

Optimizing Airport Arrival Times Using Policy Trees

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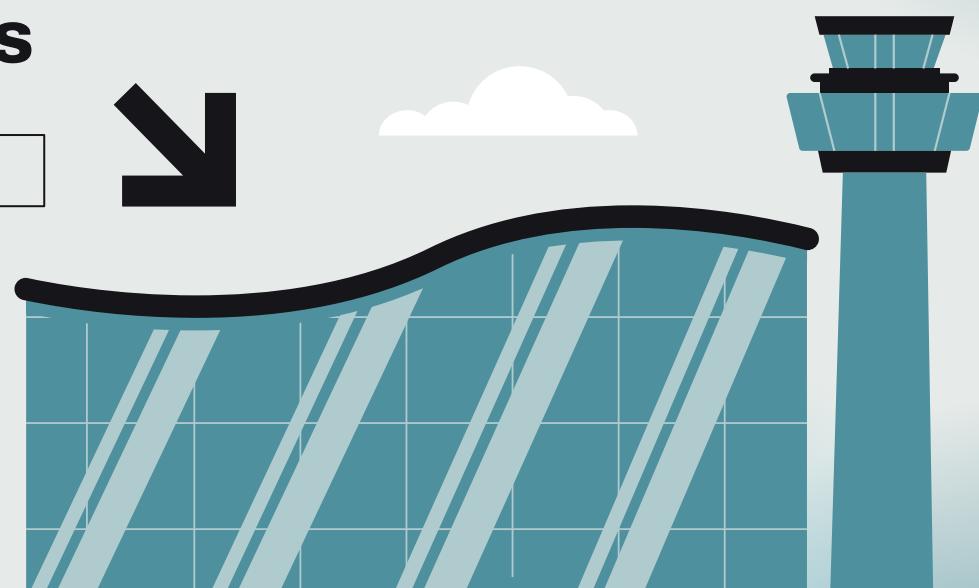


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Problem Statement

Optimizing Airport
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Methodology

