Collaborative Decision Making (CDM), Air Traffic Flow Management (ATFM), and Surface CDM

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Purpose

To provide conference participants with an overview of the FAA’s CDM program, ATFM and Surface CDM
Contents

- CDM Frequently Asked Questions (FAQ)
- Air Traffic Flow Management (ATFM)
- Surface Collaborative Decision Making (S-CDM)
- Demonstration of CDM in Action
- Q & A
CDM Frequently Asked Questions

• Why was CDM created?
• Collaborative Decision Making (CDM) Defined
• What is the basis for CDM information exchange?
• How do you create a CDM culture?
• How does the FAA apply CDM?
• What is the CDM organizational structure?
• What is the CDM Governance structure?
Why was CDM created?

To achieve system goals

Ensuring the safest, most efficient National Aerospace System in the world

- No single stakeholder has all the information, no two stakeholders have the same values, and all stakeholders interpret information through different experiences

- Sharing information, values and preferences, stakeholders learn from each other and build a common pool of knowledge

- Resulting in ATFM decisions and actions that are most valuable to the system
CDM Defined by ICAO

A *process* focused on *how to decide on a course of action* articulated *between two or more community members*. Through this process, ATM community members *share information* related to that decision and *agree on and apply the decision-making approach and principles*. 
Collaborative Decision Making (CDM) is defined as a joint government/industry initiative to improve the Air Traffic Management (ATM) system through increased information exchange among all stakeholders.

The CDM process involves sharing data to create a common view of the ATM system from which to base decisions, and to include stakeholders in the decision-making.

The purpose is to provide a Safe, Efficient and Secure National Airspace System that provides flight operators the flexibility to operate within their own capabilities and economic objectives. CDM transcends specific programs and is both a philosophy and a process by which to accommodate stakeholder preferences to the maximum extent possible.
CDM Membership Agreement for CDM Exchange of Data

The FAA’s authority to enter into this agreement is governed by 49 U.S.C. 106 (l) and (m)

- Establishes the authority by which the FAA and industry exchange CDM data - identifies the rights and responsibilities of the parties
  - The exchange of CDM data is solely intended to support FAA and industry flow management decision making associated with the daily management of aircraft flight operations
  - Provides for common situational awareness among participating stakeholders, improved demand predictions, enhanced traffic management decisions and reduced delays
- CDM membership is predicated on a realized systemic benefit to the National Airspace System (NAS) resulting from the exchange of unique flight data between the requesting NAS stakeholder and the FAA
## Creating a CDM Culture

<table>
<thead>
<tr>
<th>Barriers to CDM Culture</th>
<th>CDM Culture Attributes</th>
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<tbody>
<tr>
<td>- Absence of Structure and Processes</td>
<td>- Structure and Process Buy-in</td>
</tr>
<tr>
<td>- Individual Goals</td>
<td>- Goal Harmonization</td>
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<tr>
<td>- Hidden Agendas</td>
<td>- Transparency</td>
</tr>
<tr>
<td>- Operating on unverified Assumptions/Misconceptions</td>
<td>- Open Communication</td>
</tr>
<tr>
<td>- Resistance to Trust</td>
<td>- Trust Building</td>
</tr>
<tr>
<td>- Reluctance to Share Information</td>
<td>- Sharing Information</td>
</tr>
<tr>
<td>- Being Non-Committal</td>
<td>- Taking Ownership</td>
</tr>
<tr>
<td>- Not Following Through</td>
<td>- Supporting Decisions i.e. Accountable</td>
</tr>
<tr>
<td>- Insensitivity to Individual, Country</td>
<td>- Treating each other as partners</td>
</tr>
<tr>
<td>and Organizational differences</td>
<td>(and being country-neutral)</td>
</tr>
<tr>
<td>- Other?</td>
<td>- Other?</td>
</tr>
</tbody>
</table>

