Don Wolford

The challenges of Collaborative Trajectory Management for the flight operator

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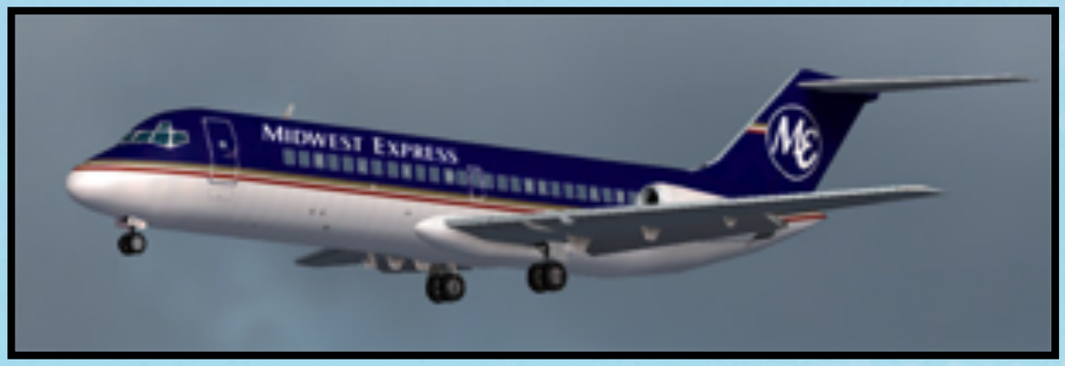

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- Thirty years as an airline flight dispatcher
- Twenty years of ATC TFM experience
- Ten years of CDM leadership
- Twenty years of instructor experience

What is Collaborative Trajectory Management?

- Collaborative development and use of automation and procedures that facilitate the safe and efficient operation of the National Airspace System (NAS) through the flexibility of trajectory management

- Strategic collaboration between flight operators and the ATC system (SPT, CCFP, etc.)

- Tactical flexibility of flight trajectories as capacity/constraint changes

- 4-DTn: Four Dimensional Trajectory negotiation

What is Collaborative Trajectory Management?

- Air Traffic and flight operators collaboratively define constraints
- Air Traffic tactically manages the constraints
- Flight operators execute their business models in strategic flight planning (FP, EI, TOS-CTOP, TOS-PDRR). *Future:* gate to gate preferences (TBFM, TFDM, Flight Object)
- Flight operators express their business model in tactical changes/opportunities as capacity changes (airborne TOS-ABRR, TOS-SFMA, 4DTn)
- ***Both*** Air Traffic and Flight Operators look for tactical opportunities

Collaborative Trajectory Management is ***both*** strategic and tactical.

Collaborative Trajectory Management ***is*** (should be) an enterprise level expression of the flight operator's business model.

Opportunity for success?

"Let me share a shocking statistic with you. Back in 1959, when American scheduled its first transcontinental Boeing 707 flight between LAX and JFK, it planned a block time of 4:45 westbound and 4:00 eastbound.

Today, those times are 6:31 and 5:40, respectively. I cannot tell you how much of that 30% deterioration is due to operating at less than design speeds to save fuel and how much is due to airways and runway congestion-but I can tell you that reducing the impact of congestion will produce a handsome financial and environmental return on whatever investment is required."

Bob Crandall, former CEO American Airlines March 26, 2015.

Over the last 20 years:

- Data exchange/modeling of data
- Strategic Collaboration (SPT/CCFP/etc.)
- Playbook/CDR routes/:NRP FPs
- Automated TMIs: FCA RR/GDP/AFP/CTOP
- Tactical flexibility remains a manual process

