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A New Dawn for UAS

Web 2.0 for the Airspace Management Enterprise

Mike Shields

Chief Technology Officer

ConceptSolutions

Introduction

In November 2007, President Bush ordered steps to reduce air traffic congestion and long airport delays during the holiday travel season. With this emergency move, the nation's commercial and restricted air traffic management system was put to the test, as well as the effectiveness of coordination among the many players involved.

In response to the President's call to action, the Pentagon opened unused military and special use airspace (SUA), from Florida to Maine, in order to create a commercial airliner "express lane" during the busiest days of Thanksgiving and Christmas travel. Although the overwhelming holiday crowds never materialized and weather delays were minimal, the process of preparing the system to accommodate such surges in air traffic again placed increased focus on an important issue: With some models projecting the number of air passengers to double or even triple by the year 2025¹, how will the nation's air traffic system handle such explosive growth?

For the many IT professionals involved in developing and implementing a variety of FAA systems currently in use, the short answer to that question may be: "Web 2.0."

Does this Enterprise Web 2.0 refer to the same, much-hyped Web 2.0 that enables anyone with a computer to launch an Internet blog, edit a Wikipedia reference, or build a MySpace page? Yes and no. While they share the basic "network as platform" characteristics, the information systems that are being deployed to help modernize air traffic management are much more robust, collaborative enterprise applications tailored for solving mission-critical problems.

The Enterprise Web 2.0 Solution: The Future is Now

Although many industry sectors have been slow to embrace "Enterprise Web 2.0," it has already taken off in the aviation industry. Key benefits of Web-based applications make them

ideal for aviation personnel who must gather, process, securely manage and act upon mountains of complex, dynamic data generated in real time and in a variety of formats. Enterprise Web 2.0 applications "harness the collective intelligence of users, and are continually updated services that get better the more people use them, consuming and remixing data from multiple sources, including individual users, through an architecture of participation."²

Demonstrating Enterprise Web 2.0's short- and long-term viability in aviation, FAA recently launched two major systems vital to the overall safety and security of our nation's air traffic infrastructure: MADE (Military Airspace Data Entry) and SAMS (Special Use Airspace Management System). Both systems were developed with the help of IT partner ConceptSolutions (www.Concept-Solutions.com), an information management and technology consultant company that provides strategic, technical, and problem solving expertise to large and mid-sized businesses, government organizations, and branches of the military.

MADE and SAMS

In June 2006, FAA's Air Traffic Office of System Operations Security began the nationwide deployment of a new Military Airspace Data Entry (MADE) system. The MADE system is a key component in the upgrade of FAA's Military Operations System (MILOPS), a real-time information management gateway that offers invaluable on-line airspace information to, and facilitates coordination among users in a variety of government, military and civilian agencies, including general and commercial aviation.

An Enterprise Web 2.0 application, MADE is an automated, Web-based system that enables the U.S. Department of Defense (DOD) and branches of the military to safely and efficiently schedule use of Special Use Airspace (SUA), Air Traffic Control Assigned Airspace (ATCAA), and Military Training Routes.

¹ "Next Generation Air Transportation System to 2025," Joint Planning and Development Office publication, 6/12/2007.

² "What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software," Tim O'Reilly, 9/20/05.

The MADE system dovetails with FAA's SUA Management System (SAMS) to provide real-time data for scheduling usage of SUA, which includes, but is not limited to, Military Operations Areas (MOA), restricted areas, warning areas, prohibited areas, and alert areas.

By bringing an underlying Web 2.0 technology (i.e., AJAX, a way of building interactive browser-based applications) to bear for the FAA enterprise, MADE enables:

- All segments of the civil aviation community to access military SUA schedules from a central database, and determine when SUA's are available and safe to navigate
- Efficient interagency collaboration between FAA, DOD and other users of SUA
- Significant travel and fuel efficiencies for civilian users, while preserving the priority of military and other special government users
- MILOPS to operate at half the cost with higher output
- Completeness of data between MADE and SAMS, which provides the public with the benefits of safety (i.e., avoiding SUA in use by the military) and cost savings (i.e., ability to fly through SUA when available rather than taking longer routes around)
- Best use of available resources, including staff, system hardware, and purchased software

ConceptSolutions collaborated with the FAA, DOD, and The MITRE Corporation's Center for Advanced Aviation System Development (MITRE/CAASD) to deploy the MADE capability throughout the National Airspace System (NAS). MITRE/CAASD, the FAA's Federally Funded Research and Development Center, laid the groundwork for developing and deploying the MADE system with a series of SUA research trials in Central Florida, Central Texas and Ohio. The trials involved several DOD organizations, commercial and general aviation airspace users, and FAA field facility personnel.

