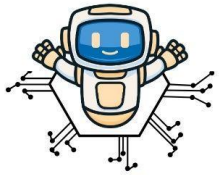
AI²

Artificially Intelligent Invoices



Team Copper
Fall 2025

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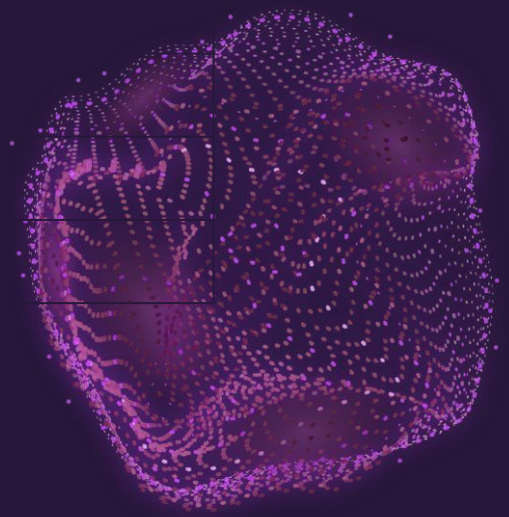


Meet The Team

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

[3]

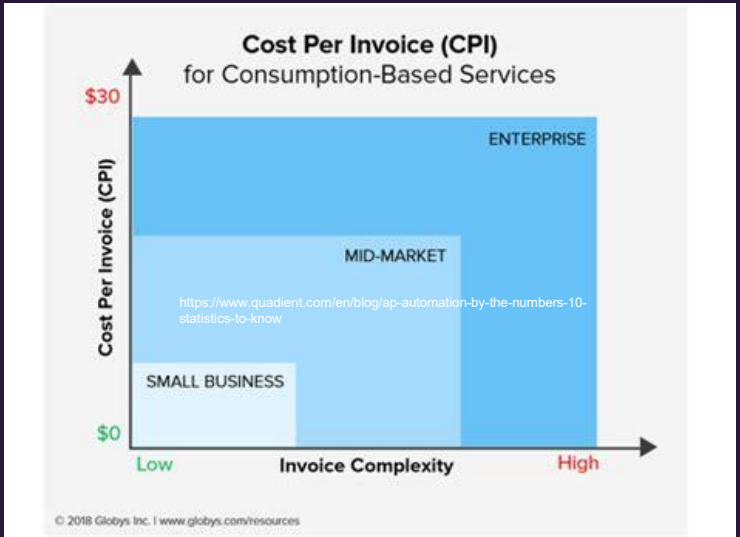
Background

- 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

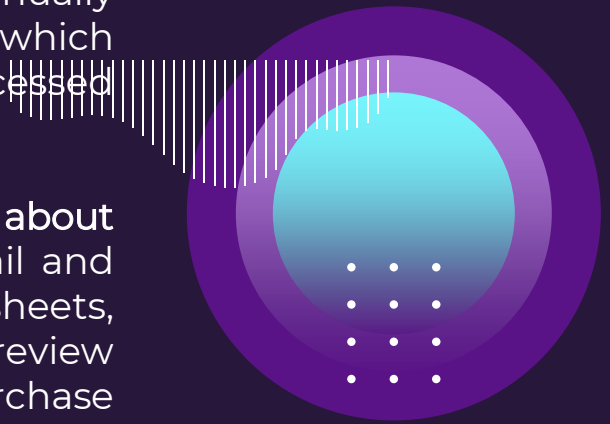
- ADS processes 150,000 invoices annually from ~3,000 individual suppliers
- A small team of around 6 staff members handle invoices that are received in a variety of formats PDFs, spreadsheets, etc.
- Manual handling leads to
  - Delays and payment backlogs
  - Errors (duplicates, mismatches, etc.)
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



Problem Statement

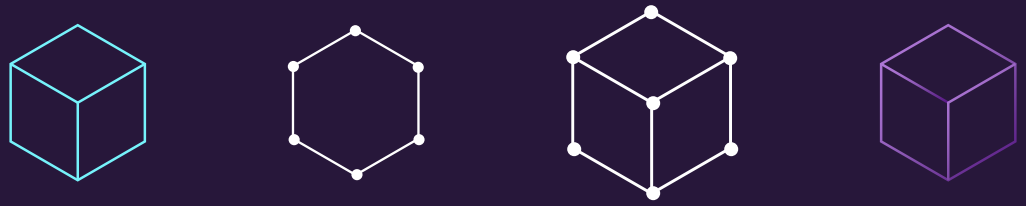
- **Accounts Payable (AP) manual processing** is costly and inefficient. Between labor costs, printing and mailing expenses, and accounting for errors, each manually processed invoice can cost between $12 and $40, which adds up across thousands of invoices. A manually processed invoice takes an average 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.



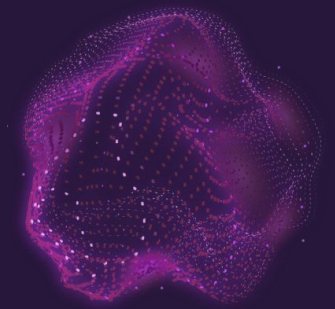
Who is Affected

- 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.

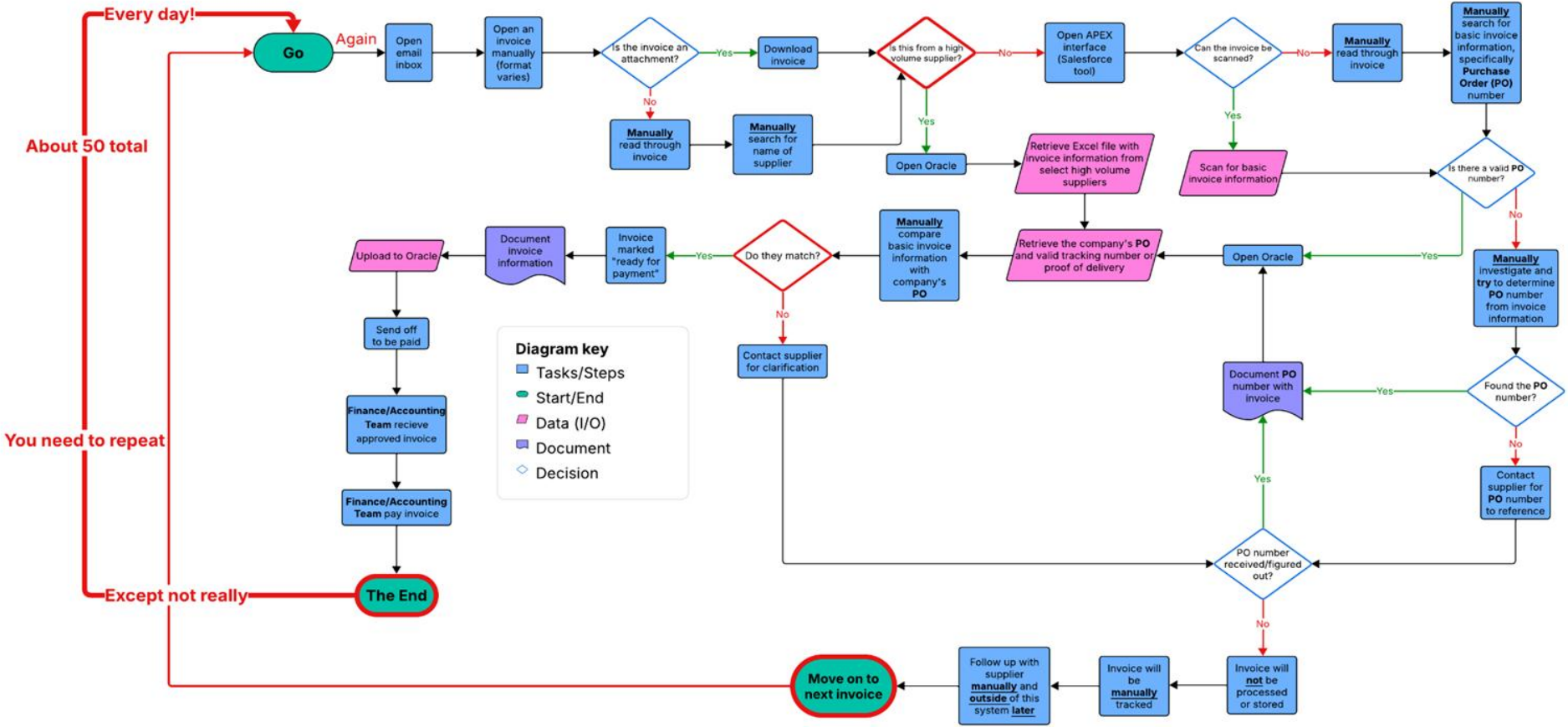


Problem Characteristics

- **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 ⅓ 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

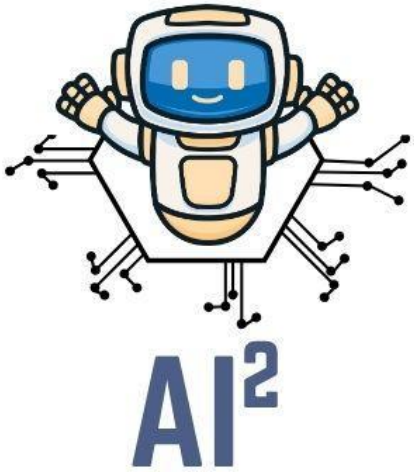


Current Process Flow



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.



