NASA air traffic management research tool shows new colors

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A pivotal piece of NASA air traffic management (ATM) software is getting fresh attention as the agency and its government, industry and academic partners prepare to test new ideas for more efficiently guiding aircraft through the nation's skies.

The software is called FACET – short for Future Air Traffic Management Concepts Evaluation Tool – and it was such a hit when it was introduced a decade ago that NASA named it the agency's Software of the Year for 2006.

As a research tool, FACET is capable of quickly analyzing thousands of aircraft paths and displaying them on a map of the United States. This allows ATM experts to simulate new operational concepts and see what happens without disrupting real air traffic.

The software also has found life as an operational tool for at least one major American airline, which has been using FACET to provide a real-time, nationwide look at current air traffic.

The Federal Aviation Administration (FAA) also uses FACET for system-wide traffic impact studies. This allows FAA traffic flow managers and airline dispatchers to anticipate potential delays and order changes in an aircraft's trajectory to avoid unsafe weather or fuel-wasting congested traffic lanes.

"FACET truly is a multifaceted tool we can use in research or the real

world to make better decisions about air traffic so as to burn less fuel and reduce emissions," said Kapil Sheth, an aerospace engineer at NASA's Ames Research Center in California.

Sheth led the team of developers that originally created FACET and continues to refine its capabilities.

One of those fairly new features, developed less than two years ago, allows FACET to incorporate and display real-time data from the National Weather Service, as well as any restricted airspaces.

The feature is called NASCENT, short for National Airspace System Constraint Evaluation and Notification Tool.

Soon after NASCENT was made available, American Airlines began using it to help plan more efficient flight paths for its hundreds of aircraft flying across the United States each day.

"So NASCENT is an application within FACET that American Airlines has been utilizing for one year as of September 1," Sheth said. "We've heard good things from American about the success they are having. We're also talking with some other commercial operators who are interested in NASCENT and FACET as well."

A second improvement since FACET originally was developed makes it possible to display global flight trajectories between the continents. The difference here is the aircraft paths shown are based on airline schedules, not real-time radar data.

NASA receives data from the Official Airline Guide, which provides the departure and arrival cities, and the expected departure and arrival times. FACET then draws a Great Circle route between the city pairs and calculates where the aircraft would be at any given time.

"We've used this capability to study the impact of global aviation emissions on the environment," Sheth said.

Looking ahead, FACET is playing a role in NASA's work to develop and demonstrate a concept for the next generation of ATM functionality when it comes to more efficiently planning the en route and arrival phases of a flight.

The concept, known as Airspace Technology Demonstration 3, intends to bring together new ground-based and cockpit-based systems capable of anticipating bad weather and/or congested air traffic and proposing the most efficient path to avoid delays – all in real time and in a way that streamlines operations for both airlines and FAA air traffic managers.

The ground-based component is now being tested at the American Airlines Integrated Operations Center in Fort Worth, TX. The cockpit-based component is scheduled to be tested aboard a trio of Alaska Airlines aircraft later this year.

Provided by NASA