In May 2007, FAA completed the nationwide rollout of MADE. From the early stages of deployment, the new system delivered immediate benefits, including increased public safety, reduced commercial traffic delays, and improved airline efficiencies through reduced fuel costs. Furthermore, the upgraded MADE and SAMS, together, satisfied the

original safety, efficiency, interagency coordination and reporting objectives set forth by the Airway Safety and Capacity Expansion Act of 1987 (PL 100-223). After nearly 20 years searching for a viable solution, FAA was able to meet the critical MILOPS objectives:

- Provide the most efficient use of US airspace while ensuring maximum safety to users
- Improve operations and provide maximum coordination between DOD, FAA and airspace users affected by SUA and other special-purpose airspace operations
- Provide authoritative auditing and reporting of actual US airspace usage.

The MADE system is now operational at 282 military SUA scheduling sites, as well as all FAA Air Route Traffic Control Centers (ARTCC) and combined center/radar approach control (CERAP) facilities. ConceptSolutions has trained more than 450 MADE users across the country, a number that the company expects to continue growing over time as more sites become MADE enabled.

A TURBO Boost to Web 2.0 Development

The MADE and SAMS solutions were developed using ConceptSolutions' Enterprise Web 2.0 platform called TURBO, an application development tool for creating and running secure Rich Internet Applications (RIA). TURBO optimizes the power of Oracle while empowering the legions of PL/SQL developers to build rich Enterprise Web 2.0 applications at lower cost and greater speed than traditional enterprise custom application development methodology.

The TURBO development engine is a virtual 3-tier architecture that contains all components for enterprise solutions, including security, UI renderings, stored business logic and optimized performance. In developing RIA for aviation industry organizations, TURBO offers the following key features and advantages for developers and the end-users of the developed applications:

Features

- UI with look and feel of a desktop application
- Real-time, data updates and on-page user interaction
- Auto-fill features
- Interactive reporting grids

- GIS capabilities
- Charts and graphs
- Rich Text Editor
- Debugging features
- Microsoft Office integration
- Service B/NOTAMS messaging for system interoperability and NAS integration
- Minimal training to use

Advantages

- Application Security
- Oracle scalability
- Rapid development with smaller team
- Built-in process improvement reduces development time & costs
- Easily embed code snippets from open source library and tools
- Application code is data-aware
- Runs native in Oracle
- Saves operation and maintenance cost by removing unnecessary middle tier physical application layer.

Conclusion

As other business sectors have been slow to adopt Enterprise Web 2.0, FAA's MADE and SAMS applications already are providing clear benefits to the aviation industry. And while Enterprise Web 2.0 continues to transform

many aspects of present-day air traffic management with enhanced safety and security, increased efficiencies, and improved collaboration and communications, long-term air traffic initiatives may soon reap similar rewards.

Over the next 20 years, the goal for commercial and military aviation is to create a more flexible, scalable and highly automated system that will handle new types of aircraft, new industry business models, and the expected growing demands on capacity – meeting up to two to three times today's air traffic volume. Enterprise Web 2.0 applications, together with other new technology upgrades, will enable improved precision navigation of departures and arrivals, which will help increase capacity and safety while reducing fuel consumption, noise and emissions.

At the same time, the future of air traffic management will leverage technologies that already exist, including satellite navigation and control, digital non-voice communication, weather forecasting, traffic flow management and advanced networking. All of these components are critical to the safety and security of our nation's skies. And all will likely tied together by Enterprise Web 2.0.

Mike Shields is Chief Technology Officer of ConceptSolutions, LLC, and oversees the company's development of customized technology solutions for commercial, government and military organizations. Prior to joining ConceptSolutions, Shields spent six years as a software engineer with America Online, Inc., where he gained expertise in online content infrastructure, deployment and technical training. ✈

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