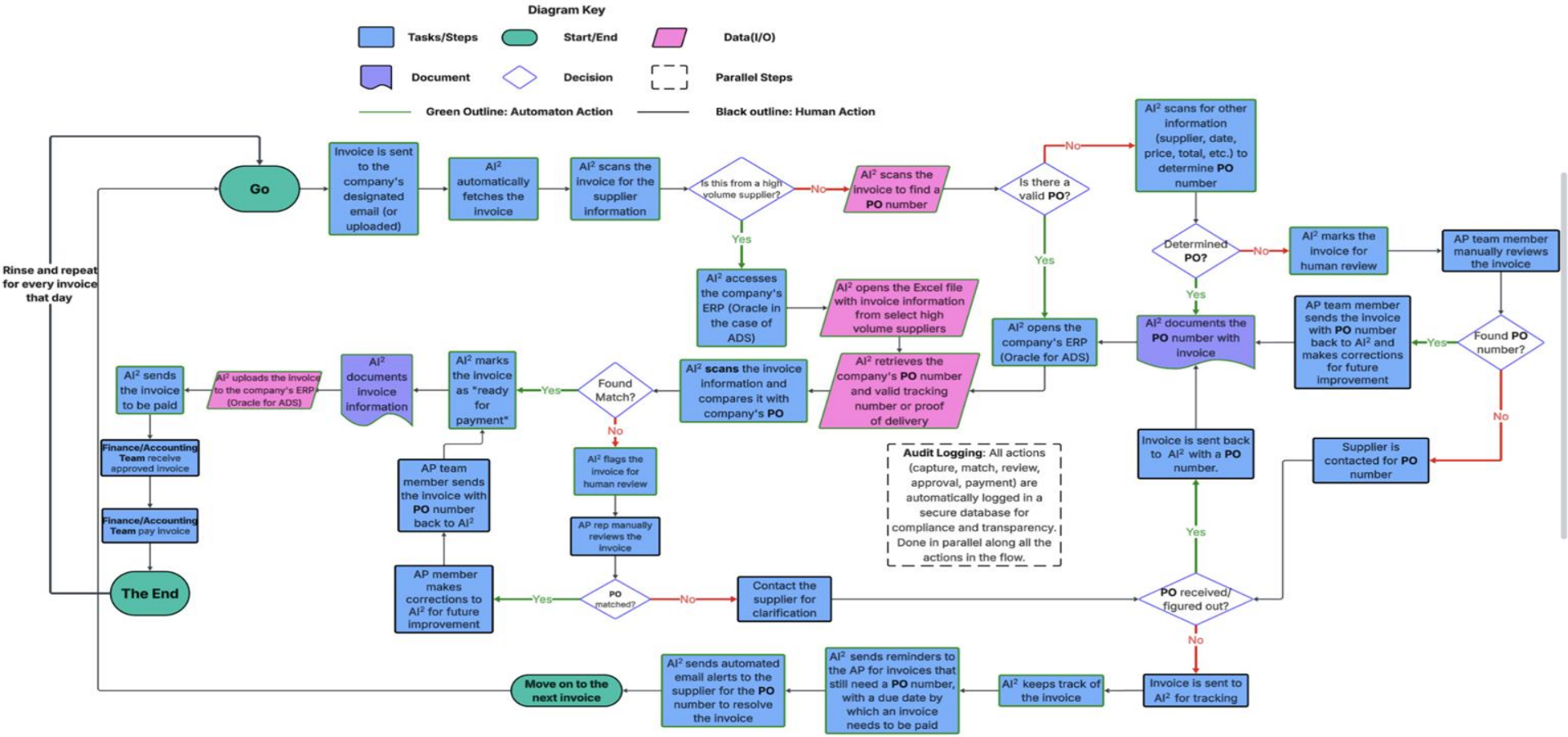
AI² and ADS

- 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
  - AI^2 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

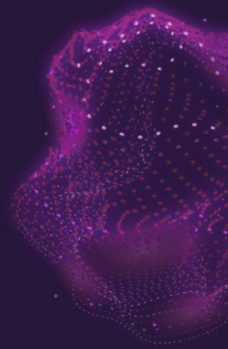
- **Email Intake and Storage:** Emails will be taken upon arrival and be sorted and prioritized.
- **Volume Handling:** AI² will considerably reduce the manual processing of individual invoices.
- **AI PO Matching:** Invoices will be matched to their corresponding purchase order.
- **AI Confidence Scoring:** 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

	AI²	Tipalti	SAP Concur	QuickBooks	Manual Processing
Volume handling	🟢	🟢	🟢	🟡	🔴
Error reduction	🟢	🟡	🟢	🟡	🔴
Less human interaction	🟢	🟢	🟢	🟡	🔴
Timeliness	🟢	🟢	🟢	🟡	🔴
AI PO matching	🟢	🟢	🟢	🔴	🔴
AI confidence scoring	🟢	🟢	🟢	🔴	🔴
Continuous learning from past corrections	🟢	🟢	🟢	🔴	🔴
Quick implementation	🟢	🟢	🔴	🟢	🟢
Tailored for client	🟢	🟢	🟢	🔴	🟢
Long-tail vendor handling	🟢	🟢	🟢	🔴	🟢
Easily customizable	🟢	🟢	🔴	🔴	🔴
Adaptable	🟢	🟢	🟢	🔴	🟢

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Major Functional Components

User Interface

- 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

Application Layer

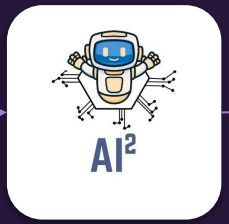
- Invoice Inbox
  - Azure (Microsoft Rest Api)
- AWS Textract (pdf's)
- Aperture (spreadsheets)
- oracledb driver to access PO's

Data Layer

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

Major Functional Components Diagram

User Interface



Web Application
And Extension

Frequency Query

PO Learning Algorithm

Application Layer

Invoice Inbox

"oracledb" for PO

PO not found, need human review

Match found in PO continue w/ invoice extract

How is the invoice delivered?

AWS Textract (pdf's)

Body of email (text extract)

Aperture (spreadsheets)