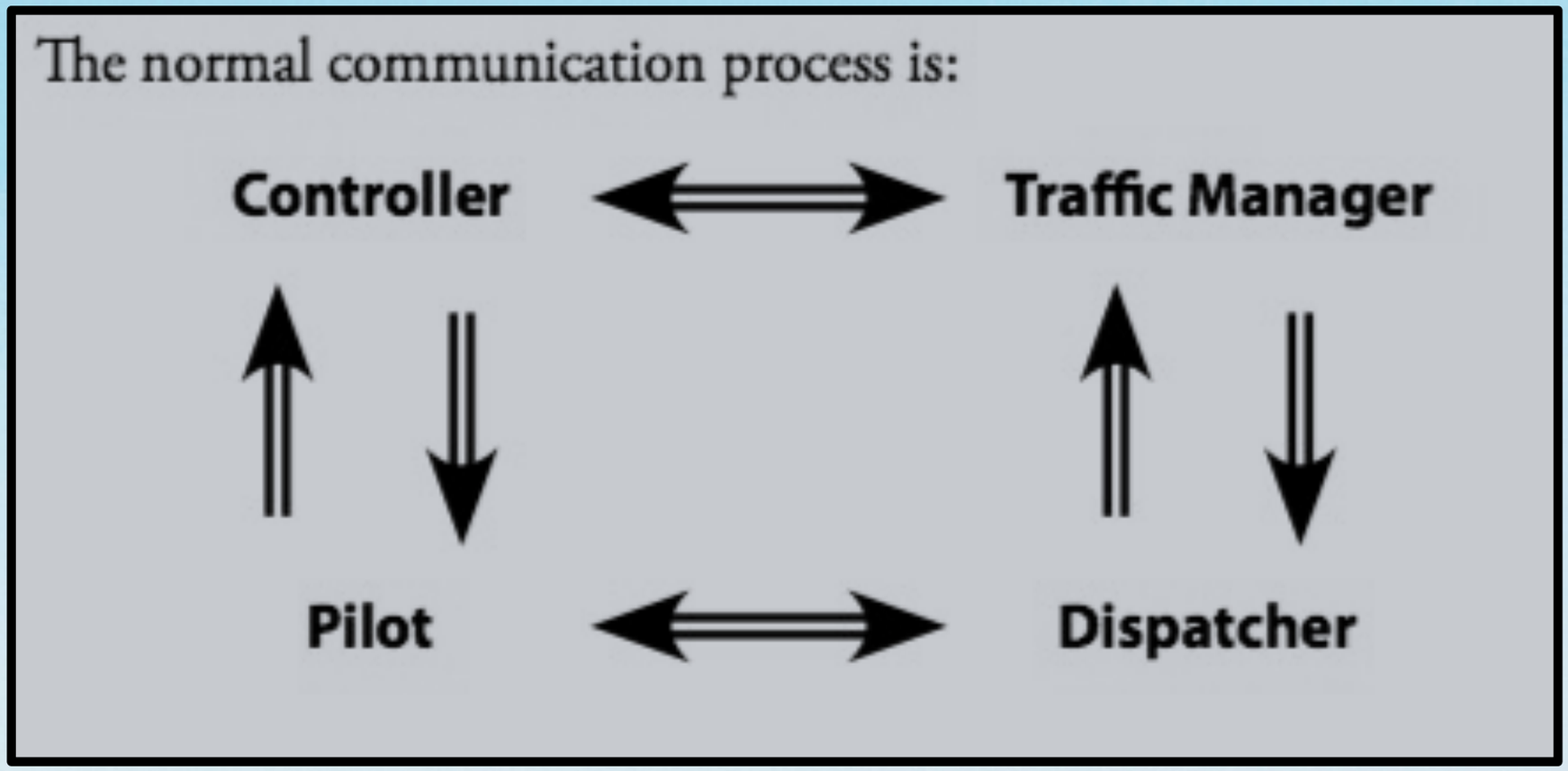
Flight operator challenges

- Strategic planning → tactical flexibility
- Expression of initial flight preferences → updated flight preferences → two way real-time trajectory negotiation
- Maintaining operational stability/predictability
- Cost of new automation and personnel
- ”Merger Mania”
- Understanding/awareness of FAA’s vision
- Variance in business models and capabilities
- Competition for NAS resources from new operators such as Commercial Space and UAS

Flight operator challenges: Awareness

- What's the current state of trajectory management?
- What automation is deployed/being deployed?
- What is the FAA's vision going forward?
- What will be expected in the near to mid term future?

The legacy process



From the FAA's "TFM in the NAS" publication.

The vision?


National Airspace System
Capital Investment Plan
FY2016–2020

The vision?

User or Operator Preferences are noted in multiple initiatives.

The vision?

