

AIRPORT MANAGEMENT SYSTEM

<https://github.com/lucky0612/Innervate>

PRESENTED BY
TEAM ZERO.AI



PROBLEM STATEMENT

Modern airports face complex operational challenges that hinder efficiency and decision-making processes. These challenges include manual and time-consuming tasks, lack of real-time data analysis, and suboptimal customer experiences. The current airport systems often struggle to integrate and harness the full potential of advanced AI technologies. As a result, there is a need for a comprehensive solution that strategically applies AI concepts and innovative features to revolutionize airport operations, ensuring seamless processes and significantly improving customer experiences. The goal is to overcome existing inefficiencies and enhance decision-making through the integration of cutting-edge AI technologies in the airport environment.



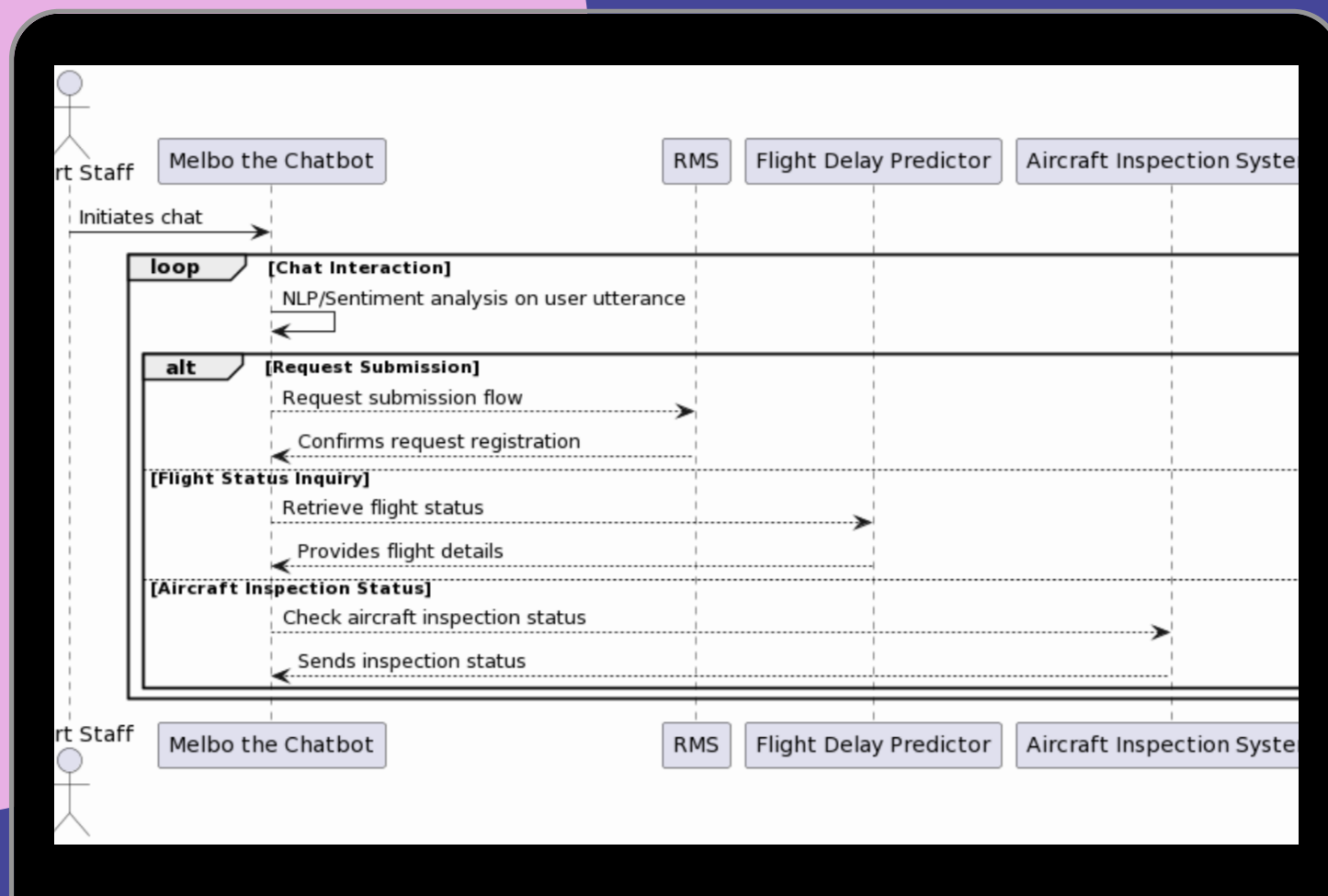
SOLUTION

The Airport Business Process Automation (BPA) Platform aims to revolutionize operational **efficiency** and **decision-making** through the strategic **integration** of AI technologies. By incorporating advanced AI concepts and innovative features, the platform seeks to address the complex challenges faced by modern airports, ensuring seamless **automation, scalability** and enhanced customer experiences.



Communication and Collaboration Module

- 1 The Communication and Collaboration module of our platform includes the powerful **Unified Messaging System (UMS)** and **Request Management System (RMS)**.
- 2 With UMS, airport staff can seamlessly communicate with each other, fostering collaboration and enhancing operational efficiency. This innate feature enables real-time messaging, file sharing, and team collaboration, ensuring smooth communication across departments.
- 3 Our robust Request Management System (RMS) empowers staff at Melbourne Airport to create and manage service, work, and HR requests seamlessly across various departments.
- 4 With RMS, teams can streamline their workflows, ensuring efficient coordination and timely resolution of requests, ultimately enhancing overall operational effectiveness.
- 5 It also doubles as a User Management System, managing user identities, access rights, and authentication for system security and Ensures secure access to RMS and other essential systems while maintaining user roles and permissions for operational integrity.



Airside Safety Inspection

1

Providing Integrated Video Intelligence by Utilizing **Google's Video Intelligence AI API** to continuously monitor aircraft conditions using camera sensors, ensuring real-time anomaly detection pre-flight and post-landing.

2

Pre-Flight Anomaly Detection by Employing **Google Vision API** for precise anomaly detection, promptly alerting ground , allowing immediate corrective actions.