Data Layer

Storage Container

Pay Order Formats

Oracle

Invoice Data

- Purchase Order #
- Supplier
- Date
- Quantity

Development Tools

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

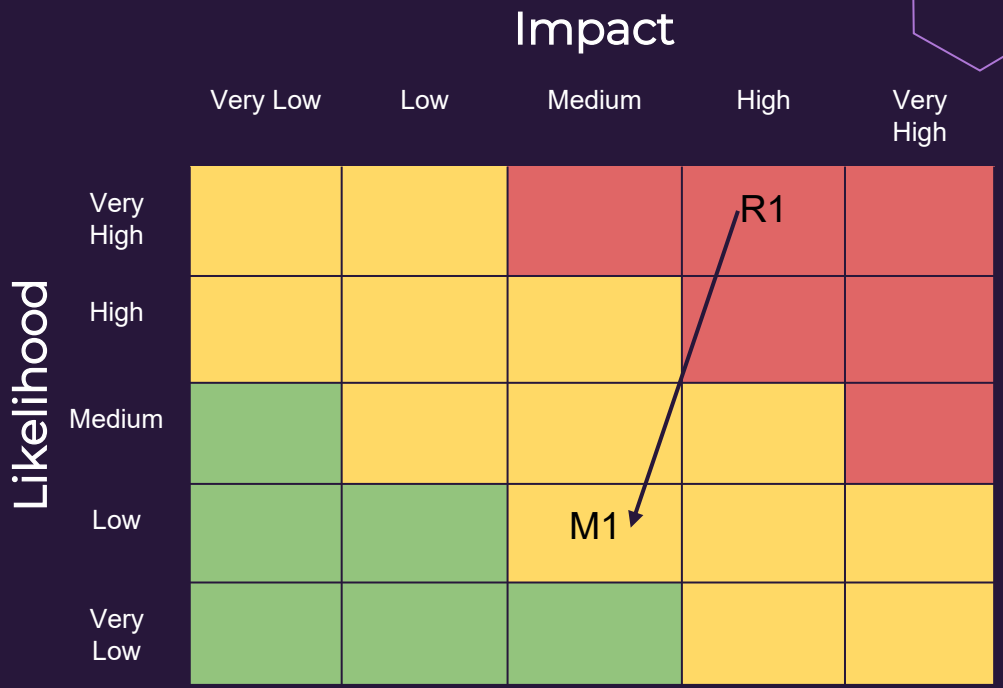
User Risks

Risk

- **R1:** Unassigned Low Confidence Invoices

Mitigation

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



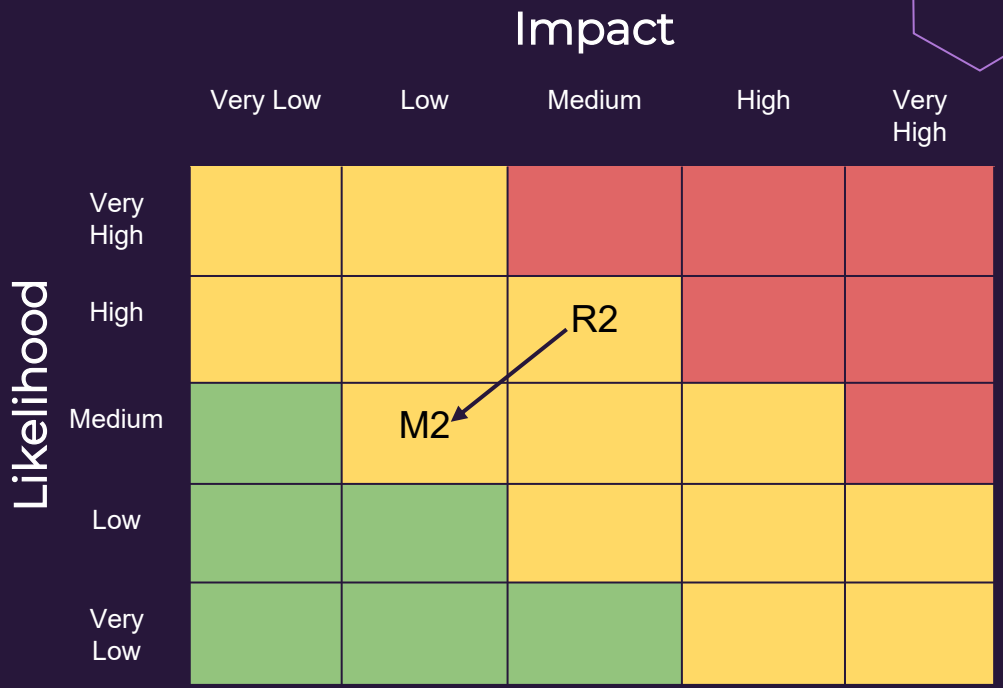
User Risks

Risk

- **R2:** Workflow disruption during transition

Mitigation

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



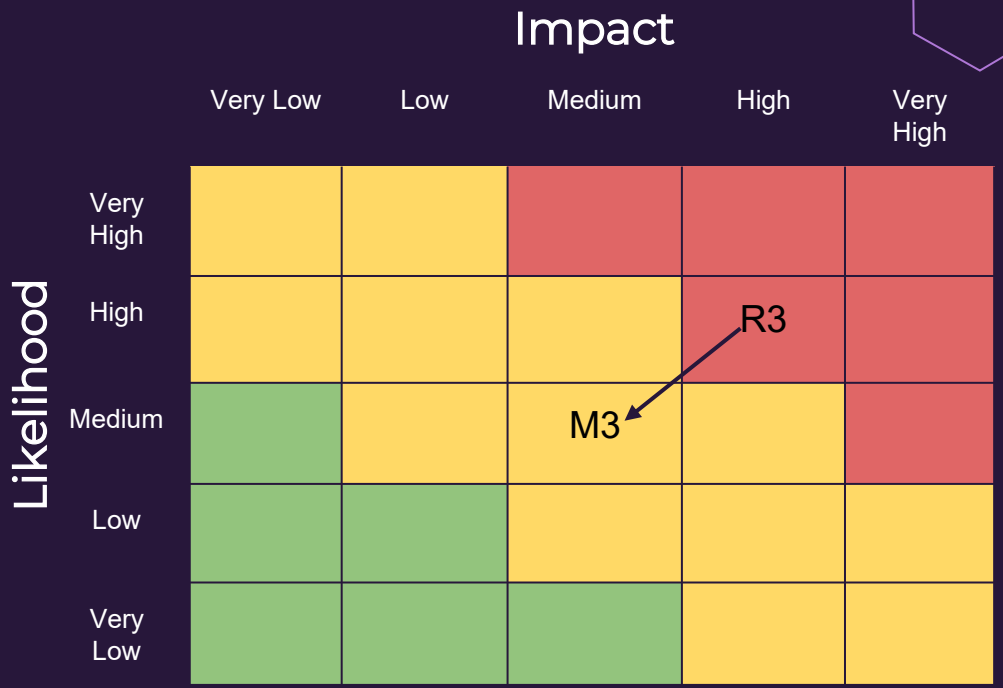
User Risks

Risk

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

Mitigation

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



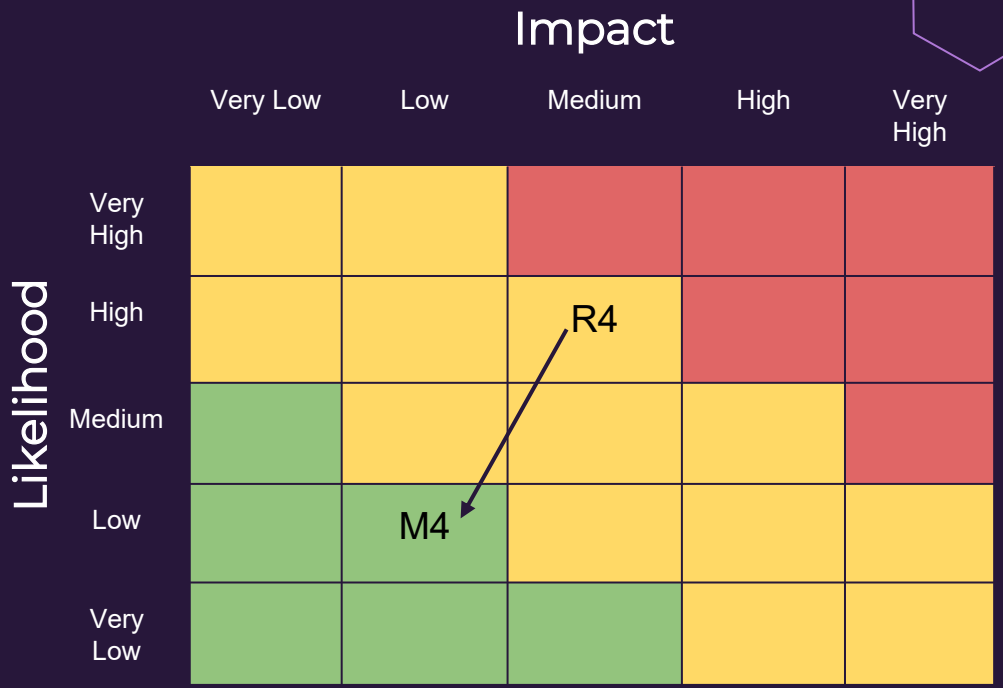
User Risks

Risk