Collaborative Decision Making
## Applying CDM with Stakeholders

<table>
<thead>
<tr>
<th>Application</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Operational Planning Telecoms (OPT)</td>
<td>Daily</td>
</tr>
<tr>
<td>National System Reviews (NSR)</td>
<td>Daily</td>
</tr>
<tr>
<td>CDM Steering Group (CSG) and Sub-Teams</td>
<td>Monthly</td>
</tr>
<tr>
<td>National Customer Forums (NCF)</td>
<td>Monthly</td>
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<tr>
<td>CDM Review</td>
<td>Annually</td>
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<tr>
<td>End of Season Review</td>
<td>Annually</td>
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CDM Organizational Structure

CSG
CDM Steering Group

CDM Co-Chair
FAA Representative

CDM Co-Chair
Industry Representative

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)

Concept ➔ Develop ➔ Test ➔ Train ➔ Execute ➔ Feedback

Collaborative Decision Making

Federal Aviation Administration
CDM Governance and Leadership

Source: FAA’s CDM Leadership, Strategies, Structure and Guidelines, December, 2014, Version 4.0

CDM Steering Group (CSG), as the oversight body of CDM:

• Establishes the strategy objectives for the CDM community
• Provides guidelines for FAA and Industry interaction and engagement
• Provides direction, guidance and processes to CDM Sub Teams
• Provides the FAA with input on prioritization and tasking to evolve the NAS
• Shares leadership (FAA and Industry)
• Votes on recommendations/motions
  - 6 CSG members have voting rights (3 FAA, 3 industry)
  - Clear majority is required to carry a recommendation/motion
CDM and ATFM
The Air Traffic Control System Command Center’s Mission is to balance safety requirements with demand and capacity, through Strategic, Pre-Tactical, Tactical and Post-Operations analysis management.

We accomplish our mission through collaborating with our Stakeholders to minimize delays and congestion. Supporting a safer and more efficient National Airspace System.
The U.S. National Airspace System
Air Traffic Management Hierarchy

Entire NAS
0 – 1000 NM of NAS
0 – 100+ NM of NAS
0 - 5 NM of NAS

1 ATCSCC
22 ARTCC
284 TRACONS
500+ TOWERS

National/International Perspective
Regional Perspective
Local Perspective
Aerodrome Perspective

FAA Order 7210.3
Collaborative Planning Process
Operations Planning Telcon (OPT)

- Planner facilitates OPT
- 8 OPT Conducted Daily
- Telcons/Terminal/Severe WX
- 25-100+ Telcons Daily
- 10 – 100+ Participates
- OPT adjusted for DST
- Hotlines

Preparation & Fact Gathering occurs between OPT
- Planner
- Terminal
- Severe Weather Unit
- National Weather Service
Traffic Management Initiatives (TMI)

- **TMI**s are used to balance demand with capacity
- **Shared Awareness** any TMI creates an impact on our stakeholders
- “**Policy**” always seek the least restrictive TMI
CDM and ATFM

Start Here

Monitor system

NO

Identify constraint

Analyze system impact

Demand exceed capacity?

YES

Exit from TMI when appropriate

Manage TMI & monitor system

Implement TMI

Develop collaborative TMI

Collaborate with stakeholders

Notify stakeholders

Explore TMI alternatives
ATCSCC International Operations Position (IO)

Can be reached anytime

Contact information (540) 359-3158 or (540) 359-3158

Email information: <9-ATOR-HQ-ATCSCCC-AT-NOM@faa.gov

• Equipment outages

• Airport incidents

• Aeronautical Fixed Telecommunication Network (AFTN) interruption/outages

• Staffing/Labor issues
Surface CDM (S-CDM)
Surface Metering – Why?

JFK May 4, 2009
WHOSE FAULT IS THIS?

$72,000 just in fuel
Surface CDM Metering Concept

• The Surface CDM Metering concept provides the basis for more efficient management of traffic flows on the surface at U.S. airports while maintaining or increasing safety.

