Advancing Collaborative Decision-Making (CDM) at Airports

March 23, 2017
2:00pm to 3:30pm ET
Purpose

Introduce collaborative decision-making (CDM) methods and the lessons learned about using CDM since the mid-1990’s by the FAA and flight operators.

Learning Objectives

At the end of this webinar, you will be able to:

• Discuss the history of CDM.
• Understand how to initiate and develop ACDM activities, data sharing, and the metrics to measure success.
All Attendees Are Muted
Questions and Answers

• Please type your questions into your webinar control panel

• We will read your questions out loud, and answer as many as time allows
Can’t locate the *GoToWebinar* Control Panel?
Having Trouble Logging On?

If you're having problems dialing in, this will bring up a list of alternate phone numbers.
1.5 Continuing Education Units (CEUs) are available to Accredited Airport Executives (A.A.E.)

Report your CEUs: www.aaae.org/ceu
American Institute for Certified Planners

The American Institute for Certified Planners has approved this webinar for 1.5 Certification Maintenance Credits.

Visit: www.planning.org/cm to report your credits.
Panelists Presentations


After the webinar, you will receive a follow-up email containing a link to the recording
Today’s Participants

- Casey Ries, Gerald R. Ford International Airport Authority, cries@grr.org

- Steve Vail, Mosaic ATM, Inc., svail@mosaicatm.com

- William Hall, Mosaic ATM, Inc., bhall@mosaicatm.com

- Andrew Churchill, Mosaic ATM, Inc., achurchill@mosaicatm.com
Get Involved in ACRP

• Submit a research idea to ACRP.
• Volunteer to participate on a project panel.
• Prepare a proposal to conduct research.
• Get involved in TRB's Aviation Group of committees.
• Take part in the Champion or Ambassador Programs.

For more information:
http://www.trb.org/acrp/acrp.aspx
ACRP is an Industry-Driven Program

✈ Managed by TRB and sponsored by the Federal Aviation Administration (FAA).
✈ Seeks out the latest issues facing the airport industry.
✈ Conducts research to find solutions.
✈ Publishes and disseminates research results through free publications and webinars.
Opportunities to Get Involved!

✈ ACRP’s Champion program is designed to help early- to mid-career, young professionals grow and excel within the airport industry.

✈ Airport industry executives sponsor promising young professionals within their organizations to become ACRP Champions.

✈ Visit ACRP’s website to learn more.
Upcoming ACRP Webinars

April 25th
Reducing the Impact of Lead Emissions at Airports

May 22\textsuperscript{nd}
NextGen for Airports - Introduction and Overview

May 24th
NextGen for Airports – Resources and Guidebooks
Additional ACRP Publications Available on this Topic

**Report 82**: Preparing Peak Period and Operational Profiles

**Report 93**: Operational and Business Continuity Planning for Prolonged Airport Disruptions

**Report 129**: Evaluating Methods for Counting Aircraft Operations at Non-Towered Airports

**Synthesis 74**: Combining Mixed-Use Flight Operations Safely at Airports

**Synthesis 78**: Continuity of Operations Planning for Small Airports
Today’s Speakers

Steve J. Vail,
Bill Hall, Ph.D.,
and
Andrew Churchill, Ph.D.
Mosaic ATM, Inc.

Presenting Report 137
Guidebook for Advancing Collaborative Decision-Making (CDM) at Airports
ACRP Report 137: Guidebook for Advancing Collaborative Decision making (CDM) at Airports

http://www.trb.org/Main/Blurbs/172799.aspx
Mosaic ATM Staff involved
Stephen (Steve) Vail svail@mosaicatm.com
Andrew Churchill achurchill@mosaicatm.com
William (Bill) Hall whall@mosaicatm.com

Projects Mosaic ATM collectively involved in:
- Next/Gen Surface Integrated Workgroup
- Airport Surface Traffic Management
- Collaborative Departure Queue Management
- FAA/Industry CDM Program
- Airport Surface Surveillance Tools
- Integration of Airport Information
- Airport Decision Support Tools
ACRP Report 137: A Guidebook for Advancing Collaborative Decision Making at Airports

• History of FAA/Industry CDM Program
• Provides examples of Airport CDM and the benefits gained
• Summarizes international Airport CDM activities
• Identifies information available for use in CDM activities
• Identifies key stakeholders
• Presents additional airport strategies and mechanisms for initiating Airport CDM
• Today’s webinar will also include:
  • Update on Airport CDM activities
  • Current and future state of operational information availability for Airport CDM
What is CDM?