Optimal Regression
Trees and Policy Trees

Data

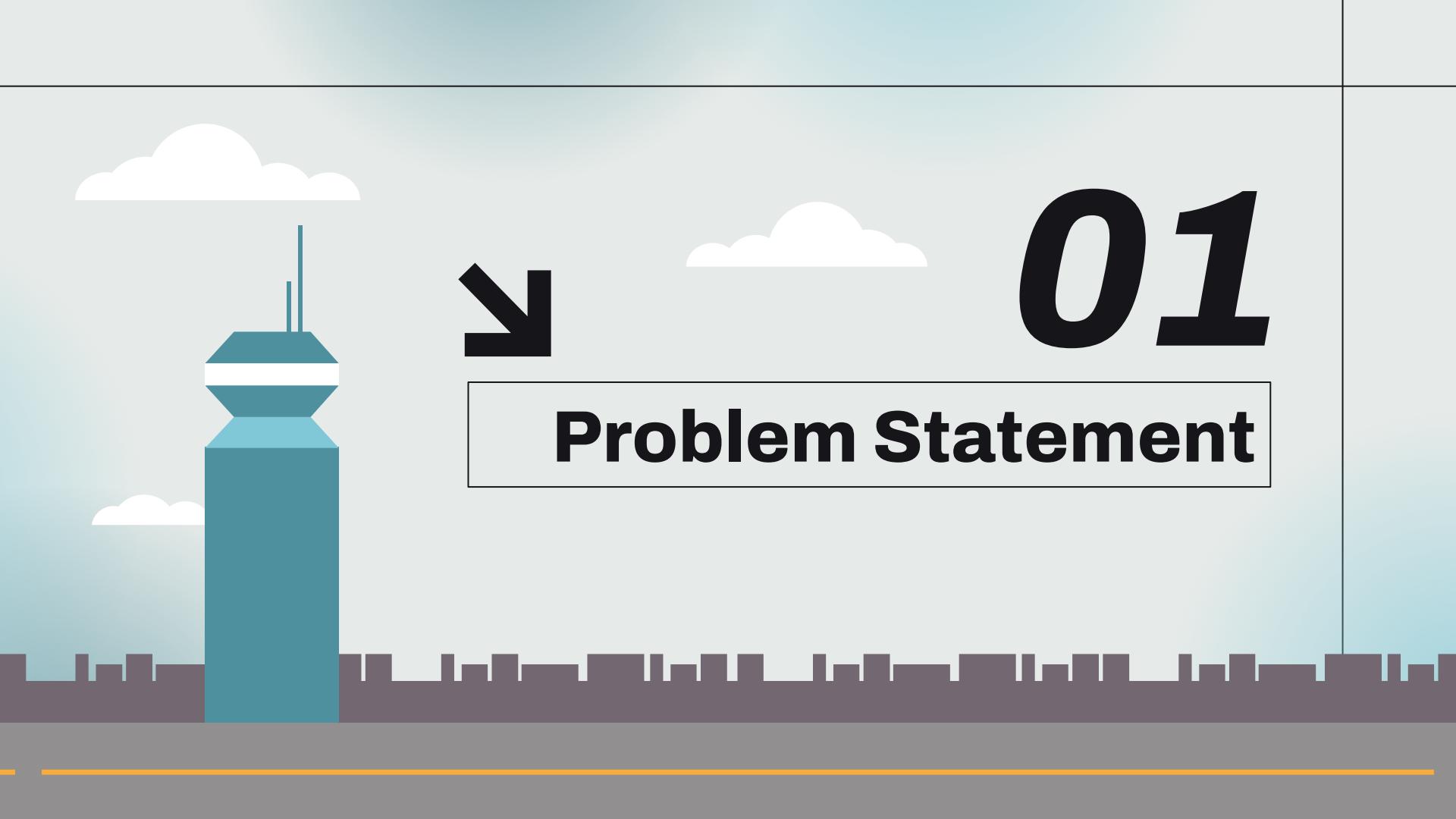
Where and how we got
our data

04



Impact

How can our project be
applied



01

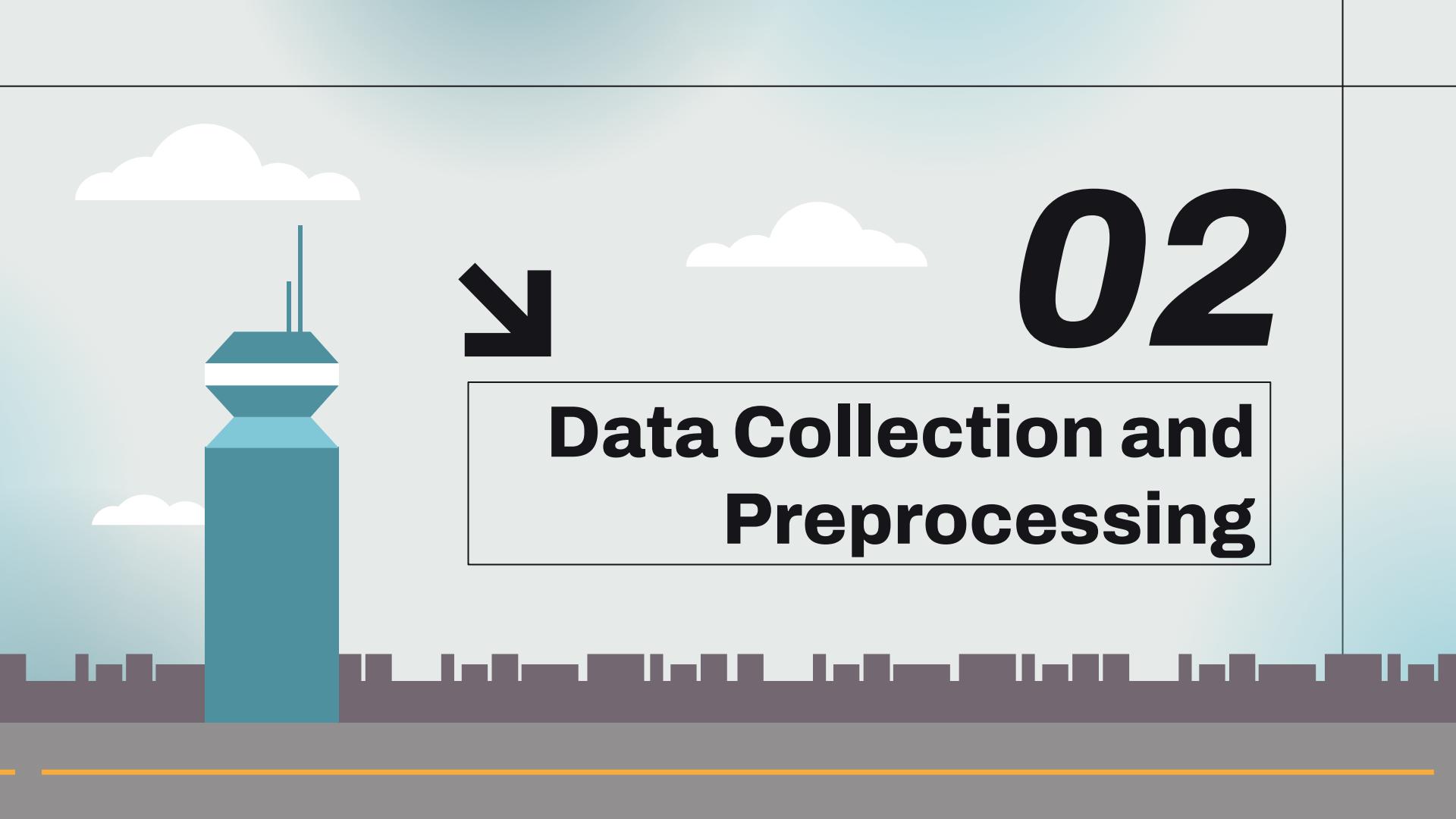


Problem Statement



When do I arrive at the airport
to minimize time in airport
without missing the flight

Overall aiming to reduce stress
associating with traveling

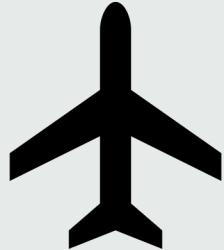


02



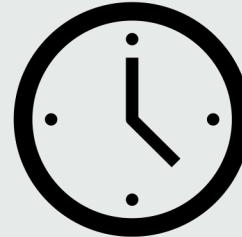
Data Collection and Preprocessing

Data



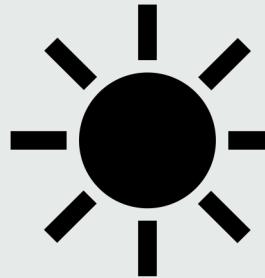
Massport

Date, Flight Number, Destination
Airport, Carrier Code(Airline),
Scheduled Departure Time,
Delayed minutes



TSA

Security Wait Time,
Baggage claim
Time



NWS

Precipitation, Visibility,
minimum(temperature),
maximum(temperature),
Average Temperature