3

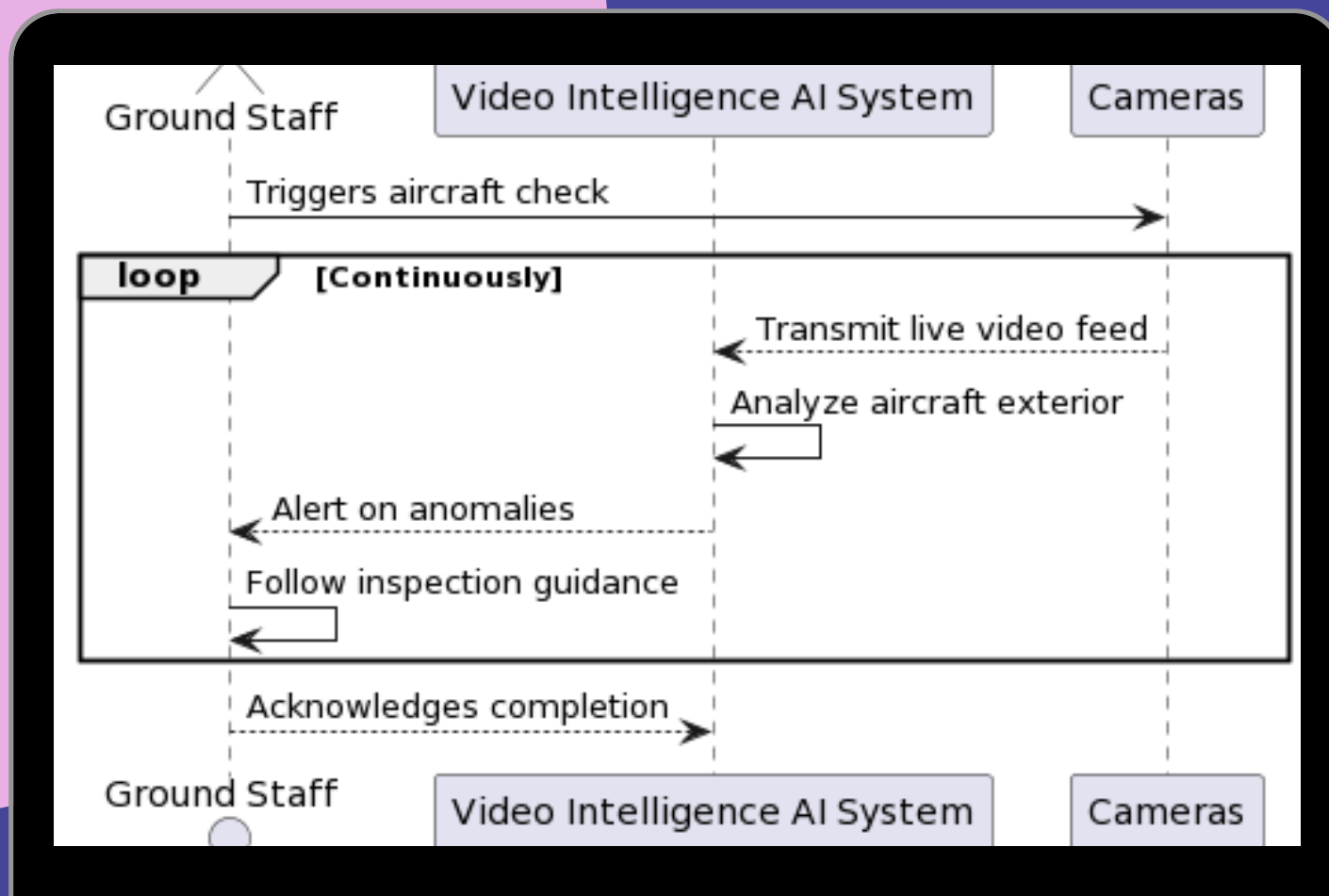
Analyze post-flight video data with **Google's Video Intelligence AI API** and historical data from Kaggle, ensuring the integrity of aircraft instruments and external components. Provide prioritized inspection guidance to ground staff for thorough post-landing checks.

