SEA
Seattle-Tacoma International Airport

Integrating AI into Airport Operations and Services

Fall 2024 Meeting

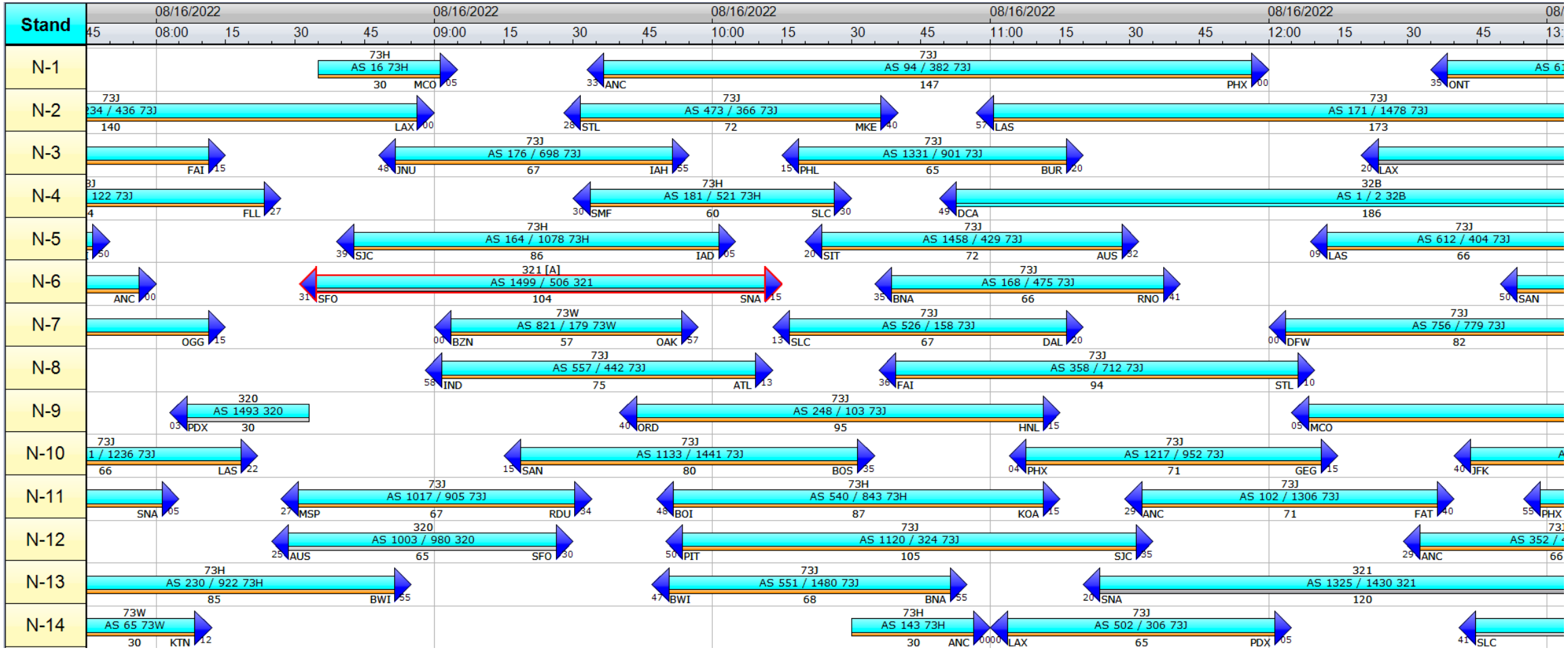
Friends & Partners in Aviation Weather

Samer Tirhi | Port of Seattle

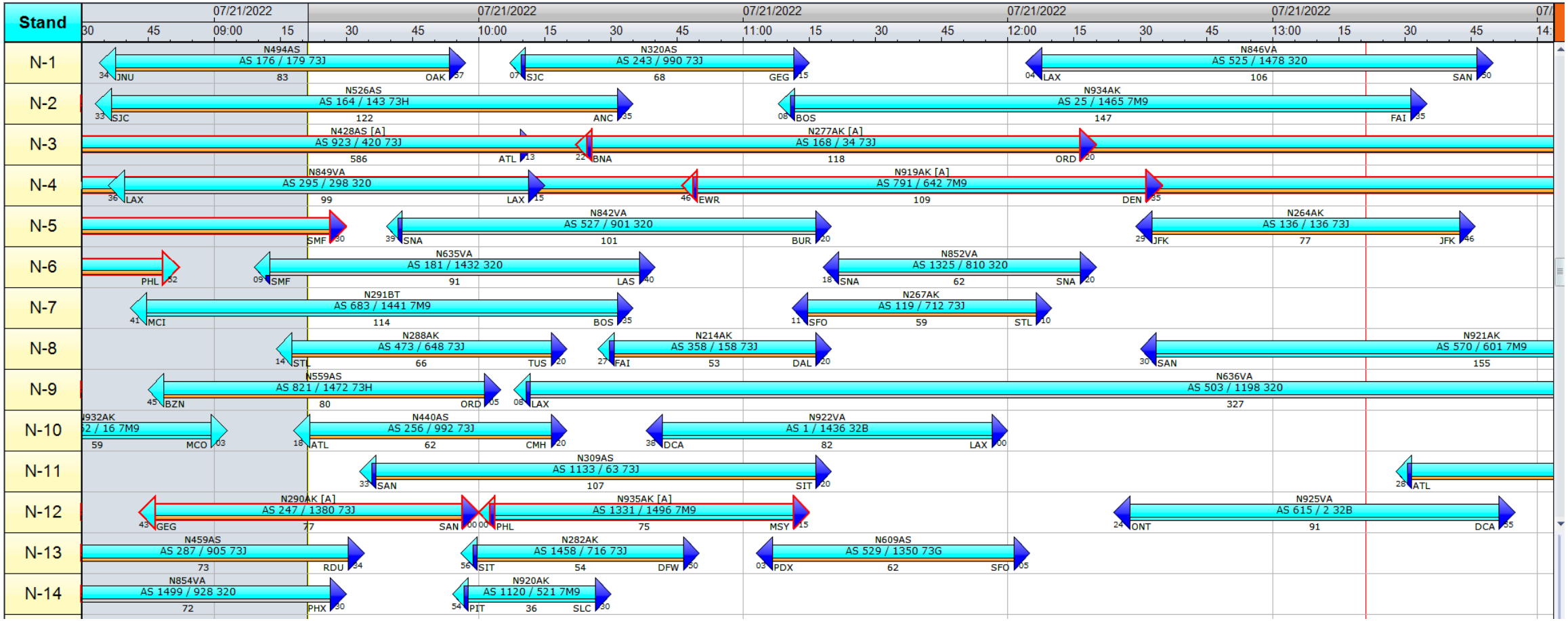
Constrained Footprint

- Physically limited space.
- Flanked by obstructions.
- Getting smarter with limited resources

