# Collaborative Sciences Center for Road Safety

## PROCEEDINGS from “The NC Highway Patrol: A Systems Approach for Data-Informed Enforcement Planning”

## Greg Ferrara and Lt. Robert Reynolds

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Greg Ferrara, the Program Manager for the Geospatial Analytics and Decision Management group at the Institute for Transportation Research and Education (ITRE) at NC State University, and Lt. Robert Reynolds, a North Carolina State Highway Patrol officer involved with its Innovative Technology Deployment Program, share their perspectives and programs for data-informed enforcement for commercial vehicles.

Ferrara starts off the session by sharing videos of distracted driving—tractor trailers causing extreme damage to other vehicles—and discussing risky driver behaviors. Risky driver behaviors, often referred to as human factors, have been shown to be contributing factors in up to 95 percent of vehicle crashes. Human factors can be roughly categorized into four main categories: recognition errors such as distractions and inattention, bad decisions such as speeding or following, performance errors such as poor control, and non-performance errors such as sleeping. Ferrara also acknowledges that there are other contributing factors to crashes, such as roadway conditions and weather.

When it comes to commercial vehicles (e.g., trucks), 89 percent are caused by driver behavior such as performance of illegal maneuvers. Ferrara and Reynolds focus on motor carrier enforcement because although commercial vehicles make up only 3 percent of North Carolina’s crashes, they are 13 times more likely to cause a fatality. Most commercial vehicle crashes, 66 percent, involve a crash into another vehicle.

North Carolina’s Motor Carrier Enforcement Operations (MCE), where Lt. Robert Reynolds works, makes up 16 percent of its state trooper force. MCE’s mission is twofold: 1) to reduce commercial vehicle collisions and fatalities; and 2) to enforce commercial vehicle weight regulations. They accomplish this through inspection, focused outreach, high visibility traffic enforcement, and data analysis. Reynolds works with MCE, where one of his challenges is to effectively use the data coming from partners at the state and federal level to determine when, where, and how to use troopers to reduce crashes.

Ferrarra works with MCE on a new online tool based in Tableau called COVERLAB: Commercial Vehicle Enforcement Resource Lab, that provides operational planning support to programs like MCE so that they can be data-informed efforts. COVERLAB provides answers to the “who, what, when, where, why, and how” of enforcement and crash data, as well as goal-tracking dashboards with breakdowns of troops’ and individuals’ goals, and a better visual understanding of data relationships. Its main audience is middle managers, field supervisors, first sergeants, and administrators at the state level. COVERLAB has two main datasets: inspections and crashes.

*Crash Dashboard*. COVERLAB has been able to geo-locate 98 percent of commercial crashes since 2001. The crash dashboard displays when crashes are occurring, on which roads and types of roads, the known causes of crashes, and who is involved in these crashes (e.g., the top carriers and a link to their Federal Motor Carrier Safety Association profile). The data is simplified in some cases, as with the assumptions made for the commercial vehicle vs. non-commercial vehicle crashes. The overwhelming number of crashes have “no contributing circumstance” for their cause. There are also challenges for data sparsity, for example, a particular troop in North Carolina may only have 8 fatal crashes, which makes it difficult to filter the results or draw any significant conclusions.

*Inspection Dashboard*. COVERLAB’s enforcement dashboard includes inspections, traffic enforcement, and citations. It also measures the out of service rate (after an inspection, what percentage of vehicles are dangerous enough to warrant taking off of the road immediately). COVERLAB’s most innovative feature for enforcement is its attempt to measure the crashes prevented. This is based on FMCSA’s Roadside Intervention Effectiveness Model (REIM), which translates estimates into a static number, crashes prevented per 1000 inspections, so that the enforcement being done can be roughly translated into a tangible “good” and then optimized to prevent even more crashes.

Ferrara and Reynolds see this commercial vehicle work as being integral to North Carolina’s Vision Zero program. They have added metrics to the safety dashboard of the [North Carolina Vision Zero website](https://ncvisionzero.org/) and are encouraged that Robeson County and Durham City are officially identified as vision zero communities.

**Resources**

[COVERLAB](http://coverlab.org/)