4

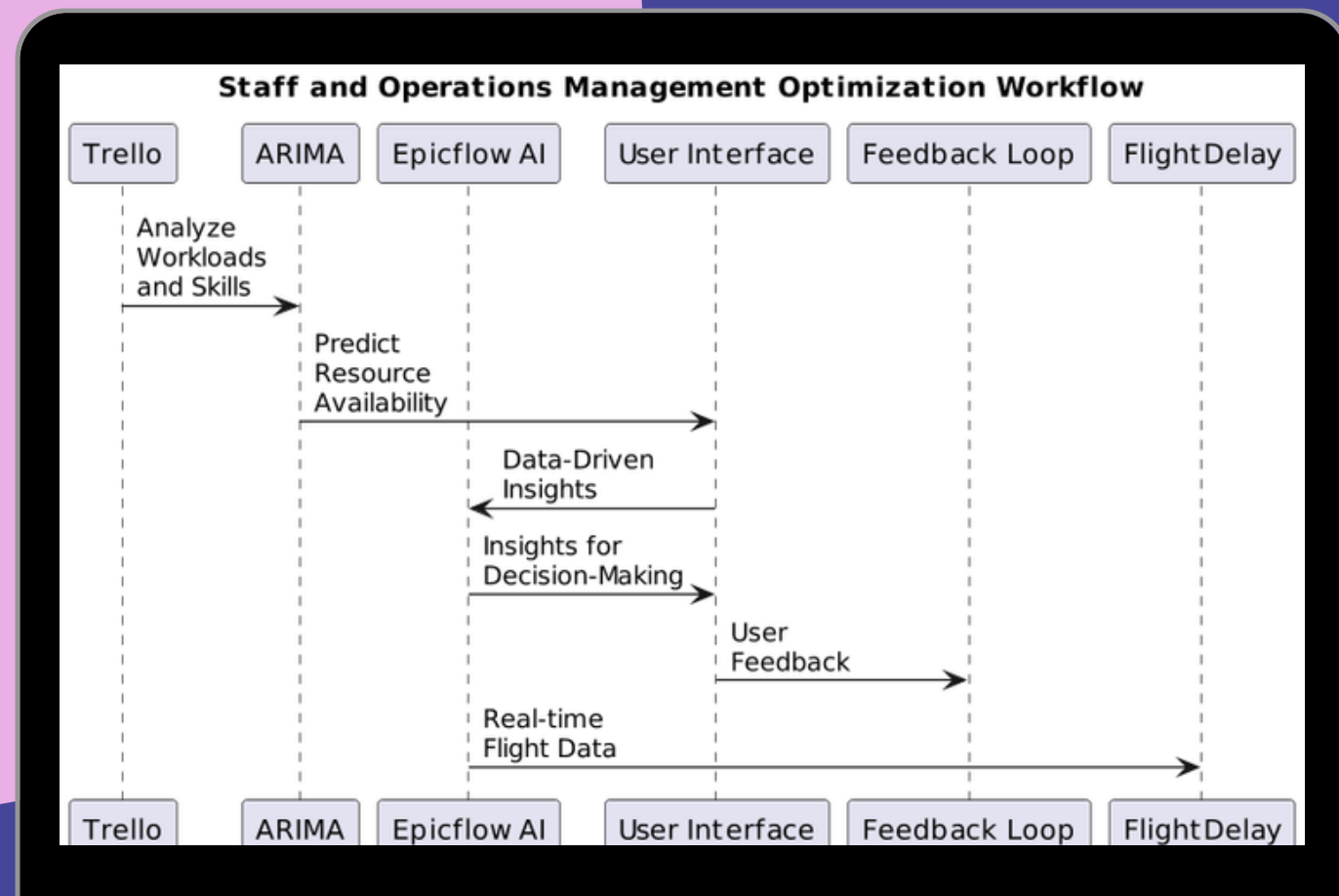
Leverage Kaggle's historical data combined with AI algorithms **Random Forest** to train a prototype machine learning model tailored specifically to suggest or trigger the concerned team optimizing inspections.

5

Offer real-time guidance to ground staff during inspections, ensuring compliance with safety protocols and accurate verification of aircraft integrity with platform showing routine tasks to be done.



Optimizing Operation Management



1

Automated scheduling of flights with embedded delay prediction machine learning model. Flight delay prediction will help to schedule and notify flight departures accordingly.

2

Utilizing machine learning model **ARIMA** to predict resource availability and anticipate fluctuations in demand, enabling real-time adjustments to schedules.

3

Enhance decision-making processes with data-driven insights by leveraging **Epicflow** AI to analyze both real-time and historical data. This approach offers valuable insights for strategic decision-making in staff management.