Resource Management - Planning



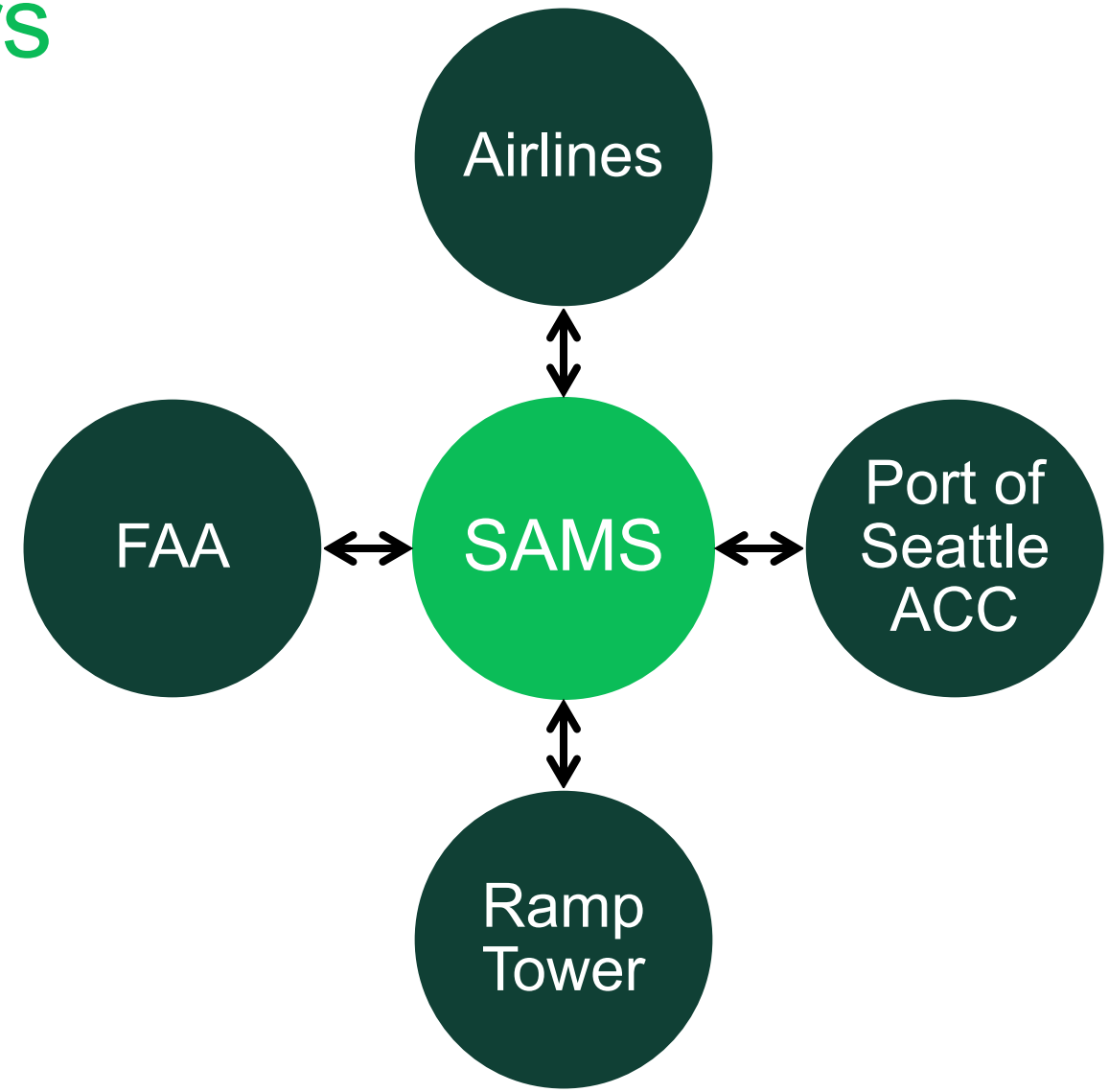
Resource Management – Day Of



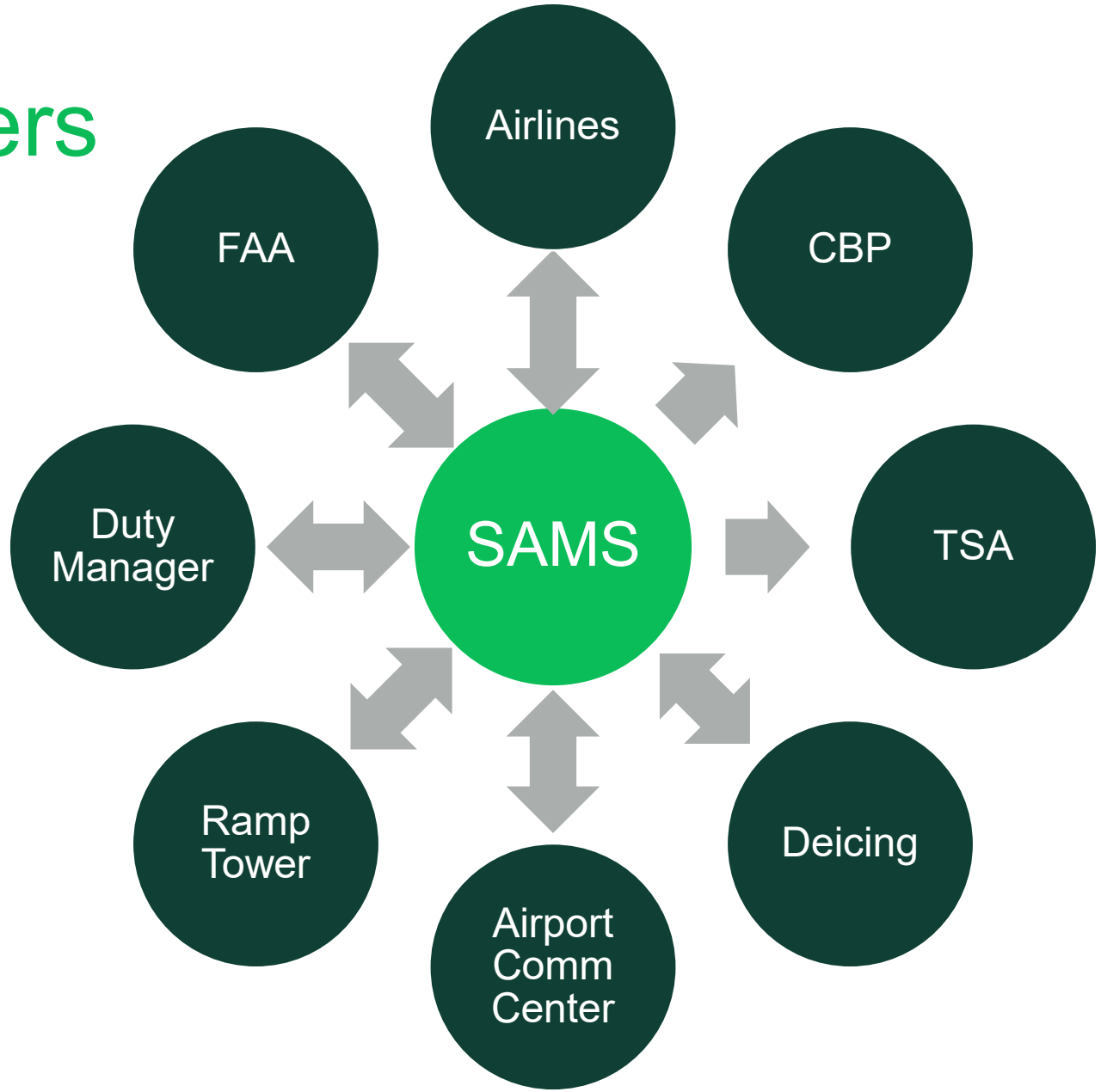
Project Goal:
Surface Area Management System (SAMS)

