

AIR TRAFFIC CONTROL 101

As many of the nation's air traffic controllers prepare for retirement, MITRE is developing advanced simulation technologies to help meet future demand.

LAST AUGUST, THE DEPARTMENT OF Transportation reported that airline delays in the United States were at their highest level since the agency started keeping statistics in 1995. Part of the blame for the delays is that demand for air travel is rising at a rate of four percent a year. It doesn't help matters that approximately two-thirds of the nation's 15,000 air traffic controllers are expected to retire within the next decade.

At the Indianapolis Air Route Traffic Control Center (ARTCC), classes of air traffic control students are receiving a portion of their training on a new simulation tool that was developed by MITRE. Known as *enrouteTrainer*, the tool is designed to improve training efficiency and quality by increasing training standardization and reducing the cost and time for training and certifying controllers.

Intelligent tutoring

A stand-alone system, *enrouteTrainer* features high-fidelity training scenarios, speech synthesis, and voice recognition technology. This year it will be enhanced to include initial intelligent tutoring capabilities. Students can view simulated aircraft on the 20- by 20-inch radar screen. They can speak commands into a headset and then observe—if they use the correct air traffic control terminology—aircraft carrying out their instructions.

From the beginning, increased realism has been a goal. As a new simulation tool, *enrouteTrainer* runs air traffic training scenarios with realistic aircraft performance. Aircraft behave as they would in live operations while the system's voice recognition and synthesis capabilities simulate interactions with pilots. Instructors can play back any scenario to assess a student's performance.

The idea for *enrouteTrainer* developed from research that MITRE performed for the Federal Aviation Administration (FAA) as it analyzed its existing training processes and compared them with other training programs, including those of sev-



Air traffic control trainees at the Indianapolis Air Route Traffic Control Center use *enrouteTrainer* to hone their skills in a realistic simulation environment.

eral European nations and the U.S. Air Force. MITRE put together a set of recommendations for the FAA, and many were adopted, including the development of the *enrouteTrainer* prototype.

"We realized that it would be very beneficial to demonstrate the role of improved technology in training," says Susan Schultheis, who oversees the day-to-day work on *enrouteTrainer* as a project team manager in the Center for Advanced Aviation System Development (CAASD). "And the process for defining which training technologies would be beneficial was not a very difficult one, because we had a clear set of objectives—reduce time and cost, including the human resource demand, and improve quality."

Historical testbed

In 2006, the prototype was evaluated for the first time by students at the Indianapolis ARTCC. "Being able to work in the field and actually test capabilities gives us valid and reliable results," says Schultheis. "It also reduces risk in the acquisition process for those capabilities since we can transfer validated technology requirements to the FAA to support acquisition."

Typically it takes between three and five years for the average enroute controller to become certified. In fact, a trainee's first dose of realism usually doesn't come until "OJT"—on-the-job training—with a certified controller standing close behind them. "Any type of higher-fidelity equipment we can use that would simulate live traffic better than what we have today is going to help students become controllers quicker and have a better understanding of how live traffic operates," says William Holland, support manager for training at the Indianapolis ARTCC.

"Because of the work that we do in CAASD in other aspects of air-traffic control, and the overall NAS [National Airspace System] modernization, we have the big picture," says Schultheis. "Training is a critical piece of the air traffic control and NAS evolution, and we can see that improved training is a necessary component of the innovations, changes, and evolution of the ATM [air traffic management] system. To me, there's no question that the training work that we're doing will be successful and relevant."

—Russell Woolard