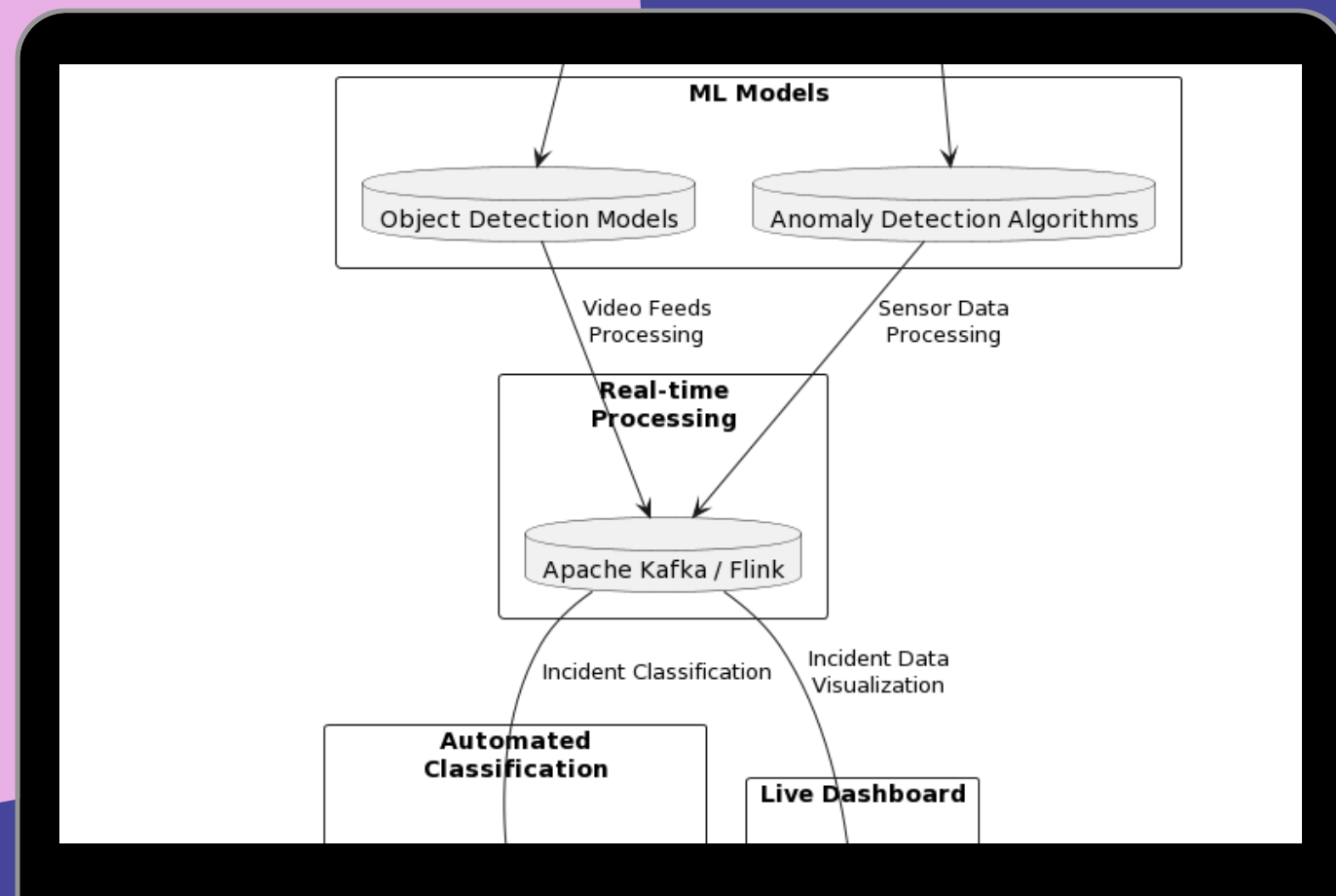
4

Harnessing machine learning models like **SciPy** and **Matplotlib** to anticipate and mitigate flight delays, enhancing operational efficiency and passenger satisfaction.

5

Establish a feedback loop to continuously monitor and improve the staff management optimization process. Provide regular assessments and updates to **Deep Q-learning** AI models based on user feedback and changing business needs in accordance with the monitoring results.

Live Incident Management



1

For Automated Incident management, AI algorithms (**YOLO, Faster R-CNN**) swiftly detect and categorize incidents, ensuring a quick response by alarming the ground staff.

2

Leveraging **Apache Kafka or Flink** optimizes real-time data processing, seamlessly incorporating inputs for efficient incident analysis.