Calculated Columns

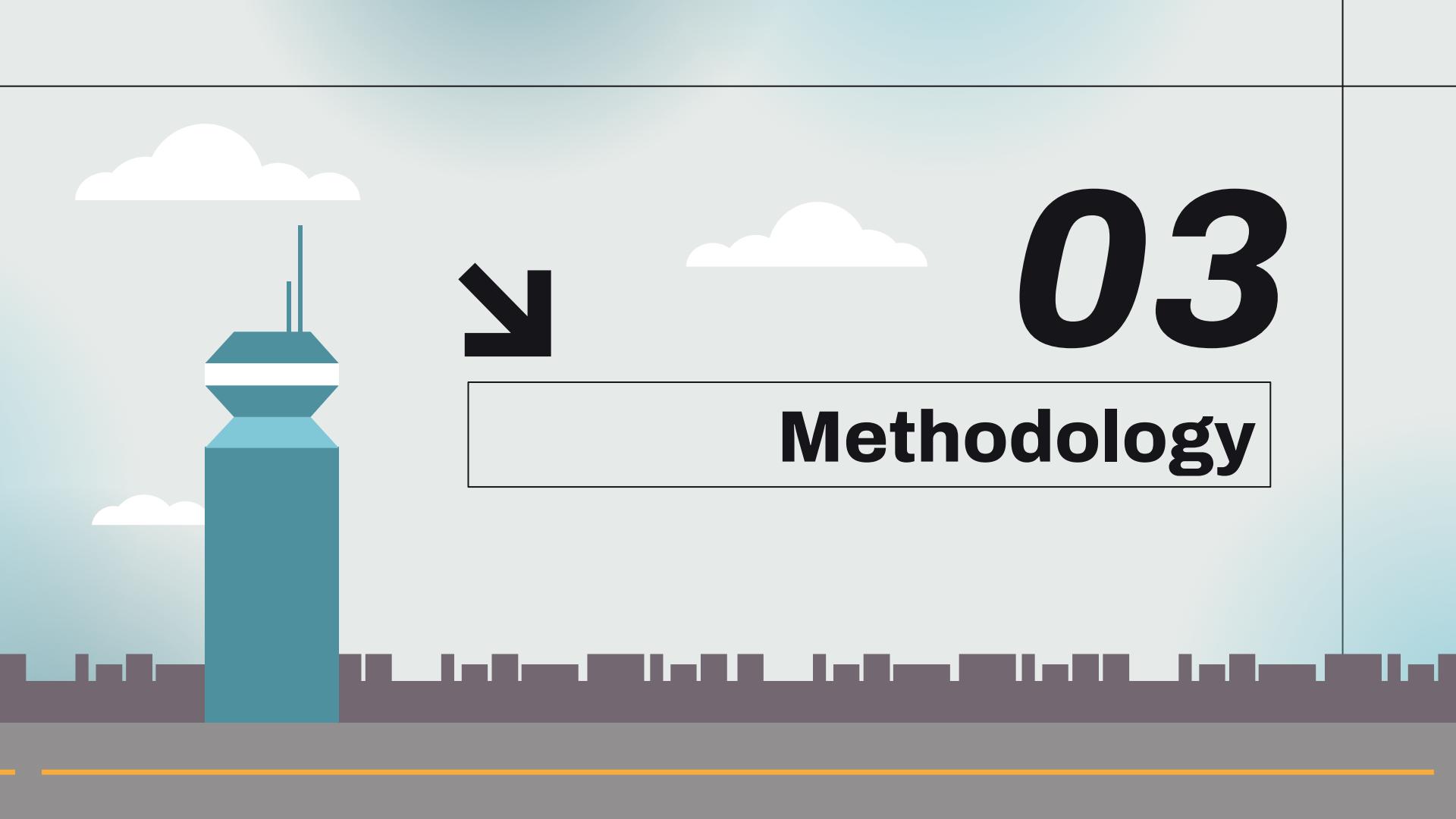


Treatments

- Range from 60 to 90 minutes in 5 minute intervals
- Worse weather → earlier arrival time on average

Outcomes

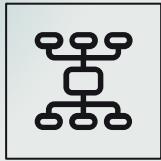
- Outcome: Treatment – security wait time – baggage wait time – 30(buffer) - delayed minutes
- If negative: + 90



