Pro Insurance Solutions

Cleansing Artificial Intelligence (CAI) System

OVERVIEW

The insurance industry in general is cautious about the adoption of new technology, and the ingestion of risk data quite often begins on hard-copy paper or in an Excel spreadsheet. This data may be entered in practically any format whatsoever before being delivered, for example, to an insurance broker. The broker may then add additional information such as the insurance coverage and terms, before pushing the data out to underwriters in the market to quote. This process, and the accompanying required data transformations, is a very manual, repetitive, and tedious one, especially due to the often liberal use of unstructured data and file types.

Pro Insurance Solutions Limited ("Pro") provides an outsourced service where they receive broker data (either directly or via an insurer) and create a template (manually) to represent that risk. Pro would then greatly enhance that data with other available information, providing to customers a generalized template more readily ingestible by 3rd party models to price that risk through computer simulations in order to determine the theoretical cost of coverage. However, these simulators required fixed data formats, while Pro and their clients received the data in random formats.

To solve these process and data issues, Pro, decided to build a new "Cleansing Artificial Intelligence" (CAI) system that would automate these data transformation and data cleaning processes. The goal was to reduce the total end-to-end processing time from several days to several hours or less. This would give Pro's clients a tremendous competitive advantage, and in fact be a major market disruptor. Atmosera, in partnership with Pro and AI firm Analycat, delivered the system in late 2019.

DETAILS

The core vision of CAI was to create a system that continuously monitors Input Events (input of spreadsheet risk data) and then semi-automates, via workflow processes, the tasks of cleansing, transforming, and generating output documents. The high-level conceptual architecture is as follows:

- Front end UI built using modern web technologies such as React and ASP.NET MVC.

- Hosting and services environments built using Microsoft Azure cloud technologies:
    - Azure Active Directory to authenticate and manage application users
    - Azure Web Apps to host the web applications
    - Azure Application Insights to capture application telemetry
- Data for the system hosted and processed using a combination of storage technologies:
    - Azure Blob storage to store worksheets in-progress and log files.
    - Cosmos DB to store information about clients, jobs, worksheet transformations, and other application state data.
    - Azure Key Vault (via use of Managed Service Identities) to store system secrets and access keys.
- Additional services:
    - Cognitive Services for language Translation.
    - Azure Search and SignalR.
- The high-level system functionality includes:
    - Basic Document Flow Management.
        - Email ingest and output components driven by an Azure Logic App, configured to trigger a workflow based on the receipt of incoming emails. The Logic App stores attachments in Workbook Storage, creates records in User/Client/Job Storage, and creates the necessary activity entries in Activity Log Storage.
        - Azure Functions are used to supplement the Logic App workflow where pre-built modules are not available.
    - End-User Application Core Features
        - Application Sign In to the Application Portal
        - User Management
        - Client Account Management
        - Data Import (Triage Interface)
        - Task Management
        - Preliminary Analysis of Documents

- Document Cleansing
- Data Transformation
- Geocoding Interface
- Output Generation
- Data Management
- Schema Management