- Reduce Emissions
- Improve Efficiency
- Enhance Safety
- Proactive & Collaborative Decisions

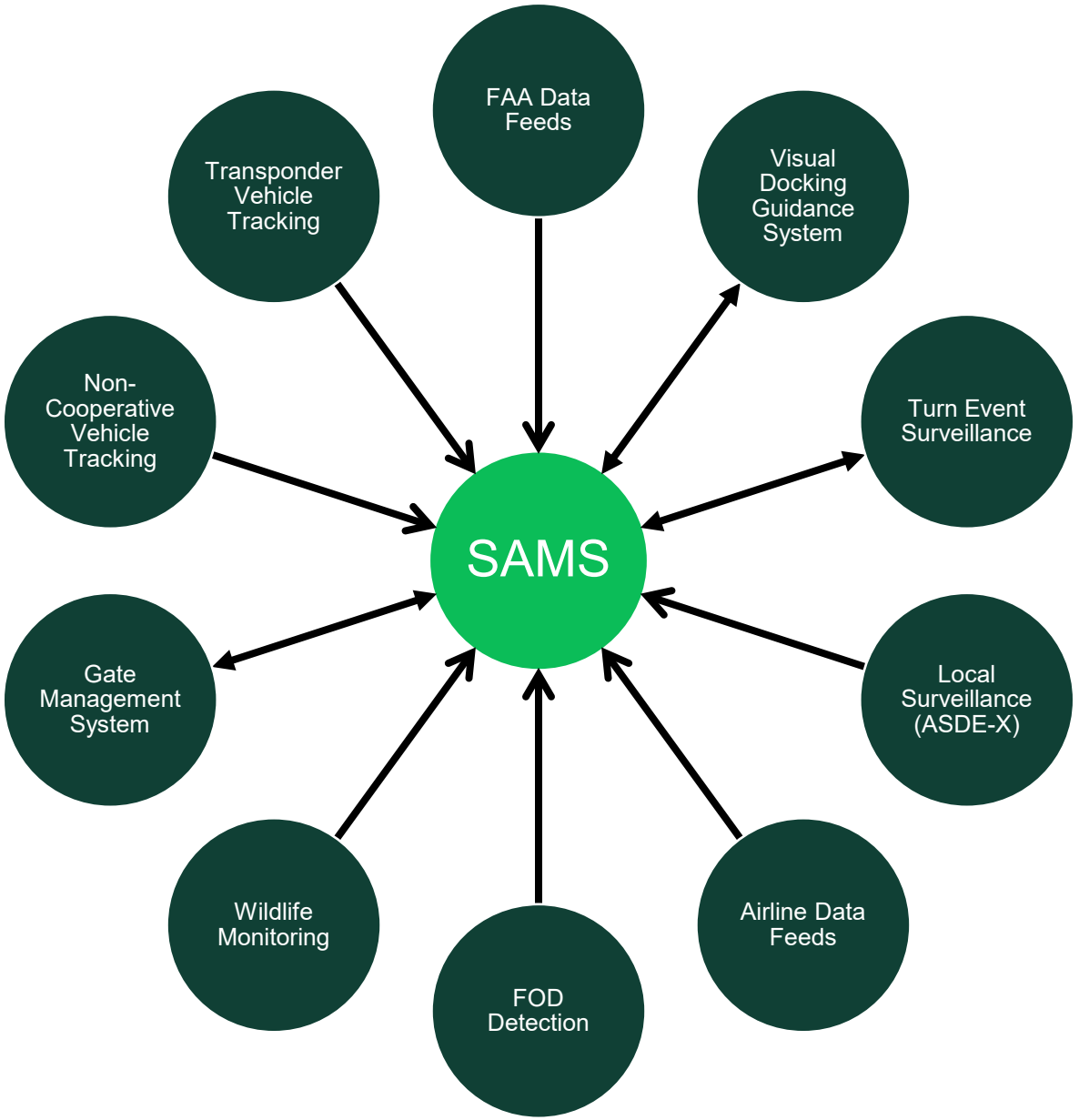
Stakeholders Interaction Post-SAMS



Stakeholders



System Interaction



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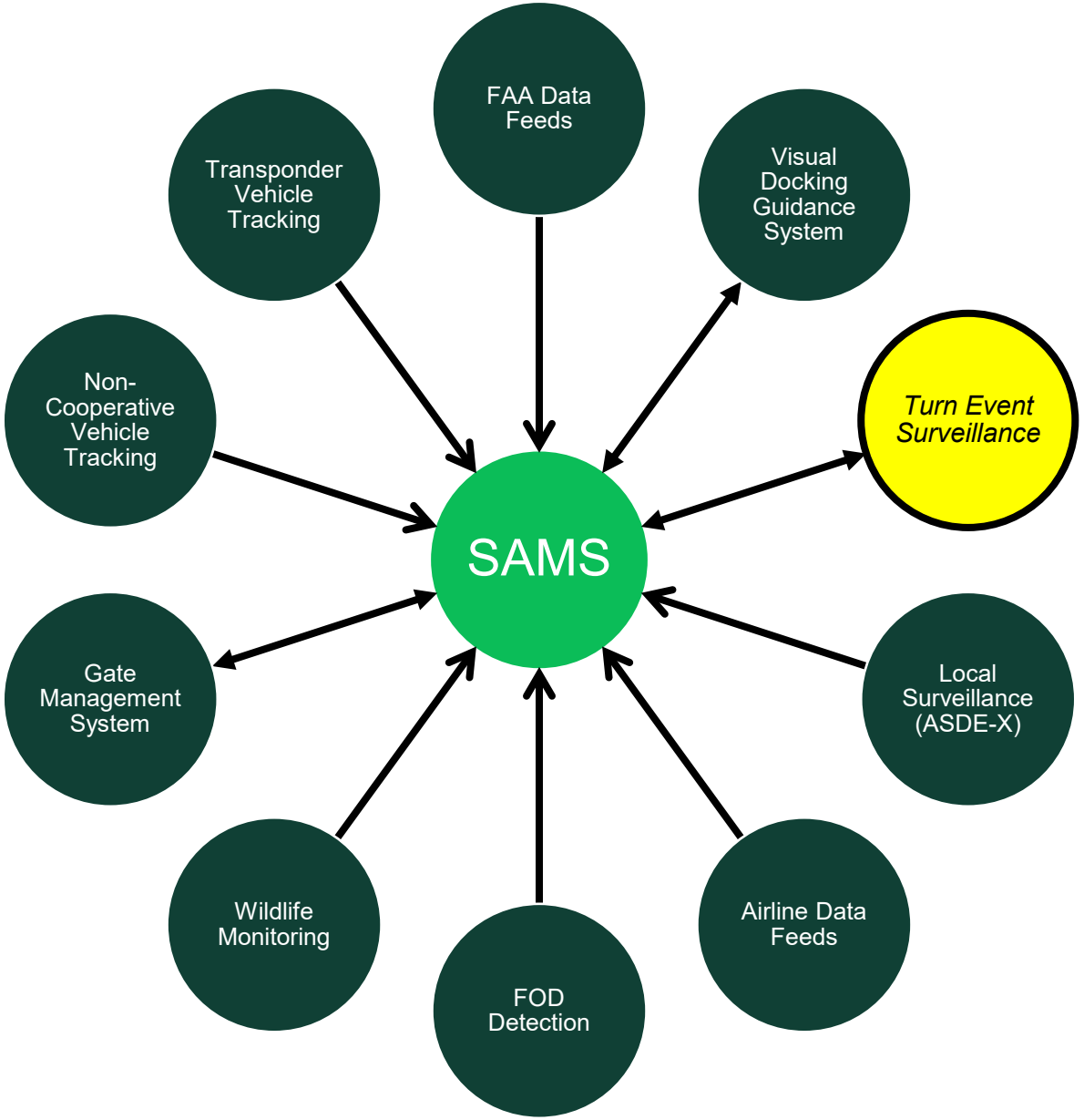