3

ELK stack automates alerts, contributing to overall operational efficiency and providing the staff instant alert.

4

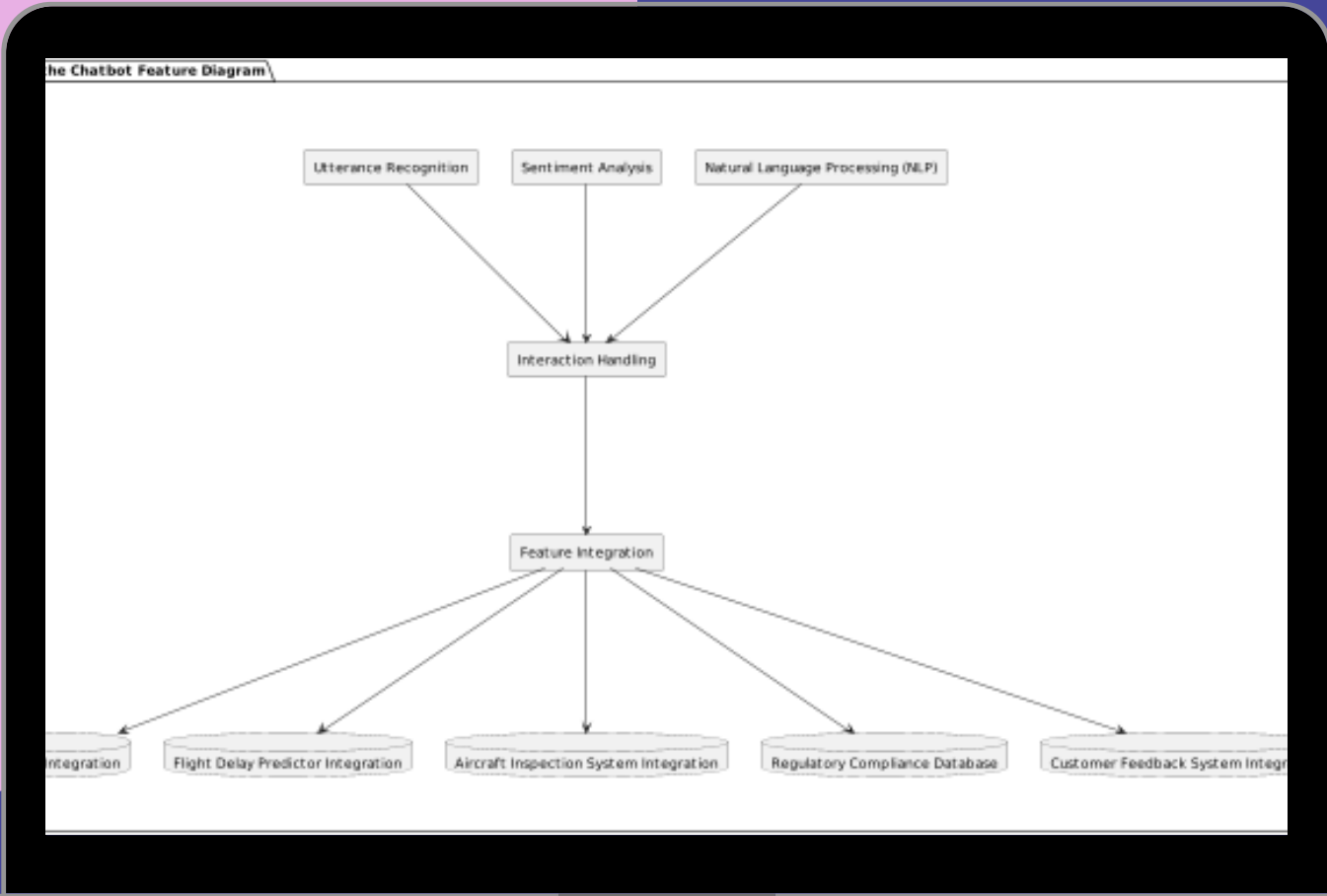
Enhanced Safety Measures with **Drone Insights** provides swift response to incidents, addressing security breaches and safety issues promptly.