• Surface CDM Metering is founded on the premise that access to airport aircraft surface surveillance data (Movement Area and Non-Movement Area) coupled with the timely sharing of accurate operational data among ATC, Airport Operators, Flight Operators, and other Stakeholders, affords the opportunity to better predict and manage demand on the airport surface.
Surface Metering produces more efficient surface operations which will create benefits in the following areas: ie. KEWR, KJFK

- *Improved predictability* for ATC, Traffic Management, Flight and Airport Operators, and the traveling public

- *Reduced taxi-out times*, with associated reductions in fuel consumption, emissions, and noise

- *Enhanced safety* through more orderly surface traffic management and better sector demand prediction

- *Enhanced air traffic management productivity* through improved real-time data exchange and use of electronic flight data in the ATCT
S-CDM Foundation


S-CDM is founded on the premise that:

- Access to airport aircraft surface surveillance data
- Coupled with the timely sharing of accurate operational data among the FAA, Airport Operators, Flight Operators, pilots, and other Stakeholders
- Affords the opportunity to better predict and manage real demand in the movement and non-movement areas on the airport surface
S-CDM Capabilities and Procedures

- Transparent, real-time sharing of current and forecast operational information in order to *improve situational awareness among all Stakeholders* and *enable continuous, accurate predictability of airport demand and capacity*

- Tactical and strategic management of airport aircraft traffic flows utilizing a *Departure Reservoir Management (DRM) capability* to better manage departure queues *to eliminate excessive taxi-out times and measurably improve departure efficiency*

- Management of arrival traffic flows to *increase total airport throughput* with balanced arrival and departure demand
S-CDM Capabilities and Procedures

• Analysis, measurement and monitoring capabilities that position Stakeholders to *better understand operational performance and the impact on the NAS* utilizing a “Scorecard” that provides an objective, transparency measurement of the performance of the local Stakeholders

• *Global harmonization* which facilitates standardization across international Airport CDM programs and the U.S. Surface CDM concept and *support ICAO ASBU “block 0” goals*
S-CDM Planned Objectives

- **Surface Traffic Flow Management**
  - Procedures, Roles, and Responsibilities
  - SCDM/TFDM link to the NAS
  - Departure Reservoir Queue Management (DRM)
  - Basic Surface Surveillance
  - Data Exchange and Integration

- **‘Surface CDM’ ConOps Validation**
  - Completes surface management integration across domains with full industry participation
  - Enhances NAS efficiency and reduces environmental impact
  - Establishes common situational awareness
  - Improves predictability
S-CDM Enhancements

- Involves increased Automated Data Exchange among all Surface Stakeholders
  - Reportable aircraft movement events (i.e., TMAT- Target Movement Area entry Time)

- Achieves operational efficiency through Surface Metering
  - Improved coordination between ATC facilities

- Utilizes a local Departure Reservoir Coordinator (DRC) manages airport Surface metering

- Collaboration is conducted with all Stakeholders based on CDM philosophy

- Performance is measured for post-operative analysis and performance reporting
Surface Metering

Utilizes the CDM philosophy of collaborative decision making with all stakeholders
Surface Metering

• Surface data exchange is required to:
  – Increase airport efficiency/productivity safely and efficiently
  – Provide a common shared situational awareness
  – Improve operational predictability for strategic planning
  – Improve post-operational analysis with greater granularity of available data points
## S-CDM Data Elements

| Surface CDM Data Elements for Traffic Flow Data Management (TFDM) Early Implementation |
|-----------------------------------------|---------------------------------|
| Actual In-Block Time (AIBT)           | Flight Cancellation             |
| Actual Landing Time (ALDT)            | Flight Intent                   |
| Actual Off-Block Time (AOBT)          | Gate Assignment (Arrival and Departure) |
| Actual Take-Off Time (ATOT)           | Initial Off-Block Time (IOBT)   |
| Aircraft Tail / Registration Number   | Target Movement Area entry Time (TMAT) |
| Earliest Off-Block Time (EOBT)        | Off-Block Time – Estimated      |
SCT Recommendation CDM
CSG APPROVED!!