- **R4:** Overdependence on automation

Mitigation

- **M4:** Confidence scoring will trigger human review automatically



Legend

High Risk

Medium Risk

Low Risk

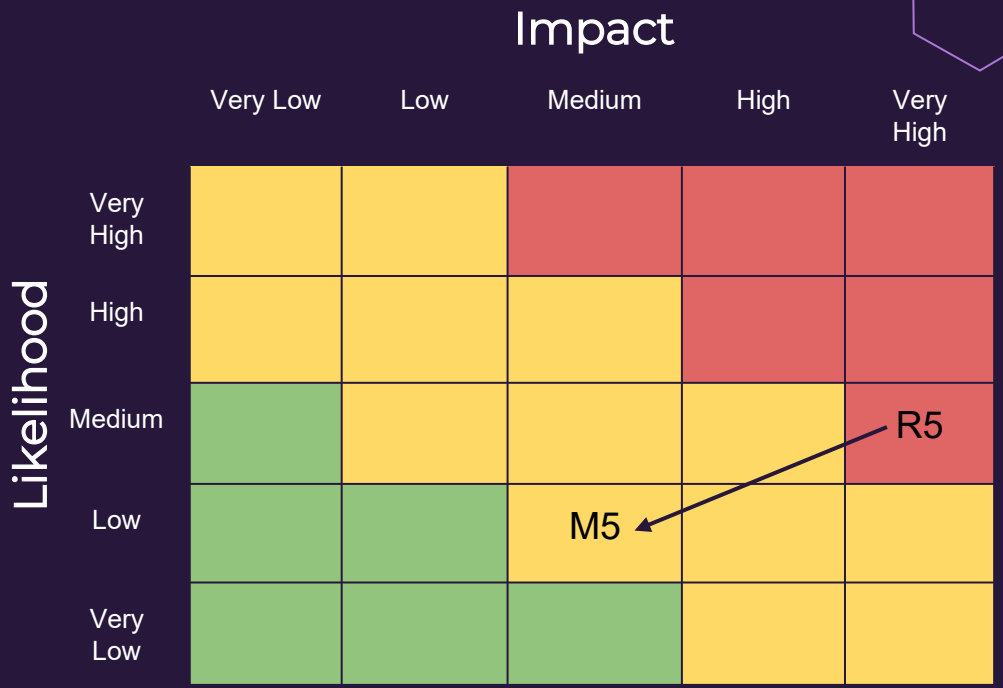
User Risks

Risk

- **R5:** Resistance or Misuse of the System

Mitigation

- **M5:** Offering transparent logs to build trust and accountability



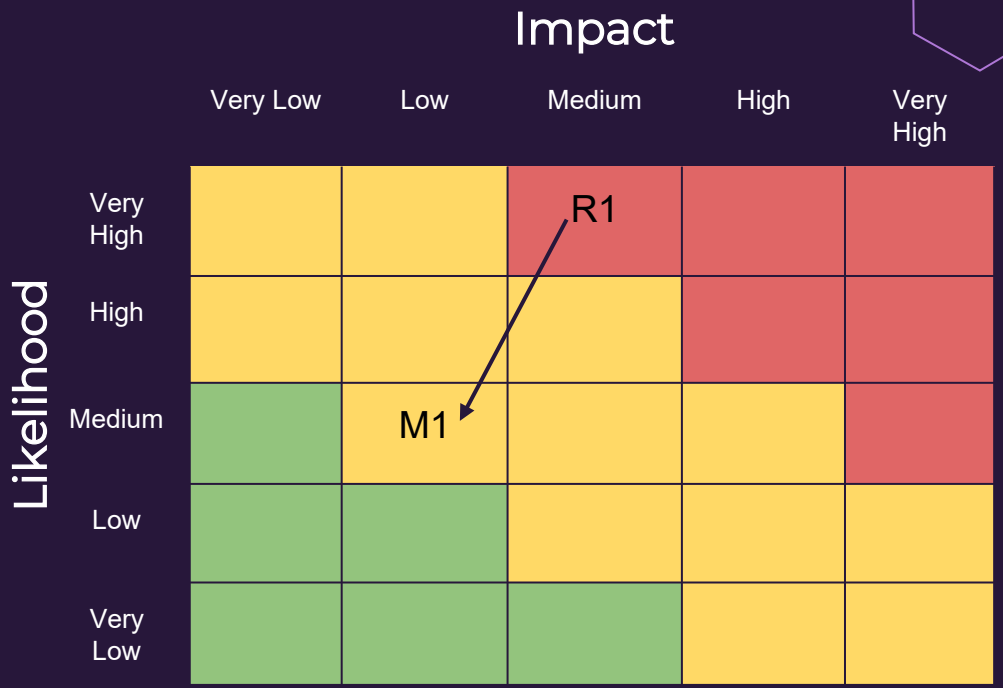
Customer Risks

Risk

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

Mitigation

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



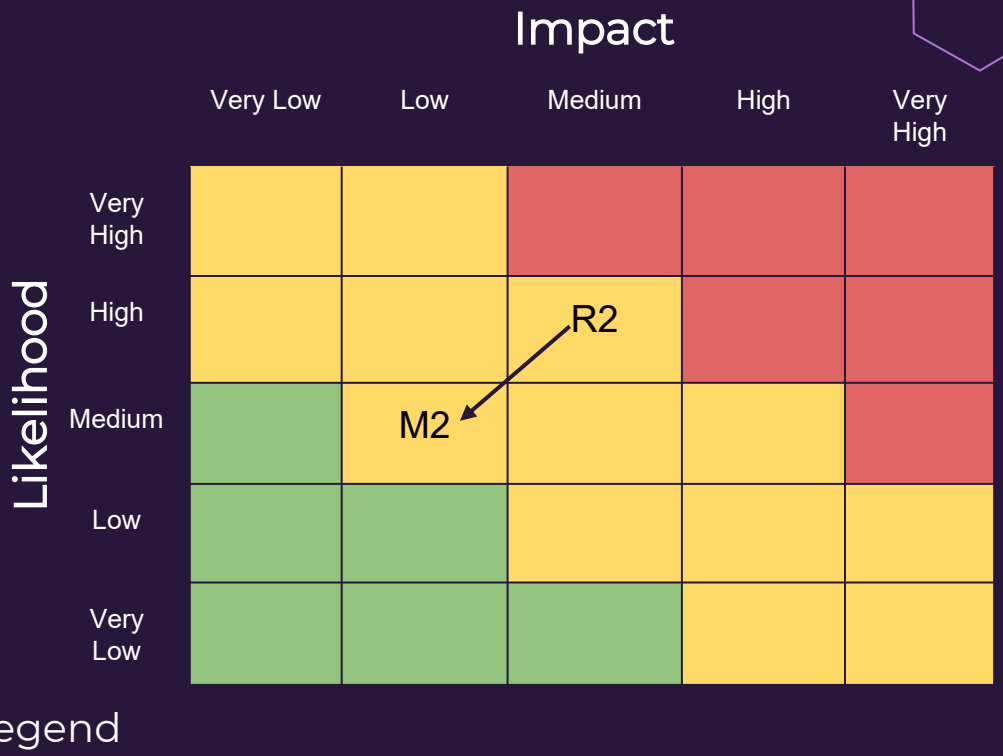
Customer Risks

Risk

- **R2:** Delayed Return on Investment (ROI) due to transition disruptions

Mitigation

- **M2:** Integrate with existing ADS tools and workflows with minimal disruption to accelerate adoption and ROI realization



