US - India

Aviation Cooperation Program

October 2008

ATFM and CDM:1970s

- Local Bias to operations - lack of system connectivity

- Frequent unplanned airborne holding

- Fuel Costs

 a) associated with holding

 b) cost of fuel rising

 c) carriage of additional fuel resulting in lost revenue

- Delays, delays, delays

- Few knew of the extent and impact of this kind of operation

 a) this lack of information sharing led to a loss of schedule integrity

 b) information dissemination to passengers was also limited/inaccurate

ATFM and CDM:1980s

- Air Traffic Controller Strike

- Creation of many additional sectors

- Significant cultural changes as replacements were not militarily trained

- Early days of system flow control

CDM: 1990s - Present

1993 – FAA Airline Data Exchange (FADE)

- **Purpose:**

  - Would the exchange of up-to-date airline schedule information result in improved traffic management decision making?

  - Would the exchange of schedule information improve the use of airport arrival capacity when capacity was reduced?

- **Problem:**

  - FAA assigned ground delay minutes on the assumption that scheduled air carriers would fly their published schedule (OAG).

  - Air Carriers would cancel flights but would not share the information with the FAA fearing the FAA would assign arrival slots to their competitors.

- **Assumptions:**

  - Current technology could be modified to accept schedule information and not penalize participants providing the information.

  - Benefits to the airlines would occur in two ways;

    - Improved decision making.

    - Schedule compression which reduced delays by moving up flights up into unused "slots" or capacity.

History of CDM

- **1994 Process:** "War game" scenarios

  - 13 air carriers and FAA traffic flow management experts.

  - Simulated a reduction in arrival capacity at four (4) airports.

- **Results:**

  - Common situational awareness and real time data exchange improved the methodology used to take advantage of available capacity.

  - Fewer Ground Delay Programs (GDPs) were necessary.

  - When GDPs were necessary, the time parameters were reduced.

  - Real time data exchange produced significant and tangible economic benefits for the participants.

History of CDM

- **Solution:**

    - Create FSM to enable real time data exchange between air carriers and FAA.

    - Integrate FSM into the Enhanced Traffic Management System (ETMS).

- FSM is the technological cornerstone of CDM.

- 1995 CDM officially formed as a government / industry initiative

CDM Hurdles

- Culture
    - Lack of system understanding and how individual actions impact the whole
    - FAA – Command and Control culture
    - Prioritizing airspace / airports
    - Challenging "First Come First Served"
    - Trust
    - Resistance to Change
    - Who is the customer?
- Technology
    - Connectivity / infrastructure / Open platforms
    - Protecting proprietary information
    - Protecting VIP/Military/Security information
    - Integration ETMS/FSM into existing stand alone systems
    - Modernization challenges (Host, STARs, Flight Management Systems, Flight planning systems,)
    - Web-based applications
- Funding

CDM Breakthroughs

- **Data Exchange:**

    - Create common situational awareness through shared information.

    - All stakeholders have same information on system demand and constraints.

    - All stakeholders have access to common platforms / technology.

- **Distributed Planning**

    - NAS stakeholders can provide input into traffic management decisions to ensure that limited resources are used in a manner that accommodates individual business needs.

- **Performance Analysis**

    - Performance analysis data is used to further enhance system performance.

- These breakthroughs have become the principles of today's CDM program as well as the creation of individual successful elements that cumulatively make up CDM.

    - The CDM Program focuses on several air traffic management initiatives and is not a single goal, but a philosophy of how business could best be done.

CDM Technological Breakthroughs

- 1996: Flight Schedule Monitor (FSM)

- 1999: Post Operation Evaluation Tool (POET)

- 2000: Route Management Tool (RMT)

- 2001: Post Analysis Flight Schedule Analyzer (FSA)

- 2002: Real Time FSA

- 2003: Slot Credit Substitutions

- 2004: General Aviation Airport Programs (GAAP) / Flow Evaluation Areas (FEA) / Flow Constraint Areas (FCAs)

- 2005: General Aviation Airport Program (GAAP)

- 2006: Airspace Flow Program (AFP) / Adaptive Compression

- 2007: Departure Flow Management Prototype (DFM)

CDM Today

- Collaborative Decision Making (CDM) is a joint government/industry initiative aimed at improving air traffic management through increased information exchange among various parties in the aviation community and improving automated decision support tools.

