



# Human Factors Research and System Applications Center of Innovation

**Volpe National Transportation Systems Center  
U.S. Department of Transportation  
Research and Innovative Technology Administration**

*Innovation for a Nation on the Move*

## Trends and Issues

*Human error stands as the largest single cause of transportation accidents, accounting for 60 to 80 percent of the total. This number is likely to increase as systems become more complex and interactive with their human operators. The difficulty lies in understanding whether the error occurred as a result of operator error, improper policy, poor engineering, or more likely a combination of the three. Truly the greatest challenge to transportation is properly designing technology and procedures for human use. Research is now underway that will benefit all transportation modes. Looking to the future, new research is required for understanding human-machine interactions.*

## COI Profile

The Human Factors Research and System Applications COI provides internationally recognized human factors research and development capabilities supporting all modes of transportation and other COIs within the Volpe Center. Pioneers new relationships between humans and current automation technologies, thus improving transportation safety, security and productivity, with due concern for unintended consequences.

## Project Snapshots

• Provides research and analysis in flight simulation, runway safety, and flight deck technologies in support of the Federal Aviation Administration (FAA). Works in support of human performance and human-system performance requirements associated with transitioning from 2015 to 2025 Next Generation Air Transportation System (NextGen) capabilities. Projects include:

- Effect of pilot training on transfer of the skills between a flight simulator and airplane.
- Scientific guidance to entities developing requirements, design, and certification of flight simulators.
- FAA's runway safety database and analyses to address specific operational issues.
- Runway Incursion Severity Classification (RISC) model that categorizes the outcome severity of runway incursions.
- Metrics for runway incursions and losses of standard separation in the air.
- Awareness of human factors issues in certifying new aircraft and in equipment design and modification.
- Certification and use of automation-based technologies, tools, and support systems.
- Risk factors in automation-related operator errors.
- Human performance information for use in designing and operating aircraft and aircraft systems.



Volpe Center

• Provides human factors services to support safe and productive railroad operations, including: assessment of railroad system performance; investigation of human performance in accidents in railroad operations; and identification of methods for reducing accidents and improving working conditions for the Federal Railroad Administration (FRA). Develops tools and methods to proactively manage risk, including:

- Confidential reporting systems to identify safety concerns before they cause harm.
- Human-systems integration to design and evaluate railroad systems.



- Organizational interventions.
- Design and evaluation of grade crossing warning devices.
- Design of locomotive cabs and blue signal warnings.
- Computer and communications technology in the use of train control systems.
- Fatigue management in scheduling railroad operations and managing locomotive crews.
- International standards for shock and vibration in locomotives.



Volpe Center

• Develops tools and methods to improve the safety of vehicle operators as well as passengers and other road users in support of the National Highway Traffic Safety Administration (NHTSA). Some projects include:

- User acceptance of vehicle-based systems that tailor warnings to driver workload and distraction.
- Usability of vehicle-based warning technologies.
- Improving the emergency evacuation of motor coaches.
- Reducing alcohol impaired driving and associated crashes.
- Simulator testing of vehicle-based alcohol counter-measures.
- Maintaining pedestrian safety with an increasing number of quieter vehicles, such as hybrids.

## About the Research and Innovative Technology Administration

The Research and Innovative Technology Administration (RITA) coordinates U.S. DOT's research programs and is charged with advancing the deployment of cutting-edge technologies to improve our Nation's transportation system. RITA was established as a U.S. DOT Operating Administration by the Norman Y. Mineta Research and Special Programs Improvement Act of 2004.

## About the Volpe Center

An innovative, Federal, fee-for-service organization, the Volpe Center, part of the U.S. DOT's RITA, is an internationally recognized center of transportation and logistics. The Volpe team represents a world-class transportation resource with multidisciplinary expertise in all modes of transportation. The Volpe Center plays a unique role in looking across the transportation enterprise to anticipate future transportation issues and challenges. The Center also has a highly skilled team of acquisition professionals. For nearly 40 years, the Volpe Center has lent critical support to all U.S. DOT's modal administrations and offices, other Federal agencies, state and local governments and organizations, foreign governments and entities, and the private sector.

The Volpe Center is organized into eight Centers of Innovation (COI). Each COI applies its technical capabilities to U.S. DOT strategic goals and national transportation priorities. The COIs expand U.S. DOT's horizon and show how innovation can arise from creative and collaborative use of internal and external assets. The COIs include:

- **Multimodal Systems Research and Analysis**
- **Safety Management Systems**
- **Environmental and Energy Systems**
- **Freight Logistics and Transportation Systems**
- **Physical Infrastructure Systems**
- **Communication, Navigation, Surveillance (CNS) and Traffic Management Systems**
- **Human Factors Research and System Applications**
- **Advanced Vehicle and Information Network Systems**

## For more information

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