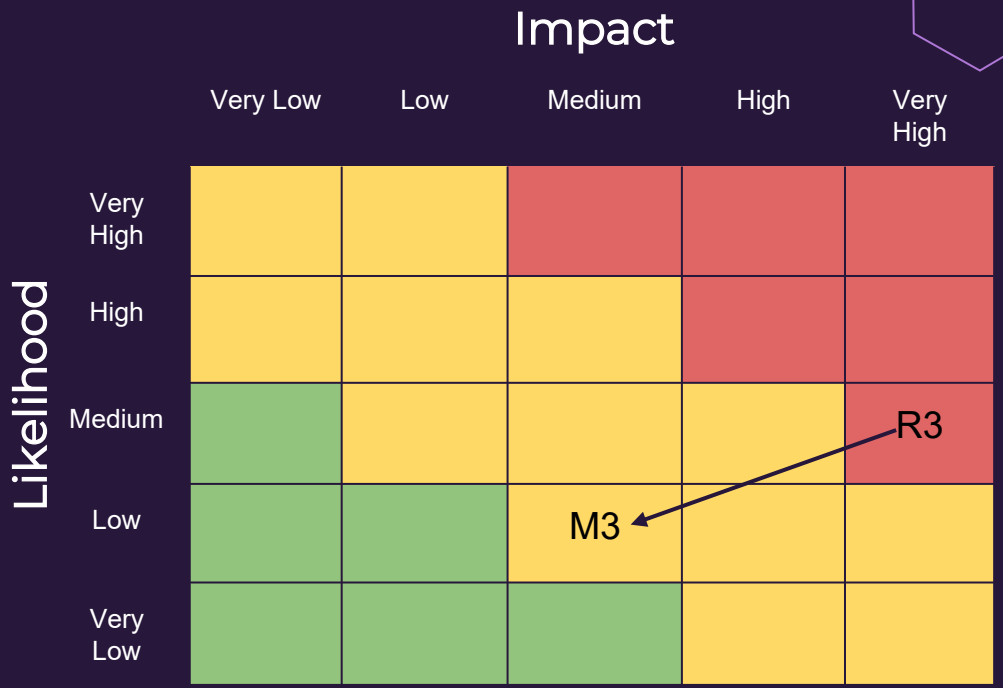
Customer Risks

Risk

- **R3:** Strain on vendor relationships from missed or late payments

Mitigation

- **M3:** Offering automated intake and supplier alerts



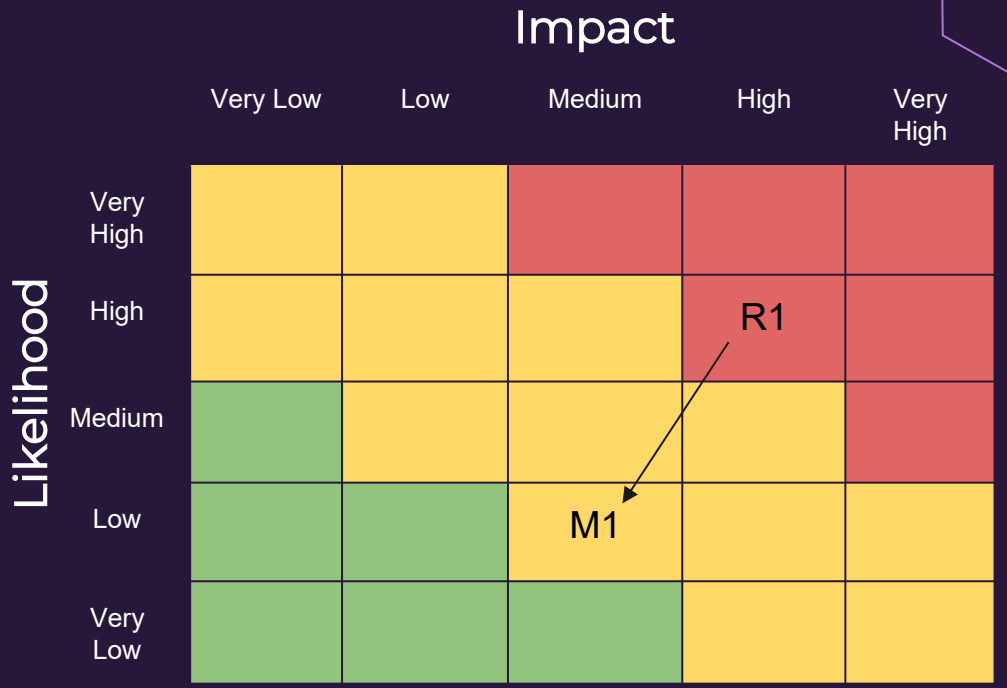
Technical Risks

Risk

- **R1:** Optical character recognition (OCR) and parsing errors

Mitigation

- **M1:** Multi-engine OCR with validation rules



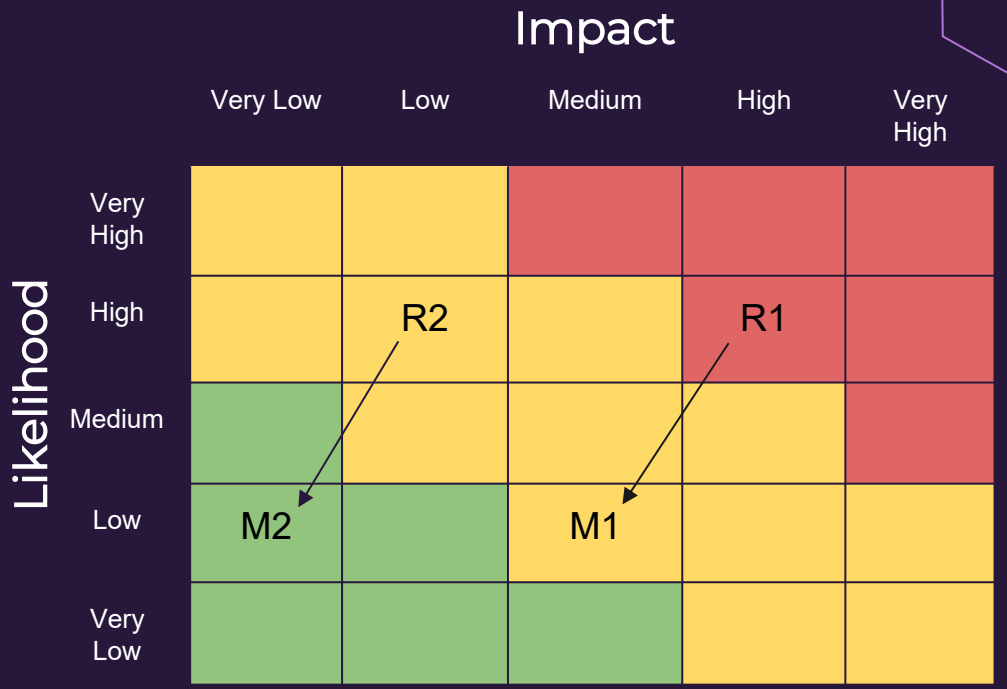
Technical Risks

Risk

- **R2:** Low accuracy for edge cases

Mitigation

- **M2:** Confidence ratings to include human reviews



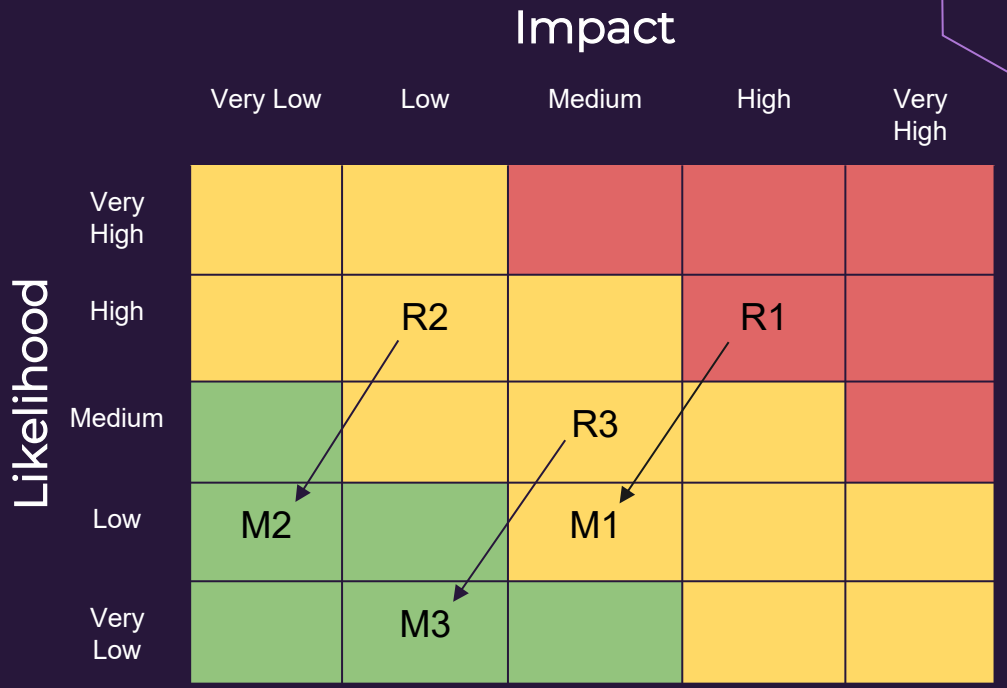
Technical Risks