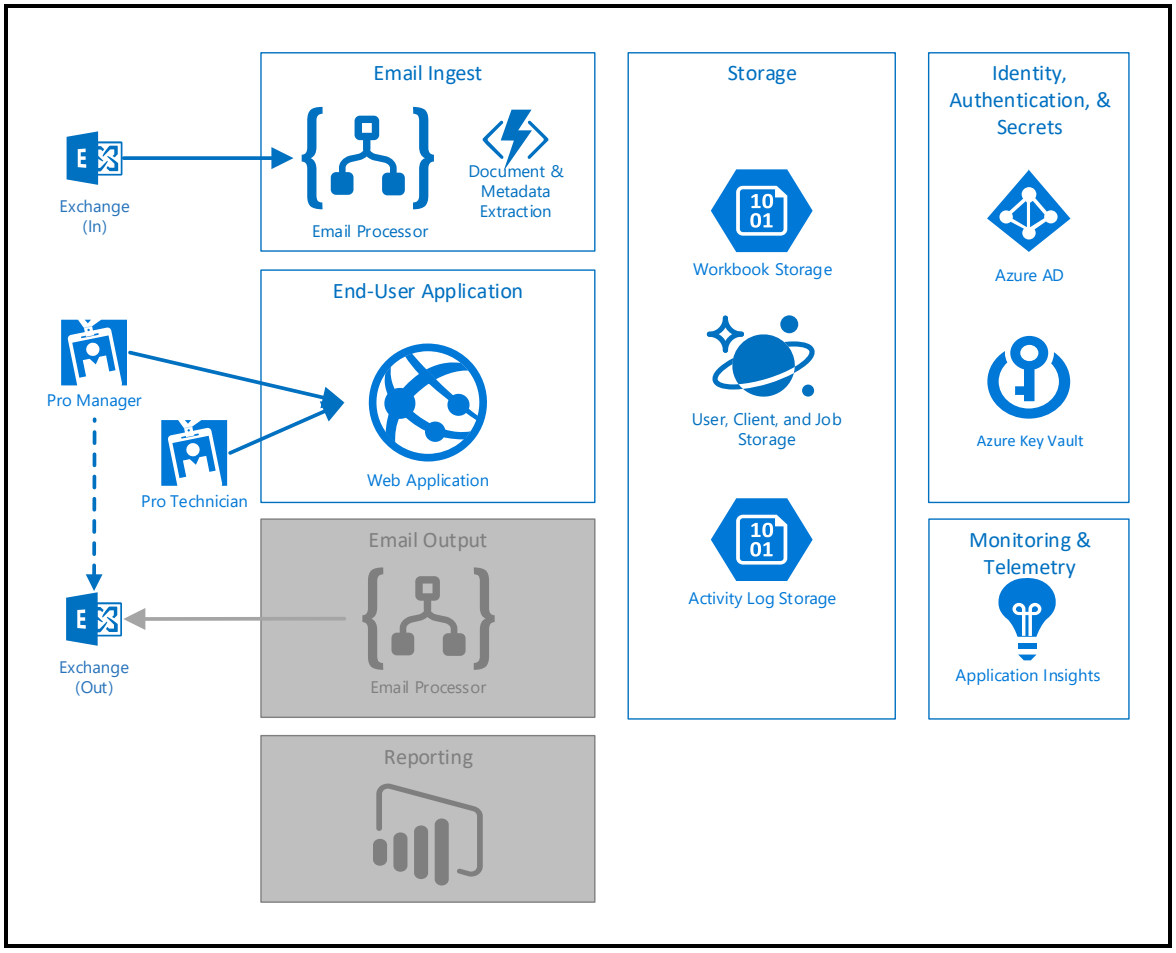

Figure 1 - High Level Architecture

The core tools used consisted of the following:

- **Power BI.** Power BI is a suite of business analytics tools that can be used to analyze data and share insights. Power BI reports can be connected to many

different data sources, produce reports, and publish them for an organization to consume on the web and across mobile devices.

- **Azure Blob Storage.** Azure Blob storage supports storing unstructured data in the cloud and can be used to store any type of text or binary data.
- **Azure Cosmos DB.** Azure Cosmos DB is a globally distributed, multi-model database service that offers storage across several well-defined consistency levels.
- **React.** A framework used for creating browser applications.
- **ASP.NET MVC.** A framework for building web APIs that are used to support the front-end browser application.
- **Also: Azure Search, Cognitive Services for Translation, and SignalR.**

Azure DevOps for Application Lifecycle Management

To ensure the application could be rapidly built, iterated on, and deployed, Azure DevOps was used for application lifecycle management, automating the build and release cycle. The team implemented continuous integration and continuous delivery processes using Azure DevOps Pipelines, ensuring code could be built, tested, and released on demand. Finally, Azure ARM templates were used as the solution for infrastructure-as-code, ensuring the entire environment could be released to Azure in a fully automated manner.