Turn Event Monitoring

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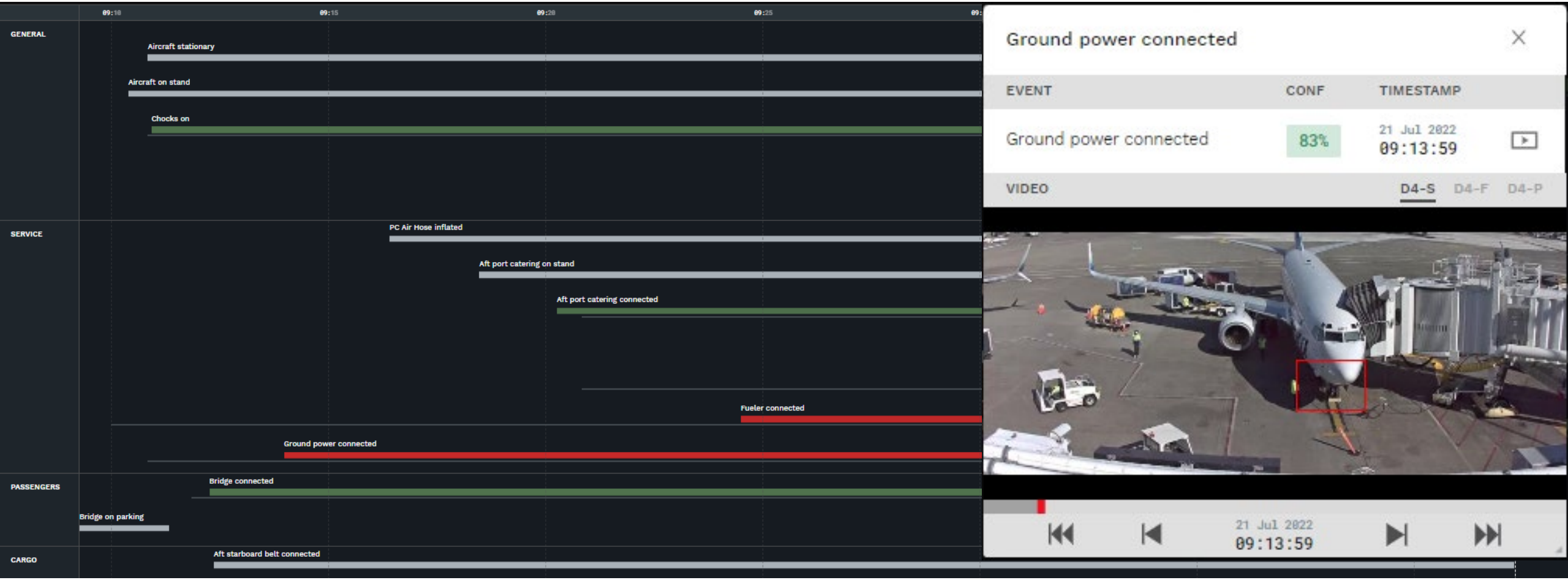
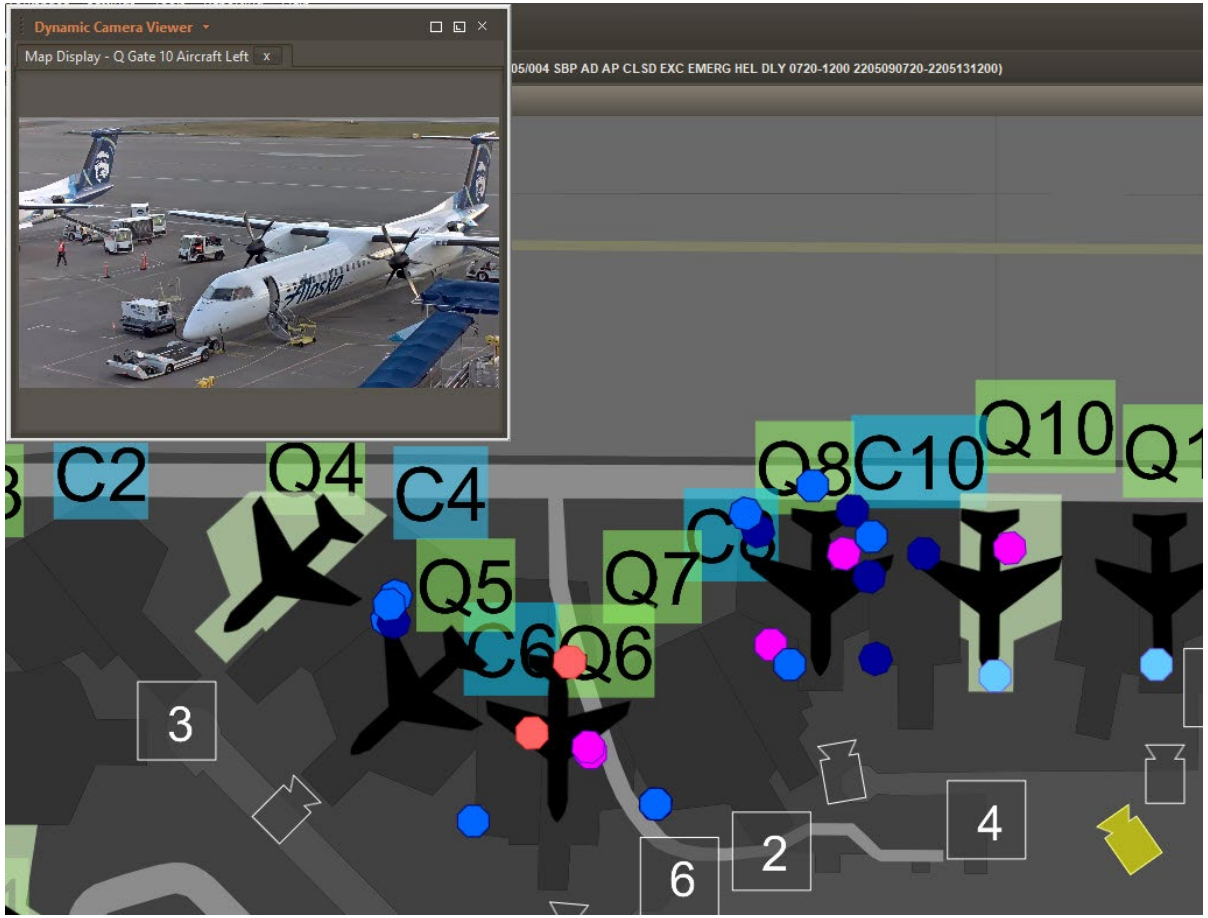


