CS 410 Lab 1 Outline (Group)

AI^2 – Artificially Intelligent Invoices

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1 Introduction

1.1 Background

Many organizations handle tens of thousands of invoices annually, often through manual processes that create inefficiencies and risk. According to the AI Invoice Processing Benchmarks for 2025, manually processed invoices can cost anywhere between $12-$14 each, as opposed to the reduced cost of just $3-$6 per invoice processed when using automated systems. The reason for these high costs comes from manual processes often involving repetitive data entry and going through numerous verification steps. As a result, there are slower turnaround times, an increased potential for human error, and mounting backlogs that put a strain on an organization's operations. In short, manual processing is expensive, slow, and prone to errors.

1.2 Problem Statement

Atlantic Diving Supply, also known as ADS, currently struggles with this same issue. Their Accounts Payable, or AP, team is facing a high-volume of invoices that they must manually process every day. According to ADS, the AP team receives approximately 150,000 invoices annually from about 3,000 suppliers. However, their AP team only has six AP clerks on staff where each member is responsible for processing around 50 to 100 invoices a day, every day. With a little math, we can calculate that the AP team as a whole needs to process roughly 300 to 600 invoices daily. This volume creates significant pressure, especially when considering that each invoice must be manually reviewed and matched against corresponding Purchase Order (PO) numbers.

Unfortunately, the manual nature of this process leads to frequent errors, such as duplicate payments and PO mismatches. Additionally, the delays caused from manual processing also slow down payment cycles, which frustrate suppliers and damage relationships. All this while the AP

staff spend long hours performing low-value verification tasks rather than focusing on analyzing tasks which are of higher value. The current process flow, as demonstrated in Figure 1, highlights these inefficiencies embedded in this system through the lens of the daily struggle an ADS AP clerk goes through to process invoices.

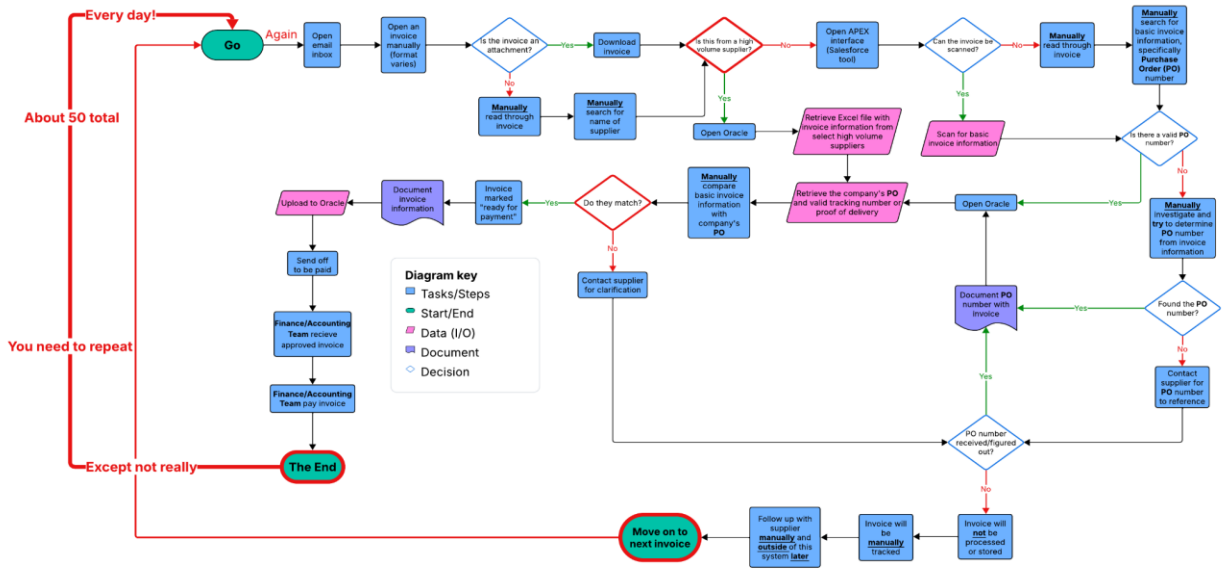

Figure 1: Current Process Flow of an AP Clerk

The impact of this manual invoice processing system is felt across multiple stakeholders. First, the ADS Accounts Payable team faces daily stress and have a limited capacity for higher-level financial tasks, suffering the brunt of the operational burden from needing to manually process invoices day-to-day. Secondly, suppliers awaiting payment experience delays and inconsistent communication, which can diminish trust and disrupt supply chain continuity. Lastly, there is the management team that rely on timely and accurate financial data to monitor performance, forecast cash flow, and make strategic decisions. These ripple effects of inefficiency in invoice handling extend beyond just the AP department but across multiple ones, influencing the broader financial health and operational agility of the ADS company.

1.3 Solution

To address these challenges, we introduce AI², otherwise known as Artificially Intelligent Invoices, as a web-based intelligent automation system designed to transform invoice management. With this new system, we aim to reduce the manual workload of the AP team, accelerate invoice processing, and improve data accuracy through AI-driven recommendations and adaptive learning. AI² combines automated parsing and matching of invoice and PO data with confidence scoring to assess the reliability of each match. Additionally, AI² incorporates a human-in-the-loop learning to ensure that feedback from AP clerks is taken in to continuously refine the system's performance. By integrating automation with human oversight, AI² enhances efficiency while maintaining control and transparency. With this approach, the AP team can feel empowered to shift from reactive verification to proactive financial management, improving outcomes with suppliers, staff, and leadership.

2 AI² Product Description

2.1 Overview

- AI² automates invoice intake, organization, and purchase order matching.
- Designed initially for ADS but scalable across industries with similar high-volume invoice processing needs.
- Objective: Accelerate payment readiness and reduce manual workload without sacrificing accuracy or control.

2.2 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.

2.3 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 Identification Of Case Study

3.1 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.

3.2 Wider Industry Issue

- Similar challenges exist among other mid-to-large government contractors, logistics companies, and manufacturers.
- AI²'s modular architecture allows adaptation to other organizations with similar high-volume AP processes.

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.

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