- **Participants:**
    - 17 Air Carriers
    - 2 Air Cargo Operators
    - 9 Air Taxi Operators
    - 2 Foreign Air Carriers
    - 2 Fractional Jet Operators
    - 3 Third Party Flight Planning Providers
    - 20 Aviation Industry Companies (e.g., Boeing, Lockheed Martin, Metron Aviation, Flight Explorer, etc)
    - 6 Colleges / Universities
    - 6 Government entities
    - 3 Professional Organizations (Air Transport Association, National Business Aviation Association, Airline Dispatch Federation)

CDM Success

- Collaboration has permanently opened a window into a new Air Traffic Business paradigm

- A sensitivity to each others' needs and a recognition of system decision vice local decision result in a more efficient National Airspace System with equal or improved safety parameters.

- CDM is expanding Globally

- CDM technology and philosophy has migrated into Europe, Canada, and Mexico and is moving into China, South Africa, Australia and likely India.

CDM Benefits

The use of CDM/TFM tools and procedures to proactively manage changes in system constraints results in significant operational savings:

CDM Capability (partial list)	Annual Savings	
Ground Delay Programs	$800M	
Airspace Flow Programs	$68M	
Adaptive Compression	$27M	
Departure Flow Management	$102M	(future)

CDM Benefits

Environmental Benefits Derived from Ground Delay Savings

Initiative	Ground Minutes Saved	Fuel Burned(kg)	CO(kg)	HC(kg)	NOX(kg)	SOX(kg)	CO2 (kg)
UGDP	480,000	4,000,058	134,590	20,529	16,982	3,862	12,400,179
GDP - Ration-By-Distance	67,600	563,341	18,955	2,891	2,392	544	1,746,358
GDP - Prob TFM	42,750	356,255	11,987	1,828	1,512	344	1,104,391
SEVEN - Replacing AFPs	223,271	1,860,618	62,604	9,549	7,899	1,797	5,767,917
SEVEN - Replacing Playbook reroutes							
SEVEN - Replacing FCA reroutes							
Integrated TMI	2,250,000	18,750,270	630,892	96,228	79,604	18,105	58,125,837
TOTAL	3,063,621	25,530,543	859,029	131,024	108,389	24,652	79,144,682

CDM Benefits

Environmental Benefits Derived from Airborne Delay Savings

Initiative	Airborne		
	Minutes Saved	Fuel Burned(kg)	CO2 (kg)
UGDP			
GDP - Ration-By-Distance			
GDP - Prob TFM	7,500	163,708	507,494
SEVEN - Replacing AFPs	-4,321	-94,317	-292,384
SEVEN - Replacing Playbook Re-routes	993,300	21,681,444	67,212,477
SEVEN - Replacing FEA/FCA Re-routes	144,250	3,148,644	9,760,797
Integrated TMI			
TOTAL	1,140,729	24,899,479	77,188,384

Systems Thinking and CDM

- CDM opened our eyes to systems thinking

- There is a need to understand and practice both

Systems Thinking

- What is systems thinking?

    - A discipline for seeing wholes

    - A conceptual framework for making full patterns clearer-to help us see how to change them effectively

- Straight lines vs. circles

Systems Thinking

- Learning disabilities arise when we view the world in linear, not systematic ways

  - I am my position

  - The enemy is out there

  - Illusion of taking charge

  - Fixation on events

  - Delusion of learning from experience

  - Myth of the management team

Systems Thinking

- The antidote to these learning disabilities:

  - Systems thinking

  - Personal mastery

  - Mental models

  - Shared vision

  - Team learning

Systems Thinking

- Why do it?

  - We need it more than ever because we are becoming overwhelmed by complexity.

  - Complexity can easily undermine confidence and responsibility as in the frequent refrain "it's all too complex for me" or "there's nothing I can do, it's the system"

  - People within the system must identify themselves as members of the entire industry rather than as members of "their component part"

Systems Thinking

- The key to Collaboration (CDM):

    - Understanding customer needs

    - Understanding service provider needs

    - Developing a plan

    - Post operations analysis

    - Feedback

Systems Thinking

- Systems thinking is a fact - you either do it more or less well or you do it poorly, but you always do it.

- Learn as much as you can about it and don't miss an opportunity to practice it.

- Thank you