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The Safe Systems Pyramid

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Why the Safe Systems Pyramid?

Transportation safety is a public health issue of increasing importance as rates of traffic fatalities and serious injuries continue to rise. The Safe Systems Pyramid is a tool that incorporates public health principles to evaluate transportation safety policies and interventions. The Safe Systems Pyramid can help transportation practitioners and decision-makers prioritize projects for safety and communicate priorities to the public.

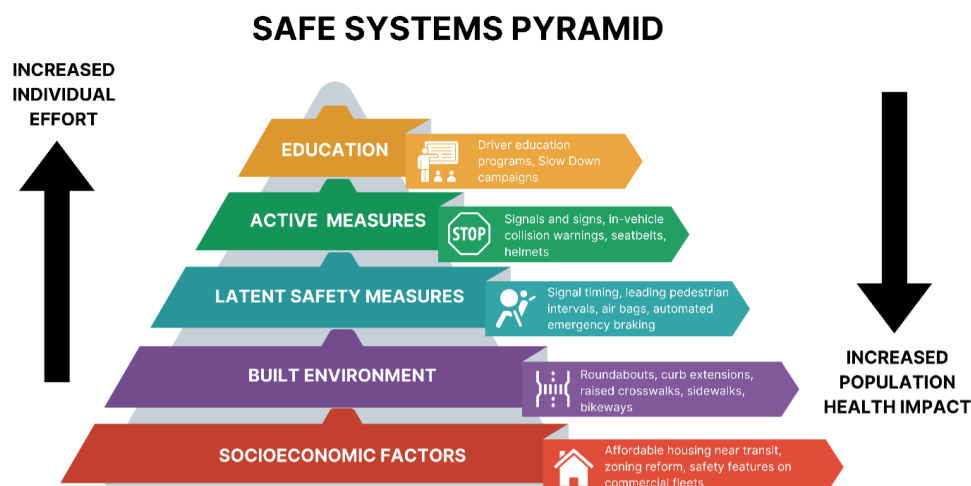
For decades, the traditional “Es” framework of transportation safety has implied equal weight between engineering, enforcement, and education interventions. Because these interventions are not equally effective, the Es paradigm neglects public health principles, which prioritize population-level interventions that require less individual effort and focus on the pathologic agent—in this case, the transfer of kinetic energy. The Safe Systems Pyramid combines two models for these principles: the Health Impact Pyramid prioritizes interventions that have increasing population health impact

and decreasing individual effort; and the Hierarchy of Controls, used in occupational safety, organizes strategies by effectiveness.

Safe Systems Pyramid Tiers

In the five-tiered Safe Systems Pyramid, lower tiers are more effective. For example, education can theoretically reach a large population, but it is not universally accessible and, to be effective, requires individuals to understand and apply the concepts they learn correctly. In contrast, applied built environment measures affect any person traveling in that environment.

Educational interventions include campaigns and programs that encourage safer behaviors by all road users (i.e., Slow Down campaigns, driver education, public service announcements, and programs to encourage walking and cycling). Educational interventions tend to be less expensive and easier to implement than measures in the other tiers. They can be effective when combined with efforts from other tiers in the pyramid.



Active Measures can be effective but act at the individual level and require individual effort.

Active measures include seatbelts, motorcycle and bicycle helmets, and traffic signals, posted speed limits, sharrows, and conventional bike lanes that require individuals to take specific action.

Latent Safety Measures decrease risk without requiring human intervention. These include in-vehicle technology like airbags and automated emergency braking, signal timing to reduce vehicle speeds, leading pedestrian intervals, and automated enforcement (via cameras).

Built Environment measures are engineering improvements or countermeasures that separate users, reduce speed, and reduce conflict points. They include sidewalks that separate pedestrians from vehicles, protected bike lanes, curb extensions that reduce vehicle speeds and reduce pedestrian crossing distances and exposure to vehicles, and roundabouts. Built Environment interventions concretely set the behavioral expectations for all road users.

Socioeconomic Factors are the base of the pyramid. This tier includes policies, projects, and programs that address socioeconomic factors and systemic inequities, as they set the context for transportation safety. These could include aligning transportation efforts with zoning and land use policies to locate affordable housing near transit, collaborating across government departments to share data and bridge organizational divides, and implementing policies such as those that reduce nighttime driving.

Applying the Safe Systems Pyramid to Funding Decisions

A state, region, or community’s transportation priorities are often expressed by choosing which projects and programs receive funding. Because dollars are scarce, funding decisions have a great impact on what projects and programs are put

in place. Integrating the Safe Systems Pyramid into funding decisions can be done primarily in two ways: including related questions in project applications and prioritizing projects.

Recommendation #1: Include application questions related to where the proposed interventions fall in the Safe Systems Pyramid and how the project addresses the tiers with greater population health impact. As part of an application, each funding agency usually asks questions to evaluate projects against their state and regional objectives. Many agencies ask vague questions regarding health benefits or impacts. Asking applicants to specifically identify which Safe Systems Pyramid tiers their proposed project falls within helps both sides (applicant and funder) understand the population impacts of a project.

Recommendation #2: Use the Safe System Pyramid in the scoring criteria or rubric to prioritize strategies in the pyramid’s tiers with greater population health impact. Scoring proposed projects can be subjective, leaving it up to the reviewers to judge the anticipated effectiveness of the proposed interventions. If a scoring rubric is used to evaluate applications, a higher number of points could be given to proposed interventions in the tiers closer to the base of the pyramid.

More Information

This policy brief is drawn from “The Safe Systems Pyramid: A new framework for traffic safety,” authored by David J. Ederer (Georgia Institute of Technology), Rachael Panik (Georgia Institute of Technology), Nisha Botchwey (University of Minnesota), and Kari Watkins (University of California, Davis). The full paper can be found at <https://doi.org/10.1016/j.trip.2023.100905>.

For more information about the findings presented in this brief, contact Kari Watkins at kewatkins@ucdavis.edu.

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