5

AI tools like **Grafana** aid proactive prevention, and continuous real-time processing ensuring operational continuity.

Melbo the Chatbot

(customer feedback analysis)



1

Continuously monitors incoming feedback uses NLP algorithm **NLTK** for text analysis to extract sentiments and key insights and apply algorithms like **VADER** to classify feedback sentiment and use **LDA** for issue identification.

2

Integrated with **Kore.ai**, it streamlines request submissions to RMS. Staff engage via conversational interactions, simplifying the submission process and bypassing complex system navigation.

3

Leveraging **Kore.ai's NLP** model, Melbo intelligently identifies user utterances and provides intelligent suggestions, data retrieval, and process guidance. This integration enhances operational efficiency and assists staff in making informed decisions.

4

Operates as a centralized hub, integrated with **UMS**, enabling staff to access and interact with user details. It facilitates direct communication by redirecting to the User Management System, promoting seamless interaction and collaboration among staff members.

5

Utilizing **NLP of Kore.ai** bot platform, Melbo assists senior employees in verifying regulatory compliance. Accessing databases or guidelines, it ensures proposed solutions align with aviation standards.

Sustainable Goals



- 1 By harnessing the power of AI and doing real-time monitoring, adaptive decision-making, and effective stakeholder engagement, the management can move beyond reactive measures and towards proactive strategies for mitigating **PFAS** risks and protecting human health and the environment.
- 2 Based on **APAC's Gas Heating Elimination Plan**, The AI-powered Automation streamlines the implementation of gas efficiency measures, heat pump installations, and system optimizations.
- 3 Automation supports the transition to **electric vehicles** seamlessly. The platform facilitates the deployment of electric charging infrastructure, optimizing the location and capacity based on AI-driven predictive models.
- 4 The platform automates the integration of **green building principles**, ensuring that every capital project adheres to sustainability specifications.
- 5 The AI-driven platform continually monitors and evaluates Melbourne Airport's carbon footprint, aligning with the Airport **Carbon Accreditation program**. Automation facilitates real-time tracking of emissions, including **Scope 3 factors** such as landing and take-off cycle emissions.

Architecture

Step 1

Workflow

Mapping out different departments and identifying tasks for automation and data-driven decision-making.

Step 2

Automation

Implementing a unified platform for automating routine tasks leveraging AI and integrating case management.