Flight Management with Trajectory

Develops and maintains all information about a flight and makes that information available to all decision support tools to improve strategic flight planning and tactical flight management. **Users may also supply trajectory option sets that represent their route preferences in the event of a constraint, such as weather.** Trajectory flight data will continue to be updated for changes and made available to subscribers so that tactical and strategic plans are developed with the most up to date 4D flight trajectory. (OI: 101202)

The vision?

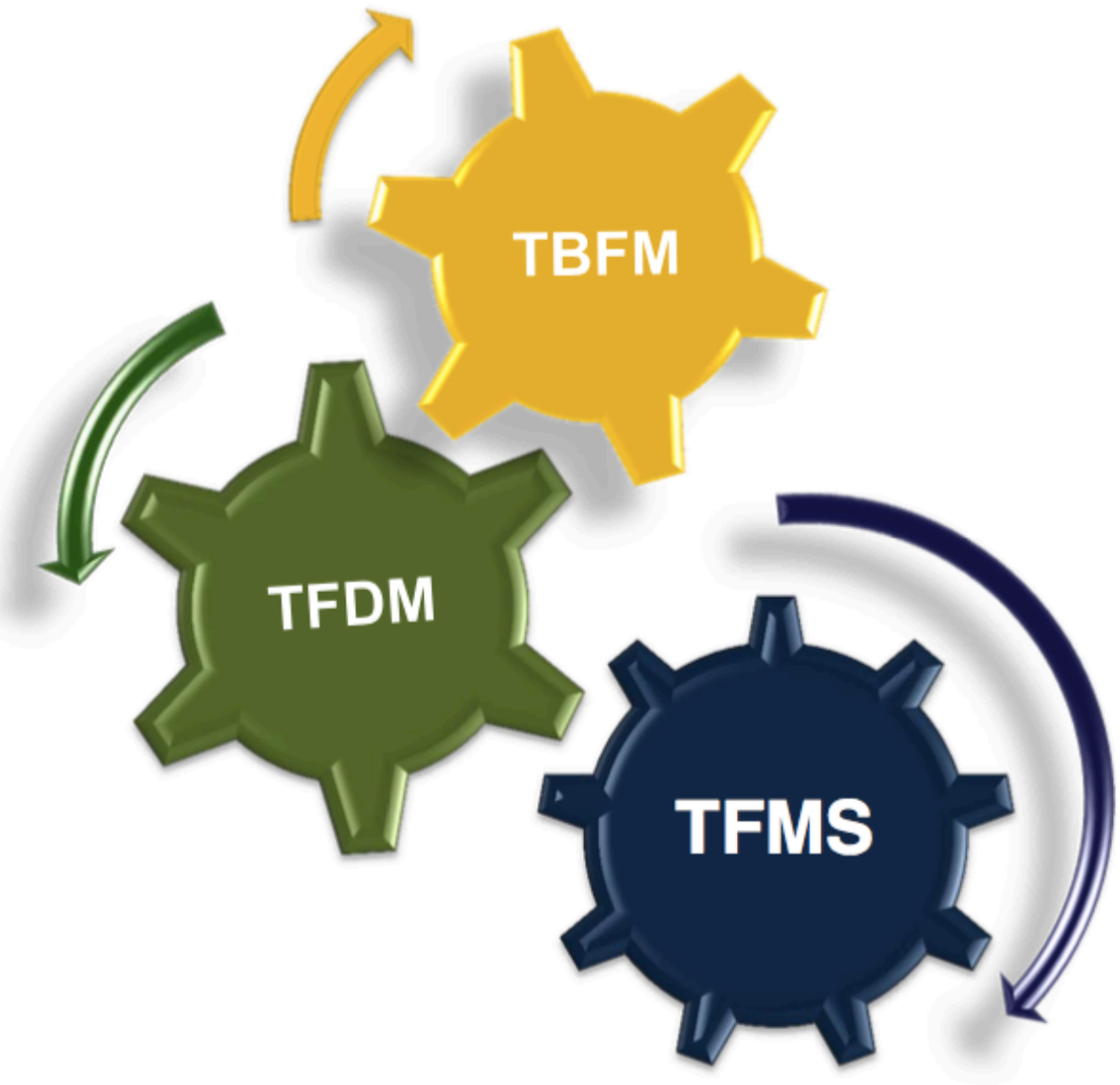
C, Strategic Flow Management Application, G05A.01-01
Program Description
Strategic Flow Management Application (SFMA) will identify operational shortfalls and gaps for rerouting of airborne and pre-departure flights, which remain after the implementation of Airborne Reroute Automation (ABRR), Collaborative Trajectory Options Program (CTOP), and Data Communications (Data Comm). SFMA will develop capabilities designed to provide traffic managers and controllers with more automated flight-specific trajectory advisory functions that will consider a wide range of input factors, such as weather impacts, resource capacity, **operator preferences**, and meter time assignments. SFMA will help resolve air traffic flow problems, reduce delay, reduce unnecessary flying time and improve metering operations. These advisories will also capitalize upon Data Comm-enabled complex reroutes and clearances to improve the generation, delivery, and execution of reroutes. Capabilities developed under SFMA will be incorporated into Collaborative Air Traffic Management Technologies (CATMT) Work Package 5 (WP5).