03

Methodology

Baseline



Decision Tree

CART

3-fold cross validation

Average MSE: 17.33

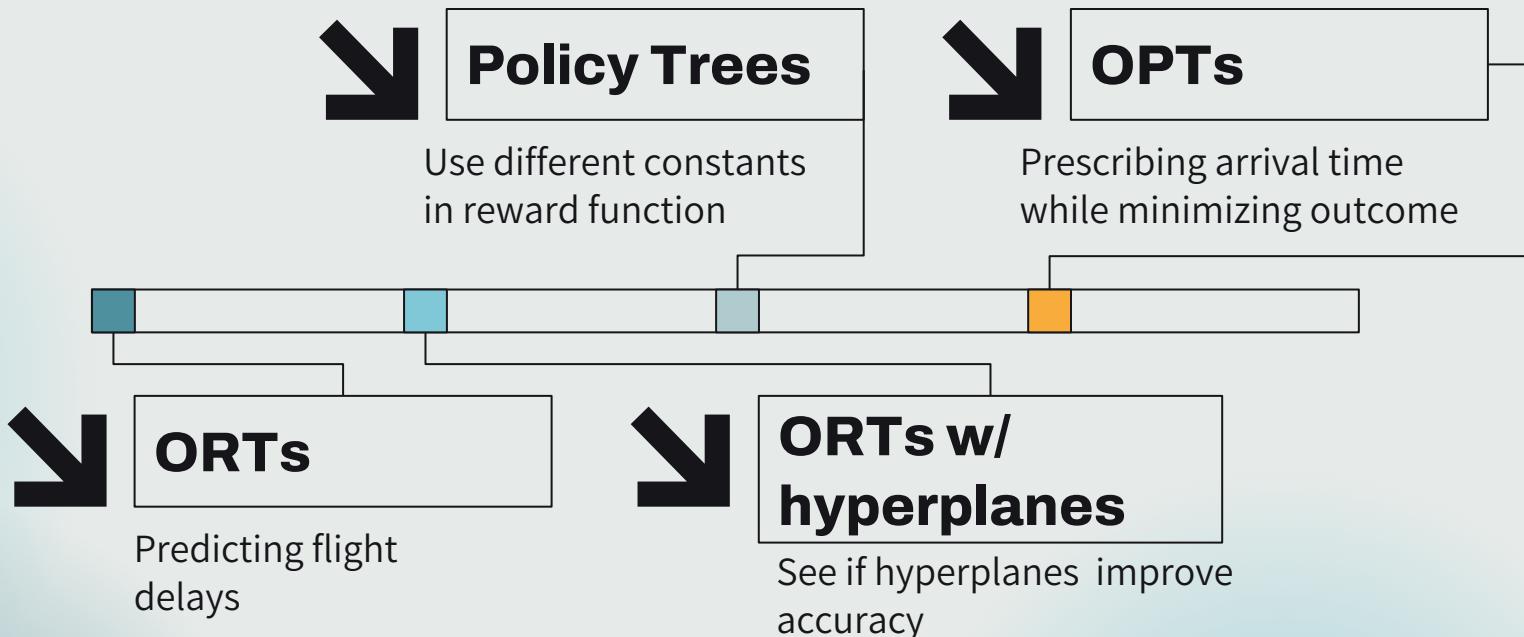


Prescribe 75 minutes

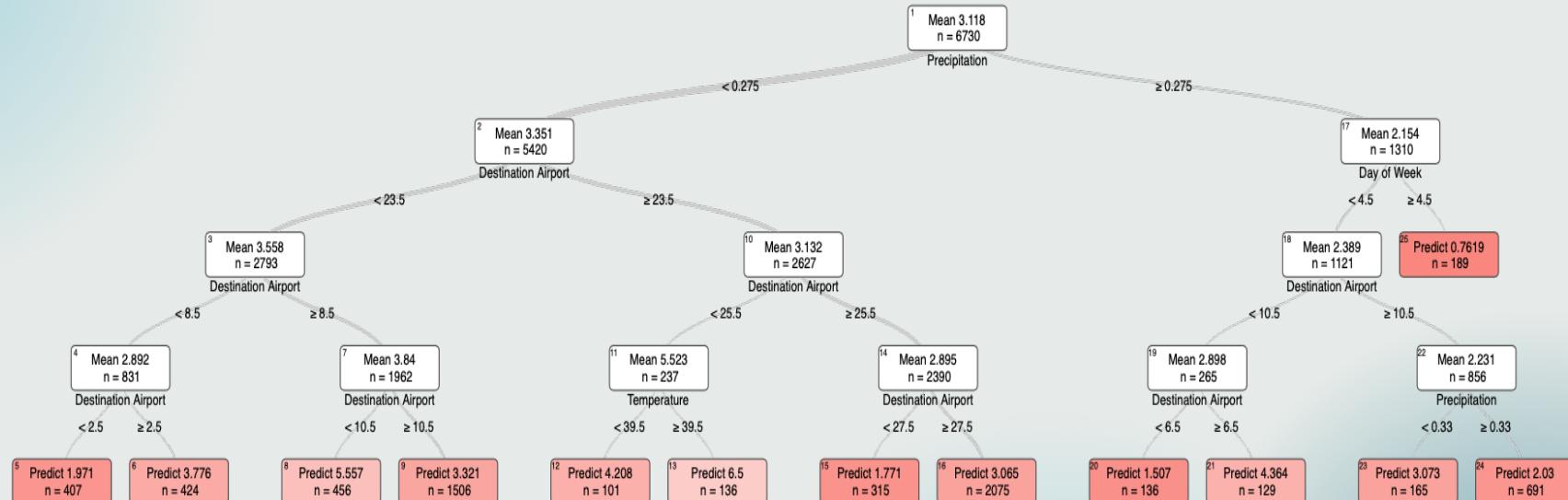
Same treatment for
