Evaluation of Approval Request / Call for Release Procedures at Charlotte Douglas International Airport

DASC

September 19-21, 2017

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Outline

• The Challenge
• Operations
• Simulation Details
• Findings
• Summary
The Challenge

• Air traffic capacity and demand imbalances result in congestion and delays

• Traffic Management Initiatives (TMIs)
  – Strategic: e.g., Ground Delay Programs or Airspace Flow Programs
  – Tactical: e.g., Approval Request (APREQ) / Call for Release (CFR)

• TMIs can result in flow control times
  – Expect Departure Clearance Time (EDCT)
  – APREQ/CFR release time
Charlotte Douglas International Airport (CLT) and Surrounding Airspace
Previous Analysis

- A benefits analysis of CLT’s 2014 operations
- TMI compliance = measure of predictability

<table>
<thead>
<tr>
<th>TMI</th>
<th>CLT</th>
<th>Nation-wide</th>
</tr>
</thead>
<tbody>
<tr>
<td>APREQ only</td>
<td>42.9%</td>
<td>54.4%</td>
</tr>
<tr>
<td>EDCT only</td>
<td>56.8%</td>
<td>46.9%</td>
</tr>
<tr>
<td>APREQ when flight has both APREQ+EDCT</td>
<td>~42.9%</td>
<td>---</td>
</tr>
<tr>
<td>EDCT when flight has both APREQ+EDCT</td>
<td>52.0%</td>
<td>---</td>
</tr>
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Reference: Coppenbarger et al., 2016
Inefficiencies with voice communications
No transparency with TBFM
Ramp Tower not in the loop
Limited predictability of takeoff times
New: APREQ Electronic Coordination

- Eliminates voice communication
- Increases transparency
- Ramp Tower in the loop
- Improves predictability of takeoff times
Surface Trajectory Based Operations (STBO) Client
<table>
<thead>
<tr>
<th>Verbal Coordination Required</th>
<th>Has APREQ/CFR restriction – needs release time</th>
<th>Has EDCT restriction/release time</th>
</tr>
</thead>
</table>

**Elements of User Interface Timeline**

- **EDCT compliance window**
- **Available slot in overhead stream**
- **Electronic Coordination Available**
- **Selected flight datablock**
- **Expect pilot call in 10 minutes**
Compliance Indicators

- Inside of compliance window (on time)

- Outside of compliance window and early

- Outside of compliance window and late
Human-in-the-Loop (HITL) Simulation
HITL Objectives

- Evaluate the new APREQ/CFR procedures
- User feedback on electronic APREQ coordination
Participants

- Two active CLT Traffic Management Coordinators (TMCs) and two active CLT Front Line Managers (FLMs)
  - All four rotated through one HITL CLT TMC position

- Four Tower controllers, one clearance delivery (CD)
  - All were retired ATC confederates

- Four confederate pseudo-pilots
Simulation Environment
Traffic Scenario in CLT

- South Dual Converging Operation
  - 92 arrivals & 80 departure per hour
- Triple North Operation
  - 75 arrivals & 65 departures per hour
- No wind, clear visibility, but IFR in effect
- No General aviation flights
- No Cargo flights
- Duration 60 min
- 6-8 APREQ flights, 6 EDCT flights
Tower TMC Procedures

• Work the traffic as they would in the field
  – Try to maximize throughput while ensuring safety
  – Launch aircraft with APREQ or EDCT times on time

• Use electronic coordination to obtain APREQ release times when able
Findings
Comparing Electronic Coordination with Current Day Procedures

Electronic coordination was rated as more efficient than current day APREQ/CFR procedures.
Comparing Electronic Coordination with Current Day Procedures

Participants preferred electronic coordination over current day APREQ/CFR procedures.
### APREQ/CFR and EDCT Compliance

- 24 total APREQ/CFR flights took off
  - Nine of the 24 also had EDCTs

<table>
<thead>
<tr>
<th>TMI</th>
<th>On time</th>
<th>Out of compliance, but early</th>
</tr>
</thead>
<tbody>
<tr>
<td>APREQ only</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>APREQ when flight has both APREQ+EDCT</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>EDCT when flight has both APREQ+EDCT</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

No flights departed later than APREQ or EDCT release time windows
• Improve APREQ and EDCT compliance indicators
• Remove “thumbs up” ready icon
• Audible alerts
• Exclude individual flights from TMIs
• Adjust acknowledgement procedures

Changes have since been made in the STBO Client to address this feedback.
Summary
Summary

• STBO Client electronic coordination trends:
  – More efficient
  – Improved coordination with ZDC

• TMI compliance trended toward improving
  – No aircraft released late

• Demonstration of new procedures at CLT beginning Fall of 2017
Thanks for your attention!

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