Stand Clear AI Tracking

- Utilizing Assaia's Apron AI from Ports Surface Area Management System (SAMS) to track if a stand has equipment parked on the tarmac prior to a flights arrival.
- Being tested on S-10, S-12, S-15, & S-16.
- In the process of capturing more data to produce a month-long system test report.
- Assaia's Initial tests prior to trial showcased 158 correct detections out of 160 test cases.
- Intend to use Misdetections and Time errors as main KPI's when testing Assaia's AI neural network.
  - Misdetections = events that were not detected by the Assaia system.
  - Time Errors = Inaccuracies of reported timestamps compared to when event actually occurred.

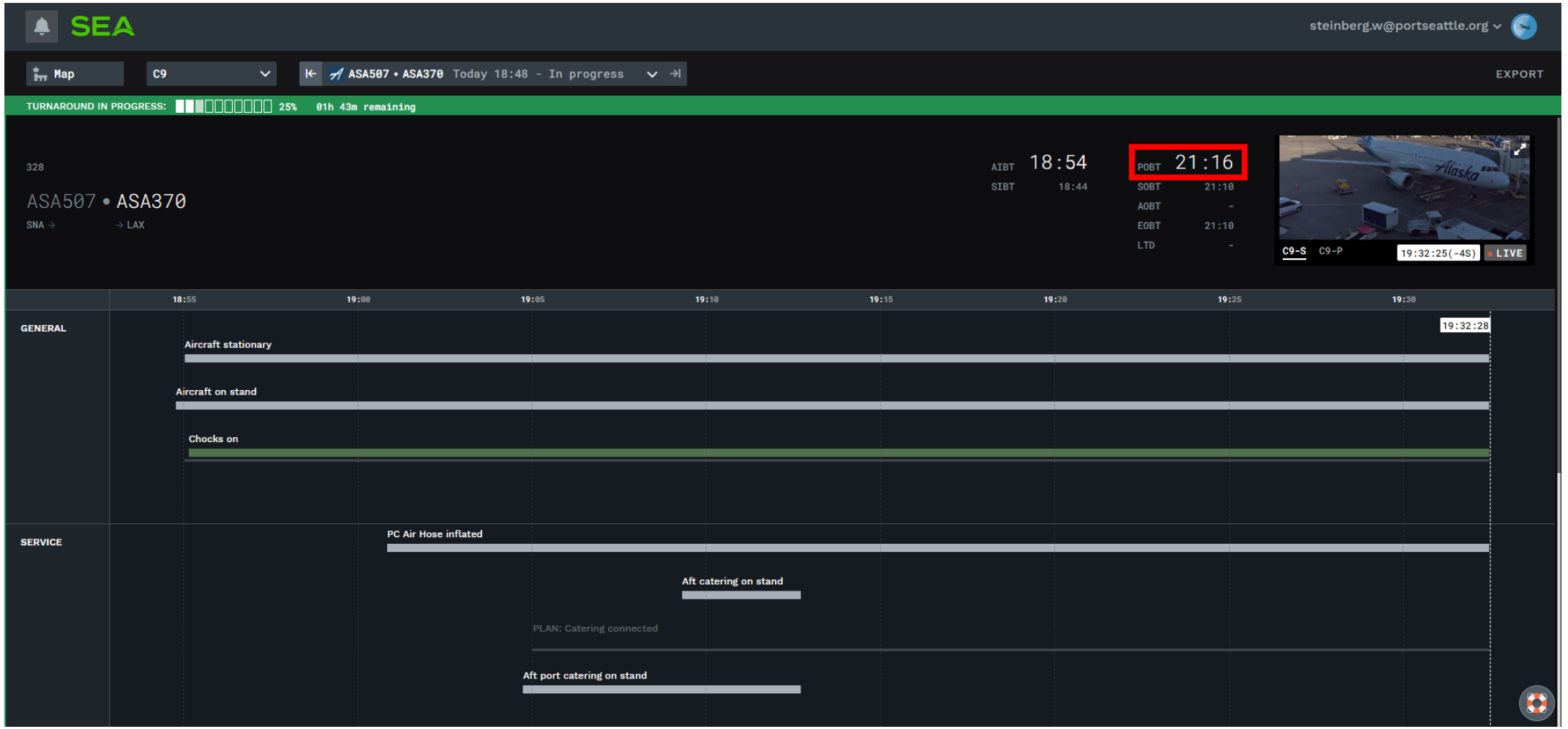
Non-Cooperative Vehicle Tracking

- Vehicle Tracking via Port cameras.
- Removes need for transponder.
- Increases ramp safety.



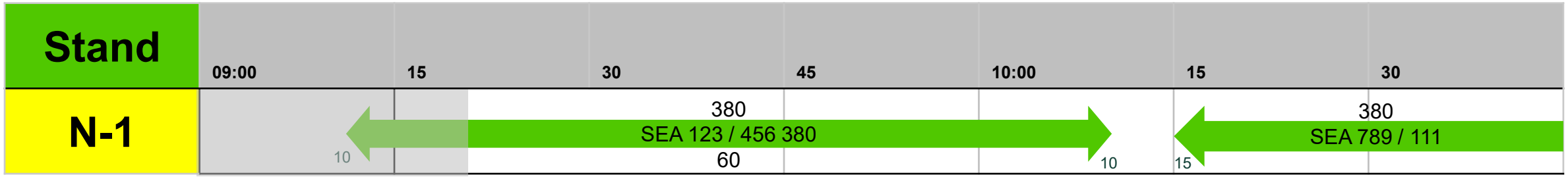
01 Aircraft
02 Bus
03 Cobus
04 Van
05 Fueling
06 Lift Truck
07 Deicing Truck
08 Other Big Vehicle
09 Fire Truck
10 Ambulance
11 Car
12 Water Truck
13 Tractor
14 Belt Loader
15 High Loader
16 Pushback Tug
17 Other Small Vehicle
18 Police
19 ULD
20 Luggage Cart
21 Empty Dolly
SMR

