Collaborative Sciences Center for ROAD SAFETY

RESEARCH BRIEF

Developing a Framework to Combine the Different Protective Features of a Safe System

To deliver a safe system, it is necessary to effectively harness all the core protective opportunities provided by the system. This study explores what means are currently available to evaluate the cumulative ability of the system to protect street users.

This research identifies kinetic energy as the appropriate "common denominator" since it captures the overall protective characteristics of the system. When observing values of kinetic energy in the transportation system it is apparent that it is not only the magnitude of the kinetic energy that matters. For example, the amount of kinetic energy carried by an airplane is very high but that does not immediately translate to a higher risk. In other words, bigger kinetic energy does not always translate to a bigger problem.

Building on kinetic energy as the focal variable, the research team developed an aggregate approach that acknowledges that kinetic energy is a crucial attribute of the system on both ends of the equation. On the one hand, the amount of kinetic energy carried by the subject mode determines the potential magnitude of the problem, and on the other hand the capability of the system to control or contain that kinetic energy determines the system's ability to respond.

To provide a holistic coverage of the Safe System approach, the ordinal protective layers were identified for any safety-critical system. This includes the design of public space which considers the changes to the built environment that would make the public space safer.

Transportation	Purpose	Examples
street design	Changes to the built environment that would make the public space safer.	**Shoulder lane**
street operations	Guidelines that dictate how we move through space safely.	**Speed limits**
street-user behavior	Individual actions to maintain safe environment around each of us.	**BAC limits**
street-user warning	Provide a warning about the level of risk.	**Lane departure warning**
street-user protection	elements that can protect you or others from a hazard given exposure.	**Airbags**
emergency medical services	Reduce symptoms and reduce the probability of death given impact.	**EMS**

Ordinal Safety Considerations - Examples

It includes public space operations which are guidelines that dictate how we move through space safely; individual actions to maintain a safe environment around each user; an early warning which can inform about the level of risk; and personal protection elements that can protect you or others from a hazard given exposure. It also includes medical treatment to reduce symptoms and reduce the probability of death given impact.

The report concludes that with every safety action taken by an agency, it is important to determine whether it's decreasing kinetic energy of a typical trip or increasing the capability of the system to protect from kinetic energy.

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This project was supported by the Collaborative Sciences Center for Road Safety, www.roadsafety.unc.edu, a U.S. Department of Transportation National University Transportation Center promoting safety.