Risk

- **R3:** Integration failures

Mitigation

- **M3:** Robust APIs that include sandbox testing



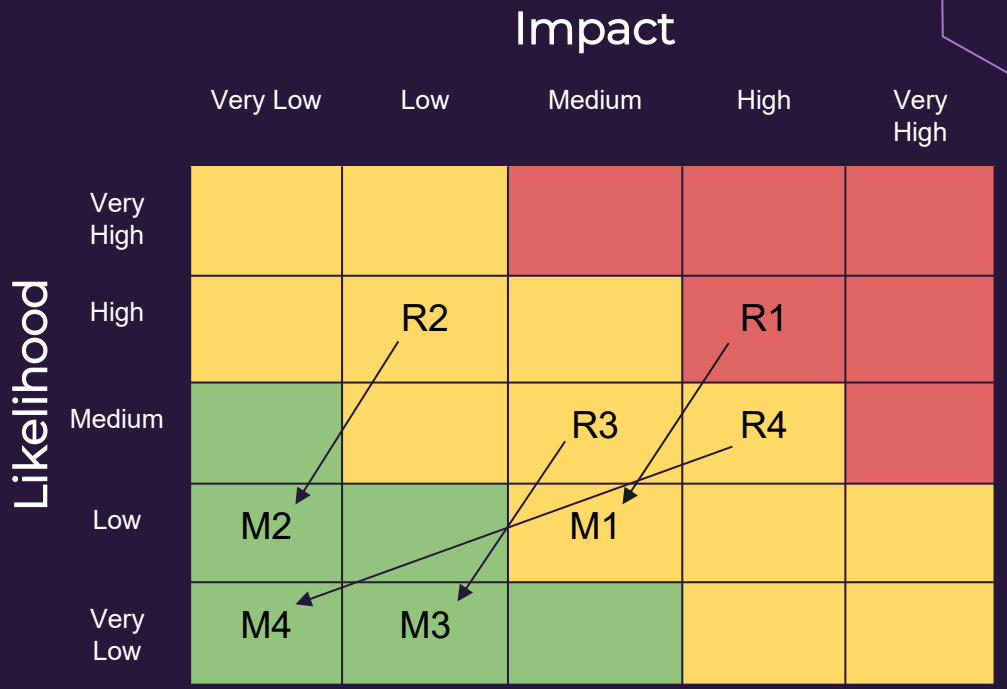
Technical Risks

Risk

- **R4:** Scalability

Mitigation

- **M4:** Microservice architecture



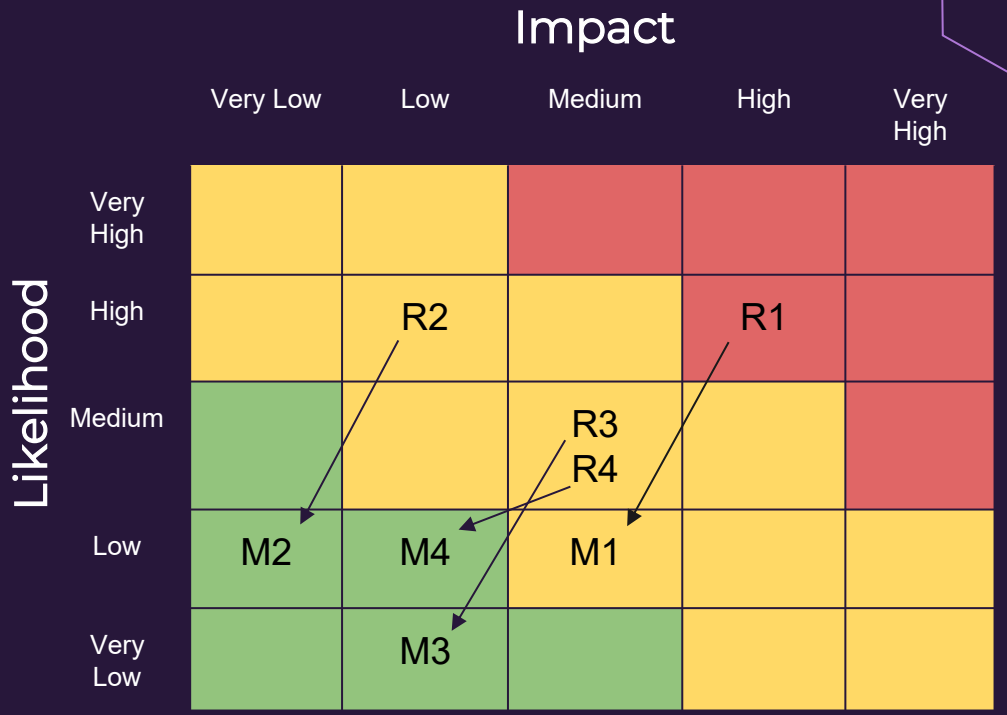
Technical Risks

Risk

- **R4:** Model drift

Mitigation

- **M4:** Continuous retraining and KPI monitoring



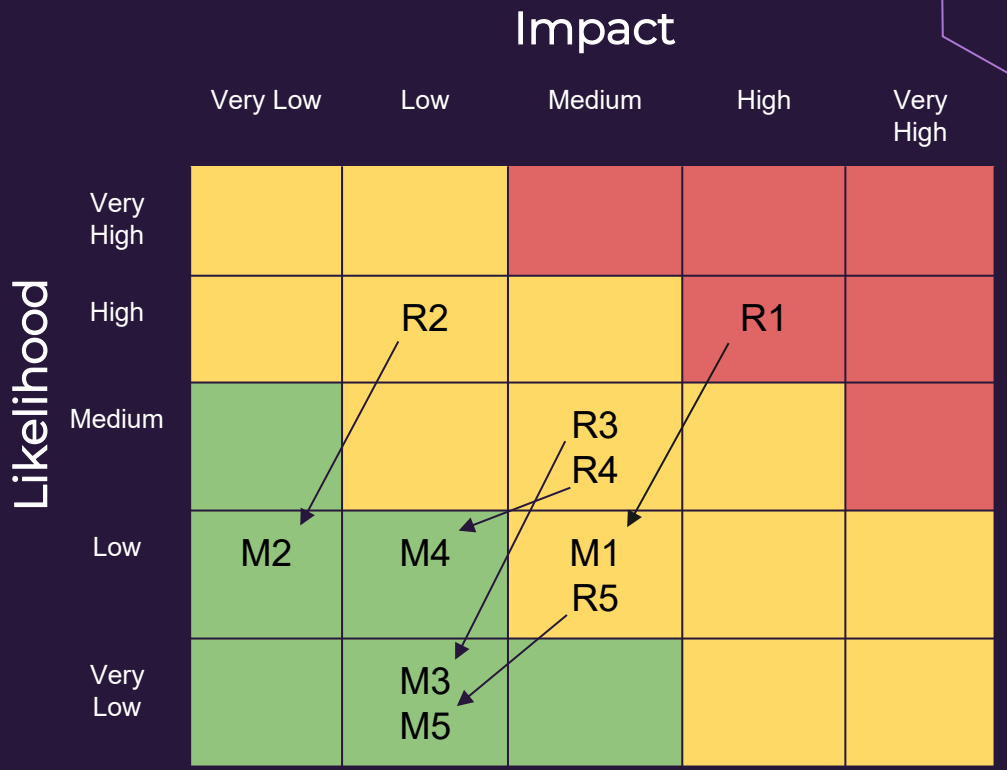
Technical Risks

Risk

- **R5:** AI black box

Mitigation

- **M5:** Include confidence scores and extracted source fields in logging



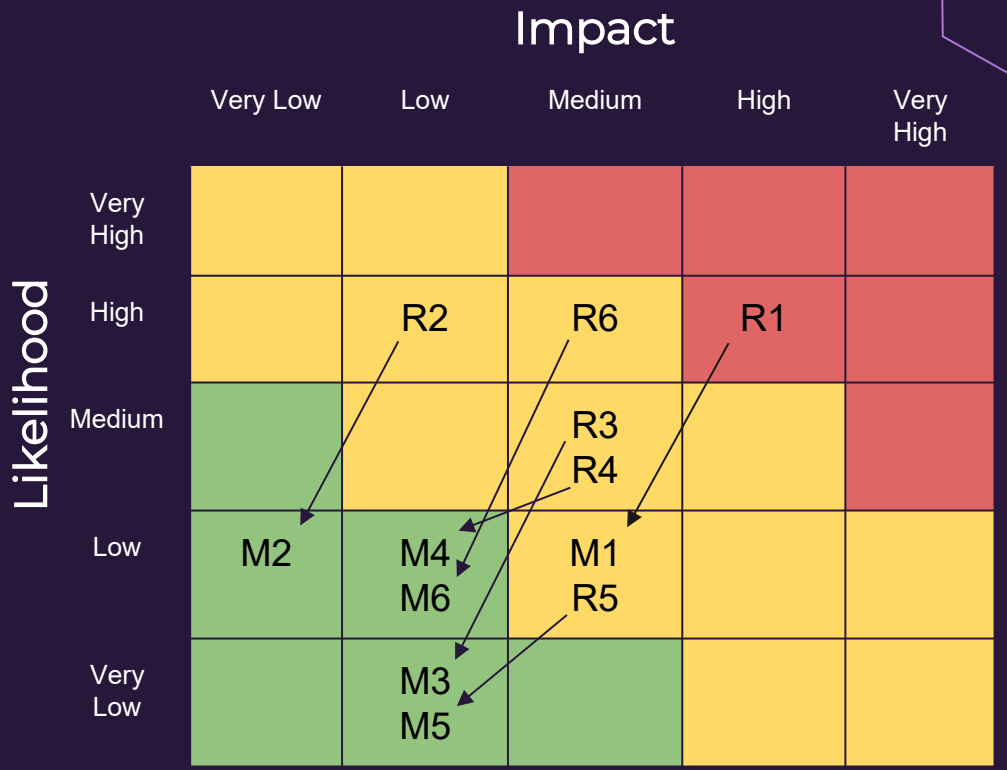