each observation

Mean outcome: 21.62

Models

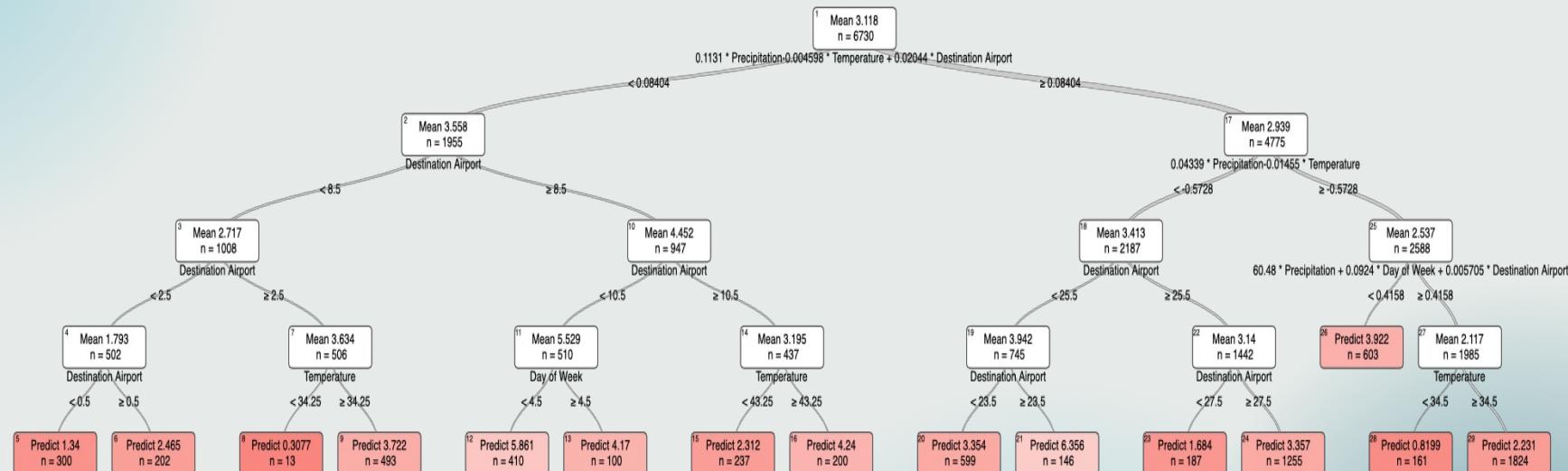


Optimal Regression Tree



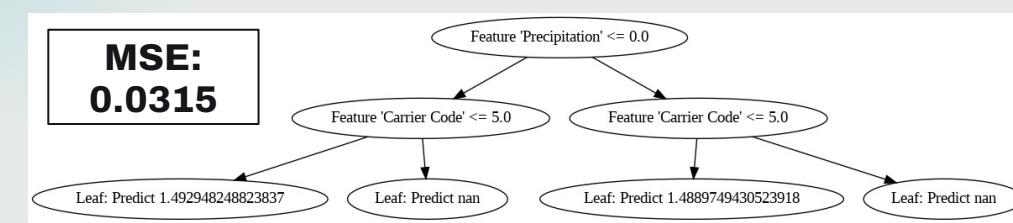
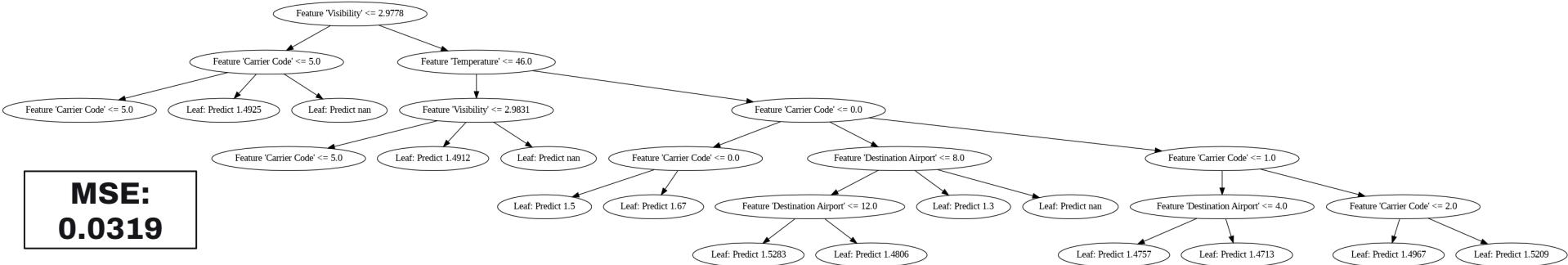
MSE: 0.066