- Informal application of cdm
  - Collaboration of entities to solve a problem
- Formal FAA/Industry CDM Program
  - A formal organized program with a stated leadership and structure
State Prior to CDM

The FAA, airports and flight operators have an operational interrelationship but little information was purposefully shared.
The FAA/Industry CDM Net was created where operators could download schedules and FAA could share demand forecasts.
Development of FAA/Industry CDM

1995
- FAA/INDUSTRY CDM PROGRAM ESTABLISHED
  Agreed NAS had to be operated as one system together

1996
- CDM AOCnet ESTABLISHED
  One common network for all to receive real time data

1997
- GRAPHICAL DISPLAY OF DEMAND
  Jointly developed common displays of ATC demand for FAA & Industry

1998
- CDM BEGINS USING COMMON DISPLAYS
  Real time full scale collaboration using common displays for FAA and operators, determining arrival rates and airport configurations collaboratively

2000-2003
- OPERATOR PREFERENCE TOOLS
  Flight operators can swap delays between flights for operator preference

2004
- ADDITIONAL TOOLS DEVELOPED
  Collaborative Wx forecasts, en route metering, added delay swapping tools

2006-Present
- OPS ANALYSIS TOOLS
  Visual replay of flight tracks and delays for post-analysis
Example of CDM Potentially Useful to Airports

RED indicates airborne, BROWN are arrival estimates for ATC delayed flights, GREEN is scheduled demand.
Results of CDM

- Improve predictability
- On-time performance
- Optimize airspace and airport infrastructure and reduce congestion
- Create flexible pre-departure planning
- Improved Situational Awareness
Formalization of Collaborative Decision Making

Philosophy

Embraces partnership, combines the talents and experiences of all individuals, and facilitates the harmonization and globalization of the world’s airspace system

Process

Sharing data to create a common view of the ATFM system from which to base decisions, and including stakeholders in the decision-making process
Surface Efficiency Benefits All Stakeholders

- Flight Operators
  - Improved Predictability
  - More timely delay information to customers
  - Less taxi time/out fuel burn
  - Maintain Network Reliability

- ATC
  - Improved Predictability
  - Better information for tactical rerouting
  - Fewer unnecessary TMIs
  - Coordinated departure restriction management
  - Fewer unnecessary restrictions
  - Better sector demand prediction

- Traveling Public
  - Improved Predictability
  - Electronic Flight Data (EFD) in the ATCT enables real time data sharing
  - More timely delay information

- Airport Operators
  - Improved Predictability
  - Reduced Engine Noise
  - Improved community relations
  - Reduced CO2
  - Better Resource Utilization

- Improved Predictability
  - Fewer aircraft in the movement area and departure queue
  - Electronic Flight Data (EFD) in the ATCT enables real time data sharing
What is Airport CDM?

Airport Collaborative Decision Making is a process, bringing together relevant airport stakeholders to improve operational decision-making and share information, to enhance surface movement of air traffic, to reduce emissions and noise from aircraft engines, to mitigate events such as construction in the airport surface area, and to ensure that the airport system provides benefits for all. It achieves these objectives through collaboration among stakeholders, particularly related to data sharing in a real-time environment.
Established Leadership
CDM Stakeholders Group

CSG Co-Chair and Co-Lead
FAA Representative

CSG Co-Chair and Co-Lead
Industry Representative

Command Center
Air Traffic Manager
AJR-11

Program Management Office
AJM

National Business Aviation Association
NBAA

Airlines for America
Co-Chair A4A

Regional Airline Association
RAA

2 Industry at Large members appointed by A4A

Future State - New Entrant at Large Members

CDM TEAMS

CDM Workgroup
Future Concept (FCT)

CDM Workgroup
Flow Evaluation (FET)

CDM Workgroup
Weather Evaluation (WET)

CDM Workgroup
Surface CDM (SCT)

CDM Workgroup
CDM Training (CTT)

CDM Workgroup
CDM Automation (CAT)

Pilot Program of 5 airports to join FAA/Industry CDM underway
Port of NY/NJ, CLT, DFW, FLL, LAS
Some Examples of the Need for Airport CDM

- More effective gate management
- De-icing coordination and throughput
- Efficient use of airport vendors
- Diversion handling and recovery
- Construction mitigation
- Departure queue management
- Departure readiness
- Capturing of new separation techniques (RECAT)
- Scheduled vs special activity demand
Installation of ASDE-X
What was the Root Cause of Taxi-in Delays?
70+ aircraft taxi out for 1 departure runway
### Other/Future Needs for Airport CDM