Technical Risks

Risk

- **R6:** Excessive manual corrections

Mitigation

- **M6:** Progressive machine learning



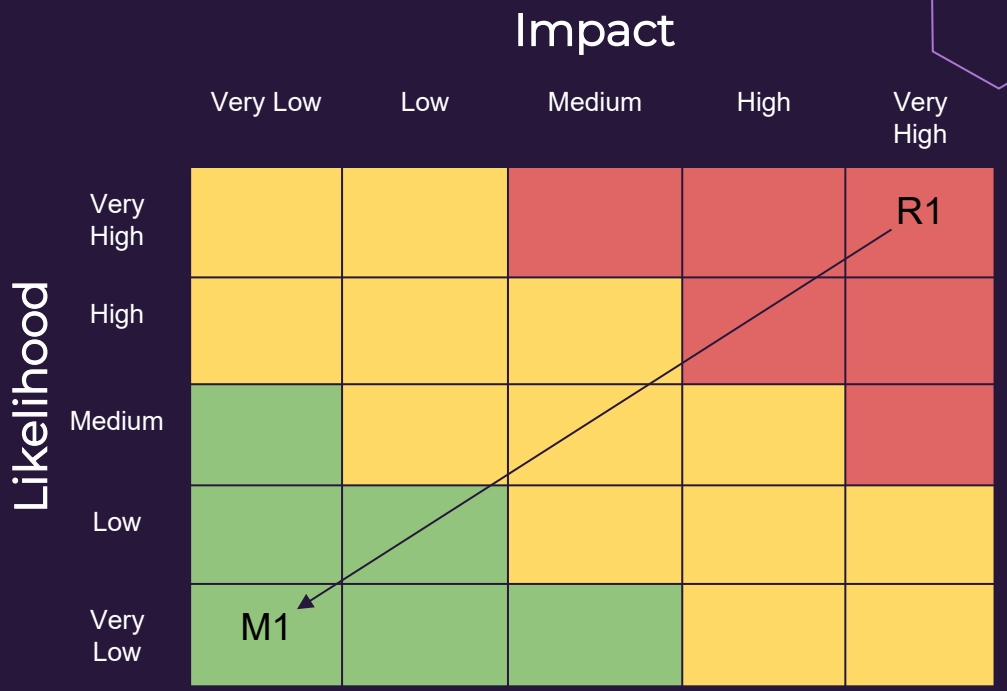
Security Risks

Risk

- **R1:** Data confidentiality

Mitigation

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



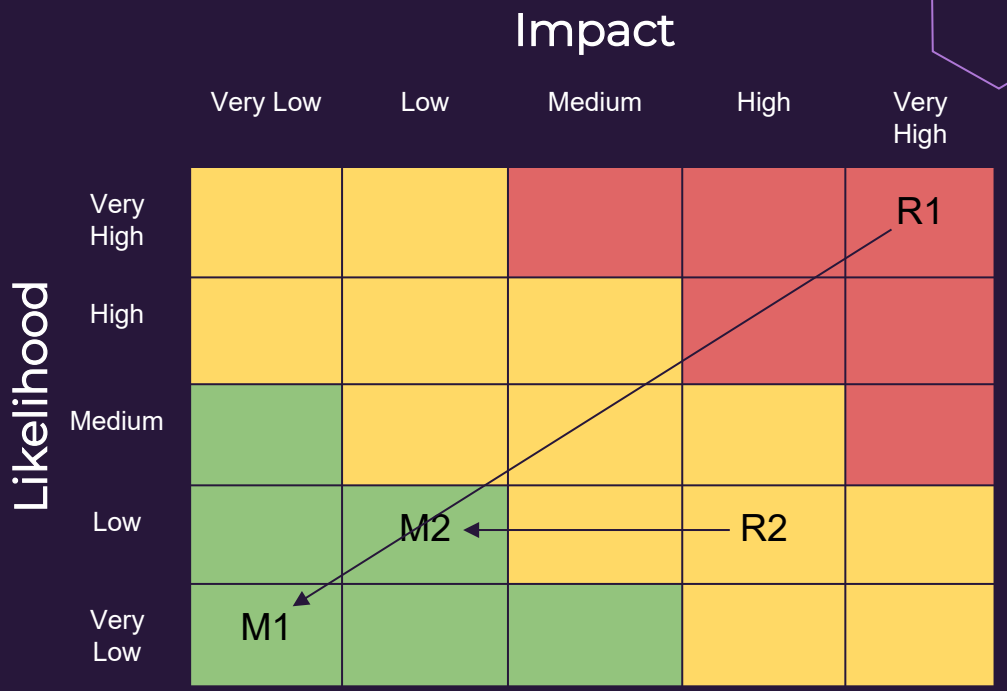
Security Risks

Risk

- **R2:** Data residency

Mitigation

- **M2:** Provide region-specific data hosting



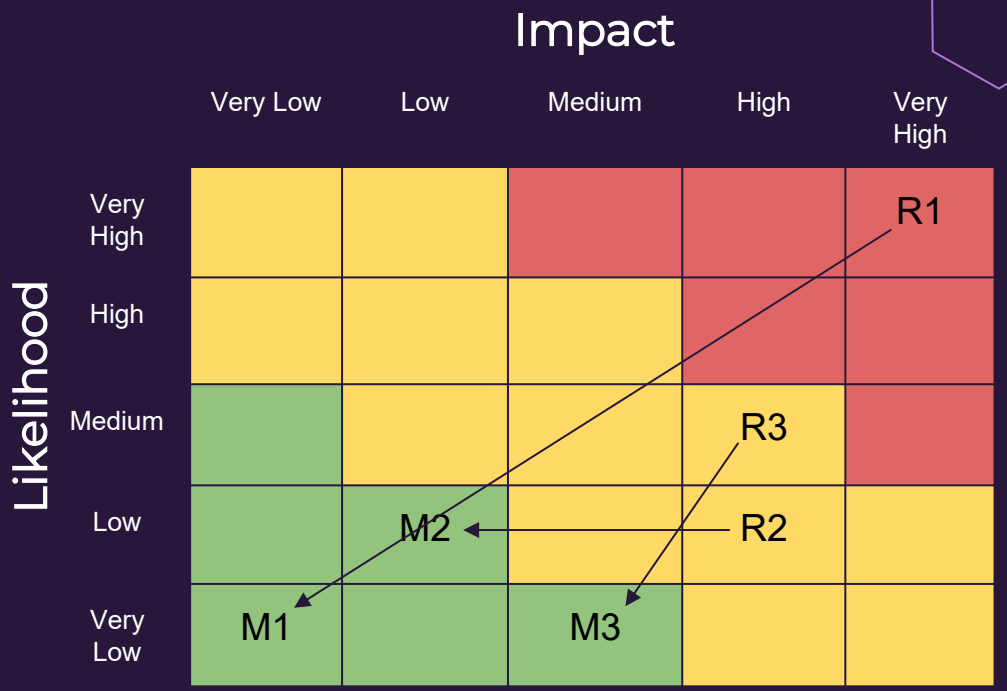
Security Risks

Risk

- **R3:** Supply chain attacks

Mitigation

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



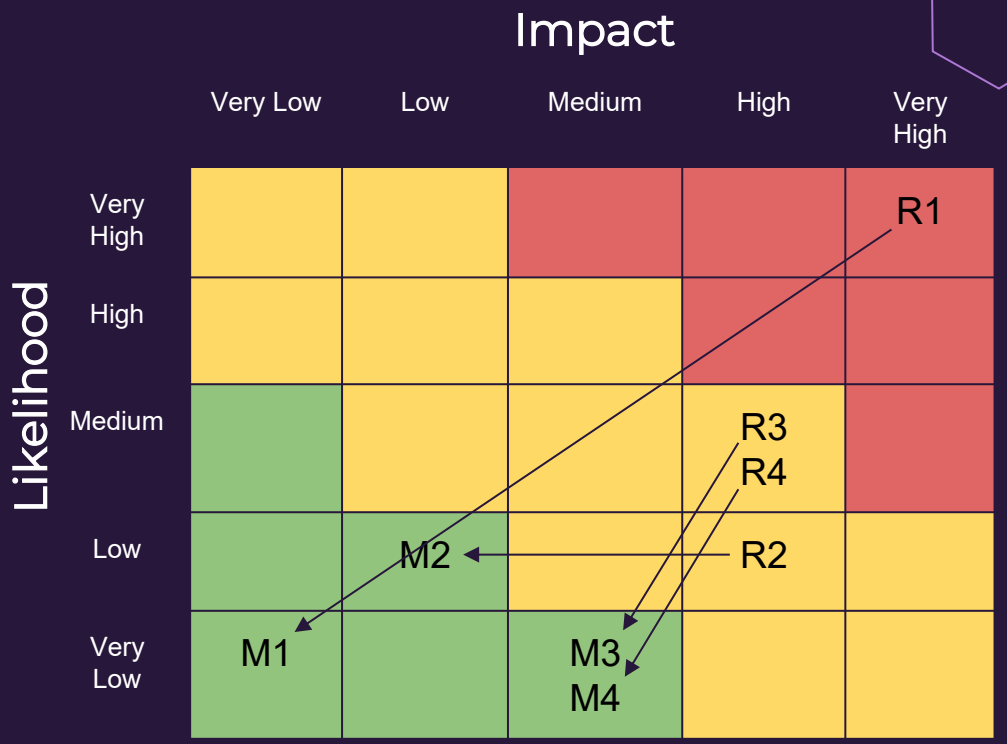