Predictive Off Block Time (POBT)



POBT Impact on Resource Management

Airline Estimated Times



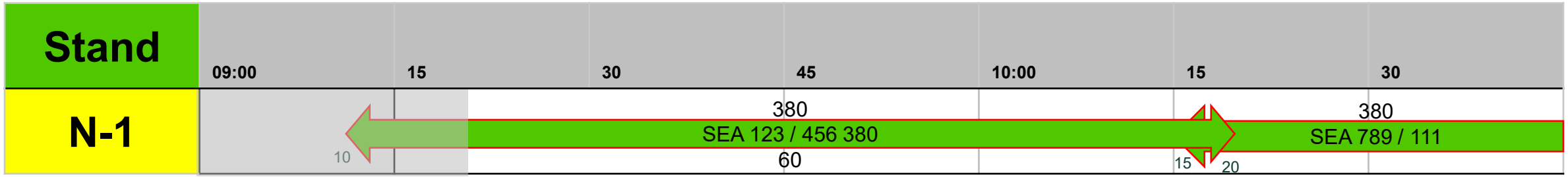
Flight Number	SEA 123
Stand	N-1
SIBT	09:00
AIBT	09:10
Flight Link	SEA 456

Flight Number	SEA 456
Stand	N-1
SOBT	10:00
EOBT	10:10
Flight Link	SEA 456

Flight Number	SEA 789
Stand	N-1
SIBT	10:15
EIBT	10:15
Flight Link	SEA 456

POBT Impact on Resource Management

Predicted Off Block Times



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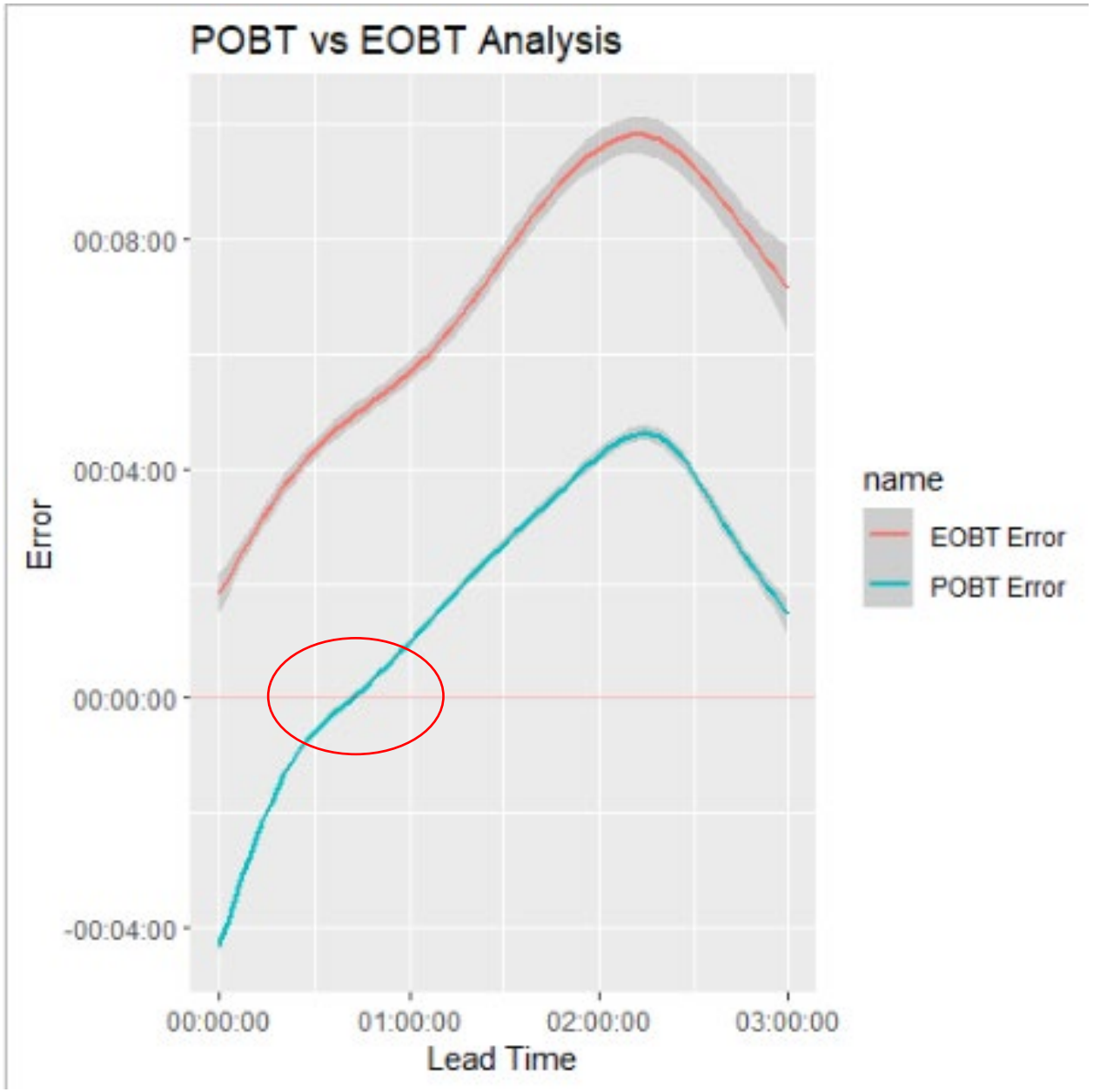
Flight Number	SEA 456
Stand	N-1
SOBT	10:00
EOBT	10:10
POBT	10:20
Flight Link	SEA 456

