

UTC Best Practices: Cleveland State Universities

Stephen F Duffy PhD, PE, FASCE

University Transportation Center Directors Summer Meeting

Amherst, MA

June 30, 2009

s.duffy@csuohio.edu

216-687-3874





Discussion Points

- How does our Transportation Center relate to Secretary LaHood's themes of safety, livability, sustainability and economy and infrastructure investment
- What we are doing (or have done)?
- Unusual Partnerships
- Why the UTC Grant is important
- Risks that we have taken
- How we define "success"



Secretary LaHood's Theme: Safety

Work Zone Safety Facts

- More than 41,000 people were injured in 2003 as a result of motor vehicle crashes in work zones. This has grown from 36,000 in 1996, an increase of 14 percent.
- In 2007, 835 fatalities resulted from motor vehicle crashes in work zones. This is a 17 percent decrease from 2006 (1,004 fatalities) and a 22 percent decrease from 2005 (1,074 fatalities).
- In 2007 there were 105 fatal occupational injuries at road construction sites. This is a 24 percent decrease from 2006 (139 fatal occupational injuries) and a 36 percent decrease from 2005 (165 fatal occupational injuries).
- Regionally, 5848 crashes occurred in Ohio work zones during 2007. Of those crashes, 1405 resulted in injuries and 13 resulted in fatalities



What are we doing?

- Safety Research Methods
 - Naturalistic driving studies
 - Driving simulator studies

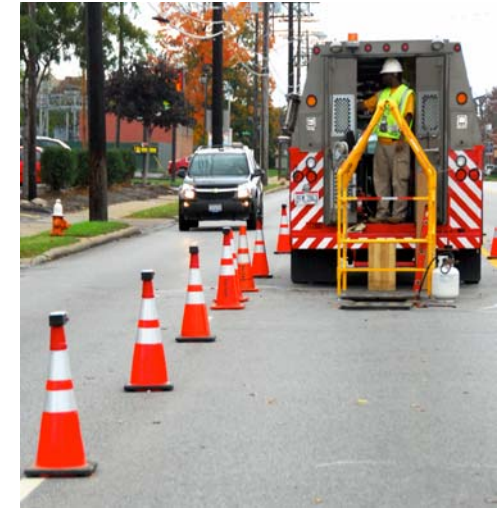




What are we doing?

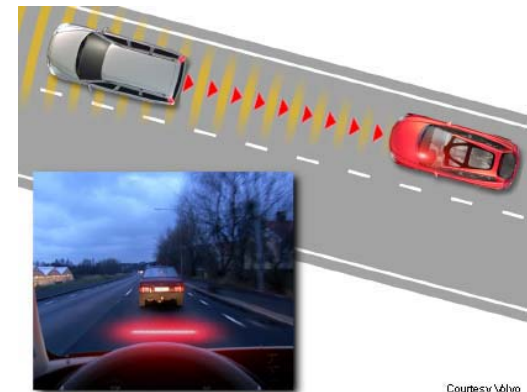
Human Factors Research

- “Smart” Work Zone Technologies
 - Coherent sensor arrays
 - Interactive internet information systems
 - Collision detection alarms



- Human Factors Focus Areas:

- Driver inattention
- Driver decision errors
- Driver perception to signage, e.g., retro-reflectivity



Courtesy Volvo



What are we doing?

Using Driving Simulators

- Advantages of Driving Simulators
 - Designed experiments can show cause/effect relationships
 - Can obtain data on near-crashes and pre-crash behaviors
 - Can induce distractions, secondary tasks, etc. to see effects at no risk to driver
 - Cost
 - Others...
- Disadvantages of Driving Simulators
 - Fidelity
 - Validity
 - Small sample size



CSU Driving Simulator

- High-speed vehicle dynamics
- Extensive library of roads, intersections, vehicles and traffic patterns.
- Geometrically correct roadways and traffic control devices
- Roadways modeled to highway design standards.
- Ability to simulate 256 totally autonomous interactive ambient vehicles in the simulated environment.





CSU Driving Simulator

- 45 standard performance measures
- 25 customizable performance measures
- Potential to integrate eye trackers, physiological measurement devices, and external input/coding systems





Unusual Partnerships

- Coalition of companies from the heavy highway construction industry in Northeast Ohio pushed for the creation of the Center at CSU that focused narrowly on work zone safety.
- As soon as the SAFETEA-LU legislation passed the president (business manager) of the local Laborers Union contacted the Civil Engineering Department. As a result our Center is one of two nationally that have Labor representatives on our Advisory Board.
- In our first year of operation the Ohio Laborers-Employers Cooperative Education Trust (LECET) fund made \$100,000 donation in support of the Driving Simulation Lab.
- Research collaboration with other Ohio universities.



Why the UTC Program is Important

- Heavy highway construction is the third largest industry in Ohio. Safety is a paramount concern of this industry.
- The three UTCs in Northeast Ohio (CSU, Youngstown State University, the University of Akron) have impacted civil engineering education and left the region with much stronger transportation engineering programs.
 - Allowed us to invest in undergraduate scholarships
 - Allowed us to increase the number of graduate assistantships
- Has allowed the engineering program to impact K-12 STEM education. Until the region's Centers became operational for Ohio there was no "E" in STEM.



Risks We Have Taken

- Investment in driving simulation lab.
 - Large capital investment.
 - Equal emphasis must be placed on retaining and/or investing in human capital.
- Investing in K-12 outreach program.
 - Not just a student recruitment effort
 - Must invest the K-12 teachers in the effort, especially middle school teachers
 - Interact closely with regional STEM organizations (OSLN), STEM schools, and STEM initiatives.
- Developing research efforts applicable to short duration work zones.
 - Actively collaborating with Ohio University on this topic



How We Define “Success”

- Increase undergraduate enrollment in the civil engineering program.
- Increase graduate enrollment in the transportation engineering program.
- Increase number of transportation engineering faculty.
- Increase research funding and research output.
- Developing research that has commercial applicability.
- Establishing a sustainable dialogue between engineering faculty and K-12 teachers.