FAA/Industry Collaborative Weather Rerouting Workshop: Working Sessions

April 10 - 11, 2001
Collaborative Decision Making

• Collaborative Decision Making (CDM) represents a shift from a central planning paradigm to a collaborative paradigm
  – Requires working together and the mutual understanding of the respective roles and responsibilities of those in the aviation community

• Three specific factors define the collaborative paradigm
  – All parties must know the constraints
  – All parties must be able to react to the constraints
  – Performance must be measured, in order to improve the system

Source: http://www.metsci.com/cdm/philosophy.html
CDM Roles and Responsibilities

- CDM Roles & Responsibilities guideline signed in 1995 by FAA development and Air Traffic entities
  - Air Traffic Management (ATM)* will:
    - Monitor the NAS for constraints that produce capacity and demand problems (e.g. runway closures, weather fronts)
    - Make these constraints known to NAS users
    - Develop a baseline solution to the constraint in cooperation with the users
  - Airline Operational Control (AOC) will:
    - Keep ATM informed of current operational demand & intent
    - Provide airline business need plans and designs within the general baseline solution provided by ATM (e.g., cancellations/substitutions in response to a ground delay program)

* ATM = Air Traffic Control + Traffic Flow Management
Workshop Purpose and Scope

• **Purpose**
  – Extend the roles and responsibilities agreement to the next level of detail for weather rerouting
  – Establish priorities for continued refinement of
    • Weather rerouting concepts
    • Flow management decision support research

• **Scope: collaborative focus areas**
  – Information dissemination to achieve common situational awareness
  – Automation and procedures development
  – Practical application in real-time
Example: Collaboration Applied During the Resolution of a Weather Problem

- Data sharing might be the largest contributor to solving weather problems
- Pro-active flight changes can reduce the need for more drastic strategies
- Automation and procedures are the first lines of defense once a problem is identified
- Real-time collaboration can be more effective once the specific resolution strategy is established
Workshop Objectives

• A workshop decision on how users will collaborate with the FAA and interact with decision support systems
• An improved understanding of participant needs and the value of their collaboration
• Progress in reaching consensus in the three identified collaborative focus areas
• Identification and prioritization of weather rerouting research needs
Track Structure and Objectives

• Each track session
  – First 10 - 15 minutes: introduction to focus area
  – 1 hour: discussion of focus area
  – Last 15 minutes: prioritize concepts with respect to importance for development (i.e., which concepts should be addressed first)

• Report-outs
  – Resulting nine prioritized lists grouped by focus area and presented on Day 2 as focus area report-outs

• Emphasis is always upon decision support or procedural enhancements to support collaborative weather rerouting
Focus Area: Information Dissemination to Achieve Common Situational Awareness

• Question
  – What data are needed to ensure a common situational awareness for weather problem detection and resolution and who supplies the data?

• Examples
  – Airlines: What data do users need from the FAA for the proactive solution of a weather problem?
  – ATC: What data are needed (and when) by the operational supervisor and controller to implement weather rerouting?
  – TFM: What data does TFM need from users or from other sources for weather problem identification?
Focus Area: Automation and Procedures Development

- **Question**
  - What can be developed and agreed upon beforehand?
    - Decision support tools
    - Procedures

- **Examples**
  - **Airlines:** Rationing schemes
  - **ATC:** Understanding complexity (e.g., use of Monitor Alert values, route design rules-of-thumb) and determining capacity
  - **TFM:** Adapting pre-defined routes for weather rerouting (e.g., Playbook, LAADR)
Focus Area: Practical Application in Real-Time

• Questions
  – What are the (airline, ATC, TFM)’s primary responsibilities in weather reroute planning? For example:
    • Identify weather problem
    • Design reroutes
    • Determine reroute capacity
    • Assign specific flights to reroutes
      – Initial assignment
      – Adjustments
    • Implement reroute strategy
      – Proposed flights
      – Active flights
Focus Area: Practical Application in Real-Time (concluded)

- What are the (airline, ATC, TFM)’s secondary roles in weather reroute planning?
- Is there any planning activity where collaboration is not desired or beneficial?

**Result**

- Operational concept for real-time strategic solution of weather problem
  - Roles and responsibilities
  - Details of collaboration (e.g., cyclic planning)
    - Who, what, when, where, how
Degrees of Interaction Among Decision Makers

- **Independent**: Decision makers make independent decisions with little or no interaction with other decision makers.

- **Communication**: Decision makers make independent decisions while exchanging status information and decision results.

- **Coordination**: Communication PLUS the rationale behind decisions may also be exchanged.

- **Cooperation**: Coordination PLUS other decision makers’ goals are taken into account when making independent decisions. There is some mutual understanding regarding each other’s independent and shared goals.

- **Collaboration**: Decision makers make joint decisions with mutual understanding regarding goals (both shared and independent).

Constraints on Collaboration

• Not all decisions require full collaboration, i.e., joint decision making:
  – Collaboration may be too slow for some decisions (e.g., conflict avoidance)
  – Collaboration may involve a conflict of interest (e.g., user involvement in setting arrival acceptance rates)
  – Collaboration may be illegal (e.g., air carriers jointly setting long-term schedules)

• An appropriate level of interaction for each type of decision needs to be determined
Day 2: Solve the Weather Problem

• Group composition is now mixed:
  – Airlines
  – Air traffic supervisors
  – Traffic flow managers

• Consider the weather problem presented

• Are the capabilities identified in your tracks on Day 1 sufficient to solve the problem?
  – Information dissemination to achieve common situational awareness
  – Automation and procedures development
  – Practical application in real-time
Finalize Report-outs

• Organize report-outs by focus area
  – Information dissemination to achieve common situational awareness
  – Automation and procedures development
  – Practical application in real-time

• Revise report-outs by track based on “lessons learned” in solving weather problem
Deliver Report-outs to All Participants

- Information dissemination to achieve common situational awareness
  - Airlines
  - ATC
  - TFM

- Automation and procedures development
  - Airlines
  - ATC
  - TFM

- Practical application in real-time
  - Airlines
  - ATC
  - TFM