Opportunities for Mobile Applications in the 3T Environment
Mobile Applications for the Surface

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Initiatives and Factors Driving Surface and Departure Management Improvements

Surface and departure research

FAA investments in new surface automation

Transition to time-based management in the NAS

Improved data sharing and connectivity, including mobile tech
Uncertainty Makes Departure Management Challenging

- Maintenance issues
- Connecting flights/passengers
- Crew status
- Passenger loading
- Baggage/cargo loading
- Fueling
- And more...

Flight operators are often the best source of information regarding the status of their flights
Another Source of Uncertainty

- Mostly scheduled flights: Charlotte
- Mix of scheduled and non-scheduled flights: Las Vegas, Dallas Love
- All non-scheduled flights: Teterboro

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How Will GA/BA Operators Exchange Departure Readiness Data?
Can Mobile Technologies Be Leveraged?

MITRE has been investigating the use of mobile technology to provide this capability in collaboration with the FAA, NBAA, and NASA.
Understanding the User Environment and Operations
Earliest Off Block Time (EOBT)

A time submitted by GA/BA flight operators or pilots via a mobile app, to indicate when they will be ready to taxi. This means, engines running, at appropriate spot on the ramp, ready to contact Ground Control for taxi.
Expected Passenger Arrival Time: 1500Z

Flight Plan ETD 1445Z

Ready to taxi 1510Z

Observation: Producing EOBT estimates is not part of the pilot’s current flight planning or pre-flight procedures.
The Idea
for Departure Readiness Information Exchange for GA/BA

When do you expect to be ready to taxi?

Mobile Application Service Provider

FAA Scheduling Functions

Surface demand

Airspace demand

Arrival demand
Research Overview
## Current Research

MITRE is using mobile technology to enable the submission of departure readiness information, specifically EOBTs, by General Aviation (GA) and Business Aviation (BA) pilots at three airports:

*In collaboration with NASA as part of ATD-2*
Research Activities

- Exploring methods for collecting readiness data from GA pilots and the impact of it on the surface scheduler
  - Pilots use SMS texting and progressive web app to submit EOBTs

- Pilots receive data, such as estimated takeoff time and expected runway, after readiness submission
  - Feedback from participants: returned data helps with planning, can program expected runway in FMS before taxi, and passengers can coordinate pickup times at destination using estimated takeoff time

- Applying lessons learned across research efforts to mature and advance the concepts
Lesson Learned: Departure Readiness Submission Accuracy

CLT BA Pilots

- When pilots submitted their EOBT estimate within 45 minutes of their actual Movement Area entry time, the accuracy of their estimate was within ±10 min.

- When pilots submitted their EOBT estimate within 15 minutes of their actual Movement Area entry time, the accuracy of their estimate was within ±5 min.

Observation: GA/BA pilots can provide departure readiness times that are consistent with the accuracy of airline provided data and deemed acceptable for departure scheduling.
Technical Considerations
MITRE Prototype User Interfaces

Native apps

SMS/texting

Progressive web app
Integration into Service Provider Applications

Ability to submit readiness data

Ability to receive data
- Airport demand
- TMATs for surface metering
- Expected runway
- Delay info

The World’s Greatest Pilot Apps
Observation: There are several approaches (e.g., mobile app or texting) to using mobile technologies to provide easy and intuitive ways to submit EOBT information.
Important: colors indicate relationship between AIRPORT departure capacity and demand. It is not a reflection of departure fix demand.
Receiving Notifications with Pacer

- The mobile application will automatically notify users via text messages regarding certain conditions.

Pacer Detects High Demand for 1230 Departure Time

Pilot Receives Notifications via Text
Building the Demand Picture in Pacer

PILOT/FLIGHT OPERATOR INPUTS

WEB APP ➔ REST API ➔ DEMAND PREDICTION LOGIC ➔ SCHEDULE, FLIGHT PLAN, & DEPARTURE TIME INFORMATION ➔ INNOVATA ➔ SFDPS ➔ TFMS ➔ SWIM
Flight Matching

- To limit duplicate flights in demand predictions, flight matching is performed between the various data sources using a number of data elements including:
  - Callsign / Registration Number
  - Origin and Destination Airports
  - Time entries (e.g. scheduled time, ETD, Pacer times)
    - Logical time periods for updated times

- It can be complicated to determine if the data is for an existing flight or a new flight
  - Example: An aircraft that goes out and back to the same location multiple times in one day
Access and Identity Management

- To use Pacer a user must complete the registration process
- Requests made to the Pacer REST API must be made by an authenticated user
- The Pacer REST API limits access and visibility of data based on a user’s role within the Pacer web application

Examples of user roles in Pacer include:
  - Pilot
  - Fix Based Operator
  - Fleet Operator
  - Airport/Facility Administrator
2020 and Beyond: Exchanging Data
Roles of Mobile Application Service Providers

*With Examples*

1. **Develop and deploy a GA data exchange capability**
   - Seamlessly integrate capability into apps used by pilot
   - Make it part of pilot’s normal pre-departure workflow

2. **Incentivize GA flight operator participation**
   - Through earlier awareness of expected departure delay and relevant TMI s

3. **Collect, validate, and provide data to the FAA**
   - Ensure that data provided by GA operators is reasonable for the flight

4. **Harmonize disparate operational environments**
   - Help translate nomenclature of GA operators into Collaborative Decision Making (CDM) terminology and vice versa

5. **Establish and enforce policies**
   - Making customers aware of CDM Data Quality Code of Conduct
Using a Mobile Device to Exchange Departure Readiness Information

**Future State**

1. Pilot transmits readiness time to app provider backend server

2. App provider server forwards EOBT and parking location to FAA

3. Data is received by appropriate FAA scheduling systems

4. Controllers use information from TFDM, TFMS, and TBFM

5. FAA publishes schedule related information such as expected runway, TMAT, TTOT, and TMI

6. App provider forwards data to pilot

Expected departure runway: 36R
Expected taxi time: 1933Z
Expected wheels up time: 1945Z

Ready-to-taxi Time: 1925Z
Parking Location: West Ramp

NASA currently publishes TFDM Terminal Publication (TTP) data on the SWIM research and development network.
Benefits of Exchanging Departure Readiness Data

- Gives ATC a better view of surface demand and allows them to make more informed decisions
- Provides the flight operator more visibility into ATC scheduling and planning
- Allows better scheduling of resources, both on the surface and airborne
- Enables FAA to share relevant departure information with pilots, such as expected takeoff time, expected departure queue wait time, and TMI s
- Reduces the need for uncertainty buffers in scheduling
- Facilitates better departure planning for flight operators
- Enables greater predictability for the flight operators
Questions & Discussion
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