• Recommendation: Airport Authorities as Potential CDM Participants
  – Criteria for Eligible Airports
    • Airport CDM Members – Core airports plus other airports approved by the CSG
    • Airport CDM Participants - Airports operationally coupled with Airport CDM Member airports
SCT Recommendation CDM
CSG APPROVED!!!

• Recommendation: Airport Authorities as Potential CDM Participants (Continued)

  – Data Elements for Airport CDM Members to Share

  • Number of diversions that can be accepted
  • Gate availability (from the vantage point of the Airport)
  • De-icing throughput rates
  • Surface conditions
  • Construction (runways, taxiway closure)
  • Remote/overnight parking (Includes availability of air stairs and buses)
  • Scheduled closures (one week in advance or when available)
  • Flight delays
  • Local advisories – both airside/landside
  • Unscheduled operations data
  • Customs and Immigration throughput rates
  • Parking capacity
  • Flight operations CDM data
Weather Event Involving CDM
Strategic Planning

Week  Day  Hour -12
ATCSCC Operations Plan

TERMINAL CONSTRAINTS:
ATL/CLT-TSRA-SHRA
MEM/DFW-SHRA-VCTS
SFO-LOCIGS
FLL/DEN/PDX/LAS-RWY CONSTR
TEB-RWY 1/19 CLOSED 17/0930-1900Z

EN ROUTE CONSTRAINTS:
ZTL/ZME/ZKC/ZFW-TSTMS

1. ROUTES
AFTER 1000   -ELP PLAYBOOK PROBABLE
AFTER 1000   -LNK PLAYBOOK PROBABLE
AFTER 1000   -MCI WEST PLAYBOOK PROBABLE

2. ZOA
AFTER 1600   -SFO GROUND STOP POSSIBLE
Operational Modeling and Planning

Hour - 12 to 4
ATCSCC Operations Plan

TERMINAL CONSTRAINTS:
ATL/CLT/FLA-TSRA
MEM/DFW-VCTS
SFO-LOCIGS
FLL/DEN/PDX/LAS-RWY CONSTR
TEB-RWY 1/19 CLOSED 0930-1900Z

EN ROUTE CONSTRAINTS:
ZTL/ZME/ZKC/ZFW-TSTMS
1. ROUTES
UNTIL 1400 -NE TO ZAB/ZLA
UNTIL 1400 -SE TO ZAB/ZLA
UNTIL 1400 -LNK PLAYBOOK POSSIBLE
2. ZFW
UNTIL 1430 -DFW GROUND STOP EXPECTED
2. ZOA
AFTER 2000 -SFO GROUND STOP/DELAY PROGRAM POSSIBLE
Planning ➔ Tactical

Hour - 4 to 2
ATCSCC Operations Plan

TERMINAL CONSTRAINTS:
ATL/CLT/FLA/MEM-TSRA
DFW-VCTS
SFO-LOCIGS
FLL/DEN/PDX/LAS-RWY CONSTR
TEB-RWY 1/19 CLOSED 0930-1900Z

EN ROUTE CONSTRAINTS:
ZTL/ZME/ZKC/ZFW-TSTMS

1. ROUTES
UNTIL 1500 - EAST 2 DFW
UNTIL 1600 - ZTL 2 SW
UNTIL 0430 - EWR/JFK WIND ROUTES

2. ZTL
AFTER 1700 - ATL GROUND STOP/ GROUND DELAY PROGRAM POSSIBLE
AFTER 1700 - CLT GROUND STOP/ GROUND DELAY PROGRAM POSSIBLE