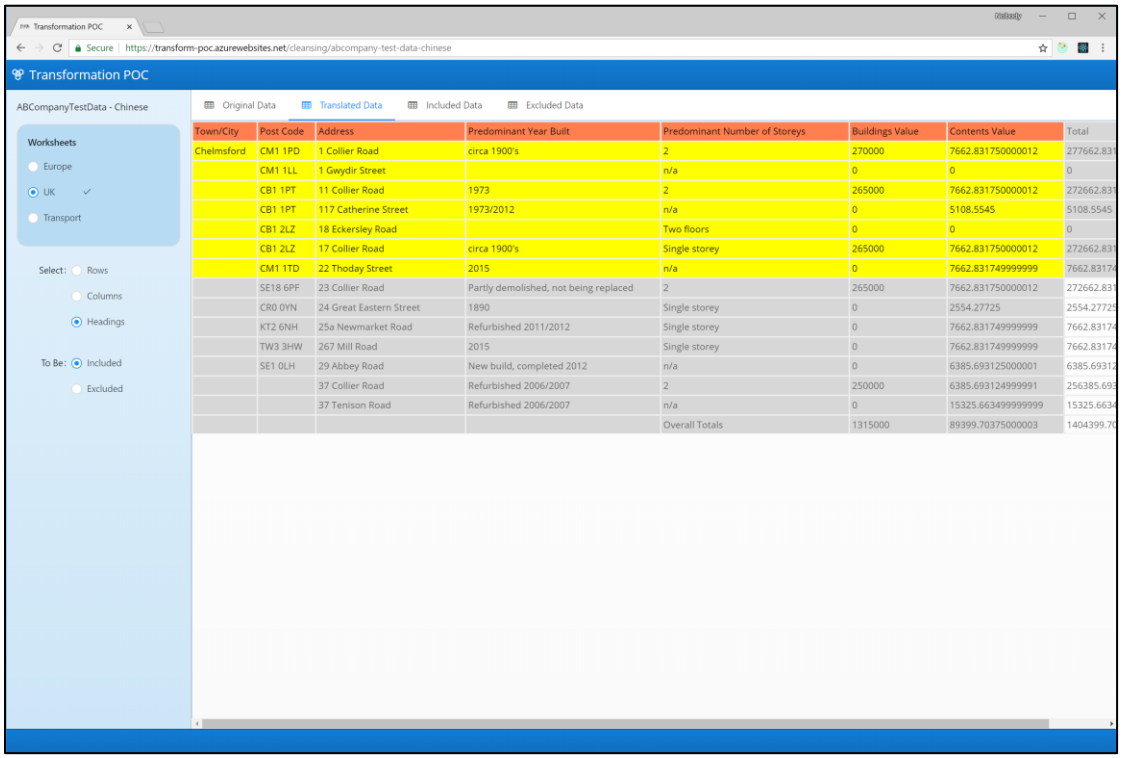

Fig 2 - Data Selection: Selecting data of interest from ingest worksheets

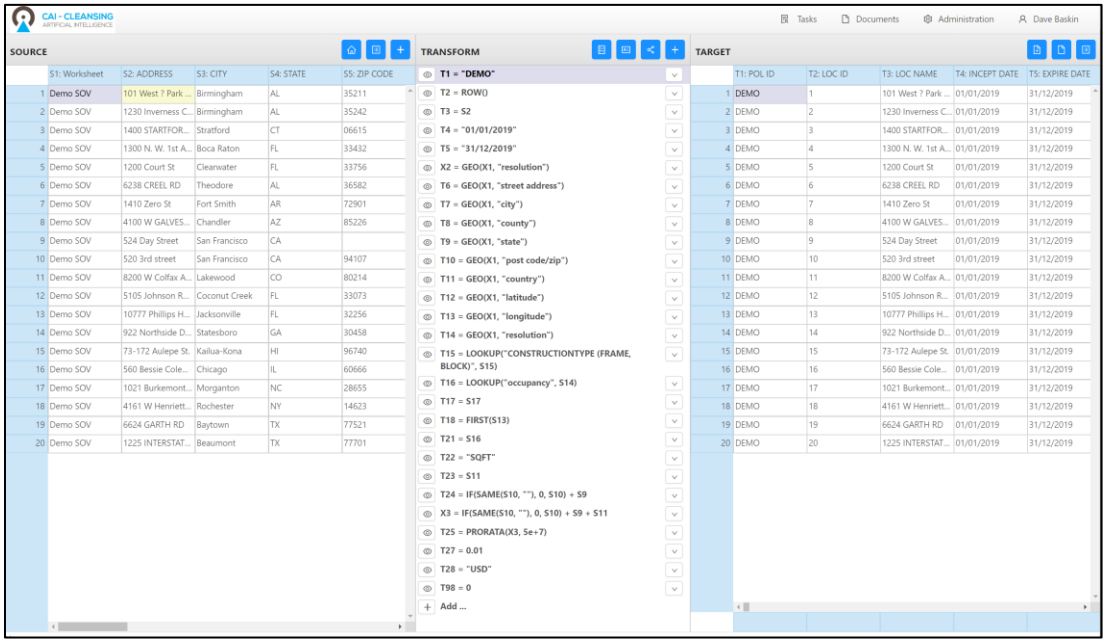

Fig 3 - Transforming origin data into standard form using transformation formulas

