



# Integration of Advanced Simulation Technologies into Controller Training

The Federal Aviation Administration (FAA) faces the challenge of training approximately 12,000 new enroute and terminal air traffic controllers over the next decade to fill the void left by retiring controllers. In addition, evolution of the Next Generation Air Transportation System (NextGen) will require training innovations to effectively transition to new Air Traffic Control (ATC) capabilities and operational procedures. Currently, training and certifying a controller is a lengthy and subjective process that requires significant human resources. The current system cannot effectively meet the near-term or the mid-to-far-term training needs.

In 2004, The MITRE Corporation's Center for Advanced Aviation System Development (CAASD) conducted research to determine advanced techniques for improving controller training. CAASD examined the training innovations being implemented in military and European ATC systems. The results indicated that advanced simulation and training technology, as part of intelligent training system (ITS) design, are critical to improving the effectiveness, efficiency, and flexibility of controller training. An ITS will enable self-paced and accelerated training and increased standardization, while reducing training costs. This is a key enabler to support the evolution of the National Airspace System (NAS) toward NextGen.

CAASD developed a comprehensive plan that recommended advanced training technology and process enhancements, many of which were included in the FAA's March 2007 Workforce Management Plan. CAASD leveraged advancements in aviation system design, new prototype technologies, and field evaluation data to develop a stand-alone enroute training simulation prototype, known as the MITRE *enrouteTrainer*. With its high-fidelity, scenario-based instruction, the *enrouteTrainer* provides students with a realistic environment, simulating the effect of winds, aircraft climb/descent rates, and aberrant conditions. The system's speech recognition and synthesis capabilities simulate pilot/controller interaction, enabling self-paced training, reduced reliance on human resources, and increased standardization. The *enrouteTrainer* enables the instructor to pause and play back any trainee scenario and it presents an assessment of a student's performance upon instructor request.

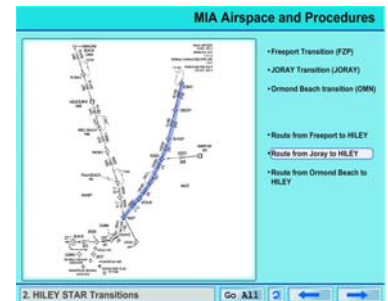


Use of *enrouteTrainer* at FAA Indianapolis ARTCC

The *enrouteTrainer* is currently being evaluated at the FAA's Indianapolis Air Route Traffic Control Center to provide Stage IV Radar Simulation training. The primary objective of this evaluation is to validate the enhanced simulation capabilities and curriculum elements that should be integrated across the NAS for controller training. It is expected that these changes will shorten training time, reduce the cost to certify a controller, improve the quality and consistency of training, and provide more flexibility to make frequent automation and procedural advancements as the FAA moves toward NextGen.

Results from the field trials indicate that the *enrouteTrainer* provides improved training context and streamlined processes that better prepare trainees to control live traffic. Specific qualitative and quantitative benefits are being assessed as groups of students complete their training. The first group of students to use *enrouteTrainer* completed their on-the-job-training in 25% less time than expected and achieved Certified Professional Controller status seven months ahead of schedule. Based on these positive results, CAASD is working with the FAA to transfer this technology to industry for broad application across the FAA's controller training program.

Many of the capabilities of the *enrouteTrainer* can be leveraged for the FAA's terminal environment. CAASD is working in partnership with the FAA's Miami Terminal Radar Approach Control training staff to develop an initial *terminalTrainer* prototype that demonstrates the use of interactive training techniques, performance measurement, and real-time feedback to effectively deliver airspace and procedure training via enhanced simulation.



*terminalTrainer*  
Interactive Display

As the FAA's Federally Funded Research and Development Center, CAASD will continue to explore new training processes and technologies for enroute and terminal ATC training NextGen to help the FAA to keep up with the ATC hiring curve and the demand for new and advanced ATC services.

#### For more information, contact:

Fran Hoover  
Information Management Specialist  
+1.703.983.5912