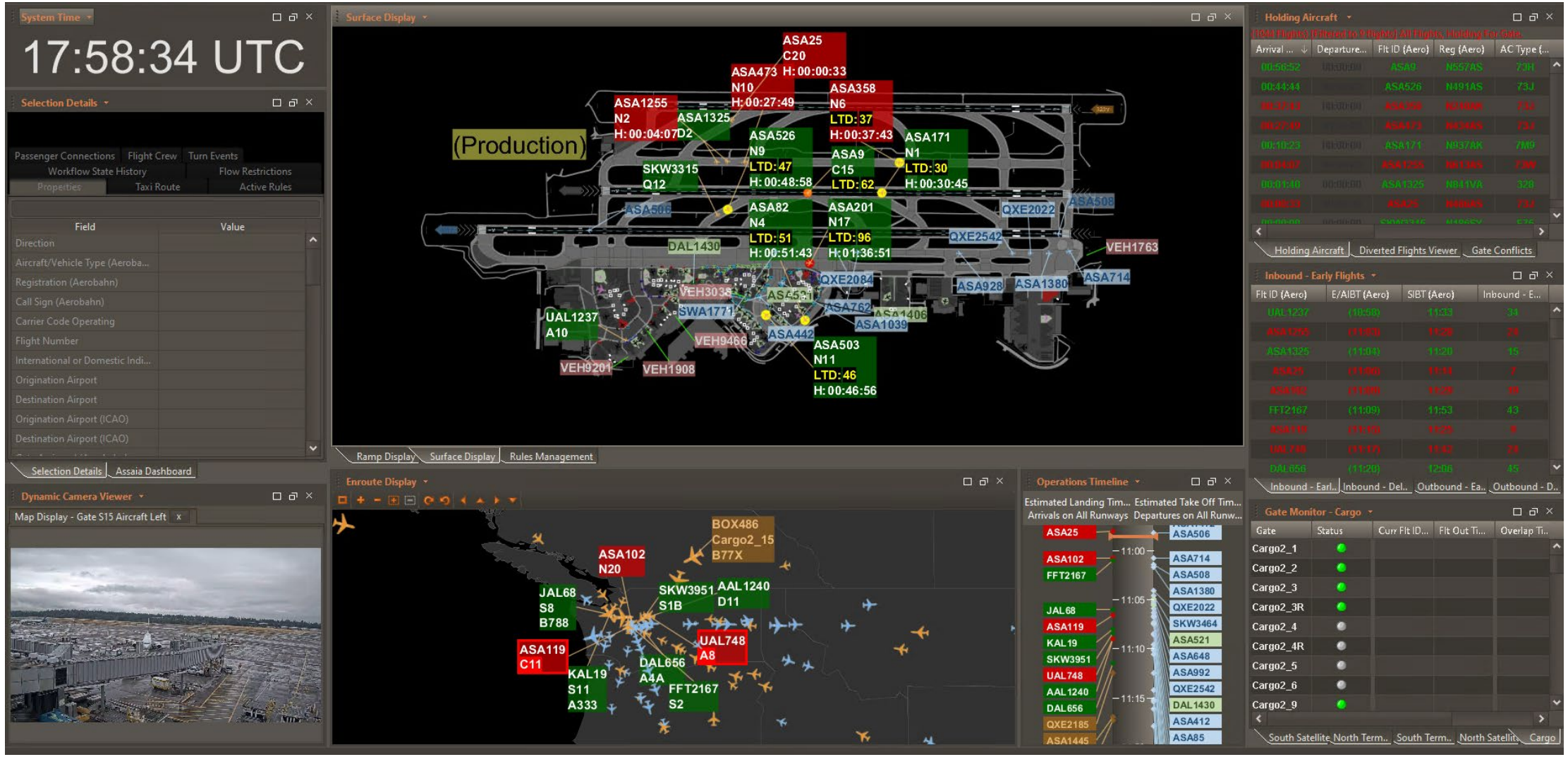
Flight Number	SEA 123
Stand	N-1
SIBT	10:15
EIBT	10:15
Flight Link	SEA 456

POBT vs EOBT Evaluation

- EOBT predicts ~2 min earlier departure at AOBT
- POBT predicts ~4 min later departure at AOBT
- At 40 minutes to departure POBT has zero error.