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Conditions for Potential Application</th>
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<tbody>
<tr>
<td>Departure metering</td>
<td>• How frequently does the airport expect to have more than seven aircraft queued for departure at a single runway?</td>
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<tr>
<td>Deicing coordination</td>
<td>• Does aircraft deice capacity sometimes restrict the departure rate?</td>
</tr>
<tr>
<td>Diversion coordination</td>
<td>• Is the airport a frequent diversion receiver?</td>
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<td>• Is there a potential for those diversions to exceed some element of airport capacity?</td>
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<td>• Is the airport notified in a timely manner of flight diversions?</td>
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<tr>
<td>Customs staffing</td>
<td>• Are customs clearing times highly variable due to timing of international arrivals?</td>
</tr>
<tr>
<td>Irregular Operations (IROPS) coordination</td>
<td>• Are all the mechanisms in place to respond to, and to prevent, tarmac rule violations?</td>
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<tr>
<td>Real-time departure scheduling</td>
<td>• How often are flights metered over shared departure fixes or into nearby TBFM arrival streams with delays?</td>
</tr>
<tr>
<td>Terminal Service</td>
<td>• Do late departures frequently arrive after normal operating hours?</td>
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<tr>
<td></td>
<td>• Could vendors capture additional revenue from adjusting hours in those cases?</td>
</tr>
<tr>
<td>Safety</td>
<td>• Is taxi conformance monitoring an issue for the airport operator?</td>
</tr>
<tr>
<td>Passenger movement information</td>
<td>• Could airlines/airport make use of the TSA boarding pass scans?</td>
</tr>
<tr>
<td>Service vehicle monitoring</td>
<td>• Is there a significant amount of surface vehicle traffic?</td>
</tr>
<tr>
<td></td>
<td>• Do these vehicles interfere with flight operations?</td>
</tr>
<tr>
<td>Passenger facilities</td>
<td>• Are passenger facilities (food, curbside, restrooms, etc.) frequently overloaded?</td>
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</tbody>
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To solve these and other issues, an integrated COLLABORATIVE solution all well as INTEGRATED DATA sharing is needed in ACDM
<table>
<thead>
<tr>
<th>Data Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Off-Block Time (AOBT)</td>
<td>The actual time at which a flight has sent a ‘block out” message from the gate or parking location. This information will be used to help determine the accuracy of flight operators' Earliest Off Block Time (EOBT)</td>
</tr>
<tr>
<td>Actual Takeoff Time (ATOT)</td>
<td>The time at which a flight lifts off from the runway as reported by the CDM Participant via a CDM message. If the CDM participant sends more than one value, the most recently submitted time is contained in this field. Otherwise, the value is null. This time stops the DOT3 time for departing flights</td>
</tr>
<tr>
<td>Actual Landing Time (ALDT)</td>
<td>The Actual time the flight has landed on the runway. Sharing arrival information provides essential information to facilitate gate conflict and demand/capacity imbalance predictions. This element is the DOT3 arriving aircraft time trigger.</td>
</tr>
<tr>
<td>Actual In-Block Time (AIBT)</td>
<td>The Actual time the flight has blocked in at the gate. Sharing arrival information provides essential information to facilitate gate conflict and demand/capacity imbalance predictions for both gate and departure predictions on availability.</td>
</tr>
<tr>
<td>Aircraft Tail/Registration #</td>
<td>The unique alphanumeric string that identifies an aircraft. Sharing the unique registration number will allow the Surface system to identify possible turn-around conflicts and other departure problems.</td>
</tr>
<tr>
<td>Earliest Off-Block Time (EOBT)</td>
<td>Time when the flight operator plans for an aircraft to push back from its assigned gate. The system can forecast surface demand vs. capacity based on flight operator's best estimation of push back time. The fidelity of EOBT is required for proper surface predictions and process.</td>
</tr>
<tr>
<td>Flight Cancellation</td>
<td>Message that indicates a flight has been cancelled. Identifies a cancelled flight to ensure that resources are not engaged and/or fully utilized.</td>
</tr>
<tr>
<td>Flight Intent</td>
<td>The Flight Intent would be limited to Flight Operator plan to push back early during a DMP and hold in the AMA.</td>
</tr>
<tr>
<td>Gate Assignment</td>
<td>Airport Gate that is assigned to a flight. Gate information will lead to more accurate ramp transit time (RTT) calculations and therefore more accurate ETD.</td>
</tr>
<tr>
<td>Initial Off-Block Time (IOBT)</td>
<td>The initial off-block that a flight provided. Used to save the original Off-Block time of the flight. Useful for flight data matching.</td>
</tr>
</tbody>
</table>
FAA System Wide Information Management (SWIM) Products

