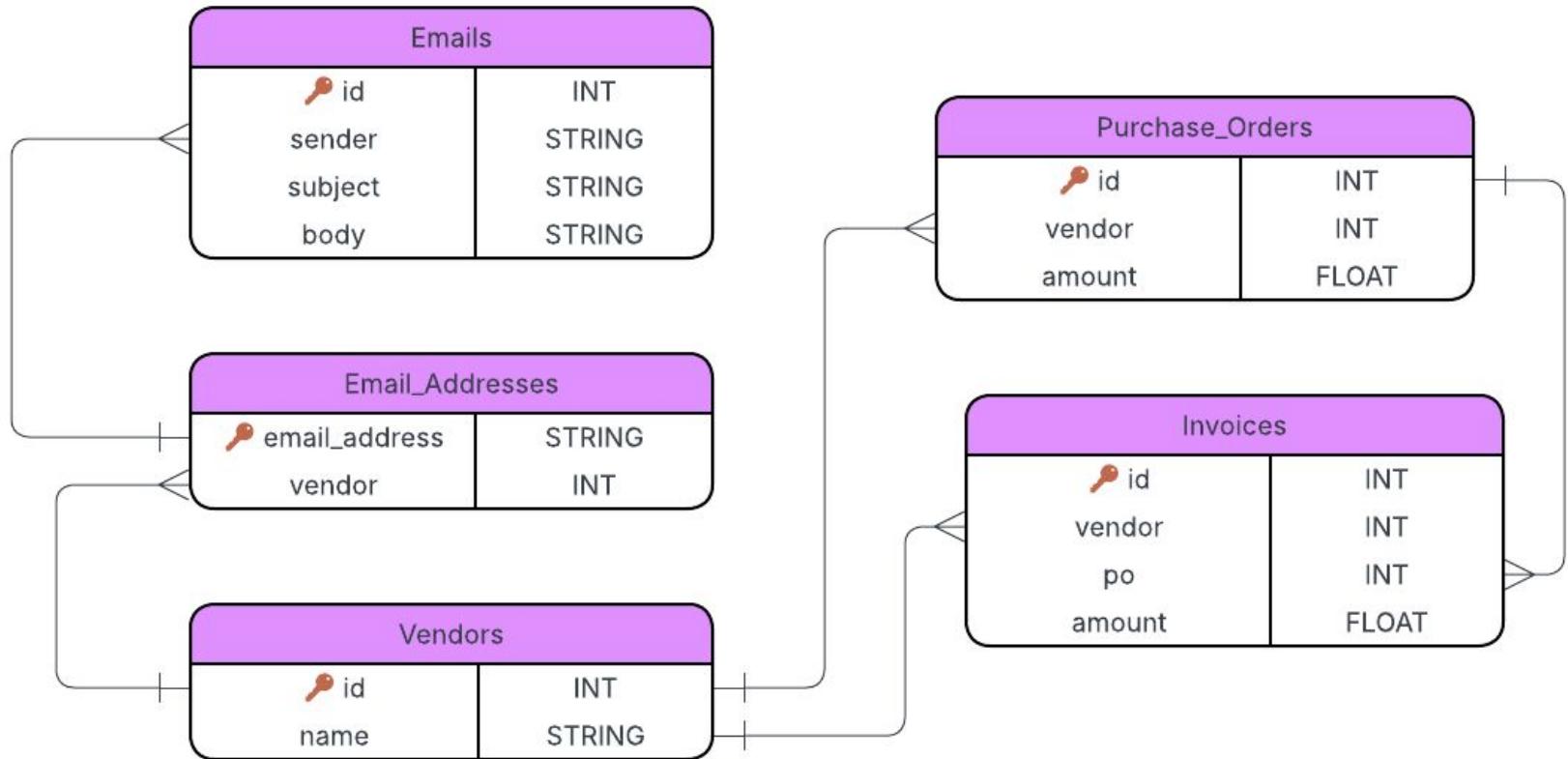
Decision



Due Date Reminder Algorithm



Database Schema





Sprint Breakdown

1. Foundation

- Basic application
- User Interface

(AP Team Member)

2. Integration

- w/ Outlook Inbox
- Oracle NetSuite

(Administrator User Story)

3. Authentication

- Integrate ADS Okta SSO (role-access)
- Security clearance

(Administrator User Story)

4. Configurations:

- Confidence thresholds
- Routing rules
- Notifications

(Administrator User Story)

5. Queues + Flagging

- Assign invoices to AP'S
- Flagging invoices w/ low confidence for AI training

(AP Team Member)

6. Training

- Pattern recognition
- Improve accuracy

(AI Model Trainer)

7. Reports

- Summaries on accuracy
- Audit logs to adhere to federal + state guidelines

(Compliance Officer)

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