3. ZFW
UNTIL 1430 - DFW GROUND STOP EXPECTED

4. ZOA
AFTER 2000 - SFO GROUND STOP/DELAY PROGRAM POSSIBLE
Tactical Adjustments
ATCSCC Operations Plan

TERMINAL CONSTRAINTS:
ATL/CLT/FLA/MEM-TSRA
DFW-VCTS
SFO-LOCIGS
FLL/DEN/PDX/LAS-RWY CONSTR
TEB-RWY 1/19 CLOSED 0930-1900Z

EN ROUTE CONSTRAINTS:
ZTL/ZME/ZKC/ZFW-TSTMS

1. ROUTES
UNTIL 1500  -EAST 2 DFW
UNTIL 1600  -ZTL 2 SW
UNTIL 0430  -EWR/JFK WIND ROUTES

2. ZTL
AFTER 1700 -ATL GROUND STOP/ GROUND DELAY PROGRAM POSSIBLE
AFTER 1700 -CLT GROUND STOP/ GROUND DELAY PROGRAM POSSIBLE

3. ZFW
UNTIL 1430  -DFW GROUND STOP EXPECTED

4. ZOA
AFTER 2000 -SFO GROUND STOP/DELAY PROGRAM POSSIBLE
Post Operations Analysis

- Determine the effectiveness of ATFM measures
- Compare the anticipated outcome with the actual measured outcome in terms of delay, route extension or other key performance indicators
- Delay Metrics
- Replay Capability
Weather Event Involving CDM
August 20, 2015
EWR Ground Delay Program

Cause: Weather/Thunderstorms

Bar Graph: EWR 2015/Aug/20 1351 HIST

EWR GDP-UDP 08/20/2015 13:51Z ETA
EWR Ground Stop
Cause: Over demand
EWR New Proposal Issued
Cause: Revised Weather
EWR Final Demand and Cancellations

Bar Graph: EWR 2015/Aug/21 0757 HIST

EWR 08/21/2015 07:57Z ETA

Collaborative Decision Making
JFK Traffic Demand  8/20/2015
JFK Demand and Capacity
Proposal Issued

Bar Graph: JFK 2015/Aug/20 1350 HIST

JFK 08/20/2015 13:50Z ETA

Time in 60-Minute Increments

Demand

Collaborative Decision Making
JFK Ground Delay Program
Cause: Weather/Thunderstorms
JFK Ground Stop
Cause: Over demand/Weather
JFK New Proposal Issued
Cause: Revised Weather

Bar Graph: JFK 2015/Aug/20 2356 HIST

JFK GDP-UDP 08/20/2015 23:56Z ETA

Collaborative Decision Making
JFK Final Demand and Cancellations

Bar Graph: JFK 2015/Aug/21 0756 HIST

JFK  08/21/2015  07:56Z  ETA

Demand

Time in 60-Minute Increments

Federal Aviation Administration

Collaborative Decision Making
LGA Traffic Demand 8/20/15

Bar Graph: LGA 2015/Aug/20 0803 HIST

LGA 08/20/2015 08:03Z ETA

Collaborative Decision Making
LGA Demand and Capacity
Proposal Issued
LGA Ground Delay Program

Cause: Weather/Thunderstorms

Bar Graph: LGA 2015/Aug/20 1352 HIST

LGA GDP–UDP  08/20/2015  13:52Z  ETA

Collaborative Decision Making

Federal Aviation Administration
LGA Ground Stop
Cause: Over demand/Weather

Bar Graph: LGA 2015/Aug/20 1759 HIST

LGA GDP-UDP/GS 08/20/2015 17:59Z ETA

Collaborative Decision Making
LGA New Proposal Issued
Cause: Revised Weather

Collaborative Decision Making
LGA Final Demand and Cancellations

Bar Graph: LGA 2015/Aug/21 0758 HIST

LGA 08/21/2015 07:58Z ETA

Collaborative Decision Making

Federal Aviation Administration
Customer Feedback

XYZ AIRLINE: NEW YORK METROS SURROUNDED BY SIGNIFICANT AMOUNT OF CONVECTION FOR MANY HOURS. THEY TACTICALLY MOVED A LOT OF AIRPLANES, USED LIMITED GROUND STOPS AND HAD A GDP THAT SERVED THEM WELL. A VERY GOOD JOB AND WE APPRECIATE HELPING XYZ1234 DFW-LGA FROM DIVERTING.
Questions?
Muchas Gracias

Collaborative Decision Making

Federal Aviation Administration