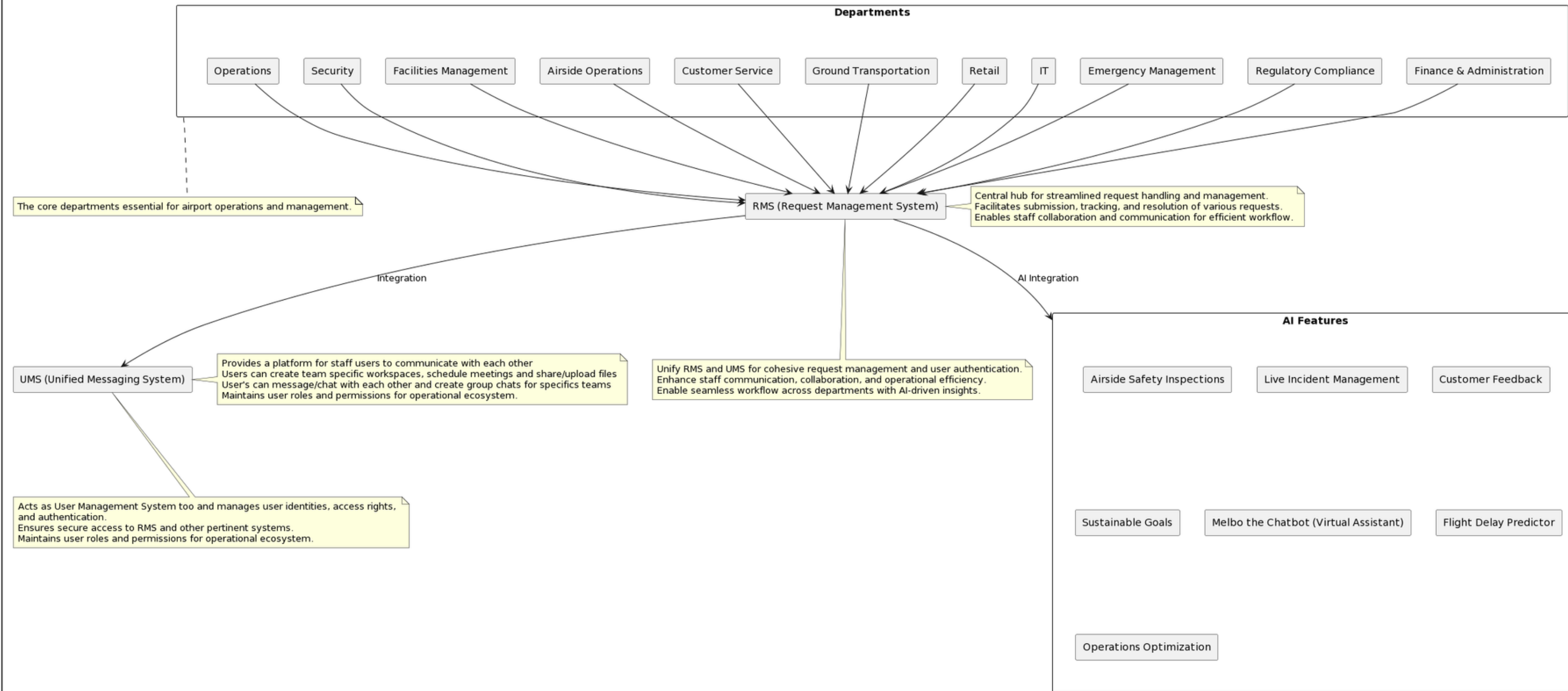
Step 3

End product

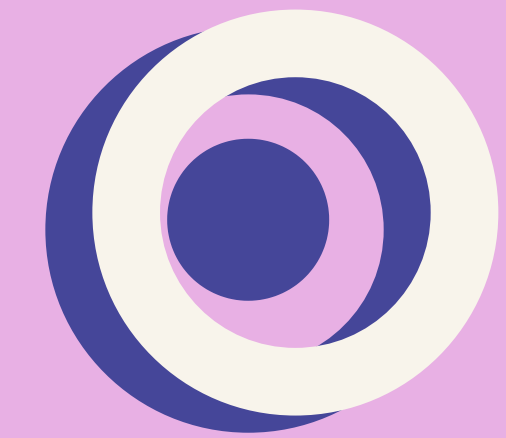
<https://github.com/lucky0612/Innervest> - detailed demo video in github

FLOWCHART and END PRODUCT





FUTURE ASPECT



The future aspects of the Airport Business Process Automation (BPA) Platform appear promising, with several key trends and developments expected to shape its evolution:

IoT Integration: Integrating IoT devices and sensors into the BPA platform can provide real-time data on various aspects of airport operations, leading to better-informed decision-making and more efficient resource management.

Personalized Customer Experiences: The BPA platform could evolve to offer more personalized experiences for passengers. By leveraging AI-driven insights, airports can tailor services, information, and interactions based on individual preferences, creating a more positive and efficient travel experience.

Global Connectivity: As airports increasingly become hubs for global travel, the BPA platform may focus on improving connectivity between different airports and airlines. Seamless integration with international systems and standardized BPA protocols could enhance coordination and communication on a global scale.



The Team - ZERO.AI



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