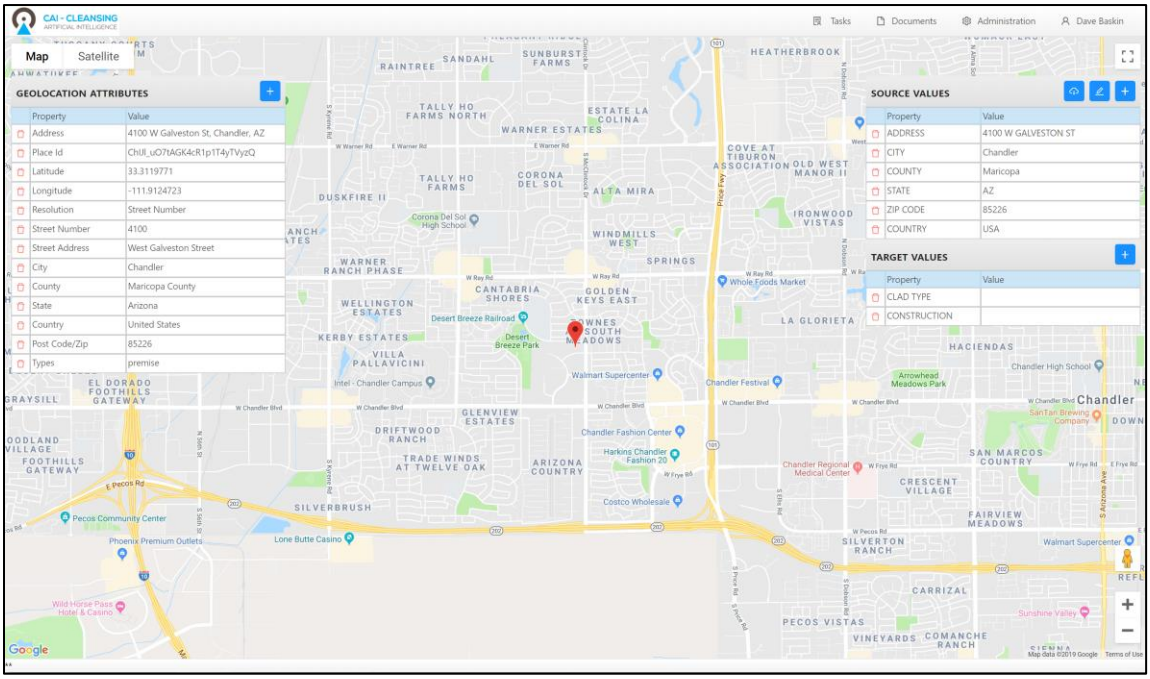

Fig 4 - Capturing geocoding information for an individual property

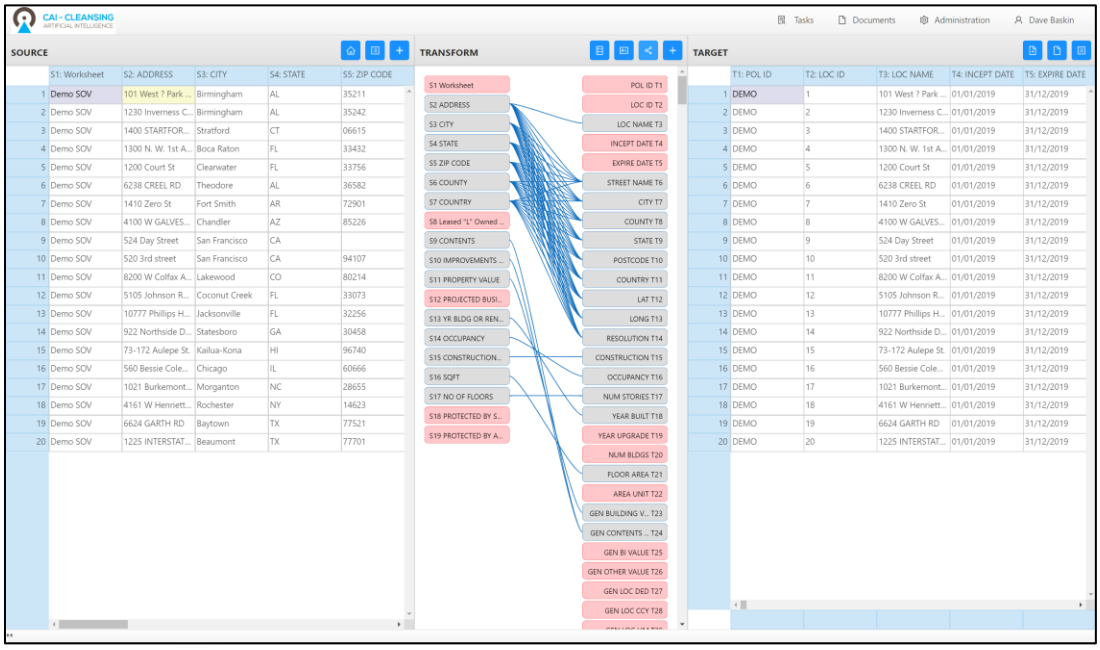

Fig 5 - Mapping relationships between source columns and target columns

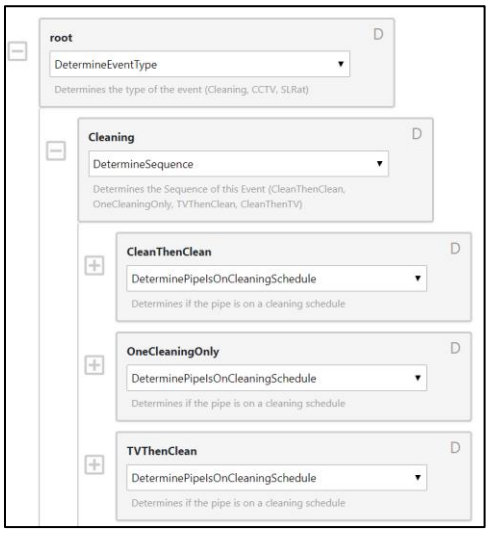

Figure 6 - Decision Tree Builder allows full configuration of processing logic

WHY ATMOSERA?

Pro needed a partner that was expert at providing the architectural skills needed to take the complex business logic required and translate that into a technical design that was flexible and performant, as well as the implementation expertise to develop the production system.

- Atmosera has deep experience in developing intelligent and configurable decision solutions.
- Atmosera is a Microsoft Gold Cloud Platform, Application Development, Data Platform, and Data Analytics partner
- Core focus and skillset in React for Modern Web Development.
- Atmosera is a recognized leader in software architecture and implementation on the web, mobile, and cloud platforms.

About Atmosera

Atmosera was founded by a team of technology experts who are renowned in the industry, with the goal of providing the highest level of custom software development, cloud,

architecture, and training expertise to our clients. Our mission is to help customers "build better software, faster," and to do this we have structured our company as a dedicated team of technology experts accompanied by the top tier of software engineers. Along the way, Atmosera has developed a reputation as a world class provider of software technology services.