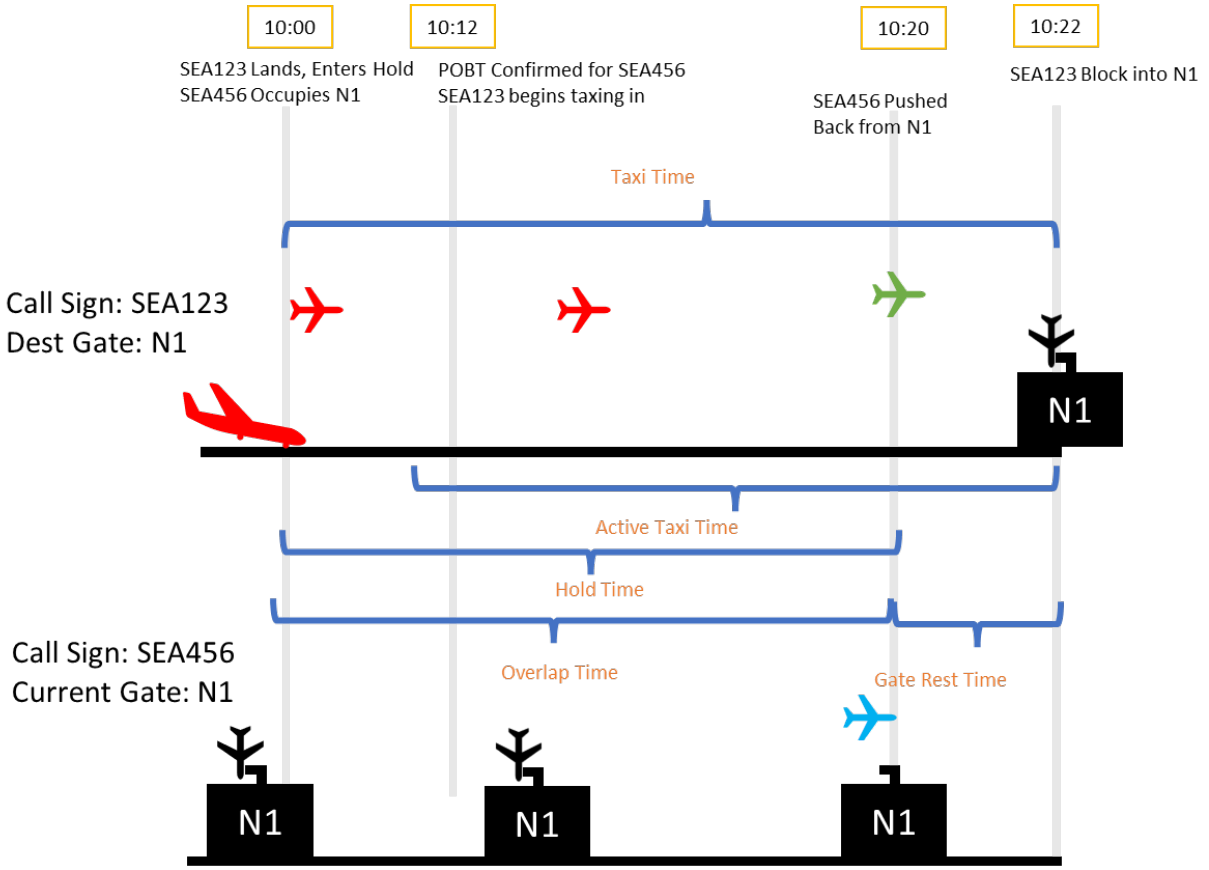


Surface Area Management System



POBT Impact on Gate Holds

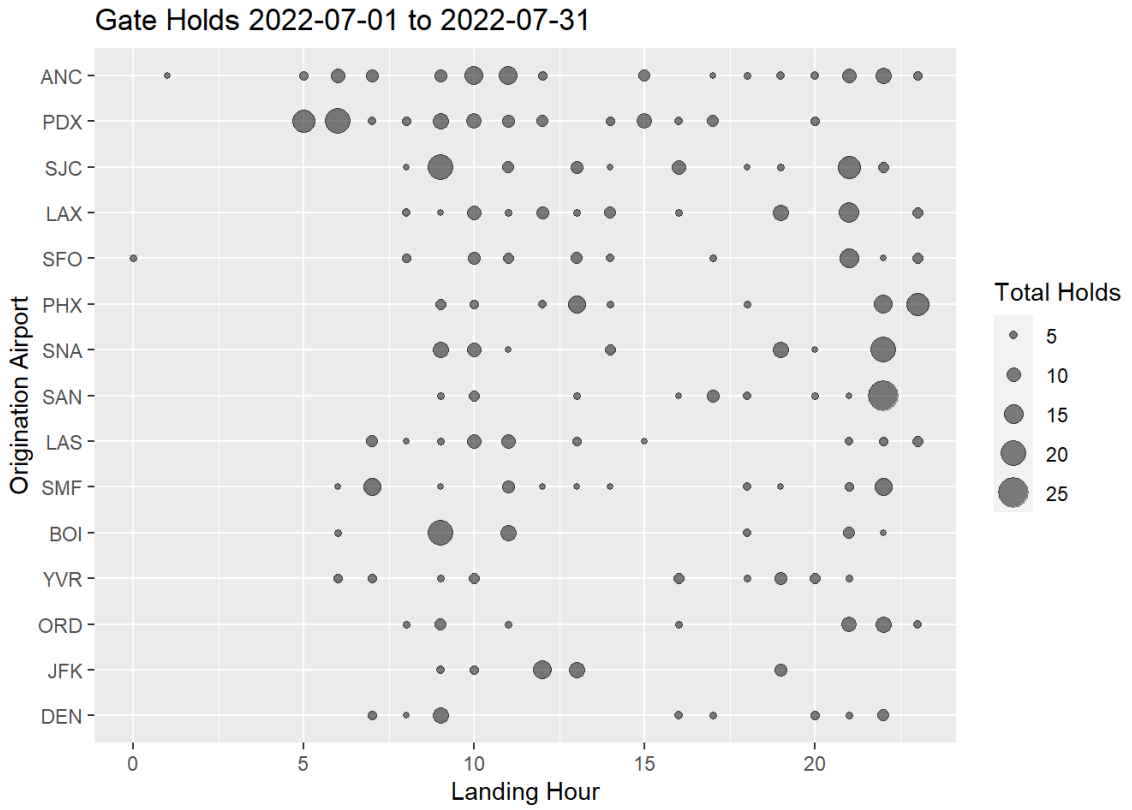
- Allow aircraft to begin taxiing prior to gate open based on POBT and estimated taxi in time
- Reduces Gate Holds by 9 minutes (avg taxi in time)
- Potential for additional turns
- $5 million in savings for 2021



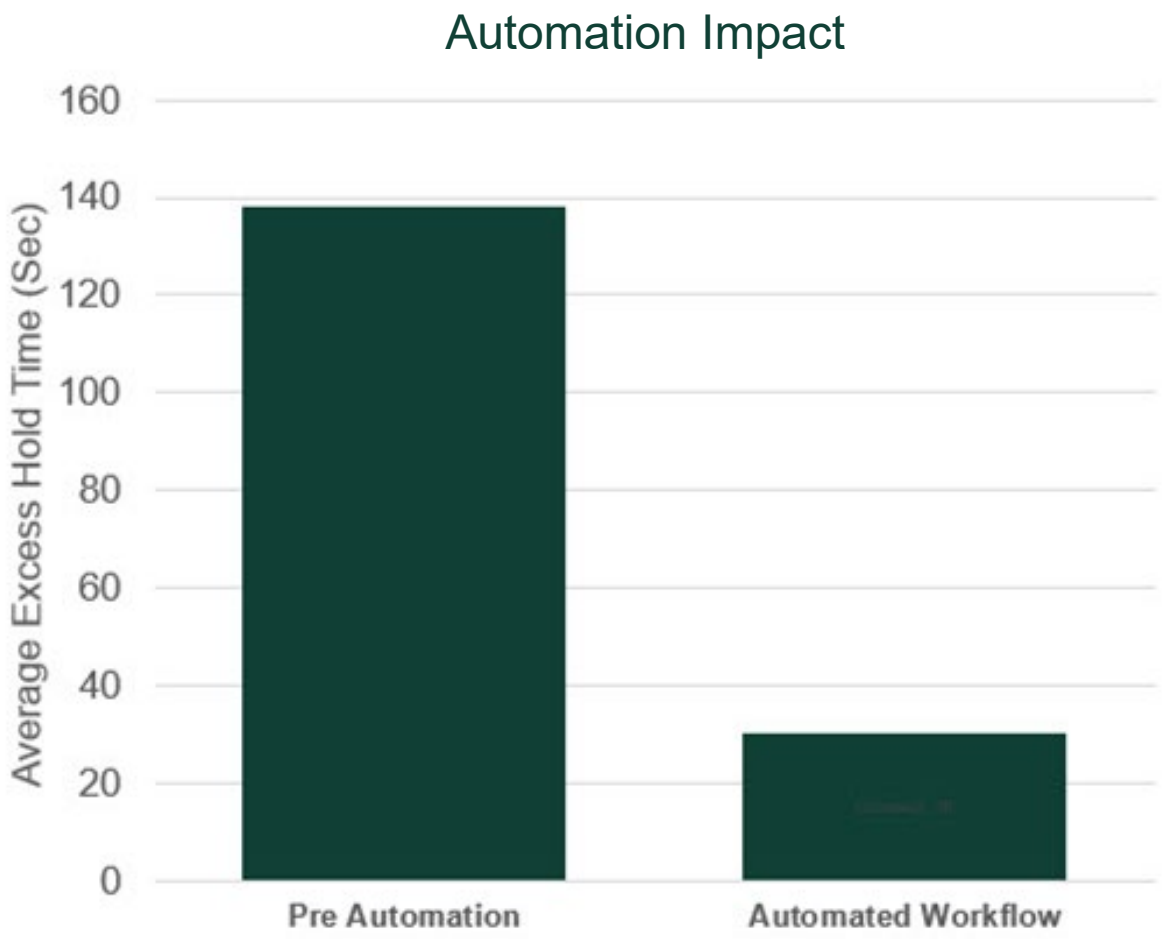
Gate Holds Analytics

Gate Hold Summary – July 2022

- 2,652 holds out of 19,009 arrivals
- 159 Holds over 30 mins
- 14% of aircraft holding
- Average Duration: 12 minutes
- Total Duration: 31,942.3 minutes
- Estimated Total Hold Cost: $77,745.59 (A4A Estimates)
- Estimated Total Hold Emissions: 1,151,035 kg CO2 (A4A Estimates)
- Gate Hold Index: 1.49 (Goal is 1, 10% YOY Reduction)



Gate Hold Operational Improvements



Applying savings to 2021

- 14.7% gate hold reduction
  - 677 total hours in 2021
- $975,249 in airline savings
  - 1,462,867 kg CO_2

Thank You!