# Lab 1 – Individual Introduction

Thomas Fuller

Old Dominion University

CS410

Dr. Sarah Hosni

11/14/2025

## Table of Contents



## List of Figures



## List of Tables

# 1 Introduction

Manual invoice processing creates substantial financial and operational burdens for organizations worldwide. Approximately 90% of companies rely on manual processing methods, with costs ranging from $12-$40 per invoice compared to $3-$6 for automated processing [1]. Manual processing requires an average of 14.6 days per invoice versus less than 5 days with automation [2], while carrying error rates of 1-3% that damage business relationships. A Gartner study found 59% of accountants make several errors monthly due to workplace overextension [3], and 96% of employees express dissatisfaction with current AP tools [4].

Atlantic Diving Supply (ADS), a government contractor, exemplifies these challenges. Receiving approximately 150,000 invoices annually from 3,000 suppliers, their six-person AP team faces volume pressure of 600 invoices daily. Manual review leads to duplicate payments, purchase order mismatches, delayed payments, and excessive stress. Labor accounts for 62% of AP processing costs, yet most work involves repetitive checking rather than value-added analysis.

Effective solutions must provide efficiency through automated invoice capture, accuracy via intelligent purchase order matching, adaptability through machine learning, transparency via audit logging, and scalability to diverse vendors and formats. AI² (Artificially Intelligent Invoices) is a web-based intelligent automation system designed to address these challenges. Integrating with Outlook via Microsoft Graph API, Oracle NetSuite through Alteryx API, and utilizing AWS Textract for document scanning with PostgreSQL database hosting on AWS GovCloud, AI² automates repetitive tasks while maintaining human oversight. This document describes the development and prototyping approach for AI², demonstrating how targeted automation can transform accounts payable operations while balancing efficiency and oversight.

# 2 AI² Product Description

- AI² automates invoice intake, organization, and purchase order matching. ● Designed initially for ADS but scalable across industries with similar high-volume invoice processing needs. Provide a summary of the solution –- and its goals and objectives. This section should be one paragraph minimum.
- Objective: Accelerate payment readiness and reduce manual workload without sacrificing accuracy or control.

## 2.1 Key Product Features and Capabilities

● **Automated Invoice Intake:**

○ Integrates with Outlook GCC High using Microsoft Graph API.

○ Automatically retrieves and parses invoice attachments and email body text.

● **Smart Matching Engine:**

○ Connects to Oracle NetSuite through Alteryx API for data retrieval.

○ Matches invoices to purchase orders, line items, and amounts.

● **Confidence Scoring:**

○ Assigns a confidence score to each match; low-confidence cases are flagged for review.

● **Human-in-the-Loop Learning:**

○ Stores staff corrections as training data to improve model accuracy.

● **Supplier-Based Queue Assignment:**

○ Routes invoices to AP representatives automatically based on supplier name.

○ Supports reassignment by administrators at the supplier level.

● **Audit Logging and Transparency:**

○ Every user and system action is recorded for compliance and traceability.

● **Innovation and Differentiation:**

○ Tailored to ADS's infrastructure (Okta SSO, Alteryx API).

- More affordable and customizable than tools like Tipalti or SAP Concur.
- Built for compliance under CMMC and FedRAMP.

- **Insert Figure 2:** AI² Solution Process Flow.
- **Insert Table 1:** Competition Matrix.

### 2.2 Major Components (Hardware/Software)

- **Hardware Environment:**
  - Hosted in AWS GovCloud for security and government compliance.
  - User access through standard office workstations or laptops.
- **Software Architecture:**
  - Web-based interface built with secure back-end architecture (REST APIs).
  - Key integrations Outlook → via Microsoft Graph API for invoice capture.
    - Oracle NetSuite → via Alteryx for data exchange and auditability.
    - Document/Invoice Scanning:
      - AWS Textract (pdf's)
      - Aperture (spreadsheets)
      - OracleDB
  - AI Component: Confidence Scoring + Retraining Pipeline.
  - Database: PostgreSQL (AWS RDS) for structured invoice data and logs.

- **Insert Figure 3:** Major Functional Component Diagram (MFCD).

## 3 Our Case Study - ADS (Atlantic Data Systems)

- ADS is a government contracting firm managing procurement and supplier payments.
- Current issues:
  - Manual invoice processing.

- Heavy AP workload.
- Delayed supplier payments.

- AI² addresses these problems by:
  - Automating repetitive work (intake, sorting, and matching).
  - Providing dashboards for monitoring invoice status.
  - Maintaining full audit traceability for compliance review.

## 4 Glossary

● **AI² (Artificially Intelligent Invoices):** The proposed automated invoice processing system designed to streamline Accounts Payable workflows through AI-driven matching, classification, and routing.
● **Alteryx:** A data automation and analytics tool that enables secure API connections and data workflows between applications.
● **AP (Accounts Payable):** The amount a business owes for goods and services purchased on credit; typically due at intervals of 30, 45, 60, or 90 days depending on repayment terms.
● **APEX:** A strongly typed, object-oriented programming language that Salesforce developers use to execute flow and transaction control statements on the Salesforce platform.
● **AWS GovCloud:** A secure U.S. government-compliant cloud environment that supports sensitive data and regulated workloads in accordance with FedRAMP and DoD requirements.
● **Atlantic Diving Supply (ADS):** An American federal contractor company that provides equipment and logistics solutions to the Department of Defense, federal agencies, and first responders.
● **CMMC (Cybersecurity Maturity Model Certification):** A framework developed by the U.S. Department of Defense to assess and enhance the cybersecurity posture of contractors handling federal information.
● **ERP (Enterprise Resource Planning System):** An integrated software system used to manage core business processes, such as finance, procurement, and supply chain operations.
● **FedRAMP (Federal Risk and Authorization Management Program):** A U.S. government program that standardizes security assessment, authorization, and continuous monitoring for cloud services.
● **Graph API:** A Microsoft API interface used to access and automate data operations within Outlook and other Microsoft 365 services.
● **Invoice:** A document listing goods or services provided, including a statement of the amount due; a bill.
● **Oracle:** The system of record used by ADS for enterprise data and financial management.
● **PO (Purchase Order):** The official order list ADS sends to suppliers detailing the items or services requested.
● **Salesforce:** A robust Customer Relationship Management (CRM) platform that allows businesses to manage customer relationships efficiently.
● **Supplier:** A person or organization that provides goods or services needed by another organization.
● **Vendor:** A person or company offering goods or services for sale.

## 5 References

[1] Tamaro, R. (2025, March 4). The Hidden Costs of Manual Accounts Payable and How Automation Solves Them. CASO Document Management. https://caso.com/2025/03/the-hidden-costs-of-manual-accounts-payable-and-how-automation-solves-them/

[2] AI Invoice Processing Benchmarks 2025 - Accuracy, Speed, And Cost Comparison. (2025, September 9). Parseur. https://parseur.com/blog/ai-invoice-processing-benchmarks

[3] Gartner Survey Shows That a Third of Accountants Make Several Financial Errors Per Week Due to Capacity Constraints. (2024, February 21). Gartner. https://www.gartner.com/en/newsroom/press-releases/2024-02-21-gartner-survey-shows-that-a-third-of-accountants-make-several-error-per-weeo-due-to-capacity-constraints

[4] Jex, S. (2024, September 24). Accounts Payable Automation by the Numbers: 10 Statistics to Know. Quadient. https://www.quadient.com/en/blog/ap-automation-by-the-numbers-10-statistics-to-know