In the training world, we are one of the top trainers on the Microsoft platform in the U.S., including for Microsoft itself where we train their product team developers and testers in Seattle and around the world. On the Consulting side, Atmosera is recognized as a leader in mission critical architecture design and development, and has worked with major companies on large enterprise systems around the country and worldwide. We have even worked with Microsoft to develop some of their products and architectures.

Atmosera is a Microsoft Gold Cloud Platform, Data Platform, AppDev, DevOps, and Data Analytics partner. In 2018, we were awarded the IAMCP World Wide Microsoft Channel Partner of the Year. In 2019 we won the MSUS Partner Award for Intelligent Cloud: DevOps.

About Analycat

Analycat was founded in 2015 as the parent company for catastrophe modeling companies around the world that have used Analycat software under various brands since 2008. Analycat's Asian distributor, Catalytics has the vast majority of the cat modeling market in Indonesia, Thailand, Vietnam, Singapore, the Philippines and Malaysia using our software. Analycat represents Atmosera in the UK, and works in partnership using their domain knowledge in the insurance industry to streamline deliverables in creating bespoke first-class solutions.

About Pro

Pro is the principal subsidiary of Pro Global Holdings Limited, an international service provider and consulting group focused on the insurance and reinsurance industries. The Pro group maintains offices in London, Cologne, Zurich, New York and Buenos Aires and is supported by regional centers across the globe, and maintains 4 main lines of business: Technical Outsourcing, Legacy Operations, Risk/Compliance, and Operational Consulting. Pro is highly embedded in the insurance industry, with a portfolio of over 160 industry-leading clients.