Security Risks

Risk

- **R4:** Model poisoning

Mitigation

- **M4:** Separate production data from training data, applying data validation before retraining



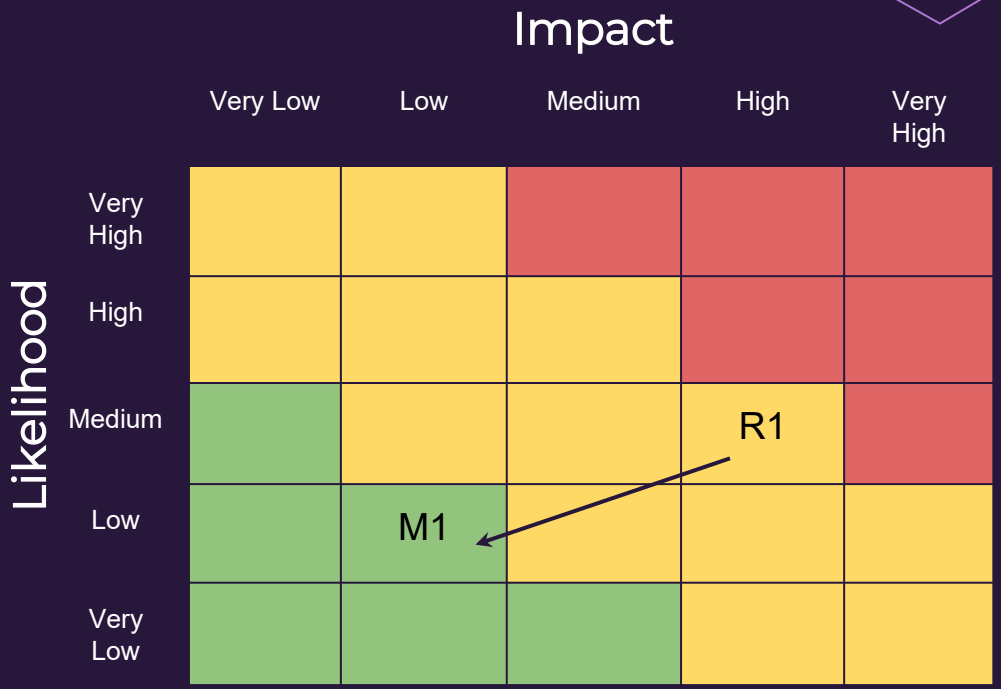
Legal Risks

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



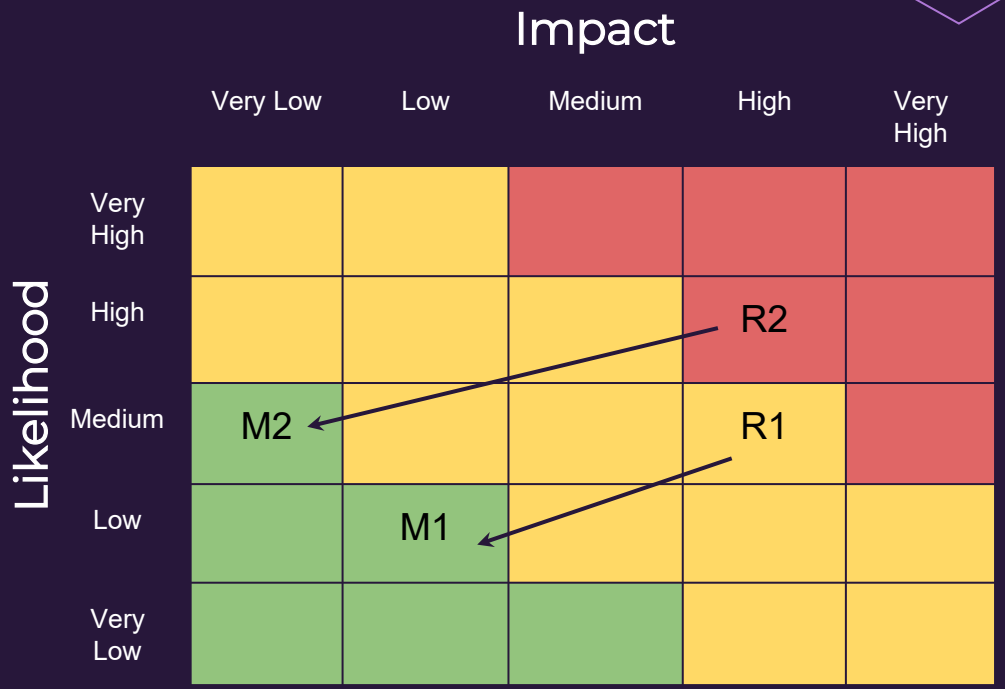
Legal Risks

Risks

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

Mitigations

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



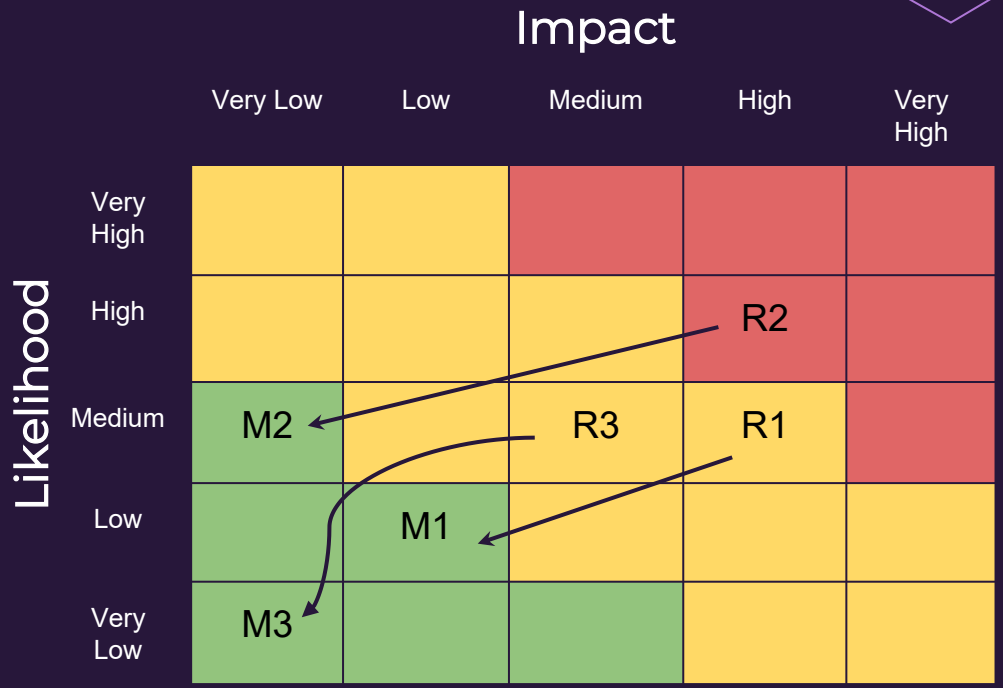
Legal Risks

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.

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