The vision?

Provide Interactive Flight Planning from Anywhere:
Flight planning activities are accomplished from the flight deck as readily as at any other location. Airborne and ground automation provide the capability to exchange flight planning information and negotiate flight trajectory agreement amendments in near real-time. (OI: 101103)

The vision?

DSS components: 3Ts are the engines of DSS



Traffic Flow Management System (TFMS)

Decision support system for planning and mitigating demand-capacity imbalances in the NAS.

Time-Based Flow Management (TBFM)

Decision support system for metering based on time to optimize the flow of aircraft.

Terminal Flight Data Management (TFDM)

A new decision support system for airport surface management and ATC tower functions.

Flight operator challenges: Philosophy/Business Model

- Operations are designed based on a high degree of stability/predictability
- Examples include dispatcher productivity/workflows and crew/aircraft usage
- Tactical management is often reactionary
- Flexibility as related to tactical opportunities is not well defined in many business processes

Flight operator challenges: Automation

- Legacy FOS/FP systems were not designed for continuous change based on improvement opportunities
- “Chicken and egg” situation between flight operators and their vendors
- ROI is difficult to capture when planning investments in connectivity/flexibility of systems
- Huge amounts of data now available, but presentation to operations/flight personnel as true decision support guidance information has not caught up

Flight operator challenges: Automation cont.

- Lack of true “turnkey” solutions
- Connectivity between FAA automation and AOC
- Connectivity between FAA automation and the aircraft
- Connectivity between AOC and the aircraft

Flight operator challenges: Resources

- Change to core automation such as FOS/FP systems is costly and time consuming
- Likewise for human resources including staffing and training
- Data storage and tactical retrieval/updating resources
- Vendor resources for upgrading/modifying systems

Flight operator challenges: New Competition

- Commercial Space operators:
  - Many different business models
  - At least twelve certificated commercial spaceports in NA
  - Launch, recovery, reusable booster, debris field

- UAS operators:
  - Integration into the NAS in terminal and cruise.
  - UAS only terminals

Opportunity

- Improved data sharing through new or updated applications such as Flight Object, TFDM, TBFM, TFMS, SFMA (CTOP is only the beginning)
- Better strategic planning by expression of user preferences in trajectory, ground movement, runway preference
- Robust and continuous tactical responsiveness to changing opportunity

Solutions?

- Availability/cost of two way datasharing: SWIM, Three T.
- Connectivity: AAtS, DataComm, IP Datalink. EFB, FMS
- CDM participation by Flight Operators (new and old), and vendors
- Awareness of opportunity by vendor cohort
- Higher awareness of FAA vision (4DT, SFMA, ATC Winds, DRNP, Advanced Methods)
- Global requirements (FIXM, WIXM, AIXM)

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Questions and Comments?

Backup

Collaborative Decision Making (CDM):
cdm.fly.faa.gov

TFM in the NAS:
http://www.fly.faa.gov/Products/Training/Traffic_Management_for_Pilots/traffic_management_for_pilots.jsp

DSS/Three T Vision:
http://faaindustryforum.org/D1B1_DSS_Stat_%20of_the_Union_Guy.pdf

FAA CIP:
https://www.faa.gov/air_traffic/publications/cip/files/FY16-20/FY16-20_CIP_Complete_Jan_2016.pdf

Don Wolford Consulting LLC:
www.donwolford.com