- **Constraint Data**
  - Digital Notice to Airman (NOTAMs)
  - Traffic Flow Management – Flow Information
  - Integrated Terminal Weather System (ITWS)
  - Runway Visual Range (RVR)

- **Aircraft Operations**
  - Surface Movement Event Data (ASDE-X)
  - Terminal Automation Information (STARS)
  - En Route Flight and Related Data (ERAM)
  - Traffic Flow Manage – Flight Data -En route flight/position data
  - Time Based Flow Management Data - Traffic sequencing order and arrival times
  - Terminal Flight Data Manager (2019/2020)

[https://data.faa.gov/](https://data.faa.gov/)

**NOTE:** Above products do not include the graphic presentations, only the data
**ASDE-X Locations**

Provides Movement and some Non-Movement Surveillance Data

*San Francisco (SFO)*

Note: ADS-B can also be used
Airport CDM Benefits

- Airport Brand Enhancement
- Diversion Handling
- Environmental
- Quality assurance
- Vendor services notification
- Construction Mitigation
- Reduced Runway Queues
- Reduced Surface Congestion
- Database of operations for analysis
- Increased SA by everyone - SAFETY
Increased SA
Implementing Airport CDM

- Problem Identification
- Identify Stakeholders (but over invite)
- Airport Staff to facilitate meetings and communication
- Identify information needed to address the issue
- Schedule meeting (well in advance, some flight operators may require travel)
- Schedule follow-up and make assignments
- Metrics for success
- Stakeholder by-in
Implementation Example

- **Problem Identification** — airport had two north/south parallels for simultaneous operations but a crossing runway. Airport needed to rebuild one of the parallels thus single ops in IFR were possible.
- **Identify Stakeholders (but over invite)**—all operational entities including vendors
- **Airport Staff to facilitate meetings and communication** — airport meeting space
- **Identify information needed to address the issue**—weather during closure, closure flights schedules, impact of closure on operations.
- **Schedule meeting** (well in advance, some flight operators may require travel) — several months in advance
CDM Implementation Successes

- Airport construction - Previous example - plan and impact were determined, airport and flight operators made a decision to rebuild the adjacent taxiway to 100 foot runway width and FAA charted a localizer approach
- Central departure metering at JFK implemented for construction but was a success and remains
- Noise abatement procedures
- Airport signage
- Airport de-icing techniques
- Diversion recovery
Lessons Learned

• Every airport is different, no universal solution, but the airport is the central arbiter
• Meet often and meet some more
• Every stakeholder may have a different benefit analysis
• Not all flights are equally important, determine the important ones
• Involve FBOs and user associations
• IT integration will be the hard part and its time consuming
• Some information is proprietary
• Trust must be established
• Scalability for first project
## Other Lessons Learned

<table>
<thead>
<tr>
<th>Airport Relevant Barriers</th>
<th>Possible Mitigation</th>
</tr>
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<tbody>
<tr>
<td><strong>ACDM Implementation Cost:</strong> Includes equipment, software, additional staff costs and training</td>
<td>Even though not required, this is the advantage of performing Benefit Cost Analysis (BCA) detailed in Chapter 6. These include reduction in emissions, airport brand enhancement, improved customer experience, reduced taxi out delays, handling of flight diversions, etc.</td>
</tr>
<tr>
<td><strong>Introduction of the ACDM Philosophy to Airport Staff:</strong> Includes new procedures and tasks, and acceptance of new working relationships by airport staff</td>
<td>CDM history has shown that these barriers will arise. Public commitments by airport senior staff, collaborative development of program goals including means to measure success, and an active feedback loop to address concerns are all extremely important in mitigating these type barriers and should receive robust attention.</td>
</tr>
<tr>
<td><strong>Modification of contractual agreements:</strong> Includes those with vendors/contractors performing ramp control functions</td>
<td>Past experiences in times of airport construction that required process changes to implement mitigation procedures, these type barriers usually didn't exist if they were part of the ACDM process that developed the changes. This reinforces the need for all stakeholder inclusion in the process.</td>
</tr>
</tbody>
</table>
Airport CDM Will Avoid This

I’m equipped for any airport