Optimal Regression Tree with Hyperplanes

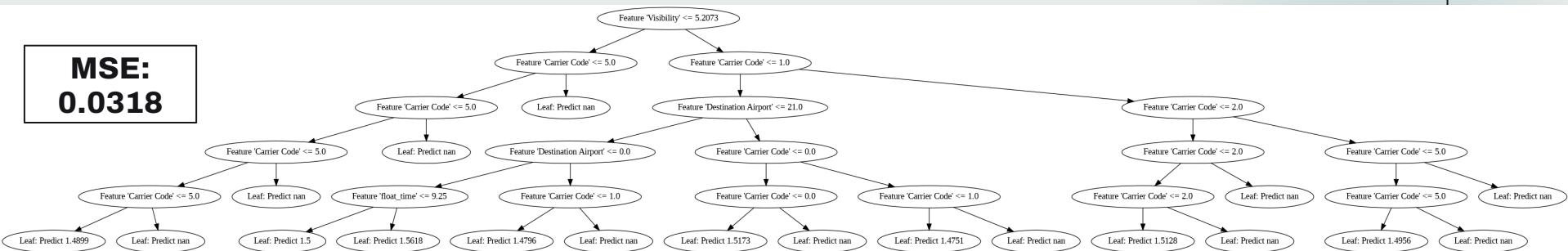


MSE: 0.064

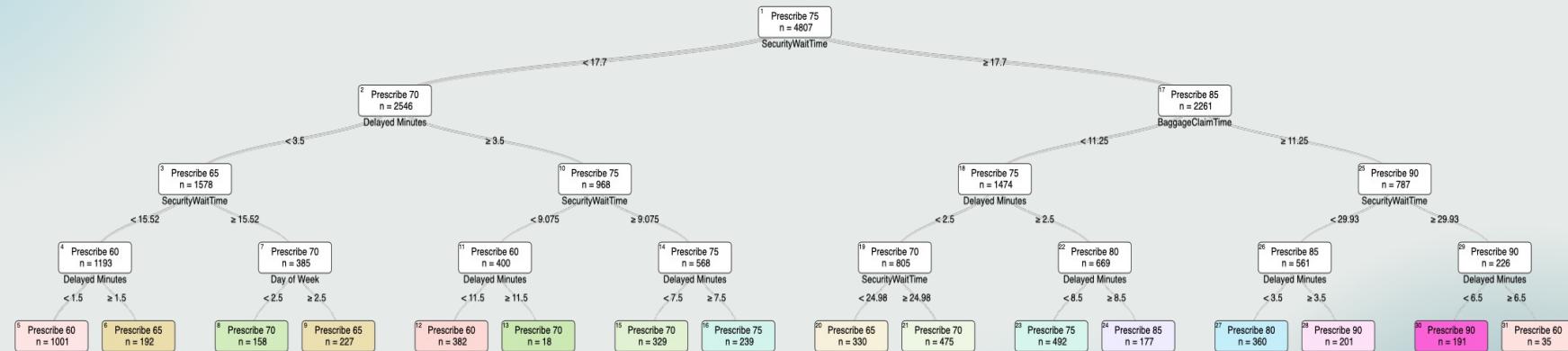
Policy Trees with Different Constants



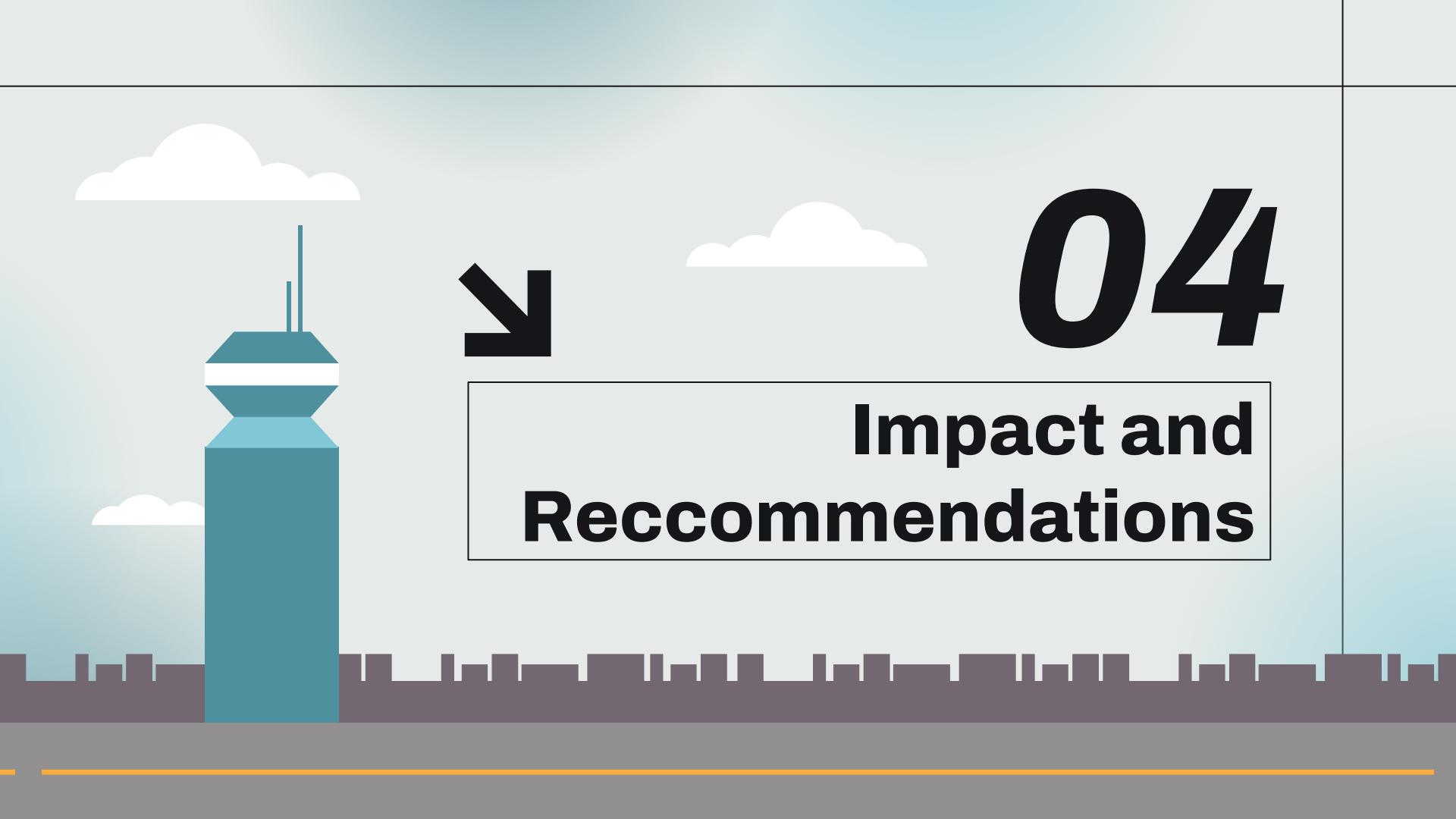
1. Initial Balanced Approach
2. Sensitive to Weather Severity
3. Balanced Approach with Sensitivity to Missed Flights



Optimal Policy Tree



Mean Test Outcome: 10.45

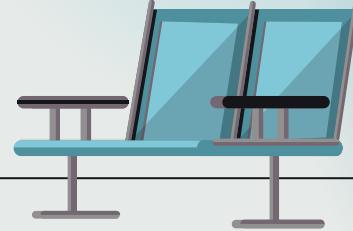


04



Impact and Reccommendations

Reccommendations



Security Wait Times



Prioritize management of security line traffic flow

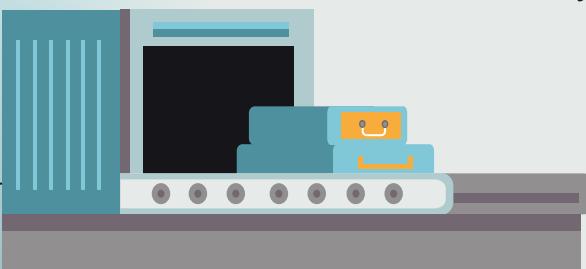


Day Specific

Tailored staffing and resource allocation by day

Communicate with Passengers

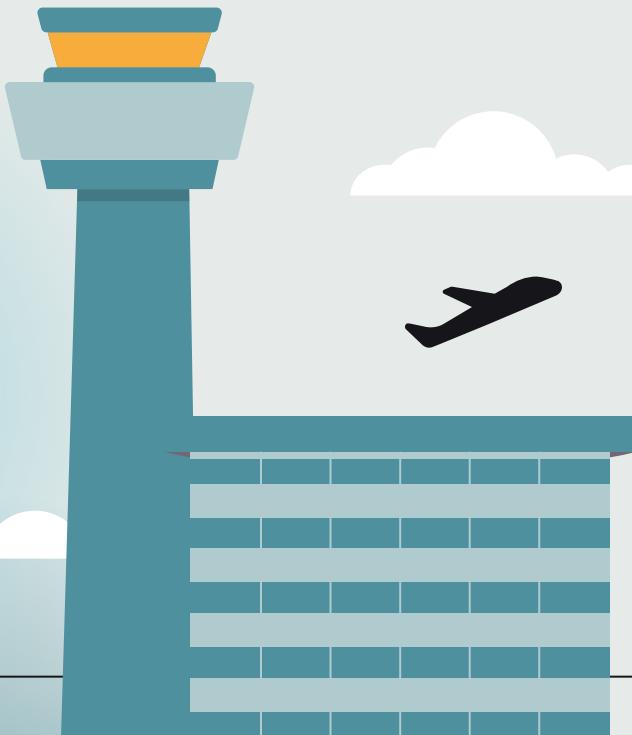
With app, mitigate bottlenecks and enhance efficiency of airport operations



Contingency Plans

Operational plans for peak-times or bad weather

Extensions



Passenger Facing App

Input flight details and receive personalized recommendation for optimal arrival time



Real-Time Data

Integrate real-time weather, security, and baggage check-in data



Case Study

Case study to observe passenger stress levels to use as outcome for the OPT

Thank You!

Any questions?

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