Flight Awareness Collaboration Tool Development

Richard Mogford, Ph.D.
NASA Ames Research Center
Moffett Field, CA
NASA AOC Research Areas

- **AOC automation**
  - Applied advanced “cognitive computing” systems to airline operations
  - Objective was to improve access to documents (e.g., FAA Regulations, airline procedures, etc.) and Internet resources

- **Winter weather operations**
  - Developing automation tool to improve airport operations during winter storms
  - Objective is to reduce cancelations and delays due to winter weather

- **Creating AOC laboratory to support research**
  - At NASA Ames in the Human Systems Integration Division
Airline Operations Research Group (AORG)
Winter Weather

• Developing the “Flight Awareness Collaboration Tool” (FACT)
• Concentrates information about winter weather events on one display
• Includes predictive tools
• Supports collaboration between AOC, air traffic control, airport authority, and de-icing operators
• User interface designed completed and web-based prototype under development
• User group at Detroit airport
• Space Act Agreement with Virgin America to support FACT evaluation
  – Virgin America backup AOC located at NASA Ames
FACT Information

- Weather status and forecasts
- Reporting of runway closures for snow/ice treatment
- Runway braking action
- Visual display of surface traffic movement at airport
- Hourly arrival and departure rates
- Airport runway configuration
- De-icing areas
- Notices to Airmen
- Field conditions
- FAA Operational Information System
- Aviation Digital Data Service icing information
- Runway visual range
- Tracking of arrival flights in en route airspace
## FACT User Interface Design

<table>
<thead>
<tr>
<th>Profiles Bar</th>
<th>Quick View Tabs</th>
<th>Quick View Tabs</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Primary Map View</strong></td>
<td><strong>Surface Map View</strong></td>
</tr>
<tr>
<td></td>
<td>displays current US map</td>
<td>displays current airport surface map</td>
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<tr>
<td></td>
<td>ZOOM/PAN CONTROLS/COLLAPSIBLE MENU</td>
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<tr>
<td></td>
<td><strong>Information View</strong></td>
<td><strong>Communication View</strong></td>
</tr>
<tr>
<td></td>
<td>formatted data for current airport</td>
<td>communication with other groups and issue tracking</td>
</tr>
</tbody>
</table>
FACT User Interface Design
Primary Map View
Surface Map View
Gathers and “tailors” data from external web sites
Information View
Communication View

LGA: Too many aircraft in de-icing area.
15:30:02

JFK: UAL 3740 stall in de-icing area. Expect a 20 min delay.
11:18:16

Comments:
13:30:45 dpekni: Not sure how to deal with this one, any suggestions? Here's the procedure attachment
13:42:34 rmoford: I'll update and send a new document to the team.
Communication View

- 41 users online
- TMC Group
- LGA Dispatchers
- GMTO
- AFP Position Managers
- Information Team
- LGA Controllers
- JFK Controllers

Chat entries:
- Hello there...
  - Richard Mogford 8:56:14 AM
- It seems like we’re getting a lot of warnings about ice and heavy freezing rain.
  - Richard Mogford 8:56:14 AM
- The group is tracking and shows an hour or more...
  - Richard Mogford 8:56:14 AM
- Thanks for the update, have a good one.
  - Before I forget, there’s another front coming in, so stay tuned for additional info.
  - Richard Mogford 8:56:14 AM

Type your message here & press Enter or the send icon to submit...
FACT Implementation

• FACT is a web-based application
• Receives JAVA messages from the FAA System Wide Information Management (SWIM) data repository
• Surface movement data are from ASDE-X
• Data are acquired from web pages and tailored for the Information View
• Predictive tools will be built into FACT
• First one competed is Metron’s Winter Weather Airport Capacity Model (WWACM)
  – Predicts changes in airport departure rates from weather reports
Deterministic precipitation rate forecast

Median actual precipitation for similar forecasts and lead times

80% confidence interval on forecast temperature

Water content of Snow on Runway (WSR)

Deterministic WSR

Median WSR

Median Relative Departure Rate (RDR)

Baseline Departure Rate (RDR)

Median Predicted Departure Rate
The 77 airports included in WWACM
WWACM in FACT
FACT Prototype
Primary Map
**Information**

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### ADVISORIES FOR MONDAY, 08-01-2016

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<td>DC METRO INTERNATIONAL DEPARTURES CAN ANTICIPATE PROBABLE USE OF JERES J220 MICAH TRANSITION INTO ZBW FOR FLIGHTS TO NATOTS THIS IS DUE TO WEATHER ANTICIPATED IN EASTERN ZNY AND ZDC FOR THE AFTERNOON EFFECTIVE TIME 01/1637 02/0500 16/08/01 1637 DCCOPS1xstn20</td>
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Communication

TWO MANY AIRCRAFT IN THE DE-ICING AREA

CREATED DATE: 2016-06-14T00:40:02.000Z
MODIFIED DATE: 2016-08-01T16:44:15.297Z
AUTHOR: admin
SHARED WITH: F.A.C.T

NOTES:

NOTES ARE EMPTY FOR THIS ITEM

COMMENTS:

00:40:27Z admin (Me) test
00:40:34Z admin (Me) test
21:32:56Z admin (Me) asdfasdfsad
FACT Progress

• Web-based prototype will be completed by the end of 2016
• Example of an approach for display integration
• Plan to demonstrate to airlines and airports to seek feedback
• FACT platform will be used to host additional automation tools (e.g., diversion management, planning snow removal)
• Creating AOC simulator at NASA Ames to evaluate FACT
• Will evaluate FACT in operational settings
NASA/Industry Collaboration

• Airline Operations Workshop in August 2016
  – Around 200 attendees
  – Focused on NASA, FAA, and private sector innovations to support the airlines (AOC and flight deck)
  – Identified gaps where research is needed

• Research themes
  – AOC simulation
  – Study dispatcher workload, situation awareness, errors
  – Display/system integration
  – Managing/accessing large information databases from multiple sources
  – Display/system integration
  – Preferred routes